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GO Rail Network Electrification
Transit Project Assessment Process
Environmental Project Report

October, 2017

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This Revised Final Environmental Project Report – Volume 3 has been updated to reflect the specific additions/revisions outlined in the Errata to the Environmental Project Report, dated November, 2017. As such, it supersedes the previous Final version dated October, 2017.

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- **Appendix L - Consultation Record:** summarizes the consultation activities carried out by Metrolinx and Hydro One as part of the GO Rail Network Electrification TPAP including the various consultation events held, feedback/comments received from review agencies, Aboriginal

Communities, and other stakeholders including members of the public, and how those comments were considered as part of the TPAP.

- **Appendix M – Cultural Heritage Evaluation Reports (CHERs), Heritage Impact Assessment Reports (HIAs) and Statements of Cultural Heritage Value (SCHVs):** includes copies of the CHERs, HIAs, and SCHVs carried out for various heritage properties as part of the GO Rail Network Electrification TPAP.
- **Appendix N - Conceptual electrification corridor plans**. Conceptual electrification corridor plans were developed to illustrate the Overhead Contact System (OCS) Impact Zone and Vegetation/Tree Removal Zone along each of the corridors to be electrified.
- **Appendix O - Conceptual Traction Power Facility Plans.** Conceptual Traction Power Facility Plans were developed to illustrate the Traction Power Facility sites and 25kV Feeder Routes.
- **Appendix P – P1: Mapping of Ecological Land Classification Areas and P2: Mapping of Terrestrial and Aquatic Features** along each rail corridor within the GO Rail Network Electrification Study Area have been included for reference.
- **Appendix Q - Mapping of Identified Cultural Heritage Resources**. Mapping of Potentially Affected Cultural Heritage Resources along each rail corridor with the GO Rail Network Electrification Study Area have been included for reference.
- **Appendix R - Mapping of Land Use Designations.** Mapping of Land Use designations along each rail corridor within the GO Rail Network Electrification Study Area have been included for reference.
- **Appendix S** - **Mapping of Noise/Vibration Receptors and Recommended Locations for Noise/Vibration Mitigation.** Mapping of Noise and Vibration Receptors that were examined in the Noise and Vibration modelling study, as well as areas where noise and vibration mitigation locations were identified along each rail corridor within the GO Rail Network Electrification Study Area have been included reference.
- **Appendix T - Mapping of Viewsheds and Potential Visual Impact Areas.** Mapping of viewsheds and potential visual impact areas along each rail corridor within the GO Rail Network Electrification Study Area have been included for reference.
- **Appendix U – List of Technical Reports and Studies Reviewed.** Contains a list of the various technical reports/studies that were reviewed as part of carrying out the TPAP.
- **Appendix V – Groundwater Assessment Report.** Summarizes the results of carrying out the preliminary groundwater assessment, including potential groundwater effects and effects on wells.

Glossary of Terms

Term	Definition
230 kV Aerial Connection	Overhead electrical high voltage connection line from the existing Hydro One tap to the new traction power substation (TPS).
AAQC	The acronym for the Province of Ontario's Ambient Air Quality Criteria.
AC	Alternating Current. Alternating Current is an electric current in which the flow of electric charge periodically reverses direction, whereas in direct current (DC, also dc), the flow of electric charge is only in one direction.
AFP	Alternative Financing and Procurement. An AFP model brings together private and public sector expertise in a unique structure that transfers the risk of project cost increases and scheduling delays typically associated with traditional project delivery.
AG	Agriculture as defined by the Ecological Land Classification System.
ANSI	Area of Natural and Scientific Interest.
APTA	APTA stands for American Public Transportation Association.
Area of Potential Environmental Concern (APEC)	An area within the Study Area where one or more contaminants are potentially present, as determined through the Contamination Overview Study including identification of past or present land uses of concern and/or identification of a Potentially Contaminating Activity (PCA).
AREMA	American Railway Engineering and Maintenance-of-Way Association. AREMA is the organization that represents the engineering function of the North American railroads.
Autotransformer	Apparatus which helps boost the overhead contact system (OCS) voltage and reduce the running rail return current in the 2 X 25 kV autotransformer feed configuration. It is a single winding transformer having three terminals. The intermediate terminal located at the midpoint of the winding is connected to the rail and the static wires, and the other two terminals are connected to the catenary and the negative feeder wires, respectively.
Bare wires	Conductive wires which do not have insulation. These wires may be solid or stranded and are normally self-supporting.
Best Practices	Professional procedures that are accepted or prescribed as being correct or most effective.
Bonding	A low impedance path obtained by permanently joining all normally-non-current carrying conductive parts to ensure electrical continuity and having the capacity to conduct safely any current likely to be imposed on it.
CA	Acronym for Conservation Authority.
CAAQS	Canadian Ambient Air Quality Standards.
Cantilever	A beam that is supported by a pole at only one end and carries the load of the electrification equipment on top of tracks. At multiple track locations where cantilever frames are not practical, portal structures should be utilized.
Catenary System	An assembly of overhead wires consisting of, as a minimum, a messenger wire, carrying vertical hangers that support a solid contact wire which is the contact interface with operating electric train pantographs, and which supplies power from a central power source to an electrically-powered vehicle, such as a train.
CEAA	Canadian Environmental Assessment Act.
CGL	Green Lands as defined by the Ecological Land Classification System.

Term	Definition
Ch	The contraction of Chainage, measurement in kilometres along the rail corridors, starting at the center of Union Station and radiating outwards along the corridors.
Circuit	A conductor or system of conductors which form an electrical section between two switching points.
Class EA	Under the Ontario Environmental Assessment Act (EA Act), Class Environmental Assessments are those projects that are approved subject to compliance with an approved class environmental assessment process (e.g., Class EA for Minor Transmission Facilities, GO Transit Class EA, etc.) with respect to a class of undertakings.
CLOCA	Central Lake Ontario Conservation Authority.
Combustion	The chemical process where a substance reacts with oxygen to release energy.
Combustion Emissions	The emissions released from the combustion of fossil fuels. These include carbon dioxide (CO_2), carbon monoxide (CO), oxides of nitrogen (NOx), particulate matter, and volatile organic compounds (VOCs).
Conceptual Design	The conceptual design phase of a project is defined as the first Detailed Design phase. This stage includes creating ideas and taking into account the pros and cons of those ideas. This is done to minimize project risks and evaluate the overall potential success of the project.
Conditional Heritage Property	A property, including buildings and structures on the property, that is determined to potentially have cultural heritage value or interest and that is not owned by Metrolinx.
Contact Wire	A solid grooved, bare aerial, overhead electrical conductor of an overhead contact system (OCS) that is suspended above the rail vehicles and which supplies the electrically powered vehicles with electrical energy through roof-mounted current collection equipment - pantographs - and with which the current collectors make direct electrical contact.
Control Centre	The building or room location that is used to dispatch trains and control the train and maintenance operations over a designated section of track.
Control Point	An established coordinate location for a physical feature. Control points are used as the basis for improving the spatial accuracy of all other points to which they are connected and for generating other points within an established distance or area around the control point.
COS	Contamination Overview Study.
COSEWIC	Committee on the Status of Endangered Wildlife in Canada.
COTS	Commercial Off-the-Shelf.
Cross Bonds	The method of tying tracks together electrically to equalize traction return currents between tracks. This is done to minimize touch potential.
Cross Feeding System	Overhead feeder lines are provided between the main gantry and strain gantry across the electrified track to feed power to the overhead contact system (OCS) wires.
Cultural Heritage Evaluation Report (CHER)	A report prepared by, or with advice from a qualified heritage professional, who gathered and recorded, through research, site visits and public engagement, enough information about the property to sufficiently understand and substantiate its cultural heritage value.
Cultural Heritage Resource (CHR)	Includes archaeological resources, built heritage resources and cultural heritage landscapes.

Term	Definition
Cultural Heritage Screening Report (CHSR)	A report prepared with advice by a qualified person who gathered and recorded, through research, site visits and public engagement enough information about the study area to identify those properties that have potential or known cultural heritage value.
Cultural Heritage Value or Interest	Cultural heritage value or interest: means the cultural heritage value or interest of a property determined in accordance with the "Criteria for Determining Cultural heritage value or interest" set out in Ontario Regulation 9/06 made under the Ontario Heritage Act or, in respect of properties of provincial significance, determined in accordance with the "Criteria for Determining Cultural Heritage Value of Provincial Significance" set out in Ontario Regulation 10/06 made under the Ontario Heritage Act and, for archaeological resources, means the cultural heritage value or interest of any archaeological resource as determined in accordance with the Standards and Guidelines for Consultant Archaeologists prepared and published by MTCS under the Ontario Heritage Act.
CUM	Cultural Meadow as defined by the Ecological Land Classification System.
CUW	Cultural Woodland as defined by the Ecological Land Classification System.
CV	Constructed Lands as defined by the Ecological Land Classification System.
CVC	Commercial and Institutional Lands as defined by the Ecological Land Classification System.
CVC Authority	Credit Valley Conservation Authority.
CVI	Transportation and Utilities as defined by the Ecological Land Classification System.
CVR	Residential Lands as defined by the Ecological Land Classification System.
Data Gap Analysis	An analysis conducted on previously available studies and research to see what information is missing in order to determine what requires further study.
dB/dBAa	A-weighted decibels, abbreviated dBA, or dBa, or dB(a), are an expression of the relative loudness of sounds in air as perceived by the human ear. In the A-weighted system, the decibel values of sounds at low frequencies are reduced, compared with unweighted decibels, in which no correction is made for audio frequency.
Deadhead Movements	Deadhead movements are considered to be empty train movements required to reposition a train before or after revenue service. (Revenue service entails train movements that carry fare paying passengers). Deadhead movements are also referred to as "unproductive moves" as they incur the costs of train operations, but are not offset by any revenue from passengers.
Detailed Design	The Detailed Design phase of a project is defined as the phase of the project where design is refined past the conceptual phase, when plans, specifications, and estimates are created. This will take place after the TPAP is completed and before the construction phase.
DFO	Department of Fisheries and Oceans.
Disconnect Switches	An electrical switch for disconnecting electrical power from a line section.
Distribution Line (DL)	Electrical line conveying electricity at voltages less than 50kV.
DMU	Diesel Multiple Unit; a train comprising single self -propelled diesel units.
Double Stacked Freight (DSF)	Freight trains carrying double stack containers.
Duct Bank	A duct bank is an assembly of electrical conduits that are either directly buried or encased in concrete. The purpose of the duct bank and associated conduit is to

Term	Definition
	protect and provide defined routing of electrical cables and wiring. It also provides physical separation and isolation for the various types of cables.
ELC	Ecological Land Classification. The system in place in Ontario for defining ecological units on the basis of bedrock, climate, physiology, and vegetation.
Electric Traction Facility	A traction substation, paralleling station, or switching station.
Electrical Potential	A measurement of the voltage (or potential difference) between two points in a system. For UP Express electrification, electrical potential is the electrical charge difference between the electrified UP Express railway and the ground. The unit for electrical potential is expressed in volts.
Electrical Section	This is the entire section of the overhead contact system (OCS) which, during normal system operation, is powered from a traction power substation (TPS) circuit breaker. The TPS feed section is demarcated by the phase breaks of the supplying TPS and by the phase breaks at the nearest SWS or line end. An electrical section may be subdivided into smaller elementary electrical sections.
Elementary Electrical Section	The smallest section of the overhead contact system (OCS) power distribution system that can be isolated from other sections or feeders of the system by means of disconnect switches and/or circuit breakers.
ELF	Extremely Low Frequency. ELF is the International Telecommunication Union (ITU) designation for electromagnetic radiation (radio waves) with frequencies from 3 to 30 Hz, and corresponding wavelengths from 100,000 to 10,000 kilometers.
EMC	Electromagnetic Compatibility. Electromagnetic compatibility is the ability of a device, equipment, or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.
EMF	Electric and Magnetic Field. Electric and magnetic fields arise from natural forces and permeate our environment. In addition to natural background EMF, anthropogenic sources include electric fields which arise anywhere electricity or electrical components are used and magnetic fields which arise wherever there is a flow of electric current. Common manmade sources of EMF include: electronics, power stations, transmission lines, telecommunication infrastructure, electric motors, etc. The strength of man-made EMF depends on the characteristics of the source including amongst others, voltage, current strength and frequency.
EMI	Electromagnetic Interference. Electromagnetic interference is a disturbance that affects an electrical circuit due to either electromagnetic induction or radiation from an external source.
EMI Noise	Unwanted electrical signals that produce undesirable effects in the circuits of the control system in which they occur.
EMU	Electric Multiple Unit; a train comprising single self-propelled electric units.
END	Endangered, a designation for a Species at Risk.
EPR	Environmental Project Report. The proponent is required to prepare an Environmental Project Report to document the Transit Project Assessment Process followed, including but not limited to: a description of the preferred transit project, a map of the project, a description of existing environmental conditions, an assessment of potential impacts, description of proposed mitigation measures, etc. The EPR is made available for public review and comment for a period of 30 calendar days. This is followed by a 35-day Minister's Decision Period.

Term	Definition
ESA	Environmentally Significant Area. These are natural areas which are particularly significant or sensitive requiring additional protection to preserve their environmental qualities and significance.
ESA, 2007	The *Ontario Endangered Species Act, 2007*.
ESAs	Environmental Site Assessments. The study of a property to determine if contaminants are present and, if so, the location and concentration of these contaminants. This study includes a phase one Environmental Site Assessment and where required a phase two Environmental Site Assessment.
Feeder	A current-carrying electrical connection between the overhead contact system and a traction power facility (substation, paralleling station or switching station).
Flash Plate	A flash plate is a conductive plate installed above a bare energized wire and below reinforced concrete. The intent is to prevent 'flash over' which is where current finds its way into the reinforcing steel. Usually this is via water dripping, ice, or animals making the bridge between wire and concrete. The plate is bonded to the static wire.
FOD	Deciduous Forest as defined by the Ecological Land Classification System.
FOM	Mixed Forest as defined by the Ecological Land Classification System.
Fossil Fuels	A group of combustible materials that have been formed from decayed plants and animals. These materials are often used as fuel by combusting them to release energy. Fossil fuels include oil, coal, and natural gas.
FTA	FTA stands for Federal Transit Administration, a United States federal agency.
FWCA	Fish and Wildlife Conservation Act.
Gantry	The feeder wires from the traction power substation (TPS) will be connected to the overhead contact system (OCS) with the help of gantries. The main gantry (also referred to as the catenary feeding gantry) is the one parallel to the track and closest to the TPF. Gantries are also used for traction power distribution. The feeder wires from the facility will be connected to the OCS with the help of gantries.
GIS	Geographic Information Systems. GIS systems are designed to capture, store, visualize, manipulate, analyze, manage, and present spatial or geographical data.
Greenhouse Gases	Greenhouse gases are those gases that absorb infrared radiation emitted from the Earth thus containing the energy within the atmosphere. Total greenhouse gases are typically expressed as carbon dioxide equivalent (CO_2e), which is the total mass of CO_2 that would have the same impact on climate change as a mixture of greenhouse gases.
Grounding	Connecting to earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to limit the build-up of voltages to levels below that which may result in undue hazard to persons or to connected equipment.
Grounding Grid	A system of horizontal ground electrodes that consists of a number of interconnected, bare conductors buried in the earth, providing a common ground for electrical devices or metallic structures, usually in one specific location.
GTR	Grand Trunk Railway
Heavy Maintenance	Heavy maintenance includes: replacement of engine traction motors, replacement of diesel engines on DMUs, replacement of transformers and ac propulsion systems on EMUs and replacement of wheel sets on engines. On railcars, heavy maintenance

Term	Definition
	includes the replacement of wheel sets, repairs to windows and brake lines, and body repairs.
HiRail Vehicle	A road-rail vehicle which can operate both on rail tracks and a conventional road.
HRCA	Halton Region Conservation Authority.
HV	High Voltages, high voltages refers to electrical energy at voltages high enough to cause injury and harm to human beings and living species. Voltages over 1000 for alternating current, and 1500 V for direct current is considered high voltage.
Hydro One	Hydro One Incorporated delivers electricity across the province of Ontario. Hydro One has four subsidiaries, the largest being Hydro One Networks. They operate 97% of the high voltage transmission grid throughout Ontario.
ICNIRP	International Commission on Non-Ionizing Radiation Protection. The ICNIRP is an international commission specialized in non-ionizing radiation protection. ICNIRP is an independent nonprofit scientific organization chartered in Germany. It was founded in 1992 by the International Radiation Protection Association (IRPA) to which it maintains close relations.
Immunity	The ability of equipment to perform as intended without degradation in the presence of an electromagnetic disturbance.
Impedance Bonds	An electrical device located between the rails consisting of a coil with a centre tap used to bridge insulated rail joints in order to prevent track circuit energy from bridging the insulated joint, while allowing the traction return current to bypass the insulated joint. The centre tap can also be used to provide a connection from the rails to the static wire and/or traction power facilities for the traction return current.
Insulated Wires	Conductive wires which are covered in a layer of insulating material to provide protection that will increase safety and efficiency, and is used to stop the passage of electricity, heat, or sound from one conductor to another. These wires are normally supported on a weight-carrying messenger wire.
IPCC	The Intergovernmental Panel on Climate Change.
kV	Abbreviation for kilovolt (equal to 1000 volts).
LIO	Land Information Ontario.
LSRCA	Lake Simcoe Region Conservation Authority.
LV	Low Voltage, according to the International Electrotechnical Commission (IEC) voltages between 50-1000 V for alternating current, and between 120-1500 V for direct current is considered low voltage.
MA	Marsh as defined by the Ecological Land Classification System.
Main Gantry	These 25 kV feeders from the traction power facility (TPF) will be connected to the overhead contact system (OCS) with the help of main and strain gantries and a cross feeder arrangement. The main gantry also referred to as the catenary feeding gantry is the one parallel to and toward the TPF side of the track.
Maintenance Facility	A mechanical facility for the maintenance, repair, and inspection of engines and railcars.
MAM	Meadow Marsh as defined by the Ecological Land Classification System.
MAS	Shallow Marsh as defined by the Ecological Land Classification System.
MBCA	TMigratory Birds Convention Act.
MEM	Mixed Meadow as defined by the Ecological Land Classification System.
Messenger Wire	In catenary construction, the overhead contact system (OCS) Messenger Wire is a longitudinal bare stranded conductor that physically supports the contact wire or

Term	Definition
	wires either directly or indirectly by means of hangers or hanger clips and is electrically common with the contact wire(s).
Mi.	The contraction of Mileage, measurement in miles along the rail corridors. This is determined by historical corridor ownership and is not consistent throughout the network.
Mid-span	Area between two overhead contact system (OCS) registration points.
Milligauss	In electricity, a practical unit of magnetic induction equal to a thousandth of one gauss or of one c. g. s. electromagnetic unit.
Minister	Ontario Minister of the Environment and Climate Change.
Mitigation Measure	Actions that remove or alleviate, to some degree, the negative effects associated with the implementation of an alternative.
MNRF	Ontario Ministry of Natural Resources and Forestry.
Modelling	The process of using collected data and information to generate rational predictions regarding the future implementation of project components.
MOECC	Ontario Ministry of the Environment and Climate Change.
MTCS	Ontario Ministry of Tourism, Culture and Sport is responsible for the administration of the Ontario Heritage Act and may determine policies, priorities and programs for the conservation, protection and preservation of Ontario's heritage.
MTO	Ontario Ministry of Transportation.
MVA	Megavolt-Ampere. This is a unit for measuring the apparent power in an electrical circuit equivalent of one million watts.
NAPS	National Air Pollution Surveillance program.
Negative Feeder	Negative feeder is an overhead conductor supported on the same structure as the catenary conductors, which is at a voltage of 25 kV with respect to ground but 1800 out-of-phase with respect to the voltage on the catenary. Therefore, the voltage between the catenary conductors and the negative feeder is 50 kV nominal. The negative feeder connects successive feeding points, and is connected to one terminal of an autotransformer in the traction power facilities (TPF) via a circuit breaker or disconnect switch. At these facilities, the other terminal of the autotransformer is connected to a catenary section or sections via circuit breakers or disconnects.
NEP	Niagara Escarpment Plan areas, part of the Greenbelt Plan.
Net Effect	The effect (positive or negative) associated with an alternative after the application of avoidance/mitigation/compensation/enhancement measures.
NHIC	Natural Heritage Information Centre.
NIEHS	National Institute of Environmental Health Sciences, a division of the United States National Institute of Health (NIH).
Notice of Commencement	The Proponent is required to prepare and distribute a Notice of Commencement, which "starts the clock ticking" for the 120-day portion of the Transit Project Assessment Process. Proponents must prepare and distribute a Notice of Commencement to indicate that the assessment of a transit project is proceeding under the Transit Project Assessment Process. Proponents must complete their documentation (the Environmental Project Report) of the Transit Project Assessment Process within 120 days of distributing the Notice of Commencement.
Notice of Completion	The Notice of Completion must be given within 120 days of the distribution of the Notice of Commencement (not including any "time outs" that might have been

Term	Definition
	taken). The Notice of Completion of Environmental Project Report signals that the Environmental Project Report has been prepared in accordance with section 9 of the regulation and indicates that the Environmental Project Report is available for final review and comment (for 30 calendar days). Following the 30-day public review period, there is a 35-day Minister's decision period.
OA	Open Water as defined by the Ecological Land Classification System.
OAO	Open Aquatic Area
OBBA	Ontario Breeding Bird Atlas.
Ohms	Unit of electrical resistance. A low electrical resistance indicates a strong path which current can easily flow.
Ontario Heritage Act (OHA)	The Ontario Heritage Act provides the framework for provincial and municipal responsibilities and powers in the conservation of cultural heritage resources. See https://www.ontario.ca/laws/statute/90o18
OP	Municipal Official Plan.
Open Route	An area of tracks where there is no vertical conflicts to the overhead contact system (OCS).
ORMCP	Oak Ridges Moraine Conservation Plan.
ORRA	Ontario Reptile and Amphibian Atlas.
Overhead Contact System (OCS)	The acronym for the Overhead Contact Systems (OCS), which is comprised of: • The aerial supply system that delivers 2x25 kV traction power from traction power substations to the pantographs of Metrolinx electric trains, comprising the catenary system messenger and contact wires, hangers, associated supports and structures including poles, portals, head spans and their foundations), manual and/or motor operated disconnect switches, insulators, phase breaks, section insulators, conductor termination and tensioning devices, downguys, and other overhead line hardware and fittings. • Portions of the traction power return system consisting of the negative feeders and aerial static wires, and their associated connections and cabling.
Overhead Contact System (OCS) Impact Zone	The defined zone within which Overhead Contact System (OCS) infrastructure will be built (e.g., OCS foundations, portal/cantilever poles, etc.).
Overhead Structure	A structure that allows a road to cross over a railway underneath.
Overpass	A structure that allows a railway to cross over a road or watercourse underneath.
OWES	Ontario Wetland Evaluation System.
Pantograph	Device on the top of a train that slides along the contact wire to transmit electric power from the catenary to the train.
Paralleling Station (PS)	This type of traction power facility contains an autotransformer which helps support the overhead contact system (OCS) voltage in the electrified system.
Particulate Matter (PM)	Microscopic solid or liquid matter suspended in the atmosphere.
Performance Standards	General specifications and criteria that define the parameters and requirements of a particular system.
Phase Break	An arrangement of insulators and grounded or non-energized wires or insulated overlaps, forming a neutral section, which is located between two sections of overhead contact system (OCS) that are fed from different phases or at different

Term	Definition
	frequencies or voltages, under which a pantograph may pass without shorting or bridging the phases, frequencies, or voltages.
Phase Break	An arrangement of insulators and grounded or non-energized wires or insulated overlaps, forming a neutral section, which is located between two sections of overhead contact system (OCS) that are fed from different phases or at different frequencies or voltages, under which a pantograph may pass without shorting or bridging the phases, frequencies, or voltages.
Pipeline	A line that is used or to be used for the transmission of oil, gas or any other commodity and that connects a province with any other province or provinces or extends beyond the limits of a province or the offshore area and includes all branches, extensions, tanks, reservoirs, storage facilities, pumps, racks, compressors, loading facilities, interstation systems of communication by telephone, telegraph or radio and real and personal property, or immovable and movable, and works connected to them, but does not include a sewer or water pipeline that is used or proposed to be used solely for municipal purposes.
Polycyclic Aromatic Hydrocarbons (PAH)	A group of compounds that contain only carbon and hydrogen and are composed of multiple aromatic rings. They are released from the burning of fuels.
Portal	Portal is an overhead contact system (OCS) structure that spans over the tracks between two OCS support poles located on the sides of the tracks in order to support the electrification equipment. The portal structure is used at multiple track locations where cantilever frames are not practical.
Portal Boom	Top steel section or truss/lattice at the top of the portal structure, supported by two columns placed either side of the railway. The “portal boom” provides support points for the overhead contact system (OCS) conductors.
Positive Train Control	A signaling system using on board and wayside equipment to automatically reduce the speed, or stop a train depending on the conditions on the track ahead.
Potential Effect	A possible or probable effect of implementing a particular alternative.
Potential Provincial Heritage Property (PPHP)	A property which has the potential to fulfill the requirements of a Provincial Heritage Property.
Potentially Contaminating Activity (PCA)	Use or activity at a site that has the potential to result in soil and/or groundwater contamination. Examples of PCAs are set out in Table 2, Schedule D of *O.Reg. 153/04.*
Preliminary Design	The design of a proposed project (including a detailed cost estimate) to a level that demonstrates that the project is buildable within the given parameters of the design scope.
Preventive Maintenance	Preventive maintenance includes items such as: replacing brake pads, measuring wheels, inspection of running gear, inspection and repair of central air conditioning, check radios and repair/replace, repair broken windows and doors, etc.
Proponent	A person who carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.
Provincial Heritage Property of Provincial Significance (PHPPS)	A provincial heritage property that has been evaluated using the criteria found in Ontario Heritage Act O. Reg. 10/06 and has been found to have cultural heritage value or interest of provincial significance.
Provincial Heritage Property (PHP)	A real property, including buildings and structures on the property, that has cultural heritage value or interest and that is owned by the Crown in right of Ontario or by a prescribed public body; or that is occupied by a ministry or a prescribed public body

Term	Definition
	if the terms of the occupancy agreement are such that the ministry or public body is entitled to make the alterations to the property that may be required under these heritage standards and guidelines. (Standard and Guidelines for Conservation of Provincial Heritage Properties, OHA)
Provincially Significant Wetland (PSW)	Wetlands deemed by the province to be ecologically significant in nature and thus protected from all development activities.
Rail Potential	The voltage between running rails and ground occurring under operating conditions when the running rails are utilized for carrying the traction return current or under fault conditions.
Receptor	Locations, structures, or facilities that have the potential to be impacted by or interact with the project.
RER	Acronym for Regional Express Rail. RER is the 10 year transit plan for the Greater Toronto Hamilton Area that is being implemented by Metrolinx. Electrification is a component of the RER plan.
Resilient Arm	A combined registration and support assembly with vertical resilience, used for support of catenary conductors in situations with restricted clearance such as tunnels and overhead bridges.
Resultant Flux Density	The mathematical computation from the combination of the measured X, Y, and Z readings of milligauss (mG). It could be approximated using a sum of squares of these readings and then taking the square root, but in the case of all readings shown in this report, the device used computed this number automatically and presented it as the Resultant Flux Density.
ROW	Right of Way, the portion of land adjacent to tracks owned by the Railway (Metrolinx, CP, CN, etc.). Can be synonymous with rail corridor.
Running Rails	Rails that act as a running surface for the flanged wheels of a car or locomotive.
SAR	Species at Risk. These are plants or animals that are considered by the Government of Ontario to be endangered, threatened, of special concern, or extirpated.
SARA	Species at Risk Act.
SC	Species Concern, a designation for a Species at Risk.
SCADA	System Control And Data Acquisition. SCADA is a control system that controls and monitors the status of the industrial processes and devices for the electrification system. These devices may include motor operated disconnect switch, relay, meter and circuit break, of the Electrification System.
Screening	The process of applying criteria to a set of alternatives in order to eliminate those that do not meet minimum conditions or requirements.
Secondary Voltage	Typically less than 750V.
Service Maintenance	Service maintenance is the light maintenance of engines (i.e., window cleaning, check oil levels and sand levels, clean engine cab, refill potable water, and empty washroom holding tanks).
Shield	As normally applied to instrumentation cables, refers to a conductive sheath (usually metallic) applied, over the insulation of a conductor or conductors, for the purpose of providing means to reduce coupling between the conductors so shielded and other conductors that may be susceptible to, or which may be generating, unwanted electrostatic or electromagnetic fields (noise).
Shielding	Shielding is the use of the conducting and/or ferromagnetic barrier between a potentially disturbing noise source and sensitive circuitry. Shields are used to protect

Term	Definition
	cables (data and power) and electronic circuits. They may be in the form of metal barriers, enclosures, or wrappings around source circuits and receiving circuits. Additionally shielding is used to protect overhead transmission lines or overhead contact system (OCS) from incidents of lightning, in regions of high isoceraunic activity. Shield wire is located above the exposed current carrying wires to provide a 45 degree angle of protection. In sensitive applications, the angle is reduced to 30 degrees for more conservative design.
SHO	Open Shoreline as defined by the Ecological Land Classification System.
Signal System	The rail signal system is a combination of wayside and on board equipment and/or software to provide for the routing and safe spacing of trains or rail vehicles.
Signal Bridges	A structure for mounting signals that spans one or more tracks. Signal bridges may be footed on both ends, or they may be 'cantilever signal bridges', footed only on one end.
Spur	A railroad track that diverges from the main track to service a specific location or industry.
Static Wire	A wire, usually installed aerially adjacent to or above the catenary conductors and negative feeders, that connects overhead contact system (OCS) supports collectively to ground or to the grounded running rails to protect people and installations in case of an electrical fault.
Strain Gantry	These 25 kV feeders from the traction power facility (TPF) will be connected to the overhead contact system (OCS) with the help of main and strain gantries and a cross feeder arrangement. The strain gantry is located within the right-of-way (ROW) parallel to and on the opposite side of the track from the TPF, with footprints exactly equal to that of the main gantry.
Study Area	The study area references to geographic space that is being examined for the Metrolinx Network Electrification Environmental Assessment.
SW	Swamp as defined by the Ecological Land Classification System.
SWD	Deciduous Swamp as defined by the Ecological Land Classification System.
Switching Station (SWS)	Switching stations are traction power facilities that are required approximately mid-way between Traction Power Substations in order to split the electrical sections.
TAG	Treed Agriculture as defined by the Ecological Land Classification System.
THD	Deciduous Thicket as defined by the Ecological Land Classification System.
Third Rail	A third rail is a way of providing electric power to a railway train, through a semi-continuous rigid conductor placed alongside or between the rails of a railway track. Third rail systems are always supplied from direct current electricity as opposed to alternating current electricity.
THR	Threatened, a designation for a Species at Risk.
Top of Rail	Top of Rail is defined as the highest point in a running rail profile.
Touch/Step Potential	Touch potential is defined as the voltage between the energized object and the feet of a person in contact with the object. Step potential is defined as the voltage between the feet of a person standing near an energized grounded object.
Traction Power Return System	The traction power return system includes all conductors (including the grounding system) for the electrified railway tracks, which form the intended path of the traction return current from the electrified rolling stock to the traction power substations. Conductors may include: • Running rails

Term	Definition
	• Impedance bonds • Static wires, and buried ground or return conductors • Rail and track bonds • Return cables, including all return circuit bonding and grounding interconnections • Ground • Negative feeders due to the configuration of autotransformer connections.
Traction Power Facility (TPF)	A general term to classify Traction Power Substations, Paralleling Stations, and Switching Stations.
Traction Power Substation (TPS)	Part of the power supply components of the system; it is a traction power facility (TPF) that transforms the utility supply voltage for distribution to the trains via overhead contact system (OCS).
Transmission Line (TL)	Electrical line conveying electricity at voltages more than 50kV.
Transmission Tap	The point at which electric power is 'tapped' from the existing Hydro One power source.
TRCA	Toronto and Region Conservation Authority.
Underground Feeder Connection	An underground conduit carrying electrical connection between the overhead contact system and a traction power facility (i.e., traction power substation, paralleling station or switching station).
Utility	A utility is an entity that generates, transmits and/or distributes electricity, water and/or gas from facilities that it owns and/or operates, including electrical transmission and distribution companies, communication companies, community antenna distribution systems and regional / municipal authorities.
View-shed	The area of visual influence of the project components.
Volatile Organic Compounds (VOCs)	A class of chemicals that contain carbon, hydrogen, and oxygen atoms and have high vapour pressures at room temperature, and therefore exist predominantly in the gas phase.
Wayside Power Control Cubicles (WPCs) and Signal Cases	A wayside installation that houses remote terminal unit (RTU) and dc power supply unit for motor operated disconnect switches at locations other than traction power facilities.
WOD	Woodland as defined by the Ecological Land Classification System.

Executive Summary

In accordance with the *Transit Projects and Metrolinx Undertakings (Transit Projects Regulation) O. Reg 231/08*, an assessment of potential environmental impacts within the Study Area (see Figure E- 1) was conducted for the GO Rail Network Electrification Transit Project Assessment Process (TPAP). Accordingly, this report volume provides a summary of the results of the various impact assessment studies that were carried out and mitigation measures proposed to eliminate or reduce potential adverse effects. For additional more detailed information on project design/infrastructure and technical components of the project, refer to Volume 1.

The following impact assessment studies were undertaken and documented in several detailed reports contained in **Appendices A to K, and Appendix V**:

- Natural Environment Impact Assessment Report;
- Preliminary Environmental Site Assessment (Taps and Traction Power Facility sites);
- Cultural Heritage Impact Assessment Report;
- Stage 1 Archaeological Assessment;
- Land Use and Socio-Economic Impact Assessment Report;
- Air Quality Impact Assessment Report;
- Noise and Vibration Impact Assessment Report;
- Visual Impact Assessment Report;
- Utilities Impact Assessment Report;
- Electromagnetic Interference/Electromagnetic Fields Impact Assessment Report;
- Preliminary Stormwater Management Impact Assessment Report (Taps and TPFs); and
- Groundwater Impact Assessment Report.

The baseline conditions information contained in Volume 2 was used as the basis from which the potential effects of the GO Rail Network Electrification Project were evaluated. Based on the conceptual engineering design developed for the project, a net effects analysis approach was taken which involved the following three steps:

Step 1 - Identify potential effects (positive and negative);

Step 2 - Establish avoidance/mitigation/compensation measures to eliminate or minimize potential negative effects (as required); and

Step 3 - Identify net effects (i.e., residual effects after applying avoidance/mitigation/compensation measures).

For purposes of differentiating the various types and range of potential environmental effects related to the GO Transit Rail Network Electrification project, they were characterized and grouped as follows:

Footprint Impacts	Potential displacement or loss of existing environmental features within the project Study Area due to the implementation of the physical Electrification Project components/infrastructure.
Operations and Maintenance Impacts	Potential longer term effects due to operations and maintenance activities associated with the electrified GO Transit network.
Construction Impacts	Potential shorter term effects due to construction activities associated with the Electrification Project.

Project Study Area and Components

The Study Area for the GO Rail Network Electrification TPAP is generally defined as the existing GO rail right-of-ways (ROW) to be electrified plus the 7 metre OCS/Vegetation Clearing Zone (as detailed in Volume 1), 2X25kV feeder routes (plus 7 metre Vegetation Clearing Zone), 5 Tap locations, and 16 Traction Power Facility sites (including ancillary components such as access roads).

More specifically the study area components are as follows:

- **Union Station Rail Corridor (USRC)** – From UP Express Union Station to Don Yard Layover
- **Lakeshore West Corridor** – From just west of Bathurst (Mile 1.20) to Burlington
  - Mimico Tap Location
  - Burlington Tap Location
  - 2 X 25kV Canpa Feeder Route
  - Mimico TPS
  - Mimico SWS
  - Burlington TPS
  - Oakville SWS
  - Gantries, duct banks, access routes
- **Kitchener Corridor** – From UP Express Spur[1] (at Highway 427) to Bramalea
  - Bramalea PS
  - Gantries, duct banks, access routes
  - 2 X 25kV Bramalea Feeder Route
- **Barrie Corridor** – From Parkdale Junction (off Kitchener Corridor) to Allandale Station
  - Allandale Tap Location
  - Allandale TPS
  - 2 X 25kV Barrie Collingwood Railway Feeder Route
  - Gilford PS

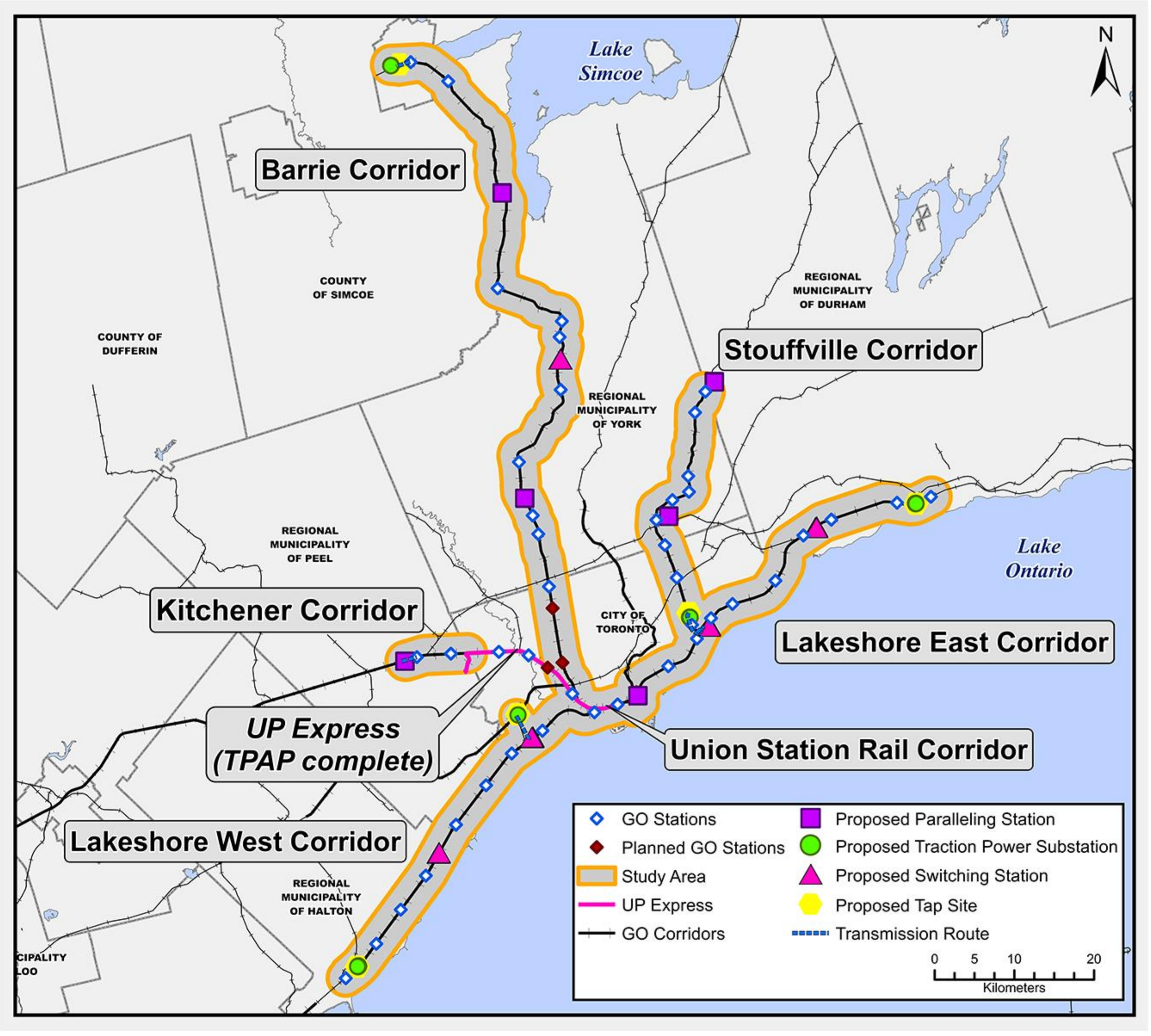
[1] *The portion of the Kitchener corridor from Strachan Ave. to the airport spur (at Highway 427) was previously assessed/approved as part of the Metrolinx UP Express Electrification EA.*

  - Newmarket SWS
  - Maple PS
  - Gantries, duct banks, access routes
- **Stouffville Corridor** – From Scarborough Junction (off Lakeshore East Corridor) to Lincolnville Station
  - Scarborough Tap Location
  - Scarborough TPS
  - 2 x 25 kV Scarbourough Feeder Route
  - Unionville PS
  - Lincolnville PS
  - Gantries, duct banks, access routes
- **Lakeshore East Corridor** – From Don Yard Layover to Oshawa Station
  - East Rail Maintenance Facility (ERMF) Tap Location
  - ERMF TPS
  - 2 x 25 kV Scarbourough Feeder Route
  - Scarborough SWS
  - Durham SWS
  - Don Yard PS
  - Gantries, duct banks, access routes

It should be noted that the electrification of the UP Express Route (along a portion of the Union Station Rail Corridor and Kitchener Corridor) from UP Express Station (just west of the Union Station Train Shed) to Terminal 1 Station at Pearson International Airport, including power supply and power distribution components, was previously assessed as part of the two previous EA projects:

- Metrolinx Union Pearson Express Electrification Transit Project Assessment (June, 2014); and
- Hydro One Union Pearson Express Traction Power Substation Class Environmental Assessment - Environmental Study Report (2014).

Figure E- 1: Study Area Map



Natural Environment

Vegetation Clearing Zone

A Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the 5 metre Overhead Contact System (OCS) Impact Zone plus an additional 2 metre offset area on either side of the OCS components. As a result, the total clearing area is defined as 7 metre measured from the centerline of the outermost tracks to be electrified on either side of each rail corridor. The 7 metre zone is considered a maximum removal zone; during Detailed Design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

Vegetation clearing is required to:

- Minimize the risk of tree limbs falling on the track or overhead wires, thus potentially causing a conflict with the electrified system resulting in loss of service and revenue.
- Accommodate a mandatory clearance zone to ensure maintenance workers are safe when working in an electrified environment.
- Reduce the extent and frequency of vegetation maintenance and any resultant service disruptions to undertake these activities.

Trees and vegetation within and adjacent to Metrolinx rail corridors consist of various levels of canopy/vegetation cover depending on whether the surrounding setting is either urban, rural, agricultural, industrial, etc. Some trees and vegetation exist within the Metrolinx rail ROW while others are located on adjacent public or private property. This vegetation, between the railroad right-of-way and adjacent land uses, may encroach into vertical and horizontal clearances for installation and safe operations and maintenance of the electric wires. Potential footprint impacts associated with the removal of trees/ vegetation were therefore considered as outlined below.

Assessment of Ecological Impacts – Vegetation Removal
As part of the TPAP, the following approach was taken to assess potential ecological impacts associated with the required vegetation removal for the Electrification Project. There were two components to the analysis:

1. Identification of ecological impacts related to vegetation removals.
2. Characterization of the extent of tree removals.

To classify potential ecological impacts due to vegetation removal, they were categorized as either: ***negligible, low, moderate, or high*** based on the rationale outlined in **Table E-1**. Using Geographic Information Systems (GIS) technology, Ecological Land Classification (ELC) communities along the corridors/feeder routes were mapped (via aerial photo interpretation as part of the baseline conditions phase), and the areas (in hectares [ha]) of potential vegetation removal (including trees) were calculated for each type of ELC community within a given corridor segment. It should be noted that the assessment did not entail field surveys or ground truthing to delineate impact areas within the vegetation clearing zone. However field investigations were undertaken along corridor sections identified within the *GO Rail Network Electrification TPAP - Natural Environmental Baseline Conditions Report* (Future/Work & Commitments section) to assess habitat suitability within various ELC communities to be affected.

In order to further characterize tree removals specifically, the extent of tree removals within each ELC community was categorized as ***minor, fair, or extensive*** based on the canopy cover within each respective ELC community (see **Table E-1**).

- Where canopy cover is minimal (<10%) or limited (10-20%), the extent of removals is considered ***minor.***
- For areas with intermediate (20-70%) canopy cover, the extent of tree removals is considered ***fair.***
- For communities with high (>70%) canopy cover, tree removals are anticipated to be ***extensive.***

Table E- 1: ELC Areas and Categories of Potential Impacts

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Agriculture (AG)	AG communities include intensive and non-intensive farming. Intensive practices includes cultivated field producing crops (e.g. corn and wheat) and specialty agricultural crops (e.g. orchards, and nurseries). Non-intensive fields are dominated with herbaceous vegetation and grasses primarily used for pasture and grazing areas. Treed areas may be located along the perimeter of AG communities. AG communities contain minimal (<10%) canopy cover	Minor	Vegetation removals within AG lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Commercial and Institutional (CVC)	CVC communities contain constructed areas, including businesses, light industry, heavy industry, educational and health buildings, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Constructed (CV)	CV communities contain constructed areas, including light and heavy industry, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CV lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Transportation and Utility (CVI)	CVI communities include roads, highways, right of ways, railways, airports, and sewage treatment facilities, and are dominated by non-native grasses and herbaceous species common to disturbed habitat. CVI communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVI lands are considered to have negligible ecological impact since the affected areas provide limited to no habitat for wildlife.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Residential (CVR)	CVR communities include low to high residential housing, rural property, single family homes, and trailer parks, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. Due to the presence of treed areas along the boundary between the CVI and CVR communities, the canopy cover within the impacted areas is considered intermediate (20-70%).	Fair	Vegetation removals with CVR lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Green Land (CGL)	CGL communities are composed of open areas such as parks, golf courses, playing fields, picnic areas, and cemeteries, and are primarily dominated by non-native grass species (Kentucky Blue Grass), as well as herbaceous species common to disturbed habitat. CGL communities contain varying levels of canopy cover from minimal (<10%) to limited (10-20%) dependent on the community.	Minor	Vegetation removals with CGL communities are considered to have a low ecological impact since these communities provide limited to no habitat for wildlife.
Cultural Meadow (CUM)	CUM communities result from, or are maintained by, cultural or anthropogenic-based disturbances and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CUM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CUM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Red Pine Coniferous Plantation (CUP)	CUP communities greater than 75% coniferous tree composition. CUP communities generally contain high (>70%) canopy cover.	N/A	Vegetation removals within the CUP communities are considered to have a low ecological impact
Cultural Woodland (CUW)	CUW communities are culturally influenced and contain high (>70%) canopy cover.	Extensive	Vegetation removals within CUW communities have low ecological impacts.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Treed Agriculture (TAG)	TAG communities include coniferous, deciduous and mixed plantations, treed pastures and fencerows. TAG communities contain TAG communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the TAG communities are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Deciduous Thicket (THD)	THD communities contain some shrub and tree cover. The communities are culturally influenced and dominated by non-native and invasive species. THD communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the THD communities are considered to have low ecological impact as the areas affected provide limited wildlife habitat.
Deciduous Forest (FOD)	FOD communities contain are dominated by deciduous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Forest (FOM)	FOM communities contain >60% tree cover and dominated by a mix of deciduous and coniferous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOM communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Marsh (MA)	MA communities are dominated by emergent hydorphytic macrophytes with some tree and shrub cover. MA communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MA communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Meadow Marsh (MAM)	MAM communities represent areas that experience seasonal flooding, and contain species that are less tolerant of prolonged flooding. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within the MAM communities have varying levels of ecological impacts, ranging from low to moderate and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, and wildlife habitat suitability.
Shallow Marsh (MAS)	MAS communities are restricted to facultative and obligate wetland plants. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MAS communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Meadow (MEM)	MEM communities contain a mix of grass-like and broadleaf species and include non-native and invasive species. MEM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with MEM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Open Shoreline (SHO)	SHO communities are associated with and adjacent to permanent or ephemeral water and subject to active shoreline processes. Vegetation cover varies from patchy to barren to more closed and treed. SHO communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within SHO communities result in a moderate ecological impact and as they contain specialized habitat for wildlife.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Open Water (OA)	OA communities include watercourses, rivers, streams, and ponds.	N/A	There are no footprint impacts associated with OA communities as all OCS components where the rail crosses open water will be attached to bridge structures and no vegetation removals are required in these areas.
Swamp (SW)	SW communities contain tree or shrub cover with variable flooding regimes and areas with standing water. SW communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within SW communities have varying levels of ecological impacts, ranging from moderate to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Swamp (SWM)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWM communities contain tree both deciduous and coniferous composition. SWM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals with SWM lands are considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.
Deciduous Swamp (SWD)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWD communities contain deciduous content. SWD communities generally contain high (>70%) canopy cover.	Extensive	There are no anticipated impacts to this community.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Deciduous Woodland (WOD)	WOD communities contain semi-closed tree cover and are dominated by mid-aged deciduous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within WOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Woodland (WOM)	WOM communities contain semi-closed tree cover and are dominated by mid-aged deciduous and coniferous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within the WOM community is considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.

The assessment of potential vegetation removal impacts has been summarized in each corridor/subsection of this Volume to provide preliminary calculations of the extent of vegetation removals. Removals required for Tap/TPF sites have also been assessed in each respective subsection of this report and mitigation measures recommended.

The evaluation of vegetation/ tree removal impacts at the TPAP stage is considered a preliminary assessment. Further studies will be undertaken during Detailed Design in order to further quantify tree/vegetation removals as follows:

Future Work & Commitments – Vegetation Management/Compensation
During the Detailed Design phase, Vegetation Management Plans will be developed for each electrified corridor/feeder route. These **Vegetation Management Plans** will consist of:

- **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.

- **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to **Section 10.1** for detailed tree protection measures during construction.
- **Tree/Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

Potential Effects Related to Bridge Modifications

Bridges identified to undergo modifications (e.g., . add bridge protection barrier, attach OCS wires, lower tracks, etc.) will require mitigation measures related to the protection of migratory birds. Mitigation measures have been developed to ensure compliance with the Migratory Bird Convention Act (MBCA) in order to reduce/ mitigate the potential for adverse effects on birds and their nests.

Union GO Station Rail Corridor

There are no traction power facilities (TPF) or Tap locations within the Union Station Rail Corridor. There are no aquatic features within the Union Station Rail Corridor. Bridge modifications, including the installation of flash plates and/or wires and/or bridge barriers, have been identified within the corridor and should follow mitigation measures to ensure compliance with the MBCA. There are no designated areas within the corridor.

In addition, Vegetation Management Plans, including a Tree/Vegetation Compensation Protocol will be developed and implemented during Detailed Design in order to minimize/ mitigate the potential impacts related to vegetation/tree removals. While vegetation removals are required along the corridor, resulting in a net loss of vegetation, no adverse effects to the natural environment including wildlife habitat or

Species at Risk are expected to result following the implementation of mitigation strategies outlined herein.

An Environmental Management System (EMS) will be developed during detailed design and implemented during construction and operation to ensure the environmental protection/mitigation measures identified as part of the GO Rail Network Electrification TPAP are fulfilled and functioning as expected. The overall intent of the EMS will be to integrate environmental management into the daily operations and other quality management systems of the project

Lakeshore West Corridor

There are four (4) TPF's and two (2) Tap locations within the Lakeshore West Corridor. There are no watercourse features present within the TPF or Tap locations. Loss of vegetation within the TPF and Tap locations will result from the footprint of the TPF and Tap components within Burlington TPS, Mimico Tap/TPS, Canpa 25kV Feeder Route, and Mimico SWS. There are no natural features associated with Oakville SWS. Vegetation removals within Mimico SWS, Mimico Tap/TPS Location and Canpa 25kV Feeder Route will be required, and the overall loss of vegetation is negligible. Vegetation clearing will also be required within vegetated communities along the corridor to create appropriate vegetation clearance zones for the OCS. Lorne Park Prairie ANSI, Sixteen Mile Creek Valley ESA, and Bronte Creek ESA are within the vegetation removal zone. Vegetation clearing within these Designated Areas should be minimized to the extent possible. The presence/absence of Butternuts will be confirmed during Detailed Design. A health assessment will be undertaken at that time for any pure butternuts. Should any Butternuts be found during Detailed Design, appropriate approval under the ESA, 2007 will be required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented. In addition, Vegetation Management Plans will be developed and implemented during Detailed Design in order to minimize/ mitigate the potential impacts related to vegetation/tree removals. While vegetation removals are required within the TPF and Tap locations and along the corridor, resulting in a net loss of vegetation, no adverse effects to the natural environment including wildlife habitat, Designated Areas or Species at Risk are expected to result following the implementation of mitigation strategies outlined herein.

There are twenty-eight (28) watercourses features crossing the Lakeshore West Corridor. There are no anticipated footprint impacts or net adverse effects to these aquatic features. Bridge modifications, including the installation of flash plates and/or wires and/or bridge barriers, and bridges requiring additional engineering solutions (i.e. below the Absolute Minimum vertical clearance) have been identified within the corridor and require appropriate mitigation measures relating to potential migratory bird nesting prior to commencing work. One (1) active Barn Swallow nest was observed at Bronte Creek Bridge (Oakville Sub Mile 25.87) during the 2016 field investigations. If active Barn Swallow nests are observed during subsequent inspections, consultation with the Ministry of Natural Resources and Forestry (MNRF) will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. Additionally, bridge modifications (OCS wires) are required at Etobicoke Creek Bridge (Oakville Sub Mile 9.82), Credit River Bridge (Oakville Sub Mile 13.27), and Sixteen Mile Creek Bridge (Oakville Sub Mile 21.71). No Barn Swallows or nests were observed on these bridges during the 2016 field investigations; however, a follow up inspection for active nests should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation/registration with the MNRF will be required to determine appropriate mitigation for this species.

An Environmental Management System (EMS) will be developed during detailed design and implemented during construction and operation to ensure the environmental protection/mitigation measures identified as part of the GO Rail Network Electrification TPAP are fulfilled and functioning as expected. The overall intent of the EMS will be to integrate environmental management into the daily operations and other quality management systems of the project

Kitchener Corridor

There is one (1) TPF property parcel located west of the Kitchener Corridor. There are no watercourse features within the TPF. Loss of vegetation within the TPF location will result from the footprint of the TPF components within Bramalea PS as well as the 25kV Feeder Route. Vegetation removals within Bramalea PS and the 25kV Feeder Route will be required, and the overall loss of vegetation is negligible. Vegetation clearing will also be required within vegetated communities along the corridor to create appropriate vegetation clearance zones for the OCS. There are no Designated Areas within the corridor. The presence/absence of Butternuts will be confirmed during Detailed Design. A health assessment will be undertaken at that time for any pure butternuts. Should any Butternuts be found during entailed tree inventories, appropriate approval under the ESA, 2007 will be required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented. In addition, Vegetation Management Plans including a Tree/Vegetation Compensation Protocol will be developed and implemented during Detailed Design in order to minimize/ mitigate the potential impacts related to vegetation/tree removals. While vegetation removals are required within the TPF location and along the corridor, resulting in a net loss of vegetation, no adverse effects to the natural environment including wildlife habitat or Species at Risk are expected to result following the implementation of mitigation strategies outlined herein.

There are three (3) watercourse features within the Kitchener Corridor. There are no anticipated footprint impacts or net adverse effects to aquatic features. Bridge modifications, including the installation of flash plates and/or wires and/or bridge barriers have been identified within the corridor and require appropriate mitigation measures relating to potential migratory bird nesting prior to commencing work.

An Environmental Management System (EMS) will be developed during detailed design and implemented during construction and operation to ensure the environmental protection/mitigation measures identified as part of the GO Rail Network Electrification TPAP are fulfilled and functioning as expected.

The overall intent of the EMS will be to integrate environmental management into the daily operations and other quality management systems of the project

Barrie Corridor

There are four (4) TPF's and one (1) Tap location within the Barrie Corridor. Loss of vegetation within the TPF and Tap locations will result from the footprint of the TPF and Tap components within Allandale Tap (Preferred and Alternative), Allandale TPS, Barrie Collingwood Railway 25kV Feeder Route, Newmarket SWS, Gilford PS, and Maple PS. Vegetation removals within Allandale Tap, Allandale TPS, the 25kV Feeder Route, Newmarket SWS, Gilford PS, and Maple PS will be required, and the overall loss of vegetation is negligible. One (1) watercourse crosses the corridor within the 25kv Feeder Route; however, no aquatic footprint impacts or net adverse effects to these aquatic features are anticipated. Based on the vegetation cover observed, Maple PS does not currently contain suitable breeding habitat for Eastern Meadowlark or Bobolink. However, crop cover should be reviewed again prior to the commencement of construction. In the event suitable crop cover is planted supporting breeding habitat conditions for Eastern Meadowlark or Bobolink, a specialized SAR breeding bird survey will need to be undertaken to determine the presence/absence of Eastern Meadowlark and Bobolink within the AG (Agricultural) communities. Vegetation clearing will also be required within vegetated communities along the corridor to create appropriate vegetation clearance zones for the OCS. Designated Areas located within the vegetation impact zone include: King-Vaughan Wetland Complex Provincially Significant Wetland (PSW), Maple Uplands and Kettles Candidate Life Science ANSI, Wesley Brooks Conservation Area, Aurora McKenzie Marsh Wetland PSW, Rodgers Reservoir Conservation Area, Holland River Marsh (BW5) PSW, Holland Marsh Wetland Complex PSW, Scanlon Creek Conservation Area, Holland River ANSI, Little Cedar Point PSW, Holland Marsh Lowland ESA, Wilson Creek Marsh PSW, Lake Simcoe Protection Plan, Oak Ridges Moraine Conservation Plan Areas (Settlement, Countryside, Natural Linkage, Natural Core), and Greenbelt Protected Countryside. Vegetation removals within these areas should be minimized to the extent possible. The presence/absence of Butternuts will be confirmed during Detailed Design. A health assessment will be undertaken at that time for any pure butternuts. Should any Butternuts be found during Detailed Design, appropriate approval under the ESA, 2007 will be required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

In addition, Vegetation Management Plans, including a Tree/Vegetation Compensation Protocol, will be developed and implemented during Detailed Design in order to minimize/mitigate the potential impacts related to vegetation/tree removals. While vegetation removals are required within the TPF and Tap locations and along the corridor, resulting in a net loss of vegetation, no adverse effects to the natural environment including wildlife habitat, Designated Areas or Species at Risk are expected to result following the implementation of mitigation strategies outlined herein.

There are approximately forty-five (45) watercourse features crossing the Barrie Corridor. There are no anticipated footprint impacts or net adverse effects to aquatic features. Bridge modifications, including the installation of flash plates and/or wires and/or bridge barriers, and bridges requiring additional engineering solutions (i.e. bridges below the Absolute Minimum vertical clearance) have been identified within the corridor and require appropriate mitigation measures relating to potential migratory bird nesting prior to commencing work. Barn Swallows were observed flying under the Holland River Bridge (Mile 41.00) during the 2016 field investigations. If active Barn Swallow nests are observed during subsequent inspections, consultation with the Ministry of Natural Resources and Forestry (MNRF) will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. Additionally, bridge modifications (OCS wires) are required at Tollendale (Lovers) Creek Bridge (Newmarket Sub 61.20). No Barn Swallows or nests were observed on this bridges during the 2016 field investigations; however, a follow up inspection for active nests should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation/registration with the MNRF will be required to determine appropriate mitigation for this species.

An Environmental Management System (EMS) will be developed during detailed design and implemented during construction and operation to ensure the environmental protection/mitigation measures identified as part of the GO Rail Network Electrification TPAP are fulfilled and functioning as expected. The overall intent of the EMS will be to integrate environmental management into the daily operations and other quality management systems of the project

Stouffville Corridor

There are three (3) TPF's and one (1) Tap location within the Stouffville Corridor. Loss of vegetation within the TPF and Tap locations will result from the footprint of the TPF and Tap components within Scarborough Tap, Scarborough TPS, Unionville PS, and Lincolnville PS. Vegetation removals within Scarborough Tap, Scarborough TPS, Unionville PS, and Lincolnville PS will be required, and the overall loss of vegetation is negligible. There are no watercourse features present within the TPF and Tap locations. Vegetation clearing will also be required within vegetated communities along the corridor to create appropriate vegetation clearance zones for the OCS. Designated Areas located within the vegetation impact zone include: Stouffville Conservation Area, Stouffville Marsh Evaluated Wetland, Rouge National Urban Park, Oak Ridges Moraine Conservation Plan Areas (Settlement and Countryside), and Greenbelt Protected Countryside. Vegetation removals within these areas should be minimized to the extent possible. The presence/absence of Butternuts will be confirmed during Detailed Design. A health assessment will be undertaken at that time for any pure butternuts. Should any Butternuts be found during Detailed Design, appropriate approval under the ESA, 2007 will be required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented. In addition, Vegetation Management Plans, including a Tree/Vegetation Compensation Protocol, will be developed and implemented during Detailed Design in order to minimize/mitigate the potential impacts related to vegetation/tree removals. While vegetation removals are required within the TPF and Tap locations and along the corridor, resulting in a net loss of vegetation, no adverse effects to the natural environment including wildlife habitat, Designated Areas or Species at Risk are expected to result following the implementation of mitigation strategies outlined herein.

There are eleven (11) watercourse features within the Stouffville Corridor. There are no anticipated footprint impacts or net adverse effects to aquatic features. Bridge modifications, including the installation of flash plates and/or wires and/or bridge barriers, and bridges requiring additional engineering solutions (i.e. bridges below the Absolute Minimum vertical clearance) have been identified within the corridor and require appropriate mitigation measures relating to potential migratory bird nesting prior to commencing work. Bridge modifications (OCS wires) are required at Bruce Creek Bridge (Uxbridge Sub 49.60) and West Highland Creek Bridge (Uxbridge Sub Mile 55.99). No Barn Swallows or nests were observed on these bridges during the 2016 field investigations; however, a follow up inspection for active nests should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation/registration with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented.

An Environmental Management System (EMS) will be developed during detailed design and implemented during construction and operation to ensure the environmental protection/mitigation measures identified as part of the GO Rail Network Electrification TPAP are fulfilled and functioning as expected. The overall intent of the EMS will be to integrate environmental management into the daily operations and other quality management systems of the project

Lakeshore East Corridor

There are four (4) TPF's and one (1) Tap location within the Lakeshore East Corridor. Loss of vegetation within the TPF and Tap locations will result from the footprint of the TPF and Tap components within ERMF Tap, ERMF TPS, Scarborough SWS, Durham SWS, and Don Yard PS. Vegetation removals within the ERMF Tap, ERMPF TPS, Scarborough SWS, Durham SWS, and Don Yard PS will be required, and the overall loss of vegetation is negligible. There are no watercourse features within the TPF and Tap locations. Therefore, no aquatic footprint impacts or net adverse effects are anticipated. There is potential for Butternut to occur within Don Yard PS. Ten (10) suspected Butternut hybrids observed during the 2016 field investigations will require further assessment during Detailed Design to determine if registration under the *Endangered Species Act* is required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Vegetation clearing will also be required within vegetated communities along the corridor to create appropriate vegetation clearance zones for the OCS. Designated Areas located within the vegetation impact zone include: East Point ESA, Rouge Marsh ESA, East Point Bluffs ANSI, Petticoat Creek Forest ESA, Petticoat Creek Conservation Area, Rouge River Valley ANSI, Lynde Shores Conservation Area, Rouge National Urban Park, and Greenbelt Protected Countryside. Although vegetation within the removal zone is mainly culturally influenced, vegetation removals within these areas should be minimized to the extent possible. The presence/absence of Butternuts will be confirmed during Detailed Design. A health assessment will be undertaken at that time for any pure butternuts. Should any Butternuts be found during Detailed Design, appropriate approval under the ESA, 2007 will be required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented. In addition, Vegetation Management Plans, including a Tree/Vegetation Compensation Protocol,will be developed and implemented during Detailed Design in order to minimize/mitigate the potential impacts related to vegetation/tree removals. A Bank Swallow colony has been confirmed within bluffs at approximately (Kingston Sub Mile 316.9), approximately 30m south of the edge of vegetation removal zone. No direct impacts are anticipated. Indirect impact avoidance measures are identified in the AECOM (2016) study (refer to **Appendix A2**). While vegetation removals are required within the TPF and Tap locations and along the corridor, resulting in a net loss of vegetation, no adverse effects to the natural environment including wildlife habitat, Designated Areas or Species at Risk are expected to result following the implementation of mitigation strategies outlined herein.

There are twenty (20) watercourse features within the Lakeshore East Corridor. There are no anticipated footprint impacts or net adverse effects to aquatic features. Bridge modifications, including the installation of flash plates and/or wires and/or bridge barriers, and bridges requiring additional engineering solutions (i.e. bridges below the Absolute Minimum vertical clearance) have been identified within the corridor and require appropriate mitigation measures relating to potential migratory bird nesting prior to commencing work. One (1) active Barn Swallow nest was observed at Carruthers Creek Bridge (G Sub Mile 5.52) during the 2016 field investigations. No bridge modifications are required at this bridge structure. Additionally, bridge modifications (OCS wires) are required at the Don River Bridge (Kingston Sub Mile 332.15), Highland Creek Bridge (Kingston Sub Mile 318.50), Rouge River Bridge (Kingston Sub Mile 316.10), Duffins Creek Bridge (GO Sub Mile 3.00). No Barn Swallows or nests were observed during the 2016 field investigations; however, a follow up inspection to identify active nests should occur prior to commencing work. If active Barn Swallow nests are observed during subsequent inspections, consultation with the Ministry of Natural Resources and Forestry (MNRF) will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented.

An Environmental Management System (EMS) will be developed during detailed design and implemented during construction and operation to ensure the environmental protection/mitigation measures identified as part of the GO Rail Network Electrification TPAP are fulfilled and functioning as expected. The overall intent of the EMS will be to integrate environmental management into the daily operations and other quality management systems of the project

Preliminary Environmental Site Assessment

Rail Corridors

Based on the gap analysis study completed along the rail corridors as part of this TPAP, portions of the corridors within the study area have been assessed (approximately 55% of the OCS Impact Zone have received some form of Environmental Site Assessment (ESA)). However there are significant lengths of the corridors/OCS Impact Zone that have not been assessed based on the documentation reviewed to date. Generally these gaps are summarized follows (refer to EPR Volume 2 for additional detail):

- **Union Station Rail Corridor** – The majority of this corridor has been the subject of Phase I and II ESAs with the exception of most of the Don Yard Layover. Two section of 0.8 km and 1 km require Environmental Site Assessment work.
- **Lakeshore West Corridor** – This corridor has been the subject of Phase I and II ESAs from Strachan Ave (eastern boundary of current study) to 29th St. (west of the Mimico TPS). The corridor west of this point has not been assessed. Approximately 37 km of this corridor have not been subject to an Environmental Site Assessment. Additional gaps include the Willowbrook Maintenance Facility.
- **Kitchener Corridor** – This corridor has been subject of a Phase I ESA and limited Phase II ESAs from Highway 427 (the eastern boundary of the current study) to Highway 407. The corridor west of this point (to Steeles Ave.) has not been assessed, a length of approximately 2.7 km.
- **Barrie Corridor** - This corridor has been subject to very limited assessment work, consisting only of a Phase I Environmental Site Assessment that extends from just north of Steeles Ave. up to Bradford, where the 9th Line crosses the corridor. The corridor both south and north of this segment has not been assessed, comprising approximately 48 km of corridor.
- **Stouffville Corridor** – Most of this corridor has been the subject of Phase I and II ESAs. A short segment extending north from the Stouffville GO Station to Lincolnville has not been assessed, being approximately 3.7 km long. An additional gap is the segment of line south from Unionville Station to Denison St. which may not have been included in the Phase II Environmental Site Assessment.
- **Lakeshore East Corridor** - This corridor has been the subject of Phase I and II ESAs from the Don River (western boundary of current study) to Frenchman's Bay (west of Liverpool Rd.) in Pickering. The corridor east of this point (including the proposed switching yard at Durham (near Brock Road) has not been assessed. Approximately 20 km of this corridor have not been subject of an Environmental Site Assessment study.

Therefore further work is recommended along the corridors to assess for potential soil and/or groundwater contamination and develop appropriate mitigation measures. As a result additional Environmental Site Assessment studies including Phase I ESAs, Phase II ESAs, etc. will be carried out by Metrolinx as required along the corridors/OCS Impact Zone during the Detailed Design phase with respect to rail corridors to be electrified.

Tap Locations

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

Traction Power Facility Sites

Based on Preliminary Environmental Site Assessment work completed as part of the TPAP, Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified.

If any properties are to be acquired by Metrolinx, Phase I Environmental Site Assessments (ESAs) are recommended for due diligence purposes prior to acquisition of the sites. Depending on the findings of the Phase I ESAs, further assessment (e.g., Phase II ESA(s)) may be required prior to acquisition.

In addition, the mitigation measures will be adhered to and implemented at all TPF sites (including ancillary components such as access roads, gantries, etc.) and along rail corridors:

- Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).
- Remediation and/or implementation of management measures to address contaminated soils and/or groundwater during construction and long term operations and maintenance if required/applicable. Management measures will be carried out in accordance with applicable environmental legislation.
- Implement a site specific health and safety plan for construction workers based on the findings of the subsurface investigations.
- Develop and implement an Excess Materials Management Plan based on the findings of the limited subsurface investigations.

Cultural Heritage

The following process/approach has been carried out to assess potential effects on cultural heritage resources and establish mitigation measure as part of the Electrification TPAP.

Step 1 – Cultural Heritage Screening Report and Cultural Heritage Evaluation Reports (CHERs)

A Cultural Heritage Screening Report was prepared to identify existing and potential cultural heritage resources within the study area that are anticipated to be affected/impacted by the Electrification undertaking.

The Cultural Heritage Screening Report addresses the area within which potential impacts are being assessed (the Study Area). For the GO Rail Network Electrification TPAP, the Study Area includes: potentially affected bridges/structures along the rail corridor ROW, electrification facility (TPS, SWS, PS) sites, GO Stations and existing GO Maintenance Facilities that will be modified. The approach to screening bridges/structures along the rail corridor was scoped to address only those bridges/structures that are anticipated to be impacted by the proposed electrification infrastructure (e.g., due to an OCS attachment, clearance issue, etc.). With respect to culverts, while no impacts to culverts are anticipated due to electrification, any known heritage culverts were automatically screened in. Similarly, any other resources within the study area that are known PHP (Provincial Heritage Property) or PHPPS (Provincial Heritage Property of Provincial Significance) were also automatically screened in.

Based on the preliminary recommendations of the Cultural Heritage Screening Report, Metrolinx subsequently carried out Cultural Heritage Evaluation Reports (CHERs) to identify heritage attributes associated with the potentially affected heritage resources. Copies of CHERs completed as part of the Electrification TPAP are included in Appendix M. All available Statements of Cultural Heritage Value have also been included in Appendix M.

The Cultural Heritage Screening Report was finalized to caption the results of CHERs completed as part of the GO Rail Network Electrification Project. A copy of the Cultural Heritage Screening Report is included in Appendix C. Copies of CHERs completed as part of the Electrification TPAP are included in Appendix M. All available Statements of Cultural Heritage Value have also been included in Appendix M.

Step 2 – Cultural Heritage Impact Assessment Report

Based on the results of the Screening Report, completed CHERs and the conceptual design prepared for the TPAP, Metrolinx prepared a comprehensive Cultural Heritage Impact Assessment Report to assess all potential cultural heritage impacts related to the electrification undertaking and establish mitigation/monitoring measures as appropriate. A copy of the Cultural Heritage Impact Assessment Report is included in Appendix C.

Step 3 – Heritage Impact Assessments (HIAs)

Based on the recommendations of the Cultural Heritage Impact Assessment Report, Heritage Impact Assessments (HIAs) were undertaken to assess the proposed activity to determine any impacts - positive or negative, direct or indirect – the proposed activity may have on the property’s cultural heritage value and identify alternatives and mitigation measures to avoid or reduce any negative impacts to the property’s cultural heritage value or interest. HIAs for Provincial Heritage Properties of Provincial Significance (10/06 properties) were completed as part of the TPAP. HIAs for Provincial Heritage Properties (9/06 properties) will be undertaken as part of Detailed Design. The results of the HIAs completed as part of the TPAP are included in the Final EPR for MTCS and stakeholder information/review. The HIAs to be undertaken as part of the Detailed Design phase will be developed in consultation with MTCS and the relevant municipality.

Refer to the Table E-2 (also refer to Table 11-3 in Section 11) for a summary of Cultural Heritage Mitigation and Monitoring Commitments that will be adhered to, as well as recommended HIAs.

Table E- 2: Summary of Cultural Heritage Mitigation and Monitoring Commitments

Rail Corridors/ Segments	CHR	Property Name	Metrolinx Heritage Committee Decision	Project Activities	Footprint Impacts	
					Potential Effect	Mitigation/Monitoring Commitments
Union Station Rail Corridor	USRC-1-1	Union Station	Provincial Heritage Property of Provincial Significance	Installation of OCS attachments	Alteration	HIA completed as part of the Electrification TPAP. Results and recommendations of the HIA will be adhered to during detailed design. Refer to EPR Volume 3, Section 3.3.1.1.1 and the HIA provided in Appendix M, Sections 5.2 and 5.3 for a complete summarization of mitigation/monitoring commitments.
	USRC-1-2	Scott Street Interlocking Tower	Provincial Heritage Property of Provincial Significance	None	None	N/A
	USRC-1-3	Cherry Street Interlocking Tower	Provincial Heritage Property of Provincial Significance	None	None	N/A
	USRC-1-4	Lower Jarvis Subway	Provincial Heritage Property	None	None	N/A
	USRC-1-5	Lower Sherbourne Subway	Provincial Heritage Property	None	None	N/A
	USRC-1-6	Parliament Street Subway	Provincial Heritage Property	None	None	N/A
	USRC-1-7	Cherry Street Subway	Provincial Heritage Property	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design
	USRC-1-8	Union Station Heritage Conservation District	Adjacent Protected Property	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan.	Potential Alteration	Consultation with heritage staff at the City of Toronto
	USRC-1-9	Postal Delivery Building	Adjacent Protected Property	None expected	None	N/A
Lakeshore West Corridor (Segments 1 – 8)	LSW-1-1	Dufferin Street Bridge	Provincial Heritage Property – structure was removed	Raising of roadway profile and bridge replacement	None: bridge demolished	N/A: bridge has been removed
	LSW-1-2	Dunn Avenue Bridge	Provincial Heritage Property – structure was removed (2015)	Raising of roadway profile and bridge replacement	None: bridge demolished	N/A
	LSW-1-3	Dowling Avenue Bridge	Provincial Heritage Property – structure was removed (2015)	Installation of bridge protection barrier and OCS wires, possible replacement of bridge	None: bridge demolished	N/A
	LSW-1-4 PHP	Humber River Bridge, Mile 5.02	Provincial Heritage Property	Installation of OCS wires and possibly track portals	Alteration	Conduct an HIA during detailed design
	LSW-1-5	Fort York Heritage Conservation District and National Historic Site	Adjacent Protected Property	None expected	None	N/A
	LSW-1-6	Palais Royale, 1601 Lakeshore Boulevard West	Adjacent Protected Property	None expected	None	N/A
	LSW-2-1	Islington Avenue Bridge	Provincial Heritage Property	Installation of bridge protection barrier, OCS wires, and flash plates	Alteration	Conduct a HIA during detailed design
	LSW 3-1	Etobicoke Creek Bridge	Provincial Heritage Property (MHC Decision pending)	Installation of OCS wires	Alteration	Conduct HIA

Rail Corridors/ Segments	CHR	Property Name	Metrolinx Heritage Committee Decision	Project Activities	Footprint Impacts	
					Potential Effect	Mitigation/Monitoring Commitments
	LSW-4-1	Credit River Bridge	Provincial Heritage Property of Provincial Significance	Installation of OCS wires and possibly track portals	Alteration	HIA completed as part of the Electrification TPAP. Results and recommendations of the HIA will be adhered to during detailed design. Refer to EPR Volume 3, Section 4.3.9.1.1 and the HIA provided in Appendix M, Sections 6 and 8 for a complete summarization of mitigation/monitoring commitments.
	LSW-4-2	Port Credit Memorial Arena	Adjacent Protected Property	None expected	None	N/A
	LSW-5-1	The General Electric Company	Adjacent Protected Property	None expected	None	N/A
	LSW-6-1	Sixteen Mile Creek Bridge	Provincial Heritage Property	Installation of OCS attachments and track portals	Alteration	Conduct a HIA during detailed design
	LSW-7-1	Bronte Creek Bridge	Provincial Heritage Property	Installation of OCS wires and possibly track portals	Alteration	Conduct a HIA during detailed design
Kitchener Corridor (Segments 1-2)	KT-2-1	8000 Dixie Road	Adjacent Heritage Property	Installation of Bramalea Paralleling Station on an adjacent portion of the property. No direct or indirect impacts to the heritage attributes associated with the Adjacent Heritage Property were identified.	None –The portion of the property where the Bramalea PS facility is proposed (and to be acquired[2]) by Metrolinx does not contain heritage attributes.	Should the location/configuration of the proposed Bramalea PS facility change during detailed diesgn, potential impacts to the Adjacent Heritage Property (i.e., portion of the 8000 Dixie Rd site that contains CHVI) will be considered and reviewed to ensure no adverse impacts to the Adjacent Heritage Property.
Barrie Corridor (Segments 1-12)	BR-1-1	National Cash Register Company Bldg, 222 Lansdowne Street	Adjacent Protected Property	None expected	None	N/a
	BR-1-2	Former Rail Station at 1550 St. Clair Avenue West	Adjacent Protected Property	None expected	None	N/A
	BR-1-3	St. Clair Avenue West Bridge	Provincial Heritage Property	Installation of OCS wires	Alteration	Conduct HIA
	BR-1-4	York Beltline Trail	Adjacent Protected Property	None expected	None	N/A
	BR-3-1	Don River Culvert	Provincial Heritage Property	None expected	None: Culvert Removed	N/A
	BR-4-1	Maple GO Station	Provincial Heritage Property	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design
	BR-4-2	Village of Maple Heritage Conservation District	Adjacent Protected Property	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan.	Potential Alteration	Consultation with heritage staff at the City of Vaughan
	BR-5-1	Crawford and Maude Wells House	Adjacent Protected Property	None expected	None	N/A
	BR-6-1	Aurora GO Station	Provincial Heritage Property of Provincial Significance	Installation of OCS attachments	Alteration	HIA completed as part of the Electrification TPAP. Results and recommendations of the HIA will be adhered to during detailed design.

[2] Details regarding property acquisition were not yet finalized at the time of writing this report.

Rail Corridors/ Segments	CHR	Property Name	Metrolinx Heritage Committee Decision	Project Activities	Footprint Impacts	
					Potential Effect	Mitigation/Monitoring Commitments
	BR-6-2	Radial Railway Bridge Abutment	Adjacent Protected Property	None expected	None	N/A
	BR-7-1	Newmarket GO Station	Provincial Heritage Property	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design
	BR-7-2	Private Residence (Robinson House)	Adjacent Protected Property	None expected	None	N/A
	BR-7-3	Former Newmarket Train Station	Adjacent Protected Property	None expected	None	N/A
	BR-9-1	Bradford GO Station	Provincial Heritage Property	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design
	BR-11-1	Cotellucci Property	Adjacent Protected Property	None expected	None	N/A
	BR-12-1	Former Allandale Train Station	Adjacent Protected Property	None expected	None	N/A
Stouffville Corridor (Segments 1-7)	SV-2-1	Proposed Agincourt HCD	Adjacent Protected Property	None expected	None	N/A
	SV-3-1	Thomas Rivis House	Adjacent Protected Property	None expected	None	N/A
	SV-3-2	Hagerman Schoolhouse	Adjacent Protected Property	None expected	None	N/A
	SV-4-1	James Eckardt House	Adjacent Protected Property	None expected	None	N/A
	SV-4-2	Unionville HCD	Adjacent Protected Property	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, and modifications to the existing Bruce Creek Bridge located adjacent to the HCD are proposed, policies identified in the HCD Plan may be applicable.	Potential Alteration	Consultation with heritage staff at the City of Markham
	Sv-4-3	Former Unionville Train Station (property also includes the Stiver Mill Complex)	Adjacent Protected Property	None expected	None	N/A
	SV-5-1	Markham GO Station	Provincial Heritage Property	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design
	SV-5-2	Markham Village Heritage Conservation District	Adjacent Protected Property	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan.	Potential Alteration	Consultation with heritage staff at the City of Markham
	SV-6-1	Rouge National Urban Park	Adjacent Protected Property	No direct impacts to the heritage attributes associated with RNUP were identified as a result of OCS infrastructure. However, given that the railway corridor passes through the park, proposed infrastructure improvements may be subject to policies identified in the park management plan. In particular, policies on viewsheds and vegetation.	Potential Alteration	Consultation with park management staff at Rouge National Urban Park
Lakeshore East Corridor (Segments 1-8)	LSE-1-1	Carlaw Avenue Bridge	Provincial Heritage Property	Installation of OCS wires	Alteration	Conduct HIA during detailed design
	LSE-1-2	Gerrard Street East Bridge	Provincial Heritage Property	Installation of OCS wires	Alteration	Conduct a HIA during detailed design
	LSE-1-3	Riverdale HCD	Adjacent Protected Property	None expected	None	N/A
	LSE-4-1	Highland Creek Bridge	Provincial Heritage Property	Installation of OCS wires	Alteration	Conduct a HIA during detailed design
	LSE-4-2	Purvis Castle Log Cabin	Adjacent Protected Property	None expected	None	N/A

Rail Corridors/ Segments	CHR	Property Name	Metrolinx Heritage Committee Decision	Project Activities	Footprint Impacts	
					Potential Effect	Mitigation/Monitoring Commitments
	LSE-5-1	Rouge River Bridge	Provincial Heritage Property of Provincial Significance	OCS wires are to be attached to the newly constructed bridge	**Potential Direct Effects:** This Metrolix-owned rail bridge is being replaced with a new bridge structure (as part of a separate Metrolinx project – Lakeshore East Rail Corridor Expansion [Guildwood to Pickering]). Therefore there is potential for direct impacts related to installation of OCS wires to the newly constructed bridge. **Potential Indirect Effects:** The new structure will require attachment of OCS wires as part of the Electrification project which has the potential to disrupt the bridge crossing's park setting (i.e., indirect effects). Effects to the park setting are considered indirect.	• The existing Metrolix-owned rail bridge is being replaced with a new bridge structure (as part of a separate Metrolinx project – Lakeshore East Rail Corridor Expansion [Guildwood to Pickering]). In consideration of the bridge's removal, no direct adverse impacts to the newly constructed Rouge River Bridge are anticipated as a result of the proposed Electrficiation project activities. Therefore, no further mitigation is required. • The new structure will require attachment of OCS wires as part of the Electrification project which has the potential to disrupt the bridge crossing's park setting (i.e., indirect effects). Effects to the park setting are considered indirect and will therefore be addressed through preparation of a Heritage Impact Assessment during detailed design. The HIA will include MTCS consultation/review. Furthermore, it should be noted that introduction of OCS infrastructure and associated indirect impacts to the park setting of the surrounding Rouge National Urban Park will be mitigated through the following measures as recommended in this report: ▪ During detailed design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible around the Rouge Beach/Marsh area along the Lakeshore East Corridor and Stouffville Corridor. ▪ The extent of vegetation removal will be confirmed during detailed design. For the purposes of the TPAP, the project team has taken a conservative approach. Further consultation and coordination for any proposed tree/vegetation removals beyond the Metrolinx ROW will be undertaken as the project's design progresses.
	LSE-5-2	Petticoat Creek Culvert	Provincial Heritage Property	None expected	None	N/A
	LSE-5-3	Dunbarton Subway	Provincial Heritage Property	None expected	None	N/A

Rail Corridors/ Segments	CHR	Property Name	Metrolinx Heritage Committee Decision	Project Activities	Footprint Impacts	
					Potential Effect	Mitigation/Monitoring Commitments
	LSE-5-4	Miller Memorial Tree	Adjacent Heritage Property	Possible impacts during construction phase due to location of construction laydown site or realignment of trail	None	N/A
	SV-6-1	Rouge National Urban Park	Adjacent Heritage Property	No direct impacts to the heritage attributes associated with RNUP were identified as a result of OCS infrastructure. However, given that the railway corridor passes through the park, proposed infrastructure improvements may be subject to policies identified in the park management plan. In particular, policies on viewsheds and vegetation.	Potential Alteration	Consultation with park management staff at Rouge National Urban Park
	LSE-7-1	Former Whitby Train Station, relocated to 1450 Henry Street	Adjacent Protected Property	None expected	None	N/A
	LSE-8-1	Emanuel Sleep House, 601 Victoria Street	Adjacent Protected Property	None expected	None	N/A

Future Work – Cultural Heritage

Heritage Impact Assessments

The results and recommendations from the HIAs completed as part of the GO Rail Network Electrification TPAP will be implemented during Detailed Design (i.e., strategies to protect heritage attributes will be developed and implemented during Detailed Design as required in accordance with these studies). In addition, the HIAs identified to be completed during Detailed Design will be carried out and the recommendations followed/implemented as part of the final design for the structures/properties.

For Provincially Significant properties, MTCS approval will be obtained for any modifications to these structures/properties prior to construction.

Union Station Train Shed

In accordance with the Union Station Trainshed Electrification HIA Report (ERA, June 2017) (see **Appendix M**), the proposed interventions (i.e., modifications due to electrification) will have an impact on the heritage attributes of the structure. However, these impacts can be mitigated as the project undergoes further analysis of its requirements and as part of developing the final design.

Generally, design solutions should be designed in visual harmony with historic features and contemporary design, including:

- Mitigating material and visual impacts to the metal truss system and pre-cast cement smoke ducts;
- Limiting the number of OCS connections where possible;
- Limiting the removal of any Trainshed material, and allowing for reversibility should any material require removal;
- Minimizing the impact on the original heritage elements on Track 1 and 2;
- Final designs will be reviewed by Parks Canada and the City of Toronto.

Collateral Agreement – Union Station

Metrolinx will follow the May 1 2006 Collateral Agreement between Parks Canada, City of Toronto, and GO Transit (Metrolinx) for the Union Station Complex. The Metrolinx Heritage Committee declared Union a Metrolinx Heritage Property of Provincial Significance on March 29, 2016. Therefore, the Union Station Conservation Plan will be updated accordingly and will be adhered to for all electrification modifications required within the Union Station Train Shed.

Ministry of Tourism Culture & Sport Regulatory Requirements

Should any heritage attributes at Union Station be removed or demolished as part of the Electrification undertaking, approval from the Ministry of Tourism Culture & Sport (MTCS) will be required.

Credit River Bridge

In accordance with the Credit River Bridge HIA Report (ASI, August 2017) (see **Appendix M**), the proposed interventions (i.e., modifications due to electrification) will have an impact on the heritage attributes of the structure. However, these impacts can be mitigated as the project undergoes further analysis of its requirements and as part of developing the final design. Recommended mitigation measures can be found in Section **4.3.9.1.1** and the HIA contained in Appendix M.

Aurora GO Station

In accordance with the Aurora GO Station HIA Report (Taylor Hazell Architects Ltd., July 2017) (see **Appendix M**), the proposed interventions (i.e., modifications due to electrification) will have an impact on the heritage attributes of the Aurora GO Station. However, by following the mitigation measures and recommended alternatives, the severity of the impacts of the proposed activities on the attributes of the Aurora GO Station are reduced to 'low' or 'none'. The recommended mitigation measures can be found in Section **6.3.11.1.1** and the HIA contained in Appendix M.

Jointly Managed Heritage Resources

For all jointly managed (i.e., Metrolinx and City of Toronto or other municipality) heritage resources (i.e., bridge or rail overpass structures), the following process will be adhered to:

- Complete a Cultural Heritage Evaluation Report, as required;
- Undertake a Heritage Impact Assessment;
- Metrolinx's Contractor will prepare and implement an electrification infrastructure management plan in cooperation with the affected municipality;
- Metrolinx will prepare and implement a Strategic Conservation Plan.

Additional Potentially Affected Heritage Resources

For any additional potentially affected resources not previously identified through the TPAP process and documented in this EPR, the following process will be adhered to:

- Carry out a Cultural Heritage Evaluation Recommendation Report (CHER) to identify heritage value and attributes;
- If found to have cultural heritage value by the Metrolinx Heritage Committee, conduct a Heritage Impact Assessment (HIA) during Detailed Design to identify potential impacts and appropriate mitigation measures and incorporate mitigation measures into the final design.;
- Follow Metrolinx Interim Cultural Heritage Management Process (2013), for managing heritage assets;
- For any properties determined by the Metrolinx Heritage Committee to be of provincial heritage value, Metrolinx will include the property on the list of Provincial heritage properties maintained by the MTCS and will provide all related documents (e.g., CHERs, etc.) as appropriate to MTCS.

Archaeology

Stage 1 Archaeological Assessment

A Stage 1 Archaeological Assessment Study was completed for entire GO Rail Network Electrification Study Area including within the 7 metre OCS impact zone/vegetation removal zone along corridors and at all Tap and Traction Power Facility sites.

Stage 2 & 3 Archaeological Assessment

Table E- 3 summarizes the recommendations of the Stage 1 Archaeological Assessment work and subsequent Stage 2 and 3 Archaeological Assessments that will be completed following the TPAP (prior to construction).

Table E- 3: Summary of further Archaeological Assessment recommended

Study Corridor	OCS/Vegetation Zone and Facility Sites	Field Inspection	Archaeological Potential	Next Assessment Steps
Union Station Rail Corridor	OCS	No (no PTE or public access)	Yes (Possible Deeply Buried Wharf/Cribbing)	No Further Assessment: Stage 2 assessment or monitoring not practical nor likely informative
Lakeshore West	Mimico SWS	Yes (PTE)	No – Removed	No Further Assessment
	Mimico (Canpa) 25 kV Feeder Route (FR)	Yes (public access)	No – Removed	No Further Assessment
	Mimico Tap Location Mimico TPS	Yes (public access) Yes (public access)	Yes Yes	Stage 2 Test Pit Survey Stage 2 Test Pit Survey
	Oakville SWS	Yes (public access)	No – Removed	No Further Assessment
	Burlington Tap Location Burlington TPS	Yes (PTE) Yes (PTE)	Yes Yes (part) No (part) -- Removed	Stage 2 Test Pit Survey Stage 2 Test Pit Survey No Further Assessment
	OCS/Vegetation Zone	Yes (public access)	No – Removed along footprint and at bridges For Dunn, Dufferin, Dowling, Jameson and Drury bridges that have been identified for replacement: if during detailed design any impacts are anticipated that extend outside the disturbed OCS/Vegetation zone, then further	No Further Assessment Stage 1 and/or Stage 2 archaeological assessment; if required

Study Corridor	OCS/Vegetation Zone and Facility Sites	Field Inspection	Archaeological Potential	Next Assessment Steps
			archaeological assessment will be required to determine archaeological potential	
Kitchener	Bramalea PS	Yes (PTE)	Yes (part) No (part) -- Removed	Stage 2 Test Pit Survey No Further Assessment
	Bramalea 25 kV FR	Yes (public access)	No—Removed	No Further Assessment
	OCS/Vegetation Zone	Yes (public access)	No – Removed along footprint and at bridges (no bridge modifications anticipated)	No Further Assessment
Barrie	Maple PS	No (Stage 2 previously done)	Adjacent to Hope Primitive Methodist Cemetery	Stage 3 Cemetery Investigation if impacts are anticipated within 10 m of cemetery boundary
	Newmarket SWS	Yes (PTE and public access)	Yes No (part) – Removed	Stage 2 Test Pit Survey No Further Assessment
	Gilford PS	Yes (public access)	Yes	Stage 2 Test Pit Survey
	Preferred Allandale Tap Alternate Allandale Tap Allandale TPS	No (previously assessed) Yes (public access) Yes (PTE)	Yes Yes No--Removed	Stage 2 Test Pit Stage 2 Test Pit Survey No Further Assessment
	Barrie-Collingwood 25 kV Feeder Route	Yes (public access)	No – Removed	No Further Assessment
	OCS/Vegetation Zone	Yes (public access)	Yes (between Essa Road and Allandale GO Station adjacent to Allandale site BcGw-69) No—Removed at remainder and at bridges If during detailed design any bridge impacts are anticipated that extend outside the disturbed OCS/Vegetation zone, then further archaeological assessment will be required to determine archaeological potential	Stage 2 Test Pit Survey, Construction monitoring No Further Assessment Stage 1 and/or Stage 2 archaeological assessment; if required

Study Corridor	OCS/Vegetation Zone and Facility Sites	Field Inspection	Archaeological Potential	Next Assessment Steps
Stouffville	Scarborough Tap Location Scarborough TPS	Yes (public access) Yes (public access)	Yes Yes (part) No (part) --Removed	Stage 2 Test Pit Survey Stage 2 Test Pit Survey No Further Assessment
	Scarborough 25 kV FR	Yes (public access)	No – Removed	No Further Assessment
	Unionville PS	Yes (public access)	Yes (part) No (part) – Removed	Stage 2 Pedestrian and Test Pit Survey No Further Assessment
	Lincolnville PS	Yes (public access)	Yes	Stage 2 Test Pit Survey
	OCS/Vegetation Zone	Yes (public access)	No – Removed along footprint and at bridges If during detailed design any bridge impacts are anticipated that extend outside the disturbed OCS/Vegetation zone, then further archaeological assessment will be required to determine archaeological potential	No Further Assessment Stage 1 and/or Stage 2 archaeological assessment; if required
Lakeshore East	Don Yard PS	No (previously assessed)	N/A	N/A
	Scarborough SWS	Yes (PTE and public access)	No – Removed	No Further Assessment
	Durham SWS	Yes (PTE and public access)	Yes (part) No (part) – Removed	Stage 2 TP Survey No Further Assessment
	ERMF Tap Location ERMF TPS	Yes (public access) No (previously assessed)	No – Low and wet N/A	No Further Assessment N/A
	OCS/Vegetation Zone	Yes (public access)	Yes- Adjacent site requires confirmation of disturbance	With respect to the Rodd Avenue area along the LSE corridor, a Stage 2 archaeological assessment was previously completed and determined archaeological potential in the direct vicinity of the rail corridor; however within the rail ROW is disturbed and therefore

Study Corridor	OCS/Vegetation Zone and Facility Sites	Field Inspection	Archaeological Potential	Next Assessment Steps
				there is no archeological potential. If during detail design it is determined that OCS/electrification infrastructure will be required outside of the MX owned right of way in this particular area and that subsequent ground disturbance is required within the established 20m buffer area (insert figure reference showing this 20m buffer area to Stage 1 AA report or Volume 3), a Stage 3 archaeological assessment will be undertaken prior to construction No Further Assessment
			No – Removed along remainder of footprint and at bridges If during detailed design any bridge impacts are anticipated that extend outside the disturbed 7 metre OCS/Vegetation zone, then further archaeological assessment will be required to determine archaeological potential	Stage 1 and/or Stage 2 archaeological assessment; if required

Stage 3 & 4 Archaeological Studies

Based on the results of the Stage 2 archaeological assessments, further Stage 3 archaeological assessment and/or Stage 4 mitigation will be conducted, as required.

Previously Undocumented Archaeological Resources

Should previously unknown or unassessed deeply buried archaeological resources be uncovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering archaeological resources must cease alteration of the site immediately and engage a licensed archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the Ontario Heritage Act. Any person discovering human remains must immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Government Services.

Land Use & Socio-Economic

Union Station Rail Corridor

There are no traction power facilities (TPFs) or Tap locations within the Union Station Rail Corridor (USRC). Overhead Contact System (OCS) infrastructure will be installed within the right of way (ROW). No bridges within USRC are expected to have vertical clearance issues, and none of the modifications required are anticipated to lead to any potential footprint effects on adjacent land uses. As a result, footprint impacts will be limited to the Metrolinx right of way.

There is one sensitive facility, the St. Lawrence Co-Operative Day Care, approximately 20m from the OCS impact zone. There are no anticipated footprint effects on this facility.

Recreational amenities along Union Station Rail Corridor in the City of Toronto include Corktown Common, the Lower Don Trail, and the Martin Goodman Trail. In addition a connecting section of the Lower Don Recreational Trail has been planned and approved. The corridor and the proposed Don Yard Paralleling Station (PS) will be within close proximity to the proposed Don Landing Re-design, within the Lower Don Trail area.

There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the City of Toronto will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities. Overall, there are no net adverse land use effects anticipated.

Lakeshore West Corridor

There are four TPFs and two Tap locations within the Lakeshore West Corridor. The proposed infrastructure is compatible with surrounding land uses and there are no foreseen negative impacts resulting from their siting. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the local municipality will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. However, the TPF's and Tap locations are not anticipated to negatively affect future development within this zoning context. OCS infrastructure will be installed within the ROW and consequently will not have a footprint impact on adjacent lands.

Seven Bridges (Strachan Avenue Bridge, Dufferin Street Bridge, Dunn Avenue Bridge, Jameson Avenue Bridge, Browns Line Bridge, Royal Windsor Drive Bridge, Drury Lane Pedestrian Bridge are expected to have vertical clearance issues, and one pedestrian bridge (Dowling Avenue Bridge) requires replacement in order to accommodate a bridge barrier however none of the modifications required are anticipated to lead to any potential footprint effects on adjacent land uses.

Three road widening projects are proposed by Halton Region within this area. Consultation with Halton Region will be required during Detailed Design to discuss the progress of the Municipal Class Environmental Assessments and to finalize design details related to road and bridge projects. OCS attachments may be required in cases where bridges are widened.

There are no sensitive facilities in the immediate vicinity of the TPFs. However there are three sensitive facilities (Caring for Kids Child Care Center, Mentor College Primary Campus and Clarkson Angels Child Care and Educational Center), within the Lakeshore West Corridor (LSW-3 and LSW-4) the closest of these facilities is 25m from the OCS Impact Zone.

There are a number of existing and proposed recreational amenities (parks and trails) within the vicinity of the Lakeshore West rail corridor._There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the relevant municipalities will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Overall, there are no net adverse land use effects anticipated.

Kitchener Corridor

There is one TPF and one Tap location within the Kitchener Corridor. The proposed infrastructure is compatible with surrounding land uses and there are no foreseen negative impacts resulting from their siting. Further coordination (which may include a series of meetings, discussions, and agreements) with the local municipality will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. However, the TPF and Tap locations are not anticipated to negatively affect future development within this zoning context. OCS infrastructure will be installed within the ROW and consequently will not have a footprint impact on adjacent lands.

No bridges are expected to have vertical clearance issues, and none of the modifications required are anticipated to lead to any potential footprint effects on adjacent land uses.

There are no sensitive facilities in the immediate vicinity of the TPFs and there are no sensitive facilities in the vicinity of the OCS Impact Zone or TPFs.

Wildwood Park is the only large park that borders the Kitchener rail corridor. There are no anticipated adverse effects on this recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the City of Mississauga will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Overall, there are no net adverse land use effects anticipated.

Barrie Corridor

There are four TPFs and one Tap location within the Barrie Corridor. Generally the infrastructure is compatible with surrounding land uses and therefore there are no foreseen negative impacts from their siting. The proposed location for the Maple Paralleling Station (PS) is located within lands that are currently being studied for the future Block 27 Secondary Plan. Given the nature and function of a PS, it likely to have a similar impact on adjacent land uses as other types of similar critical infrastructure (i.e. sewage pumping station, well houses) and is therefore not anticipated to conflict the proposed residential development for the Block 27 area. Further coordination (which may include a series of meetings, discussions, and agreements) with local municipalities will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. The TPS and Tap locations are not anticipated to negatively affect future development within this zoning context. OCS infrastructure will be installed within the ROW and consequently will not have a footprint impact on adjacent lands.

Two bridges (Dundas Street Bridge and Hwy 401 Bridge) are expected to have vertical clearance issues, and none of the modifications required are anticipated to lead to any potential footprint effects on adjacent land uses.

There are no sensitive facilities in the immediate vicinity of the TPFs. However there are three sensitive facilities (St. Nicholas of Bari Catholic Elementary School, Kidz World Child Care Centre, Aurora Montessori School), within the Barrie Corridor (BR-1, BR-5, BR-7) the closest of these facilities is 15m from the OCS Impact Zone.

There are a number of existing and proposed recreational amenities (parks and trails) within the vicinity of the Barrie rail corridor, including an Environmental Assessment for an extension of the West Toronto Rail Path that was recently approved. There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the relevant municipalities will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Overall, there are no net adverse land use effects anticipated.

Stouffville Corridor

There are three TPFs and one Tap location within the Stouffville Corridor. The proposed infrastructure is compatible with surrounding land uses and there are no foreseen negative impacts resulting from their siting. Further coordination (which may include a series of meetings, discussions, and agreements) with local municipalities will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. OCS infrastructure will be installed within the ROW and consequently will not have a footprint impact on adjacent lands.

No bridges are expected to have vertical clearance issues, none of the modifications required are anticipated on lead to any potential footprint effects to adjacent land uses.

There are over seven sensitive facilities in the immediate vicinity of the Scarborough 25kV Feeder Route. However there are four sensitive facilities (Rainbow Village Childcare Centre, Heart Beatz Child Care, Bill Crothers Secondary School, Little Readers Academy), within the Stouffville Corridor (SV-1, SV-4, SV-5) the closest of these facilities is 20m from the OCS Impact Zone.

There are a number of existing and proposed recreational amenities (parks and trails) within the vicinity of the Stouffville rail corridor, including a number of enhancement proposals within the northern segment of the Rouge National Urban Park. There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required Parks Canada and the relevant municipalities will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Overall, there are no net adverse land use effects anticipated.

Lakeshore East Corridor

There are four TPFs and one Tap location within the Lakeshore East Corridor. The proposed infrastructure is compatible with surrounding land uses and there are no foreseen negative impacts resulting from their siting. Further coordination (which may include a series of meetings, discussions, and agreements) with local municipalities will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. However, the TPF and Tap locations are not anticipated to negatively affect future development within this zoning context.

The proposed Don Yard PS is located in close proximity to lands designated as Urban River Valley under the Greenbelt Plan. OCS infrastructure will be installed within the ROW and consequently will not have a footprint impact on adjacent lands. One bridge (Birchmount Road Bridge) is expected to have vertical clearance issues. None of the modifications required are anticipated to lead to any potential footprint effects on adjacent land uses.

There are over seven sensitive facilities in the immediate vicinity of the Scarborough 25kV Feeder Route There are four sensitive facilities (Le Petit Chaperon Rouge – Jones, Enderby (Woodgreen), Chester Village, and Ballycliffe Lodge Nursing Home), within the Lakeshore East Corridor (LSE-1, LSE-2, LSE-7) the closest of these facilities is approximately 4.5m from the OCS Impact Zone. In order to mitigate impact to Chester Village further coordination (which may include a series of meetings, discussions, and agreements) with property owners will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses.

There are a number of existing and proposed recreational amenities (parks and trails) within the vicinity of the Lakeshore East rail corridor, including a number of enhancement proposals within the southern segment of the Rouge National Urban Park. There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required Parks Canada and the relevant municipalities will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Overall, there are no net adverse land use effects anticipated.

The detailed assessment of socio-economic effects such as those related to visual/aesthetics, noise & vibration, electromagnetic Interference/electromagnetic fields, and Air Quality have been detailed in the respective sections of Volume3 and in the following reports:

- Air Quality Assessment Report (Appendix F)
- Noise and Vibration Modelling Reports (Appendix G)
- Visual Assessment Report (Appendix H)
- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Assessment Report (Appendix J)

The socio-economic effects associated with the electrification undertaking are generally positive for riders and the general public:

- *Faster service*. Electric trains can accelerate faster and stay at top speed for longer, saving time for riders.
- *Reduced congestion*. By attracting additional riders, frequent electric train service reduces road congestion.
- *A more frequent and reliable service*. Electric trains allow for more frequent service, reducing reliance on scheduled trips and increasing the number of available seats.
- *Lower operating and maintenance costs*. Electric trains have lower operating costs and require less maintenance than diesel trains.

- *Improved local air quality and noise levels*. The use of electric trains will reduce the amount of greenhouse gas emissions from rail transport regionally, leading to improved local air quality. Electric trains are also generally quieter than diesel trains, reducing the amount of noise that would otherwise be generated as service increases. Noise from Traction Power Facilities (TPFs) is generally expected to be extremely low and facilities have generally been sited to avoid impacts to sensitive facilities.

Short Term Construction Phase Impacts

Construction activities associated with the Electrification Project are anticipated to be temporary, short-term and localized in nature. There is the potential for minor, temporary effects on land use during construction due to construction staging areas, equipment storage areas, etc. that may be required as well as short term nuisance effects on nearby residents (e.g., dust, noise, and vibration) however, these effects will cease once construction has finished. Refer to Air Quality and Noise/Vibration sections below for further detail regarding mitigation measures applicable to the construction phase.

Potential effects to sensitive facilities resulting from the construction of the electrification components (e.g., OCS, bridge modifications) may include nuisance effects such as noise, vibration, and temporary traffic effects (e.g., temporary detours); however, these effects will cease once construction has finished.

Mitigation Measures/Commitments

- Staging options should be developed to minimize potential effects on local access and travel patterns where possible.
- Construction Management Plans as well as Traffic Management Plans will be developed prior to commencing construction in consultation with local municipalities/road authorities as appropriate.
- Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible
- Coordination/consultation with the City of Vaughan regarding final design of the Maple PS within the Block, 27 Secondary Plan.
- Coordination/consultation with the Town of Innsifil regarding final design of the Gilford PS facility as it relates to surrounding/proposed land use, as appropriate.
- Coordination and consultation with the City of Toronto, Waterfront Toronto, Toronto and Region Conservation Authority, and other interested/affected stakeholders will be carried out as part of detailed design to determine the final design of the Don Yard PS facility in relation to the surrounding /proposed land use developments in the vicinity of the proposed PS facility site.
- Coordination/consultation with the City of Barrie regarding final design of the Allandale Tap/TPS with respect to possible conflict with proposed SWM pond.

Air Quality

Electrification will result in a significant reduction of diesel emissions which have both local and regional impacts, but also requires increased electricity generation, some of which will come from power plants operating on fossil fuel, thus adding back some regional impacts. This study quantifies the emissions from both the electricity generation required to power the electric trains based on the future (2025) service levels, and from the locomotives themselves if the trains were to remain diesel-powered. These calculations are used to establish what the net change in regional emissions will be due to electrification. The impact on climate change is also assessed by quantifying the emissions of greenhouse gases (as carbon dioxide equivalent, or CO_2e) for diesel versus electric trains.

Overall, electrification of the GO Rail Network shows a net reduction in total emissions when compared to present-day (mostly Tier 2/3) or potential future (Tier 4) diesel-powered trains. The predicted benefits of electrification with respect to air quality and climate change are greatest when more of the electricity is assumed to be generated through nuclear or hydroelectric power plants.

The reduction in diesel exhaust emissions will translate into a reduction in the local levels of air pollutants at locations adjacent to the rail corridors. Most of the pollutants of concern have significant contributions from other sources, such as other rail operators, road traffic, industry, residential/commercial heating, etc., and therefore, are not strongly impacted by the reduction of GO Transit's diesel locomotive emissions. The most significant exception is nitrogen dioxide (NO_2), which may experience a more significant decrease in maximum short-term concentrations adjacent to the corridors. In terms of regional air quality implications, the contribution of the GO Rail Network to the total regional emissions is small, and as such, the electrification provides only a small benefit for regional air quality. It also provides a small direct benefit in terms of greenhouse gas emissions.

Two existing maintenance facilities (Willowbrook and East Rail Maintenance Facility) will be modified to accommodate electric GO Trains. No significant changes to emissions or new sources of air emissions are expected as a result of modifying the existing maintenance facilities to accommodate electric GO Trains.

Construction activities will involve heavy equipment that generates air pollutants and dust. Mitigation of construction emissions is normally achieved through diligent implementation of operating procedures such as watering or applying other dust suppressants, covering up stockpiles, reducing travel speeds for heavy vehicles, minimizing haul distances, and efficiently staging the activities

Noise

Recognizing that electrification of the GO network is a component of the over-arching Regional Express Rail plan, a comprehensive noise study was undertaken to examine the noise effects of the conversion to increased electric service[3] as part of the GO Rail Network Electrification TPAP.

[3] *The electric RER scenario will entail a mixed diesel and electric fleet.*

The objective of the Noise study was to assess the effects on noise levels due to the conversion from existing/present day (2015) diesel-based GO service levels (referred to as the Future No-Build scenario) to the Electric (2025) GO RER electric-based service levels (referred to as the Future Build Scenario), and to subsequently determine whether mitigation measures may be required to address adverse noise effects. The scope of the study examined noise effects due to electric RER GO service along the rail corridors as well as noise effects related to the proposed Tap locations and Traction Power Facilities.

Cadna/A Modelling

The MOEE/GO Protocol stipulates the use of a model known as Sound from Trains Environmental Analysis Method (STEAM) for predicting rail traffic noise levels. STEAM was developed by the MOECC (MOECC, 1990). The present study deviated from this guidance in that the rail traffic noise levels were modelled using the "Federal Noise and Vibration Impact Assessment" (FTA Protocol) (FTA, 2006) incorporated in Cadna/A. Cadna/A allows for the modelling of complex railway schemes including curves, parallel and intervening tracks which cannot be easily assessed using STEAM. Cadna/A is software that includes the implementation of the FTA noise propagation algorithms and as well as aspects of ISO 9613 algorithms (ISO 1994, ISO 1996).

The existing, Diesel RER and Electric RER noise levels were modelled for the entire Study Area. Results at each discrete receptor were used to establish the adjusted noise impact of the Diesel RER scenario relative to the existing scenario, as well as that of the Electric RER scenario relative to the existing scenario.

As per the FTA Protocol, the diesel trains and electric trains were modelled with a noise source height of 2.4 metres (8 ft) and 0.6 metres (2ft), respectively. The noise from a diesel train is dominated by the engine (located at approximately 2.4 metres above the rail) with a lesser contribution from the wheels (located at approximately 0.6 metres above the rail). The noise from an electric train, on the other hand, is dominated by wheel noise (emitted approximately 0.6 metres above the rail), since the electric engine is relatively quiet.

Topography was included in the Cadna/A model to take into consideration the elevation differences of the railway, receptors and the intervening terrain. The topographical features were assumed to be the same in the existing and future scenarios. High-resolution (i.e., 5 metres) topographical information was obtained from public databases (Ministry of Natural Resources and Forestry, 2016).

"Retained" Noise Barriers

The diesel and electric locomotives were defined using the FTA standards implemented into Cadna/A. At the time of the original noise assessment, the electric locomotive train type was defined mathematically within Cadna/A with a "K" constant[4] that differed from the "K" constant defined in the FTA model.

[4] The "K" constant is un unnamed parameter in the FTA calculations, which describes the locomotive type (i.e., passenger diesel, electric, DMU, etc.)

Metrolinx presented the results of the preliminary noise modelling for electric RER service at a series of public consultations throughout the TPAP.

Following the original assessment, an option within Cadna/A to use the "K" constant which corresponds to the FTA model was created by Datakustik, the developers of the Cadna/A software. Re-assessment using this updated Cadna/A option showed that a limited number of areas where mitigation was previously identified using the preliminary noise modelling no longer achieves an increase of 5 dB or more with the updated Cadna/A noise modelling. This was a result of the correction to the noise modelling input that more accurately reflects the quieter nature of electrified locomotives. Metrolinx believes these supplemental areas should still be included for consideration of noise mitigation. As a result, the locations of these particular mitigation barriers are identified as "retained mitigation barriers" throughout **EPR Appendix G**, and in the mapping provided in **EPR Appendix S**. Refer to the orange coloured lines/symbols shown on the Lakeshore East Corridor **EPR Appendix S** maps.

Union Station Rail Corridor

The Adjusted Noise Impact between Existing and Electric RER noise levels for USRC is summarised for the evaluated 6 representative receptors can be summarised as follows:

- 6 daytime adjusted noise impacts were deemed to be Insignificant (i.e., less than 2.99 dB); and
- 6 nighttime adjusted noise impacts were deemed to be Insignificant (i.e., less than 2.99 dB).

There are no adjusted noise impacts in the Electric RER scenario that were deemed to be Noticable, Significant or Very Significant (i.e. greater than 10 dB increase).

Mitigation measures were investigated for all points of receptors with a significant adjusted noise impact (i.e., 5 dB increase or greater) in accordance with the MOEE/GO Protocol. As all Adjusted Noise Impacts for the Electric RER scenario were predicted to be not significant (i.e. there was less than 5 dB increase); investigation of noise mitigation was not required.

Refer to **Appendix G and Appendix** S for further detail regarding the noise assessment and for maps showing locations of receptors and technically feasible noise mitigation barriers.

Lakeshore West Corridor

The Adjusted Noise Impact between Existing and Electric RER noise levels for the Lakeshore West corridor is summarised for the evaluated 77 representative receptors can be summarised as follows:

- 77 daytime Adjusted Noise Impacts were deemed to be insignificant (i.e., less than 2.99 dB);
- 67 nighttime Adjusted Noise Impacts were deemed to be insignificant (i.e., less than 2.99 dB); and
- 10 nighttime Adjusted Noise Impacts were deemed to be noticeable (i.e., between 3 and 4.99 dB).

There are no Adjusted Noise Impacts in the Electric RER scenario that were deemed to be significant (i.e., between 5 and 9.99 dB increase) or very significant (i.e., greater than 10 dB increase).

As all Adjusted Noise Impacts for the Electric RER scenario were predicted to be not significant (i.e. there was less than 5 dB increase); investigation of noise mitigation was not required.

Refer to **Appendix G and Appendix** S for further detail regarding the noise assessment and for maps showing locations of receptors and technically feasible noise mitigation barriers.

Kitchener Corridor

The Adjusted Noise Impact between Existing and Electric RER noise levels for the Kitchener corridor is summarised for the evaluated 3 representative receptors can be summarised as follows:

- 1 daytime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 2 daytime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB);
- 1 nighttime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB); and
- 2 nighttime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB).

There are no Adjusted Noise Impacts in the Electric RER scenario that were deemed to be Significant (i.e., between 4.99 and 9.99 dB) or Very Significant (i.e. greater than 10 dB increase).

Mitigation measures were investigated for all receptors with a significant adjusted noise impact (i.e., between 4.99 dB and 9.99 dB increase) in accordance with the MOEE/GO Protocol. As all Adjusted Noise Impacts for the Electric RER scenario were predicted to be not significant (i.e. there was less than 5 dB increase); investigation of noise mitigation was not required.

Refer to **Appendix G and Appendix** S for further detail regarding the noise assessment and for maps showing locations of receptors and technically feasible noise mitigation barriers.

Barrie Corridor

The Adjusted Noise Impact between Existing and Electric RER noise levels for the Barrie corridor is summarised for the evaluated 140 representative receptors can be summarised as follows:

- 39 daytime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 62 daytime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB;
- 34 daytime Adjusted Noise Impacts were deemed to be Significant (i.e., greater than 5 dB increase).
- 5 daytime Adjusted Noise Impacts were deemed to be Very Significant (i.e., greater than 10 dB increase);

- 28 nighttime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 30 nighttime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB); and
- 63 nighttime Adjusted Noise Impacts were deemed to be Significant (i.e., between 5 and 9.99 dB increase); and
- 19 nighttime Adjusted Noise Impacts were deemed to be Very Significant (i.e., greater than 10 dB increase).

Mitigation measures were investigated for all points of receptors with a Significant or Very Significant Adjusted Noise Impact (i.e., 5 dB increase or greater) in accordance with the MOEE/GO Protocol. The Adjusted Noise Impacts were predicted to be Significant or greater for 88 receptors. See Figures in **Appendix S** for locations of receptors.

Refer to **Appendix G and Appendix** S for further detail regarding the noise assessment and for maps showing locations of receptors and technically feasible noise mitigation barriers.

Stouffville Corridor

The Adjusted Noise Impact between Existing and Electric RER noise levels for the Stouffville corridor is summarised for the evaluated 87 representative receptors can be summarised as follows:

- 59 daytime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 19 daytime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB);
- 9 daytime Adjusted Noise Impacts were deemed to be Significant (i.e., greater than 5 dB increase).
- 32 nighttime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 12 nighttime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB);
- 32 nighttime Adjusted Noise Impacts were deemed to be Significant (i.e., between 5 and 9.99 dB increase); and
- 11 nighttime Adjusted Noise Impacts were deemed to be Very Significant (i.e., greater than 10 dB increase).

Mitigation measures were investigated for all points of receptors with a Significant or Very Significant Adjusted Noise Impact (i.e., 5 dB increase or greater) in accordance with the MOEE/GO Protocol. The daytime Adjusted Noise Impacts were predicted to be significant for 9 receptors and the nighttime Adjusted Noise Impacts were predicted to be significant or very significant for 43 receptors.

Refer to **Appendix G and Appendix** S for further detail regarding the noise assessment and for maps showing locations of receptors and technically feasible noise mitigation barriers.

Lakeshore East Corridor

The Adjusted Noise Impact between Existing and Electric RER noise levels for the Lakeshore East corridor is summarised for the evaluated 104 representative receptors can be summarised as follows:

- 74 daytime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 26 daytime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB;
- 4 daytime Adjusted Noise Impacts were deemed to be Significant (i.e., between 5 and 9.99 dB increase).
- 57 nighttime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 18 nighttime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB); and
- 29 nighttime Adjusted Noise Impacts were deemed to be Significant (i.e., between 5 and 9.99 dB increase).

Mitigation measures were investigated for all receptors with a Significant Adjusted Noise Impact (i.e., between 5 and 9.99 dB increase) in accordance with the MOEE/GO Protocol. The Adjusted Noise Impacts were predicted to be Significant or greater for 28 receptors.

Refer to **Appendix G and Appendix** S for further detail regarding the noise assessment and for maps showing locations of receptors and technically feasible noise mitigation barriers.

Tap Locations

Hydro One tap infrastructure is not considered a source of noise and therefore was not considered in the noise assessment.

Traction Power Facilities

In the case of traction power facilities, noise impacts were expressed in terms of maximum daytime and nighttime 1-hour equivalent sound levels and were compared to applicable limits, as set out in the MOECC's Environmental Noise Guideline, NPC-300 (see **Appendix G**).

TPFs - Lakeshore West
The predicted noise impacts from the traction power facilities at nearby receptors were below the limits. Therefore, noise mitigation recommendations for traction power facility stationary sources are not required.

TPFs - Kitchener
The predicted noise impacts from the traction power facility at nearby receptors were below the limits. Therefore, noise mitigation measures for traction power facility stationary sources are not required.

TPFs - Barrie

Daytime, evening and/or nighttime predicted noise impacts of the Gilford PS at the façade and outdoor area of the residences represented by receptors R101, R102 and R103 are above the corresponding exclusion limits. Evaluation of more accurate sound levels for transformers and, if necessary, mitigation measures such as low noise fans or barriers should be investigated for the Gilford PS location during Detailed Design.

TPFs - Stouffville

The predicted noise impacts from the traction power facility at nearby receptors are below the MOECC applicable exclusion limits, with exception of one receptor (R11). The nighttime predicted noise impact of the Scarborough Tap/TPS location at R11r is 46 dBA, which is above the 45 dBA nighttime exclusion limit. Therefore mitigation measures such as low noise fans or barriers should be investigated.

TPFs - Lakeshore East

The predicted noise impacts from the traction power facilities at nearby receptors were below the limits. Therefore, noise mitigation recommendations for traction power facility stationary sources are not required.

Short Term Construction Phase Noise

To minimize the potential for construction noise impacts, the following mitigation measures will be considered and implemented by the Contractor during construction where possible:

- Metrolinx Community Relations staff will communicate construction work and respond to inquiries from residents and businesses.
- When possible, construction should be limited to the time periods allowed by the locally applicable bylaws (generally during the daytime hours and during weekdays). Certain type of construction work can only be completed when trains are not in service (i.e., outside of business hours). Although provincial agencies such as Metrolinx and Hydro One are not subject to municipal bylaws, Metrolinx (and it's Contractor) will endeavour to adhere to these local bylaws as a best practice, where practical. As part of the electrification construction activities, nighttime work may be required. Although Metrolinx is exempt from municipal noise control bylaws that place limits on the timing of construction activity, Metrolinx (and their Contractor) will strive to adhere to such bylaws by limiting nighttime noisy activities wherever practical.
- All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. All construction equipment should be verified to comply with MOE NPC-115 guidelines.
- The Contract documents should contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to be in effect.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measured may be required, where reasonably available.

- The separation distance between construction staging areas and nearby sensitive receptors is to be maximized to the extent possible to reduce noise impacts.
- Trains passing construction zones may be required to use bells and/or whistles to warn construction personnel for safety reasons. This should be minimized as much as practical while ensuring the safety of everyone involved.
- Construction equipment has safety features such as backup alarms while backing up (beeping sound). This is for the protection and safety of the workers, and is legally required. Consideration will be given to the use of broadband rather than tonal backup beepers.
- A proactive communications protocol is recommended that would advise residents in advance of nighttime construction or particularly noisy construction at any time.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative and economic feasibility of the various alternatives.

Vibration

The vibration assessment focused on the change between the existing vibration levels and the future vibration levels, as per the MOEE/GO Transit Protocol for Noise and Vibration Assessment. The subsections that follow outline which locations along each rail corridor where vibration mitigation will be considered.

Union Station Rail Corridor

To accommodate future increases in RER rail traffic, additional track will be added near the Bathurst North Yard and near the Don Yard. Associated with the additional track is the placement of new switches. The additional track and switches are applicable to both the Diesel and Electric RER scenarios.

In the case of receptor R09, the threshold is exceeded during pass-bys of both GO trains and freight trains. Mitigation such as ballast mats, under sleeper pads or resilient fixation should be investigated for all the receptors with similar conditions (i.e., 18 metre distance to proposed new tracks) as the evaluated receptors. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage.

Lakeshore West Corridor

The only area of interest identified along the LSW corridor was the addition of a fifth track between Strachan Avenue and Exhibition GO Station to accommodate future increases in rail traffic.

Neither existing nor future vibration levels from either GO, VIA or freight trains at the nearest receptor near the track upgrade were predicted to exceed the lowest MOEE/GO Protocol objective of 0.14 mm/s; therefore, mitigation was not investigated.

Kitchener Corridor

The area of interest identified along the Kitchener corridor is the addition of a track to accommodate RER service between Strachan Avenue and Bramalea GO Station, spanning the entire Study Area.

Neither, the existing and nor future vibration for GO Train traffic at the nearest receptor near the track upgrade was predicted to exceed the lowest MOEE/GO Protocol objective of 0.14 mm/s; and therefore, mitigation was not investigated.

Barrie Corridor

It was identified that receptors R015, R032, R014, R027, R039 and R049 are the closest receptors to the proposed new track and switches along the Barrie corridor; therefore, the vibration assessment focused on these seven receptors.

The predicted change in vibration level between existing conditions and future conditions is in excess of the 25% increase threshold set out in the MOEE/GO Protocol, at all of the identified receptors except R027. In the case of receptors R015 and R032, the threshold is exceeded during pass-bys of both GO Trains and freight trains. In the case of receptors R014, R039 and R014, the threshold is exceeding only during freight pass-bys. Mitigation such as ballast mats, under sleeper pads or resilient fixation should be investigated for all receptors within a 60 metre distance of proposed new switches or other special track work, or within a 15-25 metre distance of proposed new tracks. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage.

Stouffville Corridor

The areas of interest identified along the Stouffville corridor are the additional track to be placed between Kennedy GO station and Milliken GO Station, as well as near Unionville GO station, as well as the associated new switches.

For GO train traffic passing over a new switch, the increase in predicted vibrations levels is in excess of the 25% increase threshold for nearby receptors. Mitigation such as ballast mats, under sleeper pads or resilient fixation should be investigated for all receptors within 40 metres of proposed special track work. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage. In areas where new track is added, but there is no special track work, vibration levels for all train types comply with the 0.14 mm/s objective. Mitigation measures are therefore not recommended for these areas.

Lakeshore East Corridor

The area of interest identified along the Lakeshore East Rail Corridor is additional track that will be added between the Don River and the Scarborough Junction and between Guildwood GO Station and the Durham Junction, as well as the associated new switches.

It was identified that receptors R021B, R023B, R037B, R043, R013, R027, R031 and R077 are the closest receptors to the proposed new track and switches; therefore, the vibration assessment focused on these eight receptors.

The predicted change in vibration level between existing conditions and future conditions is in excess of the 25% increase threshold set out in the MOEE/GO Protocol, at all of the identified receptors except R027 and R031. In the case of receptors R021B and R023B, the threshold is exceeded during pass-bys of GO trains, other passenger trains and freight trains. In the case of receptors R037B and R043, the threshold is exceeded during pass-bys of GO trains and freight trains. In the case of R013 and R077, the threshold is exceeded during freight pass-bys only. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage.

Short Term Construction Phase Vibration

To minimize the potential for construction vibration impacts, the following mitigation measures will be considered and implemented by the Contractor during construction where possible:

- Metrolinx Community Relations staff will communicate construction work and respond to inquiries from residents and businesses;
- A proactive communications protocol is recommended that would advise residents in advance of nighttime construction.
- When possible, construction should be limited to the time periods allowed by the locally applicable bylaws (generally during the daytime hours and during weekdays). Certain type of construction work can only be completed when trains are not in service (i.e., outside of business hours). Although provincial agencies such as Metrolinx and Hydro One are not subject to municipal bylaws, Metrolinx (and it's Contractor) will endeavour to adhere to these local bylaws as a best practice, where practical. As part of the electrification construction activities, nighttime work may be required. Although Metrolinx is exempt from municipal noise control by-laws that place limits on the timing of construction activity, Metrolinx (and their Contractor) will strive to adhere to such bylaws by limiting nighttime noisy activities wherever practical.
- All construction equipment should be verified to comply with MOE NPC-115 guidelines;
- A more detailed vibration assessment of construction be completed when the specifics of construction equipment are finalized prior to the commencement of construction. This assessment should consider minimizing construction vibration levels, while balancing construction schedules and expediting construction activity;
- Pre-condition surveys for properties within the zone of influence of the planned work will be completed to establish the property condition and set a baseline prior to any work beginning.
- Consideration should be given to monitoring of vibration during vibration intensive activities, to confirm that levels do not approach those required for structural damage;

- In the presence of persistent complaints and subject to the results of a field investigation, alternative vibration control measures may be required, where reasonably available. In selecting appropriate vibration control and mitigation measures, consideration should be given to the technical, administrative and economic feasibility of the various alternatives;
- Damages to building may result when these activities occur within 15 m. It is recommended that a 15 m setback distance between the construction vibration source and nearby buildings be implemented where possible. If not possible, then the vibration levels associated with the activity should be monitored.

Visual

Based on the Visual Impact Assessment study undertaken as part of the TPAP, areas of special visual/aesthetic consideration were identified along the rail corridors as outlined in **Table E-4**. These areas were classified as high or moderate visual impact areas. Special consideration will be given to these areas during Detailed Design (as described below) to determine whether the aesthetic aspects of the electrification infrastructure can be enhanced. Traction power facilities and mitigation measures are discussed separately below.

Table E- 4: Areas of special Visual/aesthetic consideration along rail corridors

Project Component	High Potential Visual Impact	Moderate Potential Visual Impact
Union Station Rail Corridor (USRC)	• GO Stations with visual integrity ○ Union Station (See Map A-1 in EPR Appendix H)	• Residential areas where homes are between 8 and 20 metres from the railroad ROW (see Maps A-1, A-2 in EPR Appendix H)
Lakeshore West Corridor (LSW)	• Residential areas where homes are less than 8 metres from the railroad ROW • (see Maps B-12 to B-14 in EPR Appendix H)	• Residential areas where homes are between 8 and 20 metres from the railroad ROW • (see Maps B-7, B-8, B-9, B-10, B-14 and B-15 in ERP Appendix H) • Scenic Areas ○ Memorial Park (see Map B-11 in EPR Appendix H) • Scenic overpasses ○ Etobicoke Creek (see Map B-7 in EPR Appendix H) ○ Credit River (see Map B-11 in EPR Appendix H) ○ Sixteen Mile Creek (see Map B-21 in EPR Appendix H) • Bridges with interesting or scenic views: ○ Strachan Avenue (See Map B-1 in EPR Appendix H) ○ Dufferin Street (See Map B-1 in EPR Appendix H)

Project Component	High Potential Visual Impact	Moderate Potential Visual Impact
		◦ Islington Avenue (See Map B-5 in EPR Appendix H) • Pedestrian bridges ◦ Sunnyside (See Map B-2 in EPR Appendix H) ◦ Drury Lane (See Map B-31 in EPR Appendix H)
Kitchener Corridor (KT)	• None	• Residential areas where homes are between 8 and 20 metres from the railroad ROW • (See Map C-2 in EPR Appendix H)
Barrie Corridor (BR)	• Residential areas where homes are less than 8 metres from the railroad ROW • (see Map D-2 to D-4)	• Residential areas where homes are between 8 and 20 metres from the railroad ROW • (See Maps D-2, D-3, D-4, D-38 and D-39 in EPR Appendix H) • Scenic areas ◦ Allandale Waterfront (see Maps D-70 to D-71 in EPR Appendix H) • Scenic overpasses ◦ West Holland River (See Maps D-45 in EPR Appendix H) • GO Stations with visual integrity ◦ Allandale (See Maps D-70 in EPR Appendix H) • Bridges with interesting or scenic views ◦ King Road (See Map D-27 in EPR Appendix H) and Keele Street (See Map D-27 in EPR Appendix H) • Pedestrian bridges ◦ Innes Avenue (See Map D-4 in EPR Appendix H)
Stouffville Corridor (STV)	• Residential areas where homes are less than 8 metres from the railroad ROW • (see Maps E-1 and E-7 in EPR Appendix H) • Areas along the STV corridor adjacent to Rouge National Urban Park (see Maps E-21, E-22, E-23 in EPR Appendix H)	• Residential areas where homes are between 8 and 20 metres from the railroad ROW • (See Map E-8 in EPR Appendix H) • Scenic areas ◦ Main Street Unionville (See Map E-14 in EPR Appendix H) • GO Stations with visual integrity ◦ Stouffville (See Map E-24 in EPR Appendix H)

Project Component	High Potential Visual Impact	Moderate Potential Visual Impact
		• Pedestrian bridges ○ Mooregate Avenue (See Map E-3 in EPR Appendix H)
Lakeshore East Corridor (LSE)	• Residential areas where homes are less than 8 metres from the railroad ROW • (see Map F-3 in EPR Appendix H) • Areas along the LSE corridor adjacent to Rouge National Urban Park (see Map F-16 in EPR Appendix H)	• Residential areas where homes are between 8 and 20 metres from the railroad ROW • (see Maps F-6, F-7 and F-8 in EPR Appendix H) • Scenic areas ○ Lakeshore (See Maps F-13 to F-16 in EPR Appendix H) • Scenic overpasses ○ Rouge Hill (See Maps F-16 in EPR Appendix H) • GO Stations with visual integrity ○ Rouge Hill (See Maps F-14 in EPR Appendix H) • Pedestrian bridges ○ Pape Avenue (See Map F-2 in EPR Appendix H) and Woodrow Avenue (See Map F-6 in EPR Appendix H)

Tree Removals along Corridors/within Adjacent Parks

As part of the electrification project, a Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the area encompassed by the overhead contact system/2 X 25 kV feeders plus an additional 2 metre offset area on either side of the OCS components or 2 X 25 kV feeders. As a result, the total clearing area is defined as 7 metre measured from the centerline of the outermost tracks to be electrified/feeder routes on either side of each rail corridor/feeder route. The 7 metre zone is considered a maximum removal zone; during detailed design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

The Tree Compensation Protocol requirements will entail offsetting tree loss as much as possible/feasible through planting of trees in other areas of affected parks wherever possible; which will also help minimize visual effects due to tree removal. During detailed design, municipalities will be engaged as appropriate in the further development of the Metrolinx Tree Compensation Protocol.

OCS (Overhead Contact System)/Rail Corridors

- The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the detailed design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

- The Metrolinx Tree Compensation Protocol requirements will entail offsetting tree loss as much as possible/feasible through planting of trees in other areas and in affected parks wherever possible; which will also help offset/minimize visual effects due to tree removal.

Bridges/Rail Overpasses

- All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during detailed design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

- During detailed design, consider locating OCS structures away from existing bridge/rail overpass structures, where possible, to limit visibility to public viewing areas traversing corridor. Place OCS support structures symmetrically on or on either side of bridges and viaducts where possible.

Traction Power Facilities (TPFs)

- The following traction power facilities will be designed to include some form of visual screening: Maple PS, Gilford PS, Scarborough TPS, Scarborough SWS, Newmarket SWS, Don Yard PS

- During detailed design, undertake further review of TPF design in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible.

GO Stations

- During detailed design efforts will be made to minimize visual effects as much as possible.

Taps/Traction Power Facilities

The installation of Taps/Traction Power Facilities have potential to affect views within the surrounding area, particularly where vegetation/tree clearing is required or where there are no existing obstructions. Many Taps and TPFs are expected to have minimal to negligible effects on visual landscapes since they are located in industrial areas. However in cases where a facility is proposed within the vicinity of residential/sensitive areas and/or other visually sensitive areas, landscaping and/or screening will be implemented around the facility. These specific locations include:

- Maple PS (vicinity of Barrie corridor)

- Gilford PS (vicinity of Barrie rail corridor)
- Newmarket SWS (vicinity of Barrie rail corridor)
- Scarborough TPS (vicinity of Stouffville corridor)
- Scarborough SWS (vicinity of Lakeshore East corridor)
- Don Yard PS (vicinity of Lakeshore East corridor)

Utilities

Potential effects/conflicts with known utilities due to electrification of the GO network were assessed, and mitigation measures identified as appropriate as part of the TPAP. There are a significant number of utilities and utility owners in the study area. As part of the TPAP, these utilities were contacted regarding the potential effects due to electrification, however the final assessment of utility conflicts due to the proposed GO Rail Network Electrification infrastructure will need to be reviewed during the Detailed Design phase. Implementation and construction obligations will be undertaken pursuant to the crossing agreements with each of the utility companies as required.

Specifically, during the Detailed Design phase, the exact locations and depths of utilities will be determined and the staging and relocations approach will be established in discussion with affected utility companies. The following additional work will be undertaken as appropriate:

Mitigation Measures/Future Work

- Amend crossing agreements as required;
- Develop and implement detailed mitigation plan;
- Continue to meet with the utility companies to determine risks, timing and the appropriate mitigation strategy to address potential conflicts;
- Confirm utility relocations/protection required and undertake negotiations with relevant utility companies, as required;
- Based on the requirements of each utility company, utilities will be relocated or protected to allow for the electrification construction works and allow trains to pass without damage;
- With input from legal counsel for both contracting parties, amend existing crossing agreements or develop new crossing agreements that set out the additional cost burdens associated with de-energizing and limited operational windows as well as fines related to cable fall;
- Develop a mitigation plan with each utility that includes the appropriate contractual Option (1, 2 or 3) to implement the appropriate mitigation strategy (see Utilities Impact Assessment Report included as **Appendix I**);
- Implement the mitigation plan through the applicable contractual parties from design through to construction.

In addition, the following mitigation measures will be implemented with respect to utility conflicts:

- Spatial and electrical clearance conflicts may be mitigated through: removal, relocation, reconfiguration or burial of overhead utilities.
- For utilities attached to bridges, further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Electrical zone of influence effects may be mitigated through grounding and bonding or isolation.

EMI/EMF

An Electromagnetic Fields (EMF) and Electromagnetic Interference (EMI) Assessment was carried out as part of the GO Rail Network Electrification TPAP to document existing EMF and EMI conditions within the study area and to determine the potential effects of implementing an electrified GO system related to EMF and EMI. The results of this assessment recommended that additional studies and analyses will need to be carried out by Metrolinx during the future phases of the project, and once the electric train specifications are known. Generally speaking, all recommendations for mitigation and future study as identified in the GO Rail Network Electrification EMI/EMF Impact Assessment Report (see **Appendix J**) will be implemented.

Operation of OCS

As identified through the EMI/EMF Impact Assessment (see **Appendix J**), ELF EMF should be confirmed/re-assessed post-electrification, specifically at locations which exhibited ELF EMF levels above 10 mG post-electrification re-assessment cut-off, which include:

- Signal Light 138 (Segment USRC-1);
- Switch Machine 255 (Segment USRC-1);
- 3 Metres from Center of Track, near Burlington TPF site (Segment LSW-8);
- Burgess Veterinary Hospital (Segment LSW-8); and,
- Under High Voltage Lines (Segment KT-2).

Rolling Stock

No adverse EMI/EMF effects are anticipated due to operation of the electric rolling stock. Notwithstanding this, the following additional work will be carried out post TPAP:

- During Detailed Design, further analysis and measurements will be carried once the electric rolling stock specifications are known in order to ensure EMI immunity and emissions compliance for the electrified GO system.
- EMI, Time-Varying EMFs, Radiated Magnetic Fields, and ELF EMF should be verified both statically (while vehicle at rest) and dynamically (while vehicle moving under power).

- Prior to project implementation, baseline measurements will be taken statically while vehicle is powered off and while vehicle is under power but not moving, both inside and outside the vehicle, at heights and distances mandated by EN 50121 and EN 50500.
- Prior to project implementation, dynamic measurements will be taken at both selected station and/or platform location(s) and at identified EMI-sensitive sites, including Burgess Veterinary Hospital to ensure to ensure EMI levels are within acceptable industry standard ranges.
- During the electrification commissioning phase, overall ELF and RF emissions emanating from the GO electrified railway system as a whole will be field tested and verified to ensure EMFs are within the limits of applicable industry standards.

Traction Power Facility Sites

No adverse EMI/EMF effects are anticipated due to installation/operation of the traction power facilities. Notwithstanding this, the following additional study will be carried out as part of the Detailed Design phase:

- Carry out Detailed Design and implementation for each Traction Power Facility following the general guidelines of the EMC Control Plan;
- Background EMI scans at all TPF sites will be re-measured/verified prior to project implementation to verify baseline conditions at each site;
- ELF EMF should be measured post-electrification at all TPF sites;
- Detailed EMI scans, based upon information from EMC Control Plan, should be made near completion of each traction power facility, both before and after project implementation to ensure scans are within acceptable industry standard ranges;
- Industry-standard practices for handling high-voltage should be followed;
- During the electrification commissioning phase, overall ELF and RF emissions emanating from the GO electrified railway system as a whole will be field tested and verified to ensure EMFs are within the limits of applicable industry standards.

Hydro One – Tap Sites

No adverse EMI/EMF effects are anticipated due to installation/operation of the Tap infrastructure. During the design of the Tap, Hydro One will take EMF into account and minimize EMF where possible.

Electromagnetic Compatibility Control Plan

Metrolinx will prepare and implement Electromagnetic Compatibility (EMC) Control Plan, to communicate the design and development strategy for EMC general (including both ELF and EMI) and to catalogue the types of electronics that will be installed.

- The EMC Control Plan should include but not be limited to:
    - Characterizes potential EMI sources and hazards to transit/rail operations;

- Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed);
- Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.);
- Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B EMF Modelling and Measurement Tools.;
- Includes (or references) a safety analysis and failure analysis of the transit system;
- Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a key input to the detailed, post-electrification EMI scans taken at each TPF and compared to required levels in EN 50121.)
- Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions;
- Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.)

- A frequency management plan will be developed and implemented by Metrolinx during the Detailed Design phase. This plan is needed to capture the operating frequencies at the system engineering level from all intentional radiators in the vicinity of the railway.

Stormwater Management

With respect to track lowering and installation of OCS infrastructure along the corridors, it is noted that no adverse impacts to watercourses are anticipated based on the conceptual design developed as part of the TPAP. Similarly, with respect to drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to track lowering activities (or other electrification infrastructure proposed along the corridors) based on the preliminary analysis undertaken as part of the conceptual design work. Notwithstanding this, if environmental impacts are subsequently identified as part of Detailed Design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction.

An initial/preliminary Stormwater Management Assessment was carried out for all Tap locations and Traction Power Facility sites based on the conceptual designs available as part of the TPAP – the details of this assessment have been summarized in each respective section and in Appendix K.

Field investigations were completed for all sites. Information collected from site visits included, but was not limited to: existing drainage pattern, drainage features inside or in the vicinity of the site area and potential outfall locations for the site runoff.

A Baseline Drainage Condition Assessment was done for the property parcel of each Tap/TPF site, utilizing information from field investigations and from the background information review. Baseline Drainage Condition assessment provided information regarding existing drainage pattern, existing drainage features, potential outfall locations for the minor and major flows from the site area, footprint area for future building and equipment area, existing land use, estimated runoff coefficient and soil type. Conservation Authorities were contacted to determine if any of the proposed TPF sites are within the regulated area. Based on the information collected, six (6) of the sixteen (16) sites were found to be within regulated areas. It should be noted that none of the Taps/Traction Power Facilities considered 'essential emergency services' as defined in the Provincial Policy Statement (PPS), and therefore are in compliance with the PPS. Each facility will be designed such that flooding will not affect proper functioning of the facility and will not result in adverse environmental effects. Detailed Stormwater Management Plans/Designs will be developed during Detailed Design in consultation with Conservation Authorities and other applicable review agencies, as appropriate.

Proposed footprint for the Tap/TPF electrical equipment and percent imperviousness was determined for each site. As the area for the development site is small, Rational Formula was utilized to compute flows for the existing and the proposed conditions and increase in flow value was determined, to assess the requirements for the proposed measures to mitigate the impact of the development on stormwater drainage.

Measures were proposed for each site for the peak shaving, runoff quality enhancement and for the water balance. In general, these targets were met by infiltration in vegetated ditches and bio-swales.

The following additional studies/work will be carried out by Metrolinx with respect to stormwater management:

- During Detailed Design, a detailed stormwater management plan/design will be carried out based on final site configurations, survey and municipal data, and will address: quantity control, erosion control, and quality control. Specifically:
    - A more detailed analysis for the quantity, quality, erosion control and water balance will be required at Detailed Design phase.
    - The proposed development areas and their locations used in the preliminary SWM assessment were based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.
- The stormwater management plan/design will be developed in consultation with Conservation Authorities and other applicable review agencies, as appropriate.

- Implement the stormwater management plan/design prior to commencing operation of the GO Rail Network Electrification Project.

Groundwater and Wells

Water wells were identified based on a search of the Water Well Information System database (Ministry of the Environment and Climate Change, 2017a). Only wells identified as sources of potable water supply and wells that did not have a primary water use description were included in the assessment. The former comprised municipal supply wells, domestic supply wells, agricultural supply wells and industrial/commercial supply wells. In addition groundwater dependent natural heritage features were identified. These features include surface water features such as lakes, rivers, creeks and wetlands. Wetlands include unevaluated wetlands, evaluated wetlands, and Provincially Significant Wetlands.

No adverse effects related to groundwater dependent features, including water supply wells and waterbodies, have been identified for any of the corridors based on the initial assessment completed as part of the TPAP. However, there is some potential for effects related to operations/maintenance, and construction activities associated with the Electrification Project. During maintenance activities for the Overhead Catenary System (OCS) and traction power facilities, use of oils and insulating fluids may be required. As a result, accidental spills may occur during the handling of these products which have the potential to contaminate groundwater. Appropriate mitigation measures, such as Emergency Preparedness and Response Plans, will be developed during Detailed Design to mitigate/minimize the impacts to groundwater. In addition, there is potential for groundwater contamination to occur from mobile vehicle re-fueling during construction activities. This risk will be minimized by restricting vehicle refueling to designated areas and implementing an emergency response plan to establish methods to clean up accidental spills.

Groundwater may be encountered during construction activities associated with OCS foundation installation, traction power facilities and tap locations. It is expected that minor amounts of groundwater may be removed from foundation excavations along with any excess soil for these particular project components. The potential impact on groundwater due to these activities is expected to be imperceptible; however, this will be further evaluated at the Detailed Design phase along with the requirement to prepare an Erosion and Sediment Control Plan and/or a Discharge/Mitigation Plan, obtain a Permit to Take Water (PTTW) or register the water taking on the Environmental Activity and Sector Registry (EASR).

All bridge modifications such as the installation of bridge barriers, flash plates, OCS wires, OCS portal, will occur above ground on existing bridges and therefore will have no adverse effects on groundwater. With respect to bridge replacements, a detailed assessment of any potential groundwater/well impacts will be completed as part of a separate EA Addendum process as outlined in the GO Rail Network Electrification EPR. With respect to track lowering, no adverse effect on groundwater is anticipated however this will be further assessed during the Detailed Design phase for the individual affected structures, along with the requirement to prepare an Erosion and Sediment Control Plan and/or a Discharge/Mitigation Plan, obtain a PTTW or register the water taking on the EASR. Any required permits will be obtained during Detailed Design prior to associated construction activities.

Summary of Mitigation Measures and Commitments

Section 11 of this Volume provides a comprehensive summary (including a series of tables) of the key project components/activities, potential environmental effects, and commitments to mitigation measures, monitoring activities and future work identified through the GO Rail Network Electrification TPAP for each environmental component.

1 Impact Assessment – Approach & Methodology

This volume summarizes the results of the various impact assessment studies that were undertaken as part of the GO Rail Network Electrification TPAP (refer to Appendices A – K for further details). The baseline conditions information contained in EPR Volume 2 was used as the basis from which the potential effects of the GO Rail Network Electrification Project were evaluated. Based on the conceptual engineering design developed for the project, a net effects analysis approach was taken which involved the following three steps:

Step 1 - Identify potential effects (positive and negative);

Step 2 - Establish avoidance/mitigation/compensation measures to eliminate or minimize potential negative effects (as required); and

Step 3 - Identify net effects (i.e., residual effects after applying avoidance/mitigation/compensation measures).

For purposes of differentiating the various types of potential environmental effects related to the GO Transit Rail Network Electrification project, they were characterized and grouped by discipline as follows:

Footprint Impacts	Potential displacement or loss of existing environmental features within the project Study Area due to the implementation of the physical Electrification Project components/infrastructure.
Operations and Maintenance Impacts	Potential longer term effects due to operations and maintenance activities associated with the electrified GO Transit network.
Construction Impacts	Potential shorter term effects due to construction activities associated with the Electrification Project.

Following identification of potential impacts, mitigation measures were identified (if required) based on a combination of best management practices and development of project specific mitigation measures, as appropriate.

With this process in mind, the following subsections document the impact assessment carried out with respect to natural, social, cultural environmental factors:

- **Natural Environment Factor:**
  - Terrestrial Features (i.e., vegetation, wildlife/wildlife habitat, etc.)
  - Aquatic Features (i.e., surface water, fish/fish habitat)
  - Hydrological Features (i.e. groundwater and wells)
  - Preliminary Environmental Site Assessment
  - Stormwater Management

- **Cultural Environment Factor:**
  - Cultural Heritage Resources (built heritage resources and cultural heritage landscapes)
  - Archaeological Resources
- **Social Environment Factor (including Built Environment):**
  - Land Use/Socio-Economic Features
  - Air Quality
  - Noise & Vibration
  - Visual/Aesthetics
  - Utilities
- **Other**
  - Electromagnetic Fields
  - Electromagnetic Interference

For further details regarding the specific methodologies followed for each technical discipline, please refer to the reports contained in **Appendices A to K and V**. In addition, a summary of property related effects including acquisitions and easements has been included in EPR Volume 1.

1.1 Format and Organization of EPR Volume 3

EPR Volume 3 has been organized as follows:

- Section 1 describes the general approach and methodology;
- Section 2 includes an Environmental Interaction Matrix;
- Sections 3 to 8 summarize the physical ("footprint") effects and proposed mitigation associated with environmental component;
- Section 9 provides an overview of potential Operational Phase effects and proposed mitigation;
- Section 10 provides an overview of potential Construction Phase effects and mitigation; and
- Section 11 provides a summary of the mitigation and monitoring commitments.

1.2 Conceptual Electrification Plans and Mapping

To compliment the impact assessment analyses summarized in EPR Volume 3, a number of plans and maps have been included as follows:

- Conceptual electrification corridor plans were developed to illustrate the Overhead Contact System (OCS) Impact Zone and Vegetation/Tree Removal Zone along each of the corridors to be electrified. These plans have been included in **Appendix N** for reference.
- Conceptual Traction Power Facility plans were developed to illustrate the Traction Power Facility sites and 25kV Feeder Routes. These plans have been included in **Appendix O** for reference.
- Mapping of Ecological Land Classification and Terrestrial/Aquatic areas along each rail corridor within the GO Rail Network Electrification Study Area has been included in **Appendix P** for reference.
- Mapping of potentially affected Cultural Heritage Resources along each rail corridor within the GO Rail Network Electrification Study Area has been included in **Appendix Q** for reference.
- Mapping of Land Use designations along each rail corridor within the GO Rail Network Electrification Study Area has been included in **Appendix R** for reference.
- Mapping of Noise and Vibration receptors which were examined in the Noise and Vibration modelling study, as well as areas where noise and vibration mitigation locations were identified along each rail corridor within the GO Rail Network Electrification Study Area has been included in **Appendix S** for reference.
- Mapping of viewsheds and potential Visual Impact areas along each rail corridor within the GO Rail Network Electrification Study Area has been included in **Appendix T** for reference.

2 Overview of Environmental Interactions

The following interactions matrix summarizes the environmental factors that may be affected by the GO Rail Network Electrification Project components. The intent of the matrix is to provide a broad overview of the more detailed assessment of potential impacts contained in the following sections by establishing (at a high-level), the scope and types of environmental effects that may occur with respect to both operational and construction phases of the project. Generally, an “x” was identified wherever an interaction between an identified project component and an environmental factor is expected to occur.

Table 2-1: Environmental Interaction Matrix – GO Rail Network Electrification Project

PROJECT COMPONENTS	Terrestrial (Trees, Vegetation Communities)	Wildlife & Wildlife Habitat (Including Migratory Birds)	Aquatic (Surface Water & Fish/Fish Habitat)	Contaminated Soil/Groundwater	Cultural Heritage	Archaeology	Land Use/Social Features	Air Quality	Noise/Vibration	Visual	Utilities	Electromagnetic Fields / Electromagnetic Interference	Stormwater Management
Footprint Effects													
Hydro One Tap Locations – Footprint effects	X	X			X	X	X			X	X	X	X
Traction Power Facilities – Footprint effects	X	X		X	X	X	X			X	X	X	X
Overhead Contact System (OCS) – Footprint effects	X	X		X		X				X	X	X	
Gantries – Footprint effects				X		X				X	X	X	
Bridges and Rail Overpass Modifications		X			X	X	X			X	X	X	
Operational Phase													
Operation of Hydro One Taps										X		X	
Operation of Traction Power Facilities									X	X		X	
Operation of OCS		X											
Increased Train Service (RER Service Levels)									X				
Operation of 25kV Feeders		X								X		X	

PROJECT COMPONENTS	Terrestrial (Trees, Vegetation Communities)	Wildlife & Wildlife Habitat (Including Migratory Birds)	Aquatic (Surface Water & Fish/Fish Habitat)	Contaminated Soil/Groundwater	Cultural Heritage	Archaeology	Land Use/Social Features	Air Quality	Noise/Vibration	Visual	Utilities	Electromagnetic Fields / Electromagnetic Interference	Stormwater Management
Grounding and Bonding System												X	
Construction Phase													
Installation of OCS foundations and poles (within rail ROW)	X	X		X		X		X	X	X	X		
Installation of bridge barriers, OCS attachments and flash plates, raise bridge, lower tracks		X			X	X	X	X	X	X	X		
Installation of grounding and bonding	X	X		X		X		X	X			X	
Soil excavation (installation of underground duct banks, grounding and bonding)	X			X		X		X	X				
Site preparation/clearing/construct traction power facilities)	X	X	X	X		X		X	X	X	X		
Installation/construction of 25kV aerial feeder lines	X	X		X		X		X	X	X	X		
Operation of heavy trucks and machinery	X	X			X	X		X	X				
Construction staging areas					X	X	X	X	X				

3 Impact Assessment – Union Station Rail Corridor

3.1 Natural Environment

Vegetation Clearing Zone

As described in Volume 1, a Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the 5 metre OCS Impact Zone plus an additional 2 metre offset area on either side of the OCS components. As a result, the total clearing area is defined as 7 metre measured from the centerline of the outermost tracks to be electrified on either side of each rail corridor. The 7 metre zone is considered a maximum removal zone; during Detailed Design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

As part of the TPAP, the following approach was taken to assess potential ecological impacts associated with the required vegetation removal for the Electrification Project. There were two components to the analysis:

1. Identification Of Ecological Impacts Related To Vegetation Removals, And
2. Characterization Of The Extent Of Tree Removals.

Approach/Methodology for Assessing Ecological Impacts

To classify potential ecological impacts due to vegetation removal, they were categorized as either: ***negligible, low, moderate, or high*** based on the rationale outlined below. Using Geographic Information Systems (GIS) technology, Ecological Land Classification (ELC) communities along the corridors/feeder routes were mapped (via aerial photo interpretation as part of the baseline conditions phase), and the areas (in hectares [ha]) of potential vegetation removal (including trees) were calculated for each type of ELC community within a given corridor segment. It should be noted that the assessment did not entail field surveys or ground truthing to delineate impact areas within the vegetation clearing zone. However field investigations were undertaken along corridor sections identified within the *GO Rail Network Electrification TPAP - Natural Environmental Baseline Conditions Report* (Future/Work & Commitments section) to assess habitat suitability within various ELC communities to be affected.

In order to further characterize tree removals specifically, the extent of tree removals within each ELC community was categorized as ***minor, fair, or extensive*** based on the canopy cover within each respective ELC community (see **Table 3-1** below).

- Where canopy cover is minimal (<10%) or limited (10-20%), the extent of removals is considered ***minor.***
- For areas with intermediate (20-70%) canopy cover, the extent of tree removals is considered ***fair.***

- For communities with high (>70%) canopy cover, tree removals are anticipated to be ***extensive.***

Table 3-1: Extent of Tree Removals

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Agriculture (AG)	AG communities include intensive and non-intensive farming. Intensive practices includes cultivated field producing crops (e.g. corn and wheat) and specialty agricultural crops (e.g. orchards, and nurseries). Non-intensive fields are dominated with herbaceous vegetation and grasses primarily used for pasture and grazing areas. Treed areas may be located along the perimeter of AG communities. AG communities contain minimal (<10%) canopy cover	Minor	Vegetation removals within AG lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Commercial and Institutional (CVC)	CVC communities contain constructed areas, including businesses, light industry, heavy industry, educational and health buildings, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Constructed (CV)	CV communities contain constructed areas, including light and heavy industry, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Transportation and Utility (CVI)	CVI communities include roads, highways, right of ways, railways, airports, and sewage treatment facilities, and are dominated by non-native grasses and herbaceous species common to disturbed habitat. CVI communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVI lands are considered to have negligible ecological impact since the affected areas provide limited to no habitat for wildlife.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Residential (CVR)	CVR communities include low to high residential housing, rural property, single family homes, and trailer parks, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. Due to the presence of treed areas along the boundary between the CVI and CVR communities, the canopy cover within the impacted areas is considered intermediate (20-70%).	Fair	Vegetation removals with CVR lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Green Land (CGL)	CGL communities are composed of open areas such as parks, golf courses, playing fields, picnic areas, and cemeteries, and are primarily dominated by non-native grass species (Kentucky Blue Grass), as well as herbaceous species common to disturbed habitat. CGL communities contain varying levels of canopy cover from minimal (<10%) to limited (10-20%) dependent on the community.	Minor	Vegetation removals with CGL communities are considered to have a low ecological impact since these communities provide limited to no habitat for wildlife.
Cultural Meadow (CUM)	CUM communities result from, or are maintained by, cultural or anthropogenic-based disturbances and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CUM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CUM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Red Pine Coniferous Plantation (CUP)	CUP communities greater than 75% coniferous tree composition. CUP communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within the CUP communities are considered to have a low ecological impact.
Cultural Woodland (CUW)	CUW communities are culturally influenced and contain high (>70%) canopy cover.	Extensive	Vegetation removals within CUW communities have low ecological impacts.
Treed Agriculture (TAG)	TAG communities include coniferous, deciduous and mixed plantations, treed pastures and fencerows. TAG communities contain TAG communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the TAG communities are considered to have low ecological impact since the affected areas

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
			provide limited to no habitat for wildlife.
Deciduous Thicket (THD)	THD communities contain some shrub and tree cover. The communities are culturally influenced and dominated by non-native and invasive species. THD communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the THD communities are considered to have low ecological impact as the areas affected provide limited wildlife habitat.
Deciduous Forest (FOD)	FOD communities contain are dominated by deciduous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Forest (FOM)	FOM communities contain >60% tree cover and dominated by a mix of deciduous and coniferous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOM communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Marsh (MA)	MA communities are dominated by emergent hydorphytic macrophytes with some tree and shrub cover. MA communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MA communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Meadow Marsh (MAM)	MAM communities represent areas that experience seasonal flooding, and contain species that are less tolerant of prolonged flooding. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within the MAM communities have varying levels of ecological impacts, ranging from low to moderate and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, and wildlife habitat suitability.
Shallow Marsh (MAS)	MAS communities are restricted to facultative and obligate wetland plants. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MAS communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Mixed Meadow (MEM)	MEM communities contain a mix of grass-like and broadleaf species and include non-native and invasive species. MEM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with MEM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Open Shoreline (SHO)	SHO communities are associated with and adjacent to permanent or ephemeral water and subject to active shoreline processes. Vegetation cover varies from patchy to barren to more closed and treed. SHO communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within SHO communities result in a moderate ecological impact and as they contain specialized habitat for wildlife.
Open Water (OA)	OA communities include watercourses, rivers, streams, and ponds.	N/A	There are no footprint impacts associated with OA communities as all OCS components where the rail crosses open water will be attached to bridge structures and no vegetation removals are required in these areas.
Swamp (SW)	SW communities contain tree or shrub cover with variable flooding regimes and areas with standing water. SW communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within SW communities have varying levels of ecological impacts, ranging from moderate to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Mixed Swamp (SWM)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWM communities contain tree both deciduous and coniferous composition. SWM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals with SWM lands are considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.
Deciduous Swamp (SWD)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWD communities contain deciduous content. SWD communities generally contain high (>70%) canopy cover.	N/A	There are no anticipated impacts to this community.
Deciduous Woodland (WOD)	WOD communities contain semi-closed tree cover and are dominated by mid-aged deciduous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within WOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Woodland (WOM)	WOM communities contain semi-closed tree cover and are dominated by mid-aged deciduous and coniferous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within the WOM community is considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.

Additional details can be found in the Natural Environment Impact Assessment Report contained in **Appendix A2**.

3.1.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

3.1.1.1 Potential Effects and Mitigation Measures

3.1.1.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment USRC-1 are presented in **Table 3-2**. As depicted in mapping provided in **Appendix A2**, the majority of 7 metre vegetation removal zone is within the Transportation and Utilities (CVI) and Commercial and Institutional (CVC) lands. These areas do not contain any vegetation, therefore there are no footprint impacts associated with natural features within the 7 metre impact zone.

In addition, vegetation removals within Green Land (CGL) and Residential (CVR) areas will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CGL community, the extent of tree removals in these areas is minor. Due to the intermediate canopy cover within the CVR communities, the extent of tree removals in these areas is fair. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

There is no vegetation clearing required within the Deciduous Thicket (THD) community and therefore no anticipated impacts.

Table 3-2: Summary of Vegetation Removal Areas within ELC Communities - USRC-1*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.521	0.039	0.560	Minor
Transportation and Utilities (CVI)	14.458	5.060	19.608	Minor
Residential (CVR)	0.572	0	0.572	Fair
Deciduous Thicket (THD)	0	0	0	N/A
Green Land (CGL)	0.003	0.003	0.006	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

<u>*Mitigation Measures*</u>

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category"

approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.

- **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers include:

- Cherry Street (USRC Sub Mile 332.60)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

3.1.1.1.2 Aquatic

There is one watercourse adjacent to the corridor segment, the Don River. There are no impacts to the Don River associated with the OCS infrastructure in USRC-1. Impacts to the Don River Bridge are discussed in LSE-1 (**Section 8.1.6**).

3.1.1.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift there are no anticipated footprint impacts to this species or its habitat.

3.1.1.1.4 Designated Areas

Footprint impacts to CVI, CVR, CGL, and CVC lands within Toronto and Region Conservation Authority Regulated Areas are identified in **Table 3-3.**

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 3-3: Summary of Vegetation Removal Areas within Designated Areas USRC-1*

ELC Community	Area within TRCA Regulation Limit (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.463	Minor
Transportation and Utilities (CVI)	15.569	Minor
Residential (CVR)	0.572	Fair
Deciduous Thicket (THD)	0	N/A
Green Land (CGL)	0.006	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

3.1.1.2 Net Effects

3.1.1.2.1 Terrestrial

There are no footprint impacts within the THD and therefore are no net adverse effects. No net adverse effects to wildlife habitat within the CVI or CVC lands will result as there are no natural features. No net adverse effects will result from vegetation clearing within the CVR and CGL lands as these communities do not provide any specialized habitat for wildlife and mitigation measures will ensure no adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

3.1.1.2.2 Aquatic

There are no net adverse effects to the Don River within this corridor segment.

3.1.1.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift.

3.1.1.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVR, CGL and CVC communities are identified in **Table 3-3.** No vegetation clearing within the TRCA Regulated Area within the CVR communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC and CGL communities are required outside of the ROW.

3.2 Preliminary Environmental Site Assessment

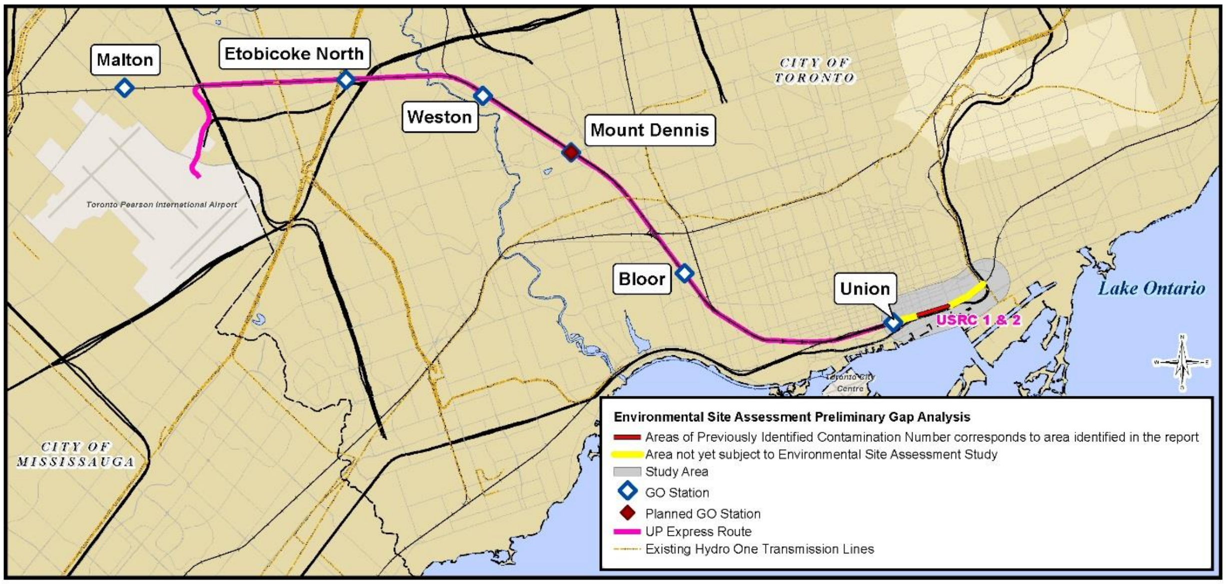
Please refer to **Appendix B** for a description of the methodology followed for Environmental Site Assessment work. Additional details can be found in the Preliminary Environmental Site Assessment Report contained in **Appendix B.**

3.2.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

3.2.1.1 Potential Effects and Mitigation Measures

The scope of the study undertaken as part of the GO Rail Network Electrification TPAP was limited to a gap analysis review of previous Environmental Site Assessment work within the OCS Impact Zones along the corridors. Based on the available background reports reviewed, the majority of this section of the USRC corridor has been the subject of Phase I and II ESAs with the exception of most of the Don Yard Layover. Two sections of 0.8 km and 1 km require an Environmental Site Assessment study as outlined in **Figure 3-1.**

Figure 3-1 Union Station Rail Corridor Gap Analysis Map



Mitigation Measures

Implement the mitigation measures and/or carry out further study as documented in the applicable USRC studies listed in **Table 3-4**.

Table 3-4: Phase I/II or Other Contaminated Site Related Documents Reviewed – Union Station Rail Corridor

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
Peto MacCallum 2000	Phase II Environmental Site Assessment Toronto Terminal Railway (TTR) West Corridor Toronto, Ontario for Go Transit	Go Transit	Peto MacCallum Ltd. Consulting Engineers	Mar-00	00TX005	USRC	Study area is along Toronto Terminal Railway from Tecumseth Street and the Don River	Phase II
Stantec 1999	Phase I Environmental Site Assessment Toronto Terminals Railways	Canadian Pacific Railway Company Canadian National Railway Company	Stantec	Feb-99	11-8836	USRC	Study area is along Toronto Terminal Railway from Tecumseth Street and the Don River	Phase I
Terrapex 2000	Phase II Environmental Site Assessment Toronto Terminals Railway Lands East of Yonge Street, Final Report	Go Transit	Terrapex Environmental Ltd.	Sep-00	CT549.0	USRC	Study area is along Toronto Terminal Railway from Yonge Street and the Don River	Phase II

Further work is recommended along the USRC corridor to assess/characterize potential soil and/or groundwater contamination and develop appropriate mitigation measures. As a result, additional Environmental Site Assessment studies including Phase I ESAs, Phase II ESAs, etc. will be carried out by Metrolinx as required along the corridors/OCS Impact Zone during the Detailed Design phase. Should these further assessments confirm the presence of subsurface contamination at these sites, recommendations for mitigation will be developed and implemented as appropriate which may include but are not limited to:

- Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site;
- Undertake remediation and/or implementation of management measures to address contaminated soils and/or groundwater during construction and long term operations and maintenance. Management measures will be carried out in accordance with applicable environmental legislation.

Furthermore, the mitigation measures as outlined in Section 9.2 will be adhered to and implemented during Detailed Design and construction.

3.2.1.2 Net Effects

Based on implementation of the mitigation measures identified above, no net adverse effects are anticipated.

3.3 Cultural Heritage

Please refer to Appendix C2 for a description of the methodology followed for assessment of cultural heritage impacts. Additional details can be found in the Cultural Heritage Impact Assessment Report contained in Appendix C2.

3.3.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

The cultural heritage resources within this section include:

- Union Station (USRC-1-1)
- Scott Street Interlocking Tower (USRC-1-2)
- Cherry Street Interlocking Tower (USRC-1-3)
- Lower Jarvis Subway (USRC-1-4)
- Lower Sherbourne Subway (USRC-1-5)

- Parliament Subway (USRC-1-6)
- Cherry Street Subway (USRC-1-7)
- Union Station Heritage Conservation District (USRC-1-8)
- Postal Delivery Building (USRC-1-9)

A summary of impacts and mitigation measures is provided in **Table 3-5** and feature mapping of resources is provided in **Appendix C2**.

3.3.1.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 3-5: Summary of USRC-2 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Union Station USRC-1-1 (PHPPS)	Installation of OCS attachments	Alteration: Displacement of heritage attributes and/or disruption of setting	• Conduct a Heritage Impact Assessment (HIA) during the TPAP to identify potential impacts and appropriate mitigation measures • During Detailed Design, the HIA should be updated, if necessary in consultation with the MTCS, Parks Canada, and City of Toronto Heritage Preservation Services
Scott Street Interlocking Tower USRC-1-2 (PHPPS)	No impacts to the property are expected as a result of alterations to the Metrolinx-owned rail ROW	N/A	N/A
Cherry Street Interlocking Tower USRC-1-3 (PHPPS)	No impacts to the property are expected as a result of alterations to the Metrolinx-owned rail ROW	N/A	N/A
Lower Jarvis Subway USRC-1-4 (PHP)	No impacts to the property are expected as a result of alterations to the Metrolinx-owned rail ROW	N/A	N/A
Lower Sherbourne Subway USRC-1-5 (PHP)	No impacts to the property are expected as a result of alterations to the Metrolinx-owned rail ROW	N/A	N/A
Parliament Subway USRC-1-6 (PHP)	No impacts to the property are expected as a	N/A	N/A

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
	result of alterations to the Metrolinx-owned rail ROW		
Cherry Street Subway USRC-1-7 (PHP)	Installation of OCS attachments	Alteration: Displacement of heritage attributes and/or disruption of setting	• A CHER was completed and it was determined to be a Provincial Heritage Property (MHC – SCHV, n.d.) • Conduct an HIA to identify potential impacts and appropriate mitigation measures. • The HIA will be developed during detailed design in consultation with MTCS and City of Toronto Heritage Preservation Services.
Union Station HCD USRC-1-8 (Protected property adjacent to the rail corridor and to Union Station)	The OCS impact zone is confined to the rail corridor and as such, no direct or indirect impacts to heritage attributes associated with the Union Station HCD were identified. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan. Impacts to Union Station previously discussed, see USRC-1-1	Potential disruption of setting	• Consultation with heritage staff at the City of Toronto to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW and to determine if a heritage permit is required (see Appendix C2 for a more detailed location map)
Postal Delivery Building USRC-1-9 (Protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the Postal Delivery Building were identified as a result of OCS infrastructure	N/A	N/A

3.3.1.1.1 Union Station Trainshed

Union Station is a National Historic Site (2006 and 2007) and was identified by Metrolinx as a provincial heritage property of provincial significance (2016). A HIA was conducted for the Union Station Trainshed. The HIA for the Union Station Trainshed was completed January 2017 by ERA Architects Inc. The purpose of the HIA was to consider the potential impacts of proposed interventions. The Union Station Trainshed requires modifications to allow for the installation of the Overhead Contact System (OCS) in order to accommodate electrification within the Trainshed. To accommodate the OCS, the metal truss system and the associated pre-cast cement smoke ducts will require alterations. Refer to **Figure 3-2** and **Figure 3-3** for a visual representation of the Union Station Trainshed. A summary of the findings and recommendations are provided below.

Background

Union Station Complex was previously evaluated under Ontario Regulation 9/06 and 10/06 in June 2016, by Taylor Hazell Architects. The Ontario Regulation 9/06 evaluation determined that the Union Station Trainshed meets the requirements to be considered a Provincial Heritage Property. The Trainshed was noted for its design and physical value:

> *The trainshed is a representative example of a Bush trainshed which was used in larger Canadian railway stations. Toronto's trainshed is notable for its through-traffic design as opposed to a stub. The trainshed were planned as part of the 1913-14 design of the station.*

Within the Ontario Regulation 10/06 evaluation of Union Station, the Trainshed was not mentioned as a contributing feature associated with Union Station.

Statement of Cultural Heritage Value

Description of Provincial Heritage Property

The Union Station Complex is a monumental, five-storey structure occupying a city block in downtown Toronto. Constructed 1914- 1919, the complex officially opened in 1927 and was fully operational in 1930. The heritage property is composed of the station building (headhouse), its moat and teamways as well as the platforms and trainshed which covers the elevated railway tracks.

Constructed by the Toronto Terminal Railways (TTR) and designed by a consortium of architects comprised of Ross & Macdonald, Hugh G. Jones and John Lyle, the Union Station Complex is the finest Beaux-Arts railway station in Ontario and one of the best examples of Beaux-Arts architecture in the country.

Currently, the Union Station Complex serves as the hub for national, provincial, urban and inter-city passenger transportation.

Cultural Heritage Value or Interest

The Union Station Complex is of cultural heritage value or interest for its historical, design and contextual values.

Historical Values

The Union Station Complex demonstrates historic values at the local and provincial levels. Construction of the massive facility was a response to the rapidly expanding rail networks in Ontario during the early 20th century and corresponding urban growth of Toronto. Railways had a dramatic effect on emerging urban centres, particularly in south-central Ontario and Toronto's dominance in this area was a result of its numerous rail connections. Railways also played an integral role in the industrialization process -- opening up new markets while, at the same time creating a demand for fuel, iron and steel, locomotives, and rolling stock. By 1927 when Union Station officially opened, it was handling 180 trains per day and between 60,000-75,000 passengers making it the busiest in the province.

Union Station is directly associated with several organizations and individuals significant to the City of Toronto and to the province. Chiefly, Canada's major railway companies (CPR, GTR/CN), the TTR and its engineer John Robert Ambrose as well as the architectural firm of Ross & MacDonald, and architect John Lyle.

Design Values

The Union Station Complex demonstrates design values at the local and provincial levels. The station building (headhouse) is a representative example of Beaux-Arts transportation facility, embodying the main tenets of the style in a single structure. This includes the exceptional quality of its design, symmetrical plan, prominent siting and use of exaggerated Classical forms and detailing. Further, it is a rare example of Beaux-Arts architecture executed at the full, monumental scale associated with the style. It is the largest and most opulent railway station in Ontario.

Designed to represent one unified structure, the station building is three distinct units, with the station function occupying the centre section and office functions to the east and west. The front façade is 230 metres (752 feet) and features a colonnade of 22 gigantic Roman Doric columns. The steel frame structure is clad in Indiana limestone and demonstrates a hierarchy of treatment with an embellished front façade (Front Street), plainer east (Bay Street) and west (York Street) facades, and unadorned rear façade.

The trainshed is a representative example of a Bush trainshed which was used in larger Canadian railway stations. Toronto's trainshed is notable for its through-traffic design. The trainshed was planned as part of the 1913-14 design of the station building.

Contextual Values

The Union Station Complex has contextual values at the local level. Occupying the entire block between Bay and York streets, the Union Station Complex is the defining feature of the area. As the first of several large-scale buildings in the area, its scale, style and extensive use of limestone created the precedent for subsequent buildings including the Royal York Hotel and the Dominion Public Building. In addition, the Union Station Complex is one component of a larger transportation network which includes the high-level viaduct and associated subways (bridges) as well as the signal towers at John, Scott and Cherry Streets.

As a hub for passenger train travel at the local, provincial and national levels, the Union Station Complex is well-known to residents of and visitors to Toronto.

The heritage attributes essential to the cultural heritage values of the Union Station Complex are:

Design and Physical Value

As a rare and representative example of Beaux-Arts the property contains the following attributes:

- Symmetrical form of a central loggia, flanked on the east and west by offices and pavilions

- A monumental sense of scale, as conveyed through the headhouse's massive rectangular footprint, oversized interior spaces and exaggerated stylistic elements
- A clear horizontal emphasis, achieved through:
    - a bold, continuous projecting cornice and largely uninterrupted roofline, lacking vertical punctuation
    - an acute length to height ratio along the principal façade
- The exterior and interior use of classical design elements, including:
    - tripartite divisions of base, column and entablature
    - the Doric order employed within the loggia and porticos
    - double pilasters and arched doorways punctuating east and west pavilions
    - decorative masonry motifs including egg and dart mouldings, dentils, scrolls, laurel wreaths and meanders
- The use of Indiana limestone for the channeled, ashlar and decorative masonry
- The use of rich materials throughout; marble, travertine, terrazzo, clay tile, copper, and cast iron
- Exterior and interior use of low-relief motifs cast into doorframes
- The Great Hall, including:
    - Its vast open space rising numerous storeys to a shallow barrel-vault;
    - Barrel-vaulted arches at each end terminating with massive arched windows illumination from diffuse, ambient lighting;
    - Decorative details including Corinthian columns, entablature carved with station names, clerestory and coffered Guastavino tiles; and
    - Built-in ticket booths.
- The exterior office fenestration, diminishing in size with every higher storey
- Monumental fenestration around doorways, and illuminating the Great Hall utilizing exposed copper or painted iron frames
- The high level of craftsmanship as seen in the carved masonry and Guastavino vaults
- As a representative train station and transportation hub the property contains the following attributes:
    - The ground level moat, set below Front Street;
    - A clear, functionally informed hierarchy of internal spaces;
    - Distinct circulation paths for arriving and departing passengers;
    - The trainshed including the through-track configuration, arched trusses spanning columns between the tracks, all remaining exterior facades and smoke ducts, and the organization, location, materials and design of elevators, stairwells and rooftop penthouses.

Historical and Associative Value

- Its direct relationship with the Royal York Hotel, as a railway hotel built by the CPR;
- The direct associations with the railways, through names and coats of arms inscribed above the loggia;
- The significance of the project to the portfolios of Ross & MacDonald and John Lyle.

Contextual Value

- Its relationship with the Dominion Public Building, creating a continuous Beaux-Arts streetscape between York Street and Yonge Street (Fig. continuous front);
- Its occupation of the entire south side of Front Street between Bay Street and York Street;
- The elevated tracks and trainshed, lining up with the USRC viaduct to the east;
- Its role in defining the Beaux-Arts character of the area.

Conclusions and Recommendations

The Union Station Trainshed requires OCS interventions to allow for electrification. To allow for the OCS wire to continue through the trainshed the wire will need to be connected with a termination bracket attached to the smoke duct bulkhead on the face of the Trainshed. There are three proposed intervention options:

- Variable Tention, Fixed Termination Twin Contact Option;
- Constant Tension Twin Contact Option; and,
- Rigid Conductor Rail Option.

The HIA report concluded that the proposed interventions will have an impact on the heritage attributes of the Union Station Trainshed, as material may need to be removed from, or added to the truss system to accommodate the insertion of the electrification system. However, these impacts can be mitigated as the project undergoes further analysis of its requirements and once a final design has been determined. The design will appropriately incorporate the HIA recommendations.

Mitigation solutions should be designed in visual harmony with historic features and contemporary design excellence. This should include:

- Ensure connections to trainshed's metal truss system and pre-cast cement smoke ducts are simple in design and strategically located in positions that will have the least material and visual impact.
- Mitigating material and visual impacts to the metal truss system and pre-cast cement smoke ducts;
- Limiting the number of OCS connections and interventions;
- Limiting the removal of any Trainshed material, and allowing for reversibility should any material require removal;
- Minimizing the impact on the original heritage elements on Track 1 and 2.

- Options for underneath the new glass atrium will need to consider the physical and visual impact on the new space and the Trainshed, particularly where the truss system meets the new glass atrium.
- Explore opportunities to develop a heritage interpretation strategy to explain the significance of the Trainshed.

Designs will be reviewed and approved by Parks Canada and the City of Toronto as per the Collateral Agreement, in coordination with MTCS. In the event that Parks Canada approvals conflict with the work approved in the TPAP, Parks Canada's approval shall prevail.

As electrification will entail modifications to Union Station's Train Shed, the HIA will need to be submitted to Parks Canada, City of Toronto and MTCS for review, and for formal approval, pursuant to the Collateral Agreement (2006) during Detailed Design and prior to construction.

The proposed interventions to the Union Station Trainshed are consistent with the ongoing Union Station Modernization Project, which aims to modernize Union Station while maintaining the building's heritage elements.

Furthermore, the proposed interventions will allow for the electrification of the rail infrastructure, allowing Union Station to continue to act as the transportation hub for Toronto and the Greater Toronto Area. Refer to **Appendix M** for a copy of the HIA prepared for the Union Station Train Shed.

Figure 3-2: Union Station Trainshed – Restored Tracks 1 and 2, East Facade

Figure 3-3: Union Station Trainshed – Restored tracks 1 and 2

3.3.1.2 Net Effects

Displacement and/or disruption to potential cultural heritage resources will be minimized by carrying out a HIA to identify impacts and appropriate mitigation measures for cultural heritage attributes. The HIA has been carried out as part of the Electrification TPAP and developed in consultation with Parks Canada (with regards to Union Station Train Shed), MTCS and City of Toronto Heritage Preservation Services.

Displacement and/or disruption of known PHPPS and their heritage attributes will be minimized by conducting a HIA during the TPAP to identify impacts and recommend appropriate mitigation measures to be incorporated into the Detailed Design. If during Detailed Design, it is determined that there may be unanticipated impacts to the CHR, then it may be necessary to prepare a further HIA to recommend appropriate mitigation measures.

Potential disruption to the Union Station HCD would be minimized through consultation with heritage staff at the City of Toronto to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW and to determine if a heritage permit is required.

3.4 Archaeology

A Stage 1 Archaeological Assessment was undertaken for the GO Rail Network Electrification Project. A summary of the findings and recommendations for the Union Station Rail Corridor can be found in the sections below. Refer to **Appendix D2** for complete details.

3.4.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

The study corridor lands have been previously disturbed by past railway construction, and this has been documented by previous and extensive background research. A field inspection was therefore not deemed to be necessary.

There are no OCS footprint issues pertaining to bridges that will affect potential archaeological resources.

3.4.1.1 Potential Effects and Mitigation Measures

OCS Footprint

The installation of OCS structures along the rail corridor may lead to disturbance of deeply buried structures related to the historic waterfront development, e.g., foundation cribs. However, no mitigation measures such as further Stage 2 archaeological assessment or archaeological monitoring will be required, given the overall depth of the overburden, the small size of the foundation footprint (due to drilling), the excavation depth (too deep at approximately 5 m) and information potential (too limited and with no context).

Bridge Modifications

There are no predicted effects to archaeological resources resulting from bridge modifications, thus no mitigation measures or further Archaeological Assessment is recommended.

3.4.1.2 Net Effects

There are no net footprint effects to archaeological resources as a result of this undertaking.

3.5 Land Use

3.5.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

3.5.1.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this corridor. However, there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

All of the seven bridges within USRC-1 are rail overpasses, as such there are no vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification) which may require replacement, bridge modifications or lowering of tracks in order to accommodate electrification infrastructure.

However, one structure will require wire attachments (Cherry Street). There are no land use effects associated with bridge modifications. A full listing of the bridges within the Union Station Rail Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

3.5.1.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along USRC-1. There are no anticipated net effects from the modification of the Cherry Street Bridge.

3.6 Socio-Economic

Please refer to Appendix E2 for a description of the methodology followed for assessment of socio-economic impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in Appendix E2.

3.6.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

3.6.1.1 Potential Effects and Mitigation Measures

There is one sensitive facility (a child care centre) in the vicinity of USRC-1, as shown in **Table 3-6** .The facility is approximately 20 metres from the OCS impact zone, and therefore there will be no footprint impacts to this facility.

Table 3-6: Sensitive Facilities within USRC-1

Type	Name	Address	Distance from OCS Impact Zone
Child Care Centre	St. Lawrence Co-Operative Day Care – Princess St.	2 Princess St., Toronto	20 m

Other potential effects on the socio-economic environment associated with the USRC 1 corridor have been assessed through other studies as part of the TPAP as follows:

- **Air Quality** – see EPR Volume 3 Section 3.7 as well as the Air Quality Assessment Report contained in Appendix F)
- **Noise and Vibration** – see EPR Volume 3 Section 3.8 and 3.9, as well as the Noise and Vibration Assessment Report contained in Appendix G
- **Visual/Aesthetics –** see EPR Volume 3 Section 3.10 as well as the Visual Assessment Report contained in Appendix H
- **EMI/EMF** – see EPR Volume 3 Section 3.12 as well as the EMI/EMF Assessment Report contained in Appendix J

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Corktown Common is located to the north of the rail corridor west of the Don River. Branching off from Corktown Common is the multi-use Lower Don Trail. The trail travels south along the Don River, crossing and then paralleling the rail corridor to Cherry Street as well as leading into the Port Lands. A second multi-use trail, the Martin Goodman Trail, parallels the rail corridor between Parliament Street and Cherry Street. In addition a connecting section of the Lower Don Recreational Trail has been planned and approved. Additionally, the corridor and the proposed Don Yard Paralleling Station (PS) will be within close proximity to the proposed Don Landing Re-design, within the Lower Don Trail area.

There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the City of Toronto will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Mitigation Measures

Ensure that the mitigation recommendations outlined in this EPR pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

3.6.1.2 Net Effects

Net effects to sensitive facilities and recreational amenities along USRC-1 are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to Sections 3.6, 3.7, 3.8, 3.12 respectively.

3.7 Air Quality

Please refer to Appendix F2 for a description of the methodology followed for assessment of air quality impacts. Additional details can be found in the Air Quality Impact Assessment Report contained in Appendix F2.

Electrification of the GO Rail Network will result in the reduction of diesel emissions (due to electric powered trains) which will have a benefit to local air quality near the rail corridors. The increased electricity generation will generate some pollutants through the combustion of fossil fuels, but overall the total air emissions will be lower as a result of the electrification. Similarly, the distribution of electricity via the Traction Power Facilities (and ancillary components such as gantries) and 25kV feeder routes does not produce air pollutants and therefore no impacts are anticipated and no mitigation measures are required. As such, no impacts are anticipated and no mitigation measures are required. As there will be a net benefit to air quality, post-construction monitoring is not necessary.

Further details related to the air quality assessment undertaken as part of the TPAP have been included in **Section 9.7.**

3.8 Noise

Recognizing that electrification of the GO network is a component of the over-arching Regional Express Rail plan, a comprehensive noise study was undertaken to examine the noise effects of the conversion to increased electric service[5] as part of the GO Rail Network Electrification TPAP.

The objective of the noise study was to assess the effects on noise levels due to the conversion from existing/present day (2015) diesel-based GO service levels (referred to as the Future No-Build scenario) to the Electric (2025) GO RER electric-based service levels (referred to as the Future Build Scenario), and to subsequently determine whether mitigation measures may be required to address adverse noise effects. The scope of the study examined noise effects due to GO service along the rail corridors as well as noise effects related to the proposed Tap locations and Traction Power Facilities.

It is noted that numerous (i.e., thousands of) receptors were included in the noise model and considered as part of the analysis; however in order to present the results in a comprehensible way for purposes of reporting, representative receptors were chosen to demonstrate the general conditions and sound levels modelled in the area.

In order to carry out this detailed noise modeling exercise, several assumptions were established. Some of the key assumptions were as follows (note - this is not an exhaustive list, please refer to **Appendix G – Noise and Vibration Modelling Reports**):

- Present day 2015 diesel based GO service was modelled as the 'base case'. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Future (2025) electric based GO RER service levels were modelled as the 'future case'. It should be noted that the 2025 scenario includes a mixed GO fleet of diesel and electric trains. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Freight traffic was included/considered in the modelling. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports.**
- Data was gathered on existing noise barriers as well as planned noise barriers along the rail corridors and were included/considered in the modelling. Planned barriers were defined as: noise barriers that were identified/proposed as part of previously completed Metrolinx/GO Transit Environmental Assessment/TPAP studies. While it is recognized that not all of these barriers have been implemented at the time the assessment was completed, they were included/considered in the modelling. It should be noted these 'planned barriers' were not evaluated for technical feasibility.
- The scope of the study did not include a comprehensive analysis of the technical, operational, economical, or administrative feasibility of implementing noise mitigation measures. Rather, a preliminary assessment of technical feasibility was completed.
- Noise sources associated with GO diesel and/or GO electric rail activity include:

[5] *The electric RER scenario will entail a mixed diesel and electric fleet.*

- Moving trains (applicable to all trains);
- Idling trains at each station (applicable to all trains);
- Road crossings signals (applicable to all trains);
- Crossovers and Switches (applicable to all trains);
- Wheel squeal (applicable to all trains); and
- Pantograph (applicable to electric trains only).

- A complete list of all assumptions applied can be found in the **Appendix G – Noise and Vibration Modelling Reports.**

Future/Committed Land Use

As per the 1995 MOEE / GO Transit Protocol, noise and vibration impacts are evaluated at lands which have been committed for (future) sensitive land uses. Committed uses beyond existing developments include: approved site plans, approved condominium plans or draft approved plans of subdivision. As part of carrying out the noise/vibration modelling work, this data was requested from the municipalities located within the Electrifcation TPAP study area. It should be noted that the only data that was available/provided was from the City of Toronto for approved building permits for new residential uses, therefore this data was reviewed and included in the assessment. Modelling was completed for all receptors identified through review of this data; results are presented for selected representative receptors.

For those sections of the corridor outside of the City of Toronto, a screening level assessment was conducted based on the limited detail provided in the available data on planned developments provided for municipalities other than the City of Toronto. The screening level assessment was designed to flag potential planned areas of development that may experience Adjusted Noise Impacts of greater than 5 dB based on the limited information available. This assessment was completed for the Electric RER scenario only and does not include the investigation of barriers within these areas. Notwithstanding this, the reports contained in **EPR Appendix G** include figures showing flagged potential planned areas of (future) development that were provided by their respective municipalities. Metrolinx will use this information for consideration of noise mitigation for new planned developments (if approved by the relevant municipalities) during the detail design stage as appropriate.

3.8.1 Credible Worst Case Scenario

The credible worst-case scenario is based on established service goals upon which the minimum infrastructure needs were determined. Increase to the service levels would require additional infrastructure due to operational and safety considerations. Current rail regulations are principally governed by Transport Canada and the US Federal Rail Administration; while Metrolinx, CN and CP are the principal sources of operational policies, standards, and rules. Other contributors to rail policy are the American Railway Engineering and Maintenance of Way Association (AREMA) and the American Public Transportation Association (APTA). Collectively, these regulators and associations set limits on how railways are designed, operated and maintained. Therefore the proposed infrastructure and service levels represent a credible worst-case scenario.

3.8.2 Ambient Sound Levels

3.8.2.1 Along the Rail Corridors

According to the MOEE/GO Protocol, ambient noise is the sound existing at a receptor in the absence of all noise from the GO Transit rail project. Ambient noise can be used as a component of the sound level objective, in combination with the sound level from any existing rail activity. The ambient levels are primarily due to noise from local road traffic and surrounding industry.

Ambient noise from road traffic and other background noise sources including industry was assumed to be negligible compared to existing rail traffic noise at most receptors near the rail corridor, and not a significant factor in determining the desirable sound level objective. Therefore, ambient noise was not assessed.

3.8.2.2 At Layover Sites

The sound level objectives for layover sites are the higher of the exclusion limits for L_{EQ} (1-hr) in the MOEE/GO Protocol or the minimum 1-hr L_{EQ} background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the layover sites. Therefore, the exclusion limits were adopted as the desired sound level objectives.

3.8.3 Rail Activity Sound Levels

3.8.3.1 CADNA/A MODELLING

The MOEE/GO Protocol stipulates the use of a model known as Sound from Trains Environmental Analysis Method (STEAM) for predicting rail traffic noise levels. STEAM was developed by the MOECC (MOECC, 1990). The present study deviated from this guidance in that the rail traffic noise levels were modelled using the “Federal Noise and Vibration Impact Assessment” (FTA Protocol) (FTA, 2006) incorporated in Cadna/A. Cadna/A allows for the modelling of complex railway schemes including curves, parallel and intervening tracks which cannot be easily assessed using STEAM. Cadna/A is software that includes the implementation of the FTA noise propagation algorithms and as well as aspects of ISO 9613 algorithms (ISO 1994, ISO 1996). Refer to **EPR Appendix G** for a copy of the correspondence from Metrolinx to MOECC on the use of Cadna/A.

The existing, Diesel RER and Electric RER noise levels were modelled for the entire Study Area. Results at each discrete receptor were used to establish the adjusted noise impact of the Diesel RER scenario relative to the existing scenario, as well as that of the Electric RER scenario relative to the existing scenario.

As per the FTA Protocol, the diesel trains and electric trains were modelled with a noise source height of 2.4 metres (8 ft) and 0.6 metres (2ft), respectively. The noise from a diesel train is dominated by the engine (located at approximately 2.4 metres above the rail) with a lesser contribution from the wheels (located at approximately 0.6 metres above the rail). The noise from an electric train, on the other hand, is dominated by wheel noise (emitted approximately 0.6 metres above the rail), since the electric engine is relatively quiet.

Topography was included in the Cadna/A model to take into consideration the elevation differences of the railway, receptors and the intervening terrain. The topographical features were assumed to be the same in the existing and future scenarios. High-resolution (i.e., 5 m) topographical information was obtained from public databases (Ministry of Natural Resources and Forestry, 2016).

The diesel and electric locomotives were defined using the FTA standards implemented into Cadna/A. At the time of the preliminary assessment, the electric locomotive train type was defined mathematically within Cadna/A with a "K" constant that differed from the "K" constant defined in the FTA model. Metrolinx presented the results of the preliminary noise modelling for electric RER service at a series of public consultations throughout the TPAP.

"Retained" Noise Mitigation Barriers

The diesel and electric locomotives were defined using the FTA standards implemented into Cadna/A. At the time of the original noise assessment, the electric locomotive train type was defined mathematically within Cadna/A with a "K" constant[6] that differed from the "K" constant defined in the FTA model. Metrolinx presented the results of the preliminary noise modelling for electric RER service at a series of public consultations throughout the TPAP.

Following the preliminary assessment, an option within Cadna/A to use the "K" constant which corresponds to the FTA model was created by Datakustik, the developers of the Cadna/A software. Re-assessment using this updated Cadna/A option showed that a limited number of areas where mitigation was previously identified using the preliminary noise modelling no longer achieves an increase of 5 dB or more with the updated Cadna/A noise modelling. This was a result of the correction to the noise modelling input that more accurately reflects the quieter nature of electrified locomotives. Metrolinx believes these supplemental areas should still be included for consideration of noise mitigation. As a result, the locations of these particular mitigation barriers are identified as "retained mitigation barriers" throughout **EPR Appendix G**, and in the mapping provided in **EPR Appendix S**. It should be noted there are no identified retained migiation barriers that are applicable to the Union Station Rail Corridor.

3.8.4 Union Station Rail Corridor - Adjusted Noise Impact of the Electric RER Scenario

The following section summarizes the results of the noise modelling analysis for the Union Station Rail corridor. The Adjusted Noise Impact between Existing and Electric RER noise levels for Union Station Rail Corridor is summarised in **Table 3-7**. See Figures in **Appendix S** for locations of receptors.

[6] The "K" constant is un unnamed parameter in the FTA calculations, which describes the locomotive type (i.e., passenger diesel, electric, DMU, etc.)

Impact ratings for the 6 representative receptors listed in the table can be summarised as follows:

- 6 daytime adjusted noise impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 6 nighttime adjusted noise impacts were deemed to be Insignificant (i.e., less than 2.99 dB);

There are no adjusted noise impacts in the Electric RER scenario that were deemed to be *Noticable, Significant or Very Significant* (i.e. greater than 10 dB increase).

Mitigation measures were investigated for all points of receptors with a significant adjusted noise impact (i.e., 5 dB increase or greater) in accordance with the MOEE/GO Protocol. As all Adjusted Noise Impacts for the Electric RER scenario were predicted to be not significant (i.e. there was less than 5 dB increase); investigation of noise mitigation was not required.

Table 3-7: Adjusted Noise Impacts of the Electric RER Scenario in Comparison to Existing GO Service – Union Station Rail Corridor

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R07	Daytime	59.2	54.9	59.2	-4.3	Insignificant	No	No
	Nighttime	58.5	54.0	58.5	-4.5	Insignificant	No	
R08	Daytime	65.5	63.2	65.5	-2.3	Insignificant	No	No
	Nighttime	63.5	58.9	63.5	-4.6	Insignificant	No	
R09	Daytime	65.1	63.4	65.1	-1.7	Insignificant	No	No
	Nighttime	63.2	60.3	63.2	-2.9	Insignificant	No	
R10	Daytime	60.1	59.7	60.1	-0.4	Insignificant	No	No
	Nighttime	58.1	55.3	58.1	-2.8	Insignificant	No	
R11a	Daytime	56.2	58.0	56.2	1.8	Insignificant	No	No
	Nighttime	53.8	54.6	53.8	0.8	Insignificant	No	
R11b	Daytime	53.1	55.2	55.0	0.2	Insignificant	No	No
	Nighttime	50.4	51.8	50.4	1.4	Insignificant	No	

Notes:
[1] The LEQ (Day) is evaluated for a 16-hour period (i.e., from 0700h to 2300h) and the LEQ (Night) is evaluated for an 8 hour period (i.e., from 2300h to 0700h).
[2] The objective is the higher of the ambient sound level, combined with the existing rail activity, or 55 dBA (Daytime) / 50 dBA (Nighttime).
[3] The potential to mitigate is considered when a significant (or greater) impact is predicted. This is equivalent to an increase of 5 dB or greater, relative to the objective level, as per the MOEE / GO Protocol for Noise and Vibration Assessments. An adjusted noise impact greater than 5 dB requires the investigation of mitigation.

3.8.5 Noise Impacts from Layover Sites

The noise impacts from the Don Yard layover site were evaluated at nearby receptors and are summarised in **Table 3-8**. The predicted noise impacts from the layover site at all receptors were below the MOEE/GO Protocol applicable exclusion limit of 55 dBA. Therefore, no mitigation measures were investigated..

Table 3-8: Noise Impacts from Existing and Electric RER Layover Sites

Receptor ID	Existing					Electric RER			
	Nearby	Evaluation Location	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit [1] (dBA)	Compliance with Performance Limit (Yes/No)	Nearby	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit[1] (dBA)	Compliance with Performance Limit (Yes/No)
R08	Don Yard Layover	Outdoor Area	13	55	Yes	Don Yard	14	55	Yes
		Façade	15	55	Yes		17	55	Yes
R09		Outdoor Area	16	55	Yes		18	55	Yes
		Façade	19	55	Yes		21	55	Yes
R10		Outdoor Area	22	55	Yes		23	55	Yes
		Façade	24	55	Yes		26	55	Yes
R11a		Outdoor Area	49	55	Yes		49	55	Yes
		Façade	53	55	Yes		54	55	Yes
R11b		Outdoor Area	53	55	Yes		53	55	Yes
		Façade	55	55	Yes		55	55	Yes

Notes:
[1] The LEQ is evaluated for any 1-hour period

3.8.6 Approach to Investigation of Mitigation - Operational Noise

Based on the Adjusted Noise Impacts resulting from a project, an investigation of noise mitigation measures is required. MOEE/GO Protocol includes the following mitigation guidance:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering, economic and administrative feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

For the purposes of this study, it was assumed that noise mitigation would be limited to locations within the GO Transit right-of-way, and to be considered feasible, the mitigation measures should achieve at least a 5 dB reduction in noise at the first row of affected receptors. The ID numbers of the barriers correspond to the ID numbers of the representative first row receptors.

If the Adjusted Noise Impact at a receptor is deemed significant during the daytime period, technical feasibility of a noise barrier was evaluated based on the noise reduction achieved during the daytime period only. Similarly, if the Adjusted Noise Impact at a receptor was deemed significant during nighttime period, technical feasibility of a noise barrier is evaluated based on the noise reduction achieved during the nighttime period only. If the Adjusted Noise Impacts at a receptor were deemed significant during both the daytime and nighttime periods and noise reduction resulting from a noise barrier is at least 5 dB in either the daytime or nighttime period, the noise barrier was deemed technically feasible.

Noise barriers can be formed of earthen berms, engineered noise walls, or some combination of the two. Where earthen berms are used, side slopes of 3:1 should be used for drainage and erosion control and right-of-way maintenance. Where noise walls are to be used, they should be free of gaps and cracks, and have a minimum surface density (mass per unit of face area) of 20 kg/m2 (4 lb. per sq. ft.). It is preferable that barriers are sound absorptive at least on the railway side, and this is mandatory in situations where parallel barriers (e.g., barriers on both sides of a railway) are proposed.

Metrolinx will use barriers with a height of 5 metres for all new or replacement noise barriers. Higher noise barriers require specially engineered footings, which may not be technically and/or economically feasible to implement. The investigation of mitigation was limited to noise barriers with heights of 5 metres.

During detailed design, each location identified as a technically feasible noise mitigation location along each rail corridor will be further reviewed to determine the administrative, operational, economic and technical feasibility and to further define what type of mitigation will be implemented.

3.8.7 Union Station Rail Corridor - Investigation of Mitigation

No noise barriers were investigated for the Union Station Rail Corridor as Adjusted Noise Impacts for the Electric RER Build scenario were predicted to be not significant (i.e., there was less than a 5 dB increase) in accordance to the MOEE/GO Protocol Impact Rating. Refer to mapping contained in **Appendix S.**

3.9 Vibration

The MOEE/GO Protocol outlines desired objectives for vibration levels from GO Transit projects. The requirement to investigate vibration mitigation focuses on the change between the existing vibration levels and the future vibration levels. Change in vibration levels may occur under the following circumstances: change in track alignment, addition of track, and change/addition of special track work (such as switches).

It should be noted that vibration impacts are associated with the characteristics of individual trains (especially the weight of the locomotive) and are not related to the increased rail traffic associated with future RER service.

Vibration effects were predicted in accordance with the methods of the United States Department of Transportation - Federal Transit Administration (FTA, 2006). Vibration levels were expressed in terms of root-mean-square (RMS) velocity in the vertical direction, which is the dominant axis for vibration generated from mobile sources such as trains and most closely correlated with human annoyance and perceptibility. The relative change between existing and future vibration levels is presented as a percentage. For further details and supporting information please refer to **Appendix G - Noise and Vibration Assessment Report.**

3.9.1 Applicable Criteria

The desirable objective of the MOEE/GO Protocol is that the RMS velocity of vibration produced by the future GO Transit operations at a sensitive receptor should not exceed:

- 0.14 mm/s; or
- The existing vibration levels where existing operations already produce vibration that exceeds 0.14 mm/s.

Furthermore, the MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the RMS velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

The FTA vibration level predictions were calibrated by measuring existing vibration levels at a small selection of locations in the vicinity of the GO network. The measurements informed the selection of appropriate adjustment factors. The adjustment factors in the FTA vibration calculations account for:

- Vehicle speed;
- Track type and track conditions;
- Type of locomotive power; and
- Condition of wheels (i.e., wheel wear).

The intent of the MOEE/GO protocol's impact assessment is to evaluate change in vibration between the pre-project and post-project scenarios. One method (i.e. modelling) was chosen to evaluate both scenarios to ensure consistency. Comparing existing measured vibration levels to future modelled vibration levels inherently introduces an additional source of uncertainty into the impact assessment. For this reason, the assessment evaluates modelled existing vibration levels against modelled future vibration levels, as opposed to measured existing vibration levels against modelled future vibration level. At the detailed design stage, verification measurements of existing conditions at receptors where the greatest effect is expected and a reasonable number of additional receptors will be conducted to validate FTA vibration calculations.

A literature review was conducted to compare the gross weight of a diesel MP40 locomotive and an electric locomotive with a similar horsepower rating. It was determined that the difference in locomotive weight was not significant enough to have an impact on the vibration levels; therefore, a single set of predicted vibration levels applies to both diesel trains and electric trains.

3.9.2 Union Station Corridor - Vibration Impacts Electric RER Scenario

Within the Union Station Rail Corridor, it was identified that receptor R09 is the closest receptor to the addition of track E0 spanning from the Don Yard to Jarvis Street; therefore, the vibration assessment focused on this receptor. There are no receptors near the Don Yard track addition (i.e., E6 and E7); therefore, changes in vibration levels due to that track addition were not evaluated. The figures contained in **Appendix S** show the receptors associated with the Union Station Rail Corridor.

The predicted existing and future vibration levels and change in vibration levels for a GO train pass-by, a passenger train pass-by and a freight train pass-by are presented in **Table 3-9**. Although it is expected that only GO trains would travel over this switch, other passenger and freight train pass-bys are also presented.

In the case of receptor R09, the threshold is exceeded during pass-bys of both GO trains and freight trains. Mitigation such as ballast mats, under sleeper pads or resilient fixation should be investigated for all the receptors with similar conditions (i.e., 18 metre distance to proposed new tracks) as the evaluated receptors. The approximate locations of trackwork and switches requiring mitigation are presented in **Appendix S**. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage.

Table 3-9: Vibration Impact Assessment Results of the Electric RER Scenario – Union Station Rail Corridor

Train Type Assessed	Receptor [1]	Speed Over Track (km/h)	Special Trackwork Present?		Distance to Rail Component		Predicted Vibration Level		Objective (mm/s) [2]	% Above Objective	Mitigation Required? [3]
			Existing	Future	Existing (m)	Future (m)	Existing (mm/s) [2]	Future (mm/s) [2]			
Go Train	R09	49	No	No	22	18	0.30	0.63	0.30	110%	Yes
VIA Train		47					0.11	0.14	0.14	N/A	No
Freight Train		24					1.7	2.1	1.7	26%	Yes

3.10 Visual

The baseline conditions information contained in the Visual Impact Assessment Baseline Conditions Report was used as the basis from which the potential effects of the GO Rail Network Electrification Project were evaluated. Based on the conceptual engineering design developed for the project, a net effects analysis approach was taken which involved the following three steps:

Step 1 Identify potential effects (positive and negative);

Step 2 Establish avoidance/mitigation/compensation measures to eliminate or minimize potential negative effects (as required); and

Step 3 Identify net effects (i.e., residual effects after applying avoidance/mitigation/ compensation measures).

For purposes of differentiating the various types of potential environmental effects related to the GO Transit Rail Network Electrification Project, they were characterized and grouped as follows:

Footprint Impacts	Potential displacement or loss of existing visual features within the project Study Area due to the implementation of the physical Electrification Project components/infrastructure.
Operations and Maintenance Impacts	Potential longer term effects due to operations and maintenance activities associated with the electrified GO Transit network.
Construction Impacts	Potential shorter term effects due to construction activities associated with the Electrification Project.

Following identification of potential impacts, mitigation measures were identified (if required) based on a combination of best management practices and development of project specific mitigation measures, as appropriate, to address project-specific impacts.

For purposes of the Visual Impact Assessment study, potential visual effects were assessed based on the viewsheds previously established in the Visual Baseline Conditions Report (Appendix H1). The effects were categorized into four categories as follows. Since the electrification infrastructure will be permanent and it is not feasible to eliminate or shield all visual changes, there will be residual/net visual effects due to the permanent nature of the proposed infrastructure. Notwithstanding this, mitigation has been recommended where feasible to reduce the visual impacts of the electrification infrastructure to the extent possible.

Potential visual impacts have been categorized into four categories:

1. Negligible Impact Areas
2. Low Impact Areas
3. Moderate Impact Areas; and
4. High Impact Areas

- ***Negligible Impact Areas*** (shown in green on the maps) which are considered not visually sensitive (where no mitigation is warranted), such as:

  - Commercial, industrial, agricultural or rural land areas.
  - Areas where there are no residential areas or no areas where people congregate in proximity to the rail corridors to see OCS infrastructure.
  - Heavily vegetated areas (outside of the 7 metre Vegetation Removal Zone) with no views to the rail corridor.
  - Tap Locations and/or Traction Power Facilities that are located in industrial areas.
- ***Low Impact Areas*** (shown in yellow on the maps) which have minimal visual sensitivity and where there are minor impacts which may warrant some mitigation, such as:
  - Residential areas where homes are more than 20 metres from the railroad right-of-way (ROW).
  - High-rise residential buildings that are more than 30 metres from the rail corridor, or are closer than 30 metres but in heavily urbanized locations with parking decks on the lower floors.
  - Areas which are already compromised by some existing overhead electric infrastructure or roadways but are still somewhat sensitive views.
  - GO Stations and areas in the immediate vicinity of GO Stations since commuters will experience visual impacts temporarily while in/around the station.
  - Visual impacts due to OCS installation on the corridors and where roads or valleys pass under corridors and where views to the corridor are not considered of scenic value or have already been degraded by other infrastructure intruding into views.
  - Overhead bridges where bridge barriers are added but existing views are not considered visually sensitive (for example views of dense vegetation or the backs of buildings).
  - Tap Locations and/or Traction Power Facilities that may be visible from surrounding development but where the existing visual environment is already compromised by other existing electric facilities such as major transmission line and power plants.
- ***Moderate Impact Areas*** (shown in orange on the maps) where sensitive views are compromised and impacts should be minimized/mitigated where feasible, such as:
  - Residential areas where homes are more than 8 metres and less than 20 metres from the railroad ROW (20 metres was chosen because rear yards that are longer than approximately 20 metres typically contain vegetation that helps to screen views of the rail corridor and new OCS infrastructure placed within the corridor).
  - High-rise residential buildings which do not have parking on the lower floors and are closer than 30 metres to the railroad ROW and where existing vegetation provides a screen of the existing rail infrastructure creating green views for residents that will no longer be screened after construction (30 metres was chosen as the distance where views from low storeys, but not necessarily the lowest storey, of buildings would be significantly altered from views of natural vegetation to views of OCS infrastructure).
  - Select GO Stations in areas of visual sensitivity.
  - Select overhead bridges where bridge barriers are added that will hide interesting views such as views of the downtown skyline or of other unique views.
  - Areas and overpasses where there are scenic views or scenic and natural areas that will be altered by the introduction of OCS structures.

  - Tap Locations and/or Traction Power Facilities that are over 150 metres from surrounding development and have some existing vegetation or other screening.
- ***High Impact Areas*** (shown in red on the maps) where views are considerably compromised and should be minimized/mitigated to the extent possible, such as:
  - Residential areas where homes are closer than 8 metres to the railroad ROW (8 metres was selected as the distance where the rear of homes were so close to the rail corridor that privacy could be compromised due to removal of vegetation for OCS installation).
  - Significant scenic, cultural or historic environments adjacent to the rail corridor.
  - Tap Locations and/or Traction Power Facilities that are located within close proximity (i.e. within 30 metres) to residential areas and have potential to adversely affect the current viewshed.

Additional details can be found in the Visual Impact Assessment Report contained in **Appendix H2**.

3.10.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

3.10.1.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section USRC-1 begins at UP Express Union Station and continues east to the Don Yard Layover. Through this section the preliminary conceptual design spans the existing tracks with OCS infrastructure. See **Figure 3-4** for an illustration of typical OCS infrastructure spanning multiple tracks.

There are two areas in this section that can be considered highly visible. The first is Union Station, a landmark in downtown Toronto. In addition, there are 27 platforms and 16 tracks within the Union Station train shed. The station is covered by a canopy though some platforms extend beyond the canopy. Within the canopy section OCS infrastructure will be supported on the structure and may not create a significant visual impact. Beyond the canopy, however, OCS will be supported on columns placed in the platforms. Union Station is classified as high visual impact since this is a heavily utilized station used by the majority of riders on the entire Metrolinx commuter rail system.

A second area in Section USRC-1 that is highly visible is the Distillery District, an old distillery that has been imaginatively renovated into a mixed-use center with retail, restaurants and interpretive exhibits. It attracts numerous local and out-of-town visitors. From most of the Distillery District, the proposed OCS infrastructure will not be visible due to the placement of buildings between public areas and the railroad. There is one public square that faces the railroad. However, the view to the railroad from this open area is already partially degraded by a parking lot and a billboard located between the square and the tracks, as well as by a signal structure over the railroad with powerlines beyond. Therefore, even though this is an important location, it is classified as potential low visual impact due to the existing degradation of the view.

The residential area around Longboat adjacent to the USRC is considered an area of moderate visual impact due to the installation of OCS infrastructure.

The remainder of this section is mostly classified as low visual impact, with high-rise residential buildings looking out over the railroad. Many of these buildings have parking on the lower floors, so there tend to be no windows looking directly at the OCS infrastructure. However, this infrastructure will be visible as people look down from the upper floors. The views to and across the central city from these buildings contain many existing unattractive features such as utilities, billboards and highway infrastructure along with views of buildings and urban activity. Corktown Common is a newly constructed urban park on the north side of the railroad overlooking the Don River. While the park overlooks the railroad, there are existing electric transmission lines and signal gantries within the rail corridor so that the addition of OCS infrastructure will not significantly alter the character of the view from the park. The OCS infrastructure is just one additional similar element in the urban setting. Therefore, the new OCS infrastructure will be a change in the viewshed but is classified as low visual impact.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

Figure 3-4: Typical Overhead Contact System (OCS) Infrastructure in an Urban Setting

GO Stations

Union Station is the only station in this section. Where the station platforms are under cover, the OCS infrastructure will be attached to the overhead structure and will not be a major visual intrusion. However, platforms extend beyond the covered section and will have OCS support structures placed within the platform area. This infrastructure will change views of the exterior of the train shed. Union Station serves almost every rider on the entire commuter rail system, and as such, is an important location visible to many people. The station area, therefore, is categorized as high potential impact.

Mitigation Recommendations:

As part of Detailed Design, efforts will be made to minimize visual effects as much as possible within the train shed and on either side of the shed where views of the station may be impacted. OCS structures may be painted to minimize their visibility within views of the station.

Figure 3-5: Current View of Platforms within Train Shed at Union Station

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there are seven rail overpasses in Section USRC-1. With respect to rail overpasses, there are potential low visual impacts due to the installation of OCS support structures on or in the vicinity of the Cherry Street Rail Overpass. All of the remaining structures are classified as having a negligible visual impact (see **Table 3-10**).

Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Table 3-10: Summary of Rail Overpasses - Section USRC-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
USRC-1	A-1	York Street	Rail Overpass	N/A	No *Negligible Visual Impact*
USRC-1	A-1	Bay Street	Rail Overpass	N/A	No *Negligible Visual Impact*
USRC-1	A-1	Yonge Street	Rail Overpass	N/A	No *Negligible Visual Impact*
USRC-1	A-1	Jarvis Street	Rail Overpass	N/A	No *Negligible Visual Impact*
USRC-1	A-1	Sherbourne Street	Rail Overpass	N/A	No *Negligible Visual Impact*
USRC-1	A-2	Parliament Street	Rail Overpass	N/A	No *Negligible Visual Impact*
USRC-1	A-2	Cherry Street	Rail Overpass	N/A	Yes *Low Visual Impact*

Parallel Barriers

A parallel barrier will be required along a walkway in the station along the south side of the tracks to protect pedestrians from possible accidental contact with live parts of the OCS. These barriers will be a minimum of 2 metres in height and solid material. These barriers are typically short in length and will result in negligible visual impact.

Figure 3-6: Current View of a Typical Rail Overpass

Figure 3-7: Visualization of new OCS Infrastructure at a Typical Rail Overpass

Mitigation Measures

None required.

3.10.1.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS infrastructure and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net visual effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along USRC, namely Union Station, the Distillery District, and a number of high-rise residential buildings along the rail corridor, will be minimized based on the implementation of the mitigation measures outlined above. Residual visual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Union Station area will be minimized based on the implementation of mitigation measures outlined above. Residual visual effects are considered moderate.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above including placement of

OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

Parallel Barriers

Residual visual effects will be negligible due to the relatively small area affected by the barriers.

3.11 Utilities

A Utilities Impact Assessment study was completed as part of the TPAP to carry out preliminary identification of existing utilities within the study area and to identify possible utility conflicts between these utilities and the planned electrification infrastructure. Conflicts were characterized under the following three categories:

1. **Spatial Conflicts**

Spatial conflicts occur where OCS structures and foundations occupy the same physical space as overhead or buried utilities. Spatial conflicts can also occur where utilities attached to bridges occupy the same space as proposed bridge barriers or bridge barrier fixing points. Overhead transmission, distribution, and communication lines are identified as potential spatial conflicts if they are located within the OCS impact zone and have a vertical clearance from top of rail of less than 10.7 metres. Buried utilities running parallel to the rail corridor within the OCS impact zone are identified as potential spatial conflicts, irrespective of depth.

2. **Electrical Zone of Influence Conflicts**

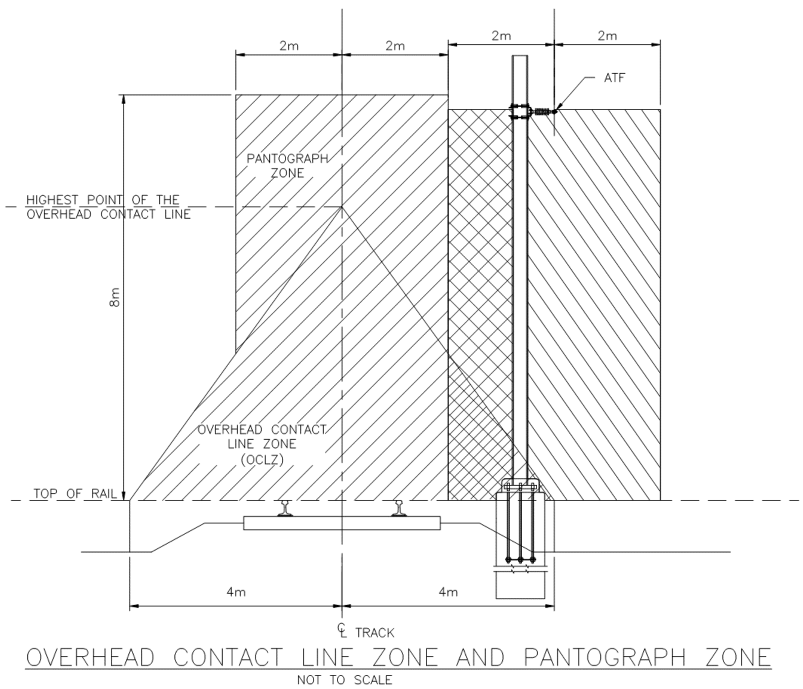
"Influence" describes the unintended effect of electrified OCS wires on adjacent infrastructure and includes the induction of current (counteracted by grounding and bonding) and electromagnetic interference (EMI). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the Overhead Contact Line Zone (OCLZ) (see **Figure 3-8**. An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the OCLZ. Because vertical spatial clearance requirements (10.7 metres) are more conservative than those shown in **Figure 3-8**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements (5.0 metres from centerline of track as captured in the OCS impact zone) are more conservative than the OCLZ clearance requirements (4.0 metres from centerline of track as shown in **Figure 3-8**), resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

Infrastructure that is considered an electrical zone of influence conflict is also a spatial conflict. The resolution for a spatial conflict (usually relocation) will also remove the utility from the electrical zone of influence and thus grounding and bonding will not be required. Existing utilities in the rail corridor outside of the electrical zone of influence may be grounded and bonded at the request of the owner but it is not a requirement for Electrification as the effects of stray current are anticipated to be minimal. Future utilities in the rail corridor outside of the electrical zone of influence should be grounded and bonded at installation.With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.

Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

Figure 3-8: Overhead Contact Line Zone



3. Electrical Clearance Conflicts

Electrical clearance is defined as the minimum distance between live components and grounded structures or rolling stock. Electrical clearance conflicts occur where the minimum required vertical (see **Table 3-11**) or parallel (see **Table 3-12**) clearances are not met. Electrical clearance does not apply to buried utilities.

Table 3-11: Vertical Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Min. Vertical Clearance Between Wires Crossing Each Other (m)	Min. Distance Above OCS (m) for Max. Wire Sag (Measured From Track)
>0 ≥ 150kV	5.0	15.7
>150kV ≥ 250kV	6.5	17.2
250kV	8.0	18.7

Table 3-12: Lateral Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Minimum Distance (m)
>0 ≥ 150kV	5.2
>150kV ≥ 250kV	6.7
250kV	8.2

Additional details on the methodology followed for assessment of utilities impacts can be found in the Utilities Impact Assessment Report contained in **Appendix I2**.

3.11.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

3.11.1.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in USRC-1 are summarized in **Table 3-13.**

Table 3-13: Section USRC-1 Potentially Impacted Utilities

Sub. Start	Sub. End	Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Zone of Influence Conflict	Electrical Clearance Conflict
East	East	0.00	0.08	Bell	Buried - Parallel to ROW	Duct Bank	8 ducts	Reinforced Concrete	Bay St	Y	N	N
West		0.02		Toronto Hydro	Buried - Crossing ROW	Duct Bank	Unknown	Reinforced Concrete	York St	Y	N	N
West	West	0.03	0.08	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	York St	Y	N	N
East	East	0.07	0.09	Allstream	Buried - Parallel to ROW	Cable	Unknown	Plastic	Bay St	Y	N	N
East	West	0.12	1.24	Bell	Buried - Parallel to ROW	Cable	Unknown	Plastic	York St to Tecumseth St	Y	N	N
East	East	0.08	0.08	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	2W2H	Reinforced Concrete	Bay St	Y	N	N
East		0.08		Telus	Buried - Crossing ROW	Duct Bank	432F/144F	Reinforced Concrete	Bay St	Y	N	N

Sub. Start	Sub. End	Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Zone of Influence Conflict	Electrical Clearance Conflict
East	West	0.08	0.02	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	Primary	Reinforced Concrete	Bay St to York St	Y	N	N
West		0.08		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	York St	Y	N	N
East		0.09		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Bay St	Y	N	N
East		0.09		Rogers	Buried - Crossing ROW	Duct Bank	Unknown	Reinforced Concrete	Bay St	Y	N	N
East		0.09		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Bay St	Y	N	N
East		0.09		Rogers	Buried - Crossing ROW	Cable	Unknown	Plastic	Bay St	Y	N	N
West		0.09		Telus	Buried - Crossing ROW	Duct Bank	144F	Reinforced Concrete	York St	Y	N	N
West	West	0.10	0.19	Telus	Buried - Crossing ROW	Duct Bank	78F, 144F, 288F	Reinforced Concrete	York St to Simcoe St	Y	N	N
East		0.11		Toronto Hydro	Buried - Crossing ROW	Duct Bank	13.8kV (2W2H)	Reinforced Concrete	Bay St	Y	N	N
West		0.11		Bell	Buried - Crossing ROW	Cable	Unknown	Plastic	York St	Y	N	N

Sub. Start	Sub. End	Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Zone of Influence Conflict	Electrical Clearance Conflict
East	East	0.11	1.65	Rogers	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Bay St to Lower Don River Trail	Y	N	N
East		0.22		Allstream	Buried - Crossing ROW	Cable	Unknown	Plastic	Yonge St	Y	N	N
East	West	0.27	0.56	TTC	Buried - Parallel to ROW	Electrical	Unknown	Metallic	Yonge St to Blue Jays Way	Y	N	N
East	East	0.30	0.40	Bell	Buried - Parallel to ROW	Cable	Unknown	Plastic	Yonge St to Lower Jarvis St	Y	N	N
East	East	0.50	0.53	Bell	Buried - Parallel to ROW	Cable	Unknown	Plastic	Lower Jarvis St	Y	N	N
East	East	0.51	0.52	Allstream	Buried - Parallel to ROW	Cable	Unknown	Plastic	Lower Jarvis	Y	N	N
East	East	0.52	0.52	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	Lower Jarvis St	Y	N	N
East		0.52		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Lower Jarvis St	Y	N	N
East	East	0.52	1.65	Allstream	Buried - Parallel to ROW	Cable	Unknown	Plastic	Lower Jarvis to Cherry St	Y	N	N
East	East	0.53	0.55	Toronto Hydro	OH - Parallel to ROW	Electrical	Secondary voltage	Metallic	Lower Jarvis St	N	Y	N

Sub. Start	Sub. End	Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Zone of Influence Conflict	Electrical Clearance Conflict
East		0.53		Telus	Buried - Crossing ROW	Duct Bank	432F/144F	Reinforced Concrete	Lower Jarvis St	Y	N	N
East	East	0.53	1.62	Telus	Buried - Parallel to ROW	Duct Bank	3x144F, 288F	Reinforced Concrete	Lower Jarvis St to Lower Don River Trail	Y	N	N
East		0.53		Toronto Hydro	Buried - Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	Lower Jarvis St	Y	N	N
East	West	0.53	1.24	Telus	Buried - Parallel to ROW	Duct Bank	144F	Reinforced Concrete	Lower Jarvis St to Tecumseth St	Y	N	N
East	East	0.53	1.62	Telus	Buried - Parallel to ROW	Duct Bank	3x144F, 288F	Reinforced Concrete	Lower Jarvis St to Lower Don River Trail	Y	N	N
East		0.68		Hydro One	OH - Crossing ROW	Electrical	115kV	Metallic	Lower Sherbourne St	Y	Y	N
East	East	0.70	1.65	Hydro One	OH - Parallel to ROW	Electrical	115kV	Metallic	Lower Sherbourne St to Lower Don River Trail	Y	Y	Y
East		0.71		Hydro One	Buried - Crossing ROW	Electrical	0kV/Idle	Metallic	Lower Sherbourne St	Y	N	N

Sub. Start	Sub. End	Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Zone of Influence Conflict	Electrical Clearance Conflict
East		0.71		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Lower Sherbourne St	Y	N	N
East		0.72		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Lower Sherbourne St	Y	N	N
East		0.72		Rogers	Buried - Crossing ROW	Cable	Unknown	Plastic	Lower Sherbourne St	Y	N	N
East		0.72		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Lower Sherbourne St	Y	N	N
East		0.72		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Lower Sherbourne St	Y	N	N
East	East	0.76	1.65	Bell	Buried - Parallel to ROW	Cable	Unknown	Plastic	Lower Sherbourne St to Lower Don River Trail	Y	N	N
East	East			Enbridge Gas	Buried - Parallel to ROW	Gas	20"	Metallic	Parliament St	Y	N	N
East	East	0.96	0.98	Bell	Buried - Parallel to ROW	Duct Bank	2 ducts	Reinforced Concrete	Parliament St	Y	N	N
East		0.97		Bell	Buried - Crossing ROW	Duct Bank	1 duct	Reinforced Concrete	Parliament St	Y	N	N

Sub. Start	Sub. End	Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Zone of Influence Conflict	Electrical Clearance Conflict
East		0.98		Bell	Buried - Crossing ROW	Duct Bank	1 duct	Plastic	Parliament St	Y	N	N
East		0.98		Telus	Buried - Crossing ROW	Duct Bank	144F	Reinforced Concrete	Parliament St	Y	N	N
East	East	0.99	1.07	Toronto Hydro	OH - Parallel to ROW	Electrical	600V/347V, 120/240V	Metallic	Parliament St	N	Y	N
East		0.99		Enbridge Gas	Buried - Crossing ROW	Gas	20''	Metallic	Parliament St	Y	N	N
East	East	1.24	1.25	Bell	Buried - Parallel to ROW	Duct Bank	1 duct	Plastic	Cherry St	Y	N	N
East	East	1.25	1.61	Bell	Buried - Parallel to ROW	Duct Bank	2 ducts	Reinforced Concrete	Cherry St to Lower Don River Trail	Y	N	N
East	West	1.28	0.09	Bell	Buried - Parallel to ROW	Cable	Unknown	Plastic	Cherry St to York St	Y	N	N
East	East	1.47	1.60	Bell	Buried - Parallel to ROW	Cable	Unknown	Plastic	Don Yard	Y	N	N
East	West	1.56	0.42	Allstream	Buried - Parallel to ROW	Cable	Unknown	Plastic	John St	Y	N	N

Mitigation/Avoidance Measures

- Spatial and electrical conflicts will be mitigated by the removal, relocation, reconfiguration or burial of overhead utilities. Further consultation and coordination with affected utility companies will need to be undertaken during Detailed Design to confirm conflicts and to establish the preferred mitigation approach. In some cases, primarily relating to those utilities attached to bridges, further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Electrical zone of influence conflicts will be resolved by installing appropriate grounding and bonding measures to counteract electromagnetic interference (EMI). Because vertical spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- Aboveground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- With regard to existing buried utilities, notification shall be provided to the third party of the anticipated AC electrification of the rail ROW.
- With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.
- Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

3.11.1.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

3.12 EMI & EMF

This section provides a summary of the key potential EMI/EMF effects, mitigation measures, and (resultant) net effects. The impact assessment was carried out using the baseline conditions data summarized in the EMI/EMF Baseline Conditions Report which entailed a survey of existing EMI/EMF conditions throughout the study area including along the rail corridors, feeder routes and at Taps/TPF locations (see **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report**).

Please refer to Appendix J2 for a description of the methodology followed for assessment of EMI/EMF impacts. Additional details can be found in the Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Impact Assessment Report contained in **Appendix J2**.

The primary effects assessed with regard to electromagnetic compatibility (EMC) relate to human exposure, i.e., Extremely Low Frequency (ELF) Electromagnetic Fields (EMF).

With regard to Electromagnetic Interference (EMI), the primary concern is adverse effects on electronics.

3.12.1 Conservative 10 mG Reassessment Value

As part of carrying out the EMI/EMF Impact Assessment for the TPAP, a conservative value of 10.0 mG magnetic field strength was established as the threshold for which a measured location along the rail corridors or at Taps/TPFs would trigger the recommendation for re-assessing/confirming baseline EMF and EMI measurements during the next phase of the project and before operation commences. This value was based upon the values summarized in **Table 3-14**, which presents information found in *NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power*.

Additional supporting technical information may be found in EN 62233:2008, *Measurement Methods for EMF of Household Appliances and Similar Apparatus with Regard to Human Exposure.*

Table 3-14: Typical Magnetic Field Strengths

Electrical Appliances in Home or Office	Magnetic Field Strength
Dishwasher	30 mG (at 30 cm)
Vacuum Cleaner	200 mG (at 30 cm)
Hair Dryer	70 mG (at 30 cm)
Electric Shaver	100 mG (at 30 cm)
Video Display	6 mG (at 30 cm)
Other Environmental Sources	
Electric Power Distribution/Subtransmission Lines7 (4 to 24 kV)	
Within Right-of-Way	10 to 70 mG
Edge of Right-of-Way	N/A

[7] As per NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power, these values "can vary considerably depending on the current carried by the line."

Electrical Appliances in Home or Office	Magnetic Field Strength
High-Voltage Transmission Lines[8] (115 kV to 500 kV)	
Within Right-of-Way	30 to 87 mG (at 1 metre height above ground)
Edge of Right-of-Way	7 to 29 mG (at 1 metre height above ground)

3.12.2 Union Station Rail Corridor

3.12.2.1 Potential Effects and Mitigation Measures – General

- Radio Frequency EMI from the control system(s) leading to improper operation of electronics on-board the train or in the surrounding neighbourhood.
- Radiated Magnetic Fields and Time-Varying EMFs leading to damage to belongings, i.e., magnetic media, of passengers.
- Induced Current in metallic wires, rail transit tracks, metallic fences, underground communication cables, gas pipelines, and track circuits in neighbouring rail properties leading to contact burns or shocks, or communication errors.
- ELF EMF from the power system(s) leading to effects on workers, passengers, or residents.

Mitigation Measures - General

- Implementation of an EMC Control Plan, the objective of which is to is to facilitate and confirm formal qualification of the electrification system and all its components with respect to the required EMC standards. The components of the EMC Control Plan will include but are not limited to:
  - Characterizes potential EMI sources and hazards to transit/rail operations;
  - Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed);
  - Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.);
  - Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B EMF Modeling and Measurement Tools.;
  - Includes (or references) a safety analysis and failure analysis of the transit system;
  - Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a

[8] Ibid. "During peak loads (about 1% of the time), magnetic fields are about twice as strong as the mean levels" quoted here.

key input to the detailed, post-electrification EMI scans taken at each TPF and compared to levels shown in EN 50121.)
    - Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions;
    - Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.).
- Baseline EMF and EMI measurements before and after system construction and operation.
- Use of ATF power systems.
- Design and installation of the electrification system and all of its components using industry-standard practices, including:
    - Good electrical grounds;
    - Proper shielding;
    - Physical separation, including burial to proper depths; and,
    - The installation of filters, capacitors, and inductors.

3.12.2.2 Net Effects – General

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

3.12.2.3 Potential Effects and Mitigation Measures – Specific Commitments (USRC)

- ELF EMF at higher-than-background levels was found in certain areas along USRC as summarized in **Table 3-15.**
- No EMI signals measured in USRC emanated from unknown sources.
- Areas requiring special attention in relation to re-assessment of background EMI/EMF levels, as summarized in **Table 3-16.**

Table 3-15: EMI Sensitive Site Locations Measurement Coordinates - USRC

Facility Name	Corridor	Garmin Lat	Garmin Lon	Current ELF Levels	Comments
St. Joseph's Health Centre	USRC	43.639912	-79.448782	Background Only	Measured from parking space along Sunnyside Avenue.

Facility Name	Corridor	Garmin Lat	Garmin Lon	Current ELF Levels	Comments
Overhead Signal Light 138	USRC	43.648766	-79.360987	Background Only	Measured from alley near HD Supply Brafasco.
Overhead Power Lines Near MP 0.75	USRC	43.646942	-79.366586	9.3, 5.3, 2.1, 10.9	Measured from sidewalk near Intersection with Gardiner.
Switch Machine 255 Near Substation	USRC	43.646942	-79.366586	9.3, 5.3, 2.1, 10.9	Measured from sidewalk near Intersection with Gardiner.

Table 3-16: EMI/EMF Commitments – Specific Locations Along Union Station Rail Corridor

USRC Location	Commitment
Overhead Signal Light 138	Confirmation/Re-Assessment of ELF EMF
Switch Machine 255, Near Substation	Confirmation/Re-Assessment of ELF EMF
Hydro One Transformers 1 and 2	Confirmation/Re-Assessment of ELF EMF
St. Joseph's Medical Center	Re-Assessment of Background EMI
USRC Station Platform[9]	Full Characterization of Radiated Magnetic Fields, Time-Varying EMF and EMI as per EN 50500 limits and ICNIRP limits. (With and Without Rolling Stock).

Specific Mitigation Measures – USRC

As per **Table 3-16**:

- Confirmation/Re-assessment of ELF EMF levels post-electrification, particularly at location(s) where higher-than-background ELF EMF was measured during baseline surveys.
- Re-assessment of EMI levels post-electrification, specifically at a selection of EMI sensitive locations identified during baseline surveys.

3.12.2.4 Net Effects

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to

[9] Full characterization of radiated magnetic fields, time-varying EMF, and EMI at any station is adequate to cover all other locations as per "Type Testing" approach used in relevant standards.

the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

3.13 Stormwater Management

Please refer to Appendix K for a description of the methodology followed for assessment of stormwater management impacts. Additional details can be found in the Preliminary Stormwater Management Report contained in **Appendix K**.

A Preliminary Stormwater Management Assessment was carried out for each of the Taps/TPFs as part of the GO Rail Network Electrification Project, however there are no Taps/TPF's proposed within the USRC.

With respect to track lowering, it is noted that no adverse impacts to watercourses are anticipated based on the conceptual design developed as part of the TPAP. Similarly, with respect to drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to track lowering activities (or other electrification infrastructure proposed along the corridors) based on the preliminary analysis undertaken as part of the conceptual design work. Notwithstanding this, if environmental impacts are subsequently identified as part of Detailed Design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction.

3.14 Groundwater and Wells

Please refer to Appendix V for a description of the methodology followed for assessment of groundwater impacts. Additional details can be found in the Groundwater Impact Assessment Report contained in **Appendix V**.

3.14.1 OCS & Bridges: Section USRC-1 – UP Express Union Station to Don Yard Layover

3.14.1.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the rail corridor in this section. The section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are two (2) waterbodies, Lake Ontario and the Don River, located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation of OCS wires at Cherry Street. These modifications will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to groundwater or groundwater dependent features including Lake Ontario and the Don River. Therefore, no mitigation measures are recommended.

3.14.1.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4 Impact Assessment – Lakeshore West Corridor

4.1 Natural Environment

Vegetation Clearing Zone

As described in Volume 1, a Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the 5m OCS Impact Zone plus an additional 2 metre offset area on either side of the OCS components. As a result, the total clearing area is defined as 7 metres measured from the centerline of the outermost tracks to be electrified on either side of each rail corridor. The 7 metre zone is considered a maximum removal zone; during Detailed Design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

As part of the TPAP, the following approach was taken to assess potential ecological impacts associated with the required vegetation removal for the Electrification Project. There were two components to the analysis:

1. Identification of ecological impacts related to vegetation removals, and
2. Characterization of the extent of tree removals.

Approach/Methodology for Assessing Ecological Impacts

To classify potential ecological impacts due to vegetation removal, they were categorized as either: ***negligible, low, moderate, or high*** based on the rationale outlined below. Using Geographic Information Systems (GIS) technology, Ecological Land Classification (ELC) communities along the corridors/feeder routes were mapped (via aerial photo interpretation as part of the baseline conditions phase), and the areas (in hectares [ha]) of potential vegetation removal (including trees) were calculated for each type of ELC community within a given corridor segment. It should be noted that the assessment did not entail field surveys or ground truthing to delineate impact areas within the vegetation clearing zone. However field investigations were undertaken along corridor sections identified within the *GO Rail Network Electrification TPAP - Natural Environmental Baseline Conditions Report* (Future/Work & Commitments section) to assess habitat suitability within various ELC communities to be affected.

In order to further characterize tree removals specifically, the extent of tree removals within each ELC community was categorized as ***minor, fair, or extensive*** based on the canopy cover within each respective ELC community (see **Table 4-1** below).

- Where canopy cover is minimal (<10%) or limited (10-20%), the extent of removals is considered ***minor.***
- For areas with intermediate (20-70%) canopy cover, the extent of tree removals is considered ***fair.***
- For communities with high (>70%) canopy cover, tree removals are anticipated to be ***extensive.***

Table 4-1: Extent of Tree Removals

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Agriculture (AG)	AG communities include intensive and non-intensive farming. Intensive practices includes cultivated field producing crops (e.g. corn and wheat) and specialty agricultural crops (e.g. orchards, and nurseries). Non-intensive fields are dominated with herbaceous vegetation and grasses primarily used for pasture and grazing areas. Treed areas may be located along the perimeter of AG communities. AG communities contain minimal (<10%) canopy cover	Minor	Vegetation removals within AG lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Commercial and Institutional (CVC)	CVC communities contain constructed areas, including businesses, light industry, heavy industry, educational and health buildings, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Constructed (CV)	CV communities contain constructed areas, including light and heavy industry, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Transportation and Utility (CVI)	CVI communities include roads, highways, right of ways, railways, airports, and sewage treatment facilities, and are dominated by non-native grasses and herbaceous species common to disturbed habitat. CVI communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVI lands are considered to have negligible ecological impact since the affected areas provide limited to no habitat for wildlife.
Residential (CVR)	CVR communities include low to high residential housing, rural property, single family homes, and trailer parks, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. Due to the presence of treed areas along the boundary between the CVI and CVR communities, the canopy cover within the impacted areas is considered intermediate (20-70%).	Fair	Vegetation removals with CVR lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Green Land (CGL)	CGL communities are composed of open areas such as parks, golf courses, playing fields, picnic areas, and cemeteries, and are primarily dominated by non-native grass species (Kentucky Blue Grass), as well as herbaceous species common to disturbed habitat. CGL communities contain varying levels of canopy cover from minimal (<10%) to limited (10-20%) dependent on the community.	Minor	Vegetation removals with CGL communities are considered to have a low ecological impact since these communities provide limited to no habitat for wildlife.
Cultural Meadow (CUM)	CUM communities result from, or are maintained by, cultural or anthropogenic-based disturbances and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CUM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CUM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Red Pine Coniferous Plantation (CUP)	CUP communities greater than 75% coniferous tree composition. CUP communities generally contain high (>70%) canopy cover.	N/A	Vegetation removals within CUP communities are considered to have low ecological impact.
Cultural Woodland (CUW)	CUW communities are culturally influenced and contain high (>70%) canopy cover.	Extensive	Vegetation removals within CUW communities have low ecological impacts.
Treed Agriculture (TAG)	TAG communities include coniferous, deciduous and mixed plantations, treed pastures and fencerows. TAG communities contain TAG communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the TAG communities are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Deciduous Thicket (THD)	THD communities contain some shrub and tree cover. The communities are culturally influenced and dominated by non-native and invasive species. THD communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the THD communities are considered to have low ecological impact as the areas affected provide limited wildlife habitat.
Deciduous Forest (FOD)	FOD communities contain are dominated by deciduous tree species. Species located along the forest edge, and primarily located	Extensive	Vegetation removals within FOD communities have varying levels of

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOD communities generally contain high (>70%) canopy cover.		ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Forest (FOM)	FOM communities contain >60% tree cover and dominated by a mix of deciduous and coniferous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOM communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Marsh (MA)	MA communities are dominated by emergent hydorphytic macrophytes with some tree and shrub cover. MA communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MA communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Meadow Marsh (MAM)	MAM communities represent areas that experience seasonal flooding, and contain species that are less tolerant of prolonged flooding. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within the MAM communities have varying levels of ecological impacts, ranging from low to

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
			moderate and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, and wildlife habitat suitability.
Shallow Marsh (MAS)	MAS communities are restricted to facultative and obligate wetland plants. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MAS communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Meadow (MEM)	MEM communities contain a mix of grass-like and broadleaf species and include non-native and invasive species. MEM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with MEM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Open Shoreline (SHO)	SHO communities are associated with and adjacent to permanent or ephemeral water and subject to active shoreline processes. Vegetation cover varies from patchy to barren to more closed and treed. SHO communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within SHO communities result in a moderate ecological impact and as they contain specialized habitat for wildlife.
Open Water (OA)	OA communities include watercourses, rivers, streams, and ponds.	N/A	There are no footprint impacts associated with OA communities as all OCS components will be attached to bridge structures and no vegetation removals are required in these areas.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Swamp (SW)	SW communities contain tree or shrub cover with variable flooding regimes and areas with standing water. SW communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within SW communities have varying levels of ecological impacts, ranging from moderate to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Swamp (SWM)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWM communities contain tree both deciduous and coniferous composition. SWM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals with SWM lands are considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.
Deciduous Swamp (SWD)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWD communities contain deciduous content. SWD communities generally contain high (>70%) canopy cover.	Extensive	There are no anticipated impacts to this community.
Deciduous Woodland (WOD)	WOD communities contain semi-closed tree cover and are dominated by mid-aged deciduous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within WOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Mixed Woodland (WOM)	WOM communities contain semi-closed tree cover and are dominated by mid-aged deciduous and coniferous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within the WOM community is considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.

Additional details can be found in the Natural Environment Impact Assessment Report contained in **Appendix A2**.

4.1.1 Burlington Tap Location

4.1.1.1 Potential Effects and Mitigation Measures

4.1.1.1.1 Terrestrial

The proposed Tap Location will include two structures, with an approximate footprint of 10m^2 and up to 30m tall, under/adjacent to the Hydro One 230kV transmission lines to facilitate tapping to the 230kV transmission circuits.

Impact Related to TPF Vegetation Clearing

Vegetation removal areas for Burlington Tap Location are presented in **Table 4-2**. **Figure 4-2** depicts the footprint impacts associated with the Burlington Tap property parcel are within the Cultural Meadow (CUM) and Deciduous Thicket (THD) and will require vegetation removals. The majority of the vegetation to be removed is primarily composed of non-native and invasive vegetation common to edge habitats and disturbed areas, including Common Buckthorn (*Rhamnus cathartica*), Norway Maple (*Acer platanoides*), Manitoba Maple (*Acer negundo*), Trembling Aspen (*Populus tremuloides*), and Dog Strangling Vine (*Cynanchum rossicum*). The THD and CUM communities do not contain specialized habitat for wildlife and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover within these communities, the extent of tree removal in these areas is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for migratory birds are identified below. No vegetation clearing within the Transportation and Utilities (CVI) or Commercial and Institutional (CVC) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

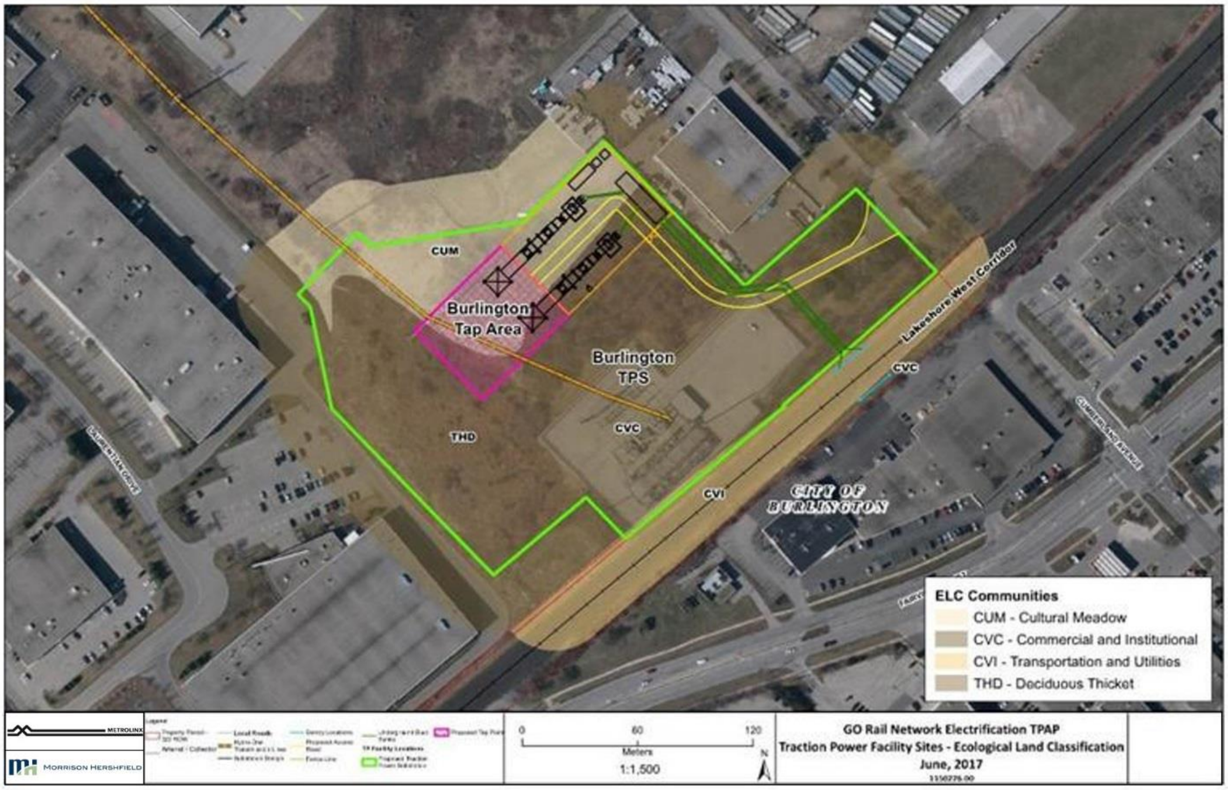
Table 4-2: Summary of Vegetation Removal Areas within ELC Communities – Burlington Tap*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0.199	Minor
Deciduous Thicket (THD)	0.116	Minor
Commercial and Institutional (CVC)	0	N/A
Transportation and Utilities (CVI)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 4-1: Existing conditions - Burlington Tap/TPS

Figure 4-2: Footprint Impacts Ecological Land Classification - Burlington Tap/TPS



Mitigation Measures

Hydro One must maintain specific clearances between lines and trees/vegetation to prevent tree caused outages and electrocutions and therefore any trees removed from the Tap location will not be replaced. However, consideration for plantings that are compatible with transmission lines may be considered. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA)

4.1.1.1.2 Aquatic

There are no aquatic features within the Tap property parcel, and therefore no aquatic footprint impacts are anticipated.

4.1.1.1.3 Species at Risk

Given the low potential of occurrence of Monarch within the CUM communities, and low quality habitat observed during the field investigations, there are no anticipated footprint impacts to this species or their habitat. No Butternuts were observed during field investigations and there are no footprint impacts.

4.1.1.1.4 Designated Areas

There are no footprint impacts within any Designated Areas within the Tap property parcel.

4.1.1.2 Net Effects

4.1.1.2.1 Terrestrial

There are no net adverse effects to the CVI or CVC communities as there are no anticipated impacts to these areas. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the Tap location as the THD and CUM communities do not provide any specialized habitat for wildlife.

4.1.1.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the Tap property parcel.

4.1.1.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat as there are no footprint impacts for Butternut or Monarch.

4.1.1.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the Tap property parcel as there are no footprint impacts.

4.1.2 Mimico Tap/TPS Location & 25kV Feeder Route

4.1.2.1 Potential Effects and Mitigation Measures

4.1.2.1.1 Terrestrial

The infrastructure required at the Mimico Tap and Mimico TPS Location include the following:

- **Mimico Tap:** Two Hydro One owned/constructed structures (with an approximate footprint of 10m2 and up to 30m tall) positioned under/adjacent to the Hydro One 230kV transmission lines to facilitate tapping the 230kV transmission circuits.
- **Mimico TPS Location:** The facility dimension is approximately 75m x 50m and will contain ancillary components associated with the TPF including access road, and 25kV aerial feeder routes.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for the Mimico Tap/TPS Location and 25kV feeder route are presented in **Table 4-3** to **Table 4-5**. **Figure 4-4** depicts that the footprint impacts associated with the Mimico Tap/TPS Location. The footprint impacts associated with the Mimico Tap are located within Transportation and Utilities (CVI), Cultural Meadow (CUM), and Deciduous Thicket (THD) communities. The footprint impacts associated with the Mimico TPS Location are within the Commercial and Institutional (CVC), Transportation and Utilities (CVI), Cultural Meadow (CUM), Deciduous Thicket (THD), Utilities (CVI) communities and vegetation removals will be required. **Figure 4-4** to **Figure 4-9** depict the 25kV Feeder

Route located within Green Land (CGL), Commercial and Institutional (CVC), Transportation and Utilities (CVI), and Deciduous Thicket (THD) communities.

The majority of the vegetation to be removed is primarily composed of non-native and invasive vegetation common to edge habitats and disturbed areas, including Common Buckthorn, Glossy Buckthorn (*Rhamnus frangula*) Norway Maple, Manitoba Maple, Trembling Aspen, and Dog Strangling Vine. The CGL, CVC, CVI, CUM and THD communities do not contain specialized habitat for wildlife and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover in the CGL, CVC, CVI, CUM and THD communities, the extent of tree removals is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 4-3: Summary of Vegetation Removal Areas within ELC Communities – Mimico Tap Location*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0	N/A
Transportation and Utilities (CVI)	0.312	Minor
Cultural Meadow (CUM)	0.022	Minor
Deciduous Thicket (THD)	0.528	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Table 4-4: Summary of Vegetation Removal Areas within ELC Communities – Mimico TPS Location*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.065	Minor
Transportation and Utilities (CVI)	0.664	Minor
Cultural Meadow (CUM)	0.016	Minor
Deciduous Thicket (THD)	0.245	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Table 4-5: Summary of Vegetation Removal Areas within ELC Communities – 25kV Feeder Route*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals(based on canopy cover within ELC community)
Commercial and Institutional (CVC)	4.729	Minor
Transportation and Utilities (CVI)	4.729	Minor
Green Land (CGL)	0.289	Minor
Deciduous Thicket (THD)	0.083	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 4-3: Exiting Conditions - Mimico Tap/TPS

Figure 4-4: Footprint Impacts Ecological Land Classification - Mimico Tap/TPS & Canpa 25kV Feeder Route

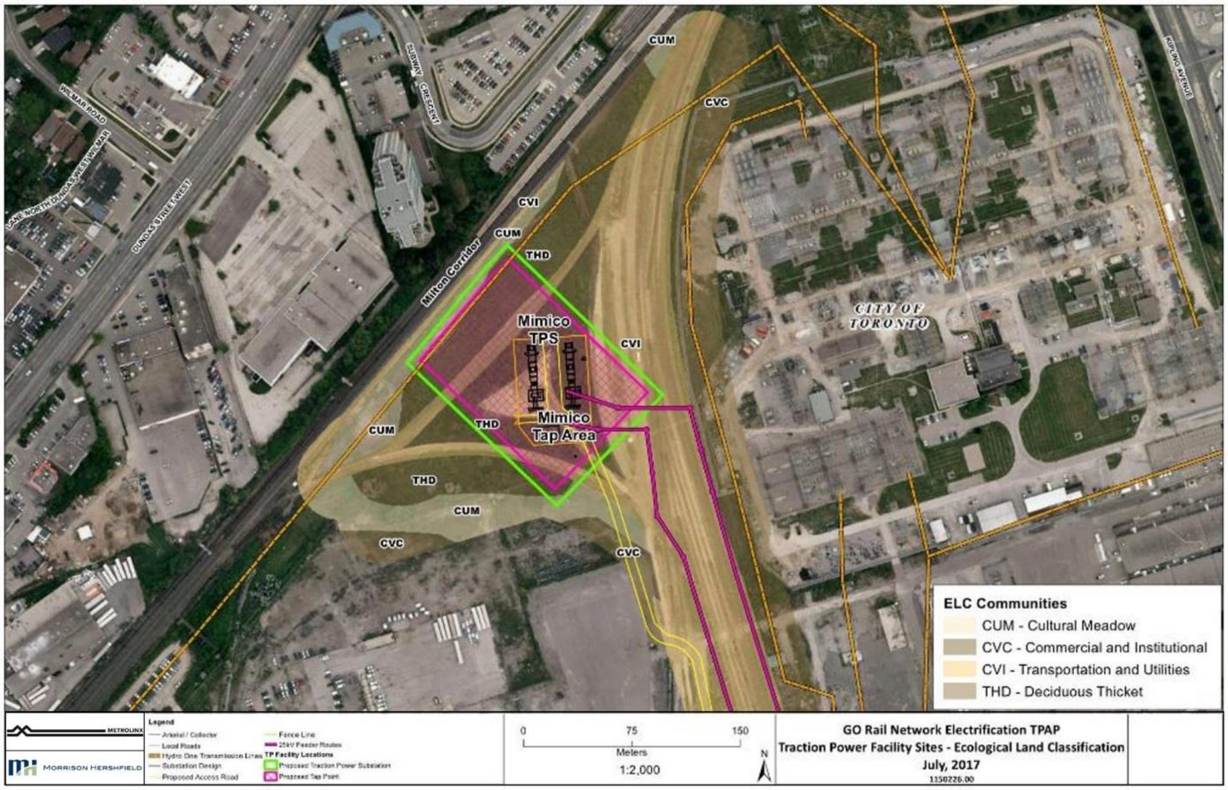


Figure 4-5: Footprint Impacts Ecological Land Classification -Canpa 25kV Feeder Route – Image 1

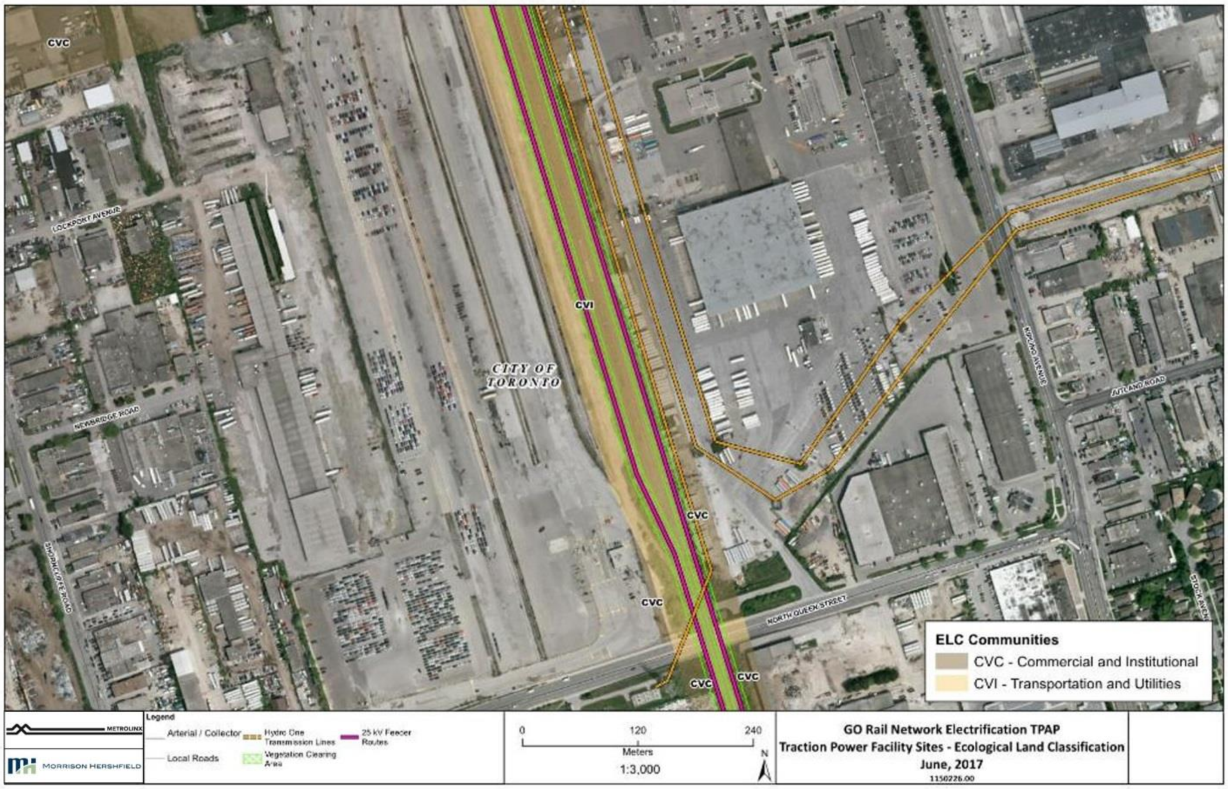


Figure 4-6: Footprint Impacts Ecological Land Classification - Canpa 25kV Feeder Route - Image 2

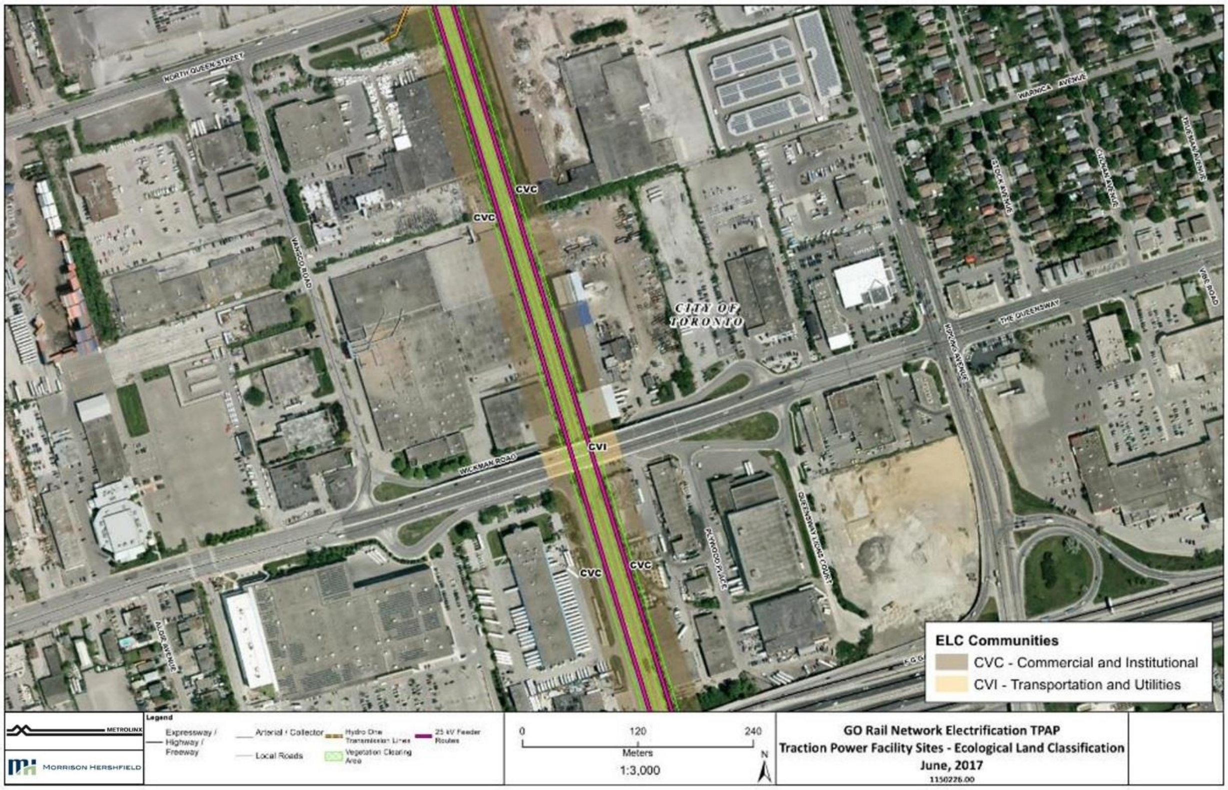


Figure 4-7: Footprint Impacts Ecological Land Classification - Canpa 25kV Feeder Route - Image 3

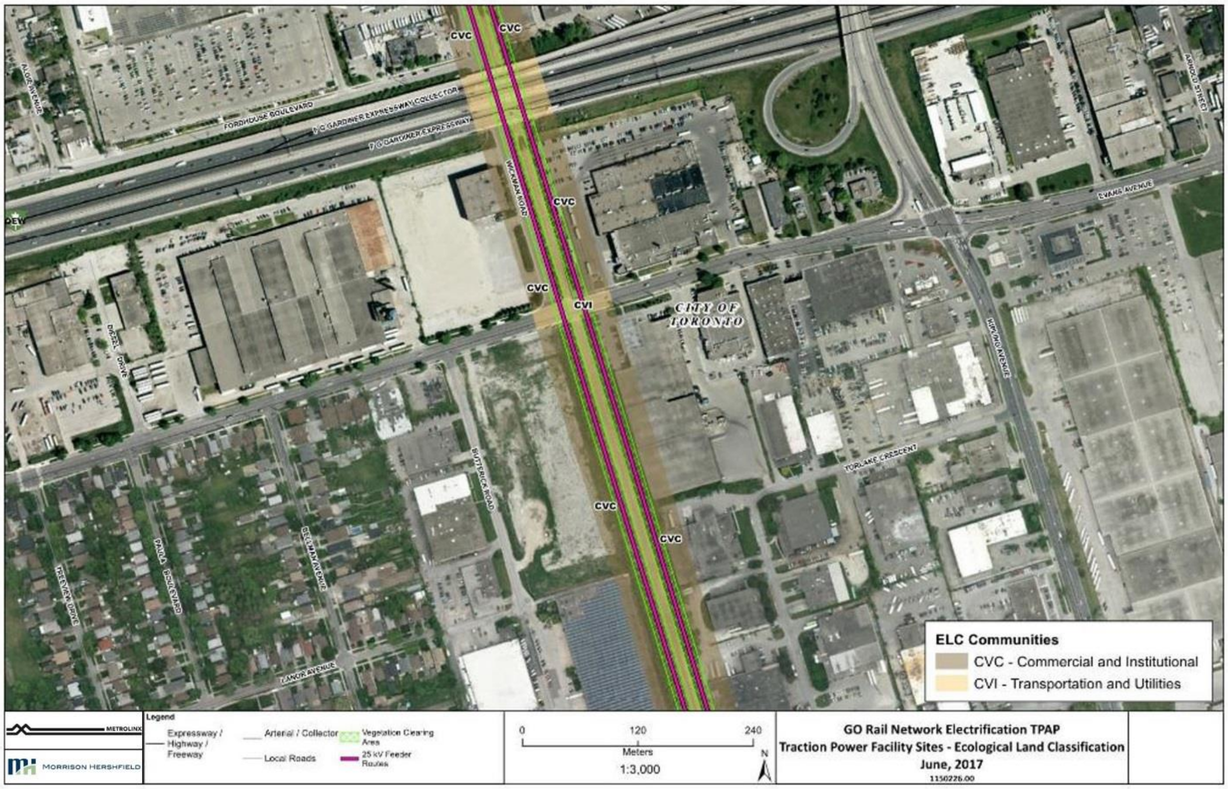


Figure 4-8: Footprint Impacts Ecological Land Classification - Canpa 25kV Feeder Route - Image 4

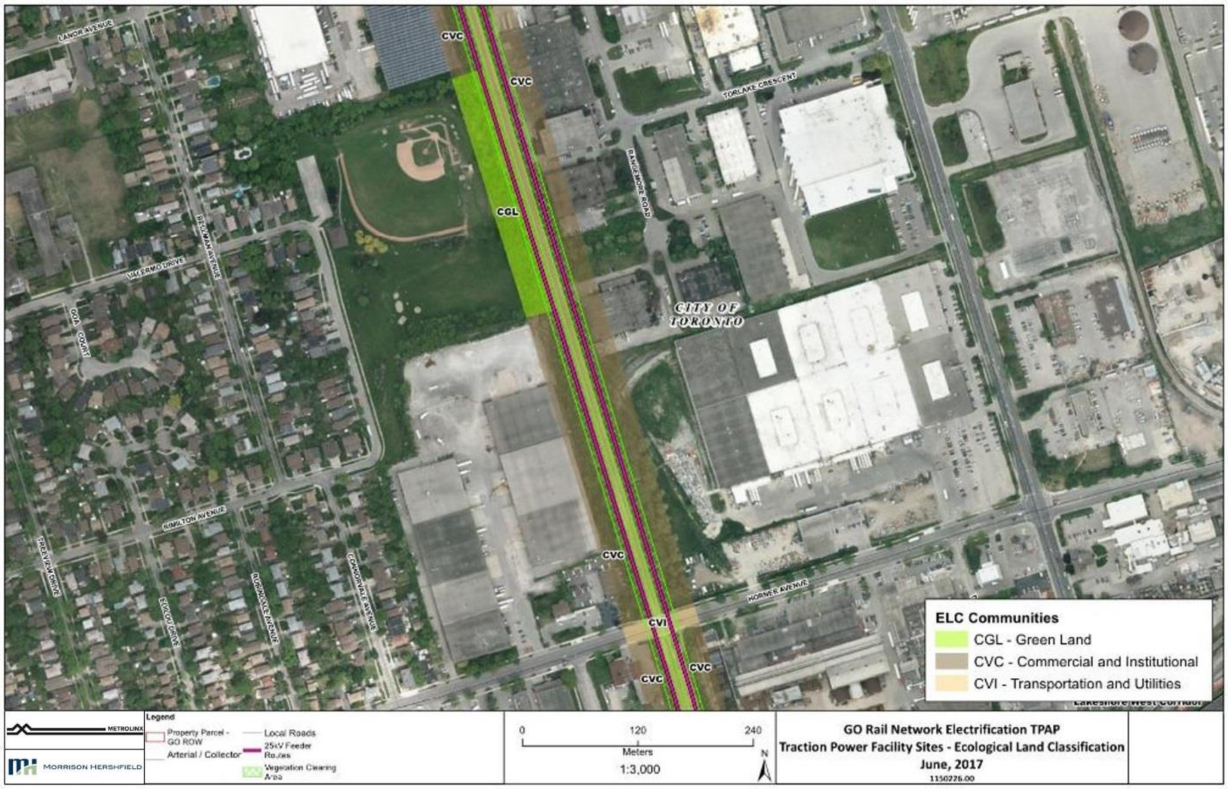
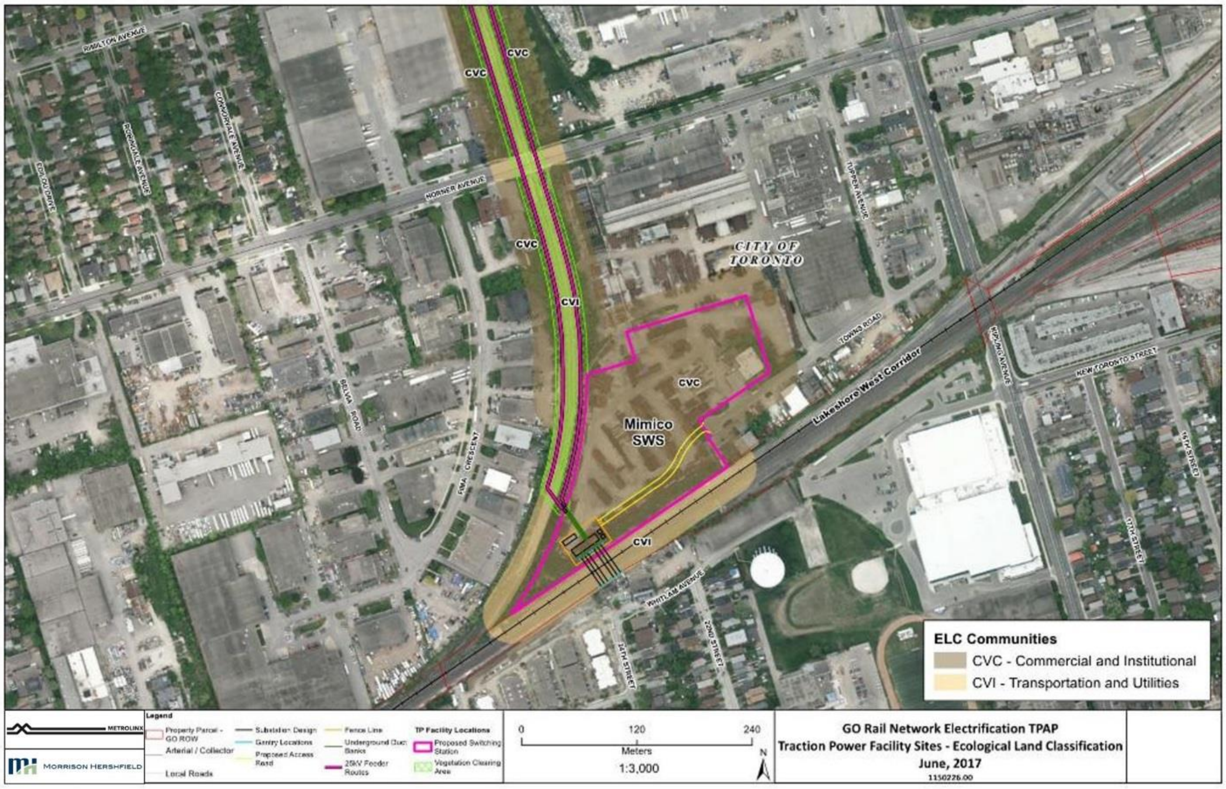


Figure 4-9: Footprint Impacts Ecological Land Classification - Mimico SWS & Canpa 25kV Feeder Route



Mitigation Measures

Hydro One must maintain specific clearances between lines and trees/vegetation to prevent tree caused outages and electrocutions and therefore any trees removed from the Tap location will not be replaced. However, considerations for plantings that are compatible with transmission lines may be considered. The following mitigation measures which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to the Natural Environment Impact Assessment Report (Appendix A2 of the EPR) for detailed tree protection measures during construction.
  - **Tree/Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA).

4.1.2.1.2 Aquatic

There are no aquatic features within the Tap/TPS property parcel or along the feeder route, and therefore no aquatic footprint impacts.

4.1.2.1.3 Species at Risk

No Butternuts were observed during field investigations at the Tap/TPS location and there are no footprint impacts. Along the Canpa Feeder Route, Butternuts have a low potential for occurrence within the CVC communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Given the low potential of occurrence of Monarch and low quality habitat within the CUM communities, there are no anticipated footprint impacts to this species or their habitat.

4.1.2.1.4 Designated Areas

There are no footprint impacts within any Designated Areas within the Tap/TPS property parcel or along the 25 kV Feeder Route.

4.1.2.2 Net Effects

4.1.2.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the Tap/TPS Location and 25 kV Feeder Route as the CGL, CVC, CVI, CUM or THD communities do not provide any specialized habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities.

4.1.2.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the Tap/TPS property parcel or the 25kV Feeder Route.

4.1.2.2.3 Species at Risk

Net effects to Butternut along the Canpa Feeder Route will be determined during Detailed Design. There are no net adverse effects on Species at Risk or their habitat as there are no footprint impacts for Butternut or Monarch within the Tap/TPS property parcel.

4.1.2.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the Tap/TPS property parcel or the 25kV Feeder Route as there are no footprint impacts.

4.1.3 Burlington TPS

4.1.3.1 Potential Effects and Mitigation Measures

4.1.3.1.1 Terrestrial

The approximate footprint dimension of the TPS facility is 75m x 50m and will contain ancillary components associated with the TPF including gantries, access road, and 25kV aerial feeder routes.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Burlington TPS are presented in **Table 4-6**. **Figure 4-2** depicts footprint impacts associated with the TPS property parcel and access road are within the Deciduous Thicket (THD), Cultural Meadow (CUM), and Commercial and Institutional (CVC) communities and will require vegetation removals. The majority of the vegetation to be removed is primarily composed of non-native and invasive vegetation common to edge habitats and disturbed areas, including Common Buckthorn, Norway Maple, Manitoba Maple, Trembling Aspen, Dog Strangling Vine, Tall Goldenrod (*Solidago altissima*), Alsike Clover (*Trifolium hybridum*), Timothy-grass (*Phleum pretense*), and Tall Fescue (*Schedonorus arundinaceus*). The THD, CUM, and CVC do not contain specialized habitat for wildlife and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the THD, CUM, and CVC communities, the extent of tree removals is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The gantries are located within the Transportation and Utilities (CVI) lands and have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

Table 4-6: Summary of Vegetation Removal Areas within ELC Communities – Burlington TPS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.101	Minor
Deciduous Thicket (THD)	0.197	Minor
Cultural Meadow (CUM)	0.228	Minor
Transportation and Utilities (CVI)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

<u>*Mitigation Measures*</u>
Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

4.1.3.1.2 Aquatic

There are no aquatic features within the TPS property parcel, and therefore no aquatic footprint impacts.

4.1.3.1.3 Species at Risk

Given the low potential of occurrence of Monarch within the CUM and CVI communities, there are no anticipated footprint impacts to this species or their habitat. No Butternuts were observed during field investigations and there are no footprint impacts.

4.1.3.1.4 Designated Areas

There are no footprint impacts within any Designated Areas within the TPS property parcel.

4.1.3.2 Net Effects

4.1.3.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the TPS facility as the THD, CUM, and CVC communities do not provide any specialized habitat for wildlife.

4.1.3.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the TPS property parcel.

4.1.3.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat as there are no footprint impacts for Butternut or Monarch.

4.1.3.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the TPS property parcel as there are no footprint impacts.

4.1.4 Mimico SWS

4.1.4.1 Potential Effects and Mitigation Measures

4.1.4.1.1 Terrestrial

The approximate footprint dimension of the SWS facility is 75m x 50m and will contain ancillary components associated with the TPF including gantries, access road, underground duct banks and 25kV aerial feeder route.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Mimico SWS are presented in **Table 4-7**. **Figure 4-9** depicts that the footprint impacts associated with the Mimico SWS, including the underground duct banks and proposed access road are encompassed within Commercial and Institutional (CVC) land. The majority of the vegetation to be removed is primarily composed of non-native and invasive vegetation common to edge habitats and disturbed areas, including Common Buckthorn, Glossy Buckthorn, Manitoba Maple, Trembling Aspen, and Dog Strangling Vine. The CVC community does not contain specialized habitat for wildlife and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the CVC community the extent of tree removals is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The gantries are located within the Transportation and Utilities (CVI) lands and have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

Table 4-7: Summary of Vegetation Removal Areas within ELC Communities – Mimico SWS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals(based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.228	Minor
Transportation and Utilities (CVI)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 4-10: Existing Conditions - Mimico SWS

Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA)

4.1.4.1.2 Aquatic

There are no aquatic features within the Mimico SWS property parcel, and therefore no aquatic footprint impacts.

4.1.4.1.3 Species at Risk

No Butternuts were observed during field investigations and there are no footprint impacts.

4.1.4.1.4 Designated Areas

There are no footprint impacts within any Designated Areas within the Mimico SWS property parcel.

4.1.4.2 Net Effects

4.1.4.2.1 Terrestrial

There are no net adverse effects to the wildlife habitat associated with the loss of vegetation within the footprint of the SWS as the CVC community does not provide any specialized habitat for wildlife.

4.1.4.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the Mimico SWS property parcel.

4.1.4.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat as there are no footprint impacts for Butternut.

4.1.4.2.4 Designated Areas

There are no net impacts to Designated Areas within the Mimico SWS property parcel as there are no footprint impacts.

4.1.5 Oakville SWS

4.1.5.1 Potential Effects and Mitigation Measures

4.1.5.1.1 Terrestrial

The approximate footprint dimension of the SWS facility is 22 metres x 55 metres and will contain ancillary components associated with the TPF including gantries, access road and underground duct banks.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Oakville SWS are presented in **Table 4-8**. **Figure 4-11** depicts the footprint impacts associated with the SWS facility, access road, underground duct banks, and gantries located within Commercial and Institutional (CVC) and Transportation and Utilities (CVI) lands do not contain any natural features and will not impact wildlife or wildlife habitat. No vegetation removal will be required.

Table 4-8: Summary of Vegetation Removal Areas within ELC Communities – Oakville SWS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals(based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.169	N/A
Transportation and Utilities (CVI)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 4-11: Existing Conditions - Oakville SWS

Figure 4-12: Footprint Impacts Ecological Land Classification - Oakville SWS

Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

4.1.5.1.2 Aquatic

There are no aquatic features within the SWS property parcel, and therefore no aquatic footprint impacts.

4.1.5.1.3 Species at Risk

There are no Species at Risk or Species at Risk habitat identified within the SWS property parcel and therefore no footprint impacts.

4.1.5.1.4 Designated Areas

There are no footprint impacts within any Designated Areas within the SWS property parcel.

4.1.5.2 Net Effects

4.1.5.2.1 Terrestrial

There are no net adverse effects to wildlife habitat as there are no natural features within the SWS property parcel.

4.1.5.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the SWS property parcel.

4.1.5.2.3 Species at Risk

There are no net adverse effects to Species at Risk or Species at Risk habitat within the SWS property parcel as there are no footprint impacts.

4.1.5.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the SWS property parcel as there are no footprint impacts.

4.1.6 OCS & Bridges: Section LSW-1 – West of Bathurst Street (Mile 1.20) to Mimico Station

4.1.6.1 Potential Effects and Mitigation Measures

4.1.6.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSW-1 are presented in **Table 4-9**. As depicted in mapping provided in **Appendix A2,** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. Mitigation for CVI areas include ensuring vegetation removals follow the general mitigation measures for vegetation/tree removal outlined below.

In addition, vegetation removals within several other ELC communities including Green Land (CGL), Residential (CVR) and Commercial and Institutional (CVC) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) associated with Mimico Creek will result in a loss of vegetation along the edge of this natural vegetation community which provides habitat for wildlife and acts as a migratory corridor. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. Due to the natural attributes of the woodlands community, and its association with Mimico Creek, impacts to these areas are considered moderate. The high amount of canopy cover in the WOD community will result in extensive tree removals within this community. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 4-9: Summary of Vegetation Removal Areas within ELC Communities – LSW-1*

ELC Community	Vegetation Removal Area within Metrolinx owned ROW (ha)	Vegetation Removal Area outside Metrolinx owned ROW (ha)	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.457	0.253	0.7094	Minor

ELC Community	Vegetation Removal Area within Metrolinx owned ROW (ha)	Vegetation Removal Area outside Metrolinx owned ROW (ha)	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Transportation and Utilities (CVI)	24.803	0.640	25.442	Minor
Residential (CVR)	1.420	0.082	1.502	Fair
Green Land (CGL)	0.520	0.018	0.5380	Minor
Deciduous Woodland (WOD)	0.151	0	0.151	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx’s property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.

    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Strachan Avenue (Oakville Sub Mile 1.57)
- Humber River (Oakville Sub Mile 5.02)
- Gardiner Expressway (Oakville Sub Mile 5.61)

Bridges below the Absolute Minimum vertical clearance (6937 mm) will require additional modifications and/or solutions, to accommodate electrification, including unique engineering designs, lowering tracks, raising the bridge, bridge replacement or improving the quality of maintenance to reduce the track maintenance allowance (TMA). Bridges under the Absolute Minimum vertical clearance include:

- Strachan Avenue (Oakville Sub Mile 1.57) – lower tracks
- Dufferin Street (Oakville Sub Mile 2.38) – replace bridge in combination with lowering tracks, wires/bridge barrier attached to new bridge
- Dunn Avenue (Oakville Sub Mile 2.69) – replace bridge in combination with lowering tracks, wires/bridge barrier attached to new bridge
- Jameson Avenue (Oakville Sub Mile 2.85) – replace bridge in combination with lowering tracks, wires/bridge barrier attached to new bridge
- Sunnyside Pedestrian Bridge (Oakville Sub Mile 3.54) – reduce track maintenance allowance (TMA)
- Gardiner Expressway (Oakville Sub Mile 5.61) - reduce track maintenance allowance (TMA)

Bridges where the preferred alternative to address issues related to attachment of protective barriers is bridge modifications or bridge replacement include:

- Sunnyside Pedestrian Bridge (Oakville Sub Mile 3.54) – modify pedestrian bridge
- Dowling Avenue Pedestrian (Oakville Sub Mile 3.02) – replace pedestrian bridge

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests..

4.1.6.1.2 Aquatic

There are two watercourses within this corridor segment, Lower Humber River and Mimico Creek. Bridge modifications will occur within the existing Lakeshore West route/corridor on the existing Lower Humber Bridge (Oakville Sub Mile 5.02). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Lower Humber River or fish/fish habitat. No attachments are required on the Mimico Creek Bridge and therefore there are no footprint impacts to Mimico Creek. Similarly, no adverse effects to Lower Humber River or Mimico Creek are anticipated to result from the installation of OCS structures as they are located within the existing Metrolinx rail corridor ROW away from the watercourses. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

4.1.6.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift, Monarch, Eastern Flowering Dogwood, and American Chestnut there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL and CVR communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Humber River Bridge (Oakville Sub Mile 5.02) and Mimico Creek Bridge (Oakville Sub Mile 5.94) were surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at Humber River Bridge or Mimico Creek Bridge. Modifications to Humber River Bridge (OCS wire attachments) are anticipated. An inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Given no Barn Swallows were found, no mitigation measures are proposed at this time. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CVR communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CVR is not anticipated to have an impact on this species.

While Blanding's Turtle, Eastern Musk Turtle, and Snapping Turtle have a moderate potential of occurrence within the Open Water (OA), there are no footprint impacts to these areas.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

4.1.6.1.4 Designated Areas

No footprint impacts have been identified within Lower Humber River Wetland Complex Provincially Significant Wetland (PSW), High Park Oak Woodlands Area of Natural and Scientific Interest (ANSI) or the Humber River Coastal Marsh Candidate ANSI. Footprint impacts to CVI, CVR, CGL and WOD lands within Toronto and Region Conservation Authority Regulated Areas are identified in **Table 4-10**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 4-10: Summary of Vegetation Removal Areas within Designated Areas – LSW-1*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	2.462	0.049	2.511	Minor
Residential (CVR)	0.151	0.014	0.165	Fair
Green Land (CGL)	0.003	0	0.003	Minor
Deciduous Woodland (WOD)	0.151	0	0.151	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

4.1.6.2 Net Effects

4.1.6.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVR, CVC, and CGL lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD community including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol, where required, pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

4.1.6.2.2 Aquatic

There are no net adverse effects on Lower Humber River or Mimico Creek as there are no anticipated footprint impacts.

4.1.6.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift, Monarch, Eastern Flowering Dogwood, American Chestnut, Blanding's Turtle, Eastern Musk Turtle, or Snapping Turtle. While there are footprint impacts to the WOD and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. No Barn Swallow nests were found on impacted bridges; therefore there are no net adverse effects. Net effects to Butternut will be determined during Detailed Design.

4.1.6.2.4 Designated Areas

There are no net adverse effects within the Lower Humber River Wetland Complex PSW, Humber River Coastal Marsh Candidate ANSI, or High Park Oak Woodlands ANSI as there are no footprint impacts. Net adverse effects to relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVR, CGL, and WOD communities are identified in **Table 4-10**. No vegetation clearing within the TRCA Regulated Area within the WOD and CGL communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI and CVR communities are required outside of the ROW.

4.1.7 OCS & Bridges: Section LSW-2 – Mimico Station to Long Branch Station

4.1.7.1 Potential Effects and Mitigation Measures

4.1.7.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSW-2 are presented in **Table 4-11**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone for LSW-2 is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Deciduous Thicket (THD) and Green Land (CGL) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL and THD communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) community will result in a loss of vegetation along the edge of this natural vegetation community. However, the WOD communities within the corridor segment are located mainly adjacent to the rail corridor and CVR communities. These areas provide only non-specialized habitat for wildlife which result in low potential ecological impacts. The high amount of canopy cover in the WOD community will result in extensive tree removals within this community. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Details relating to impacted areas within Toronto and Region Conservation Authority (TRCA) Regulated Areas can be found in **Table 4-12**.

Table 4-11: Summary of Vegetation Removal Areas within ELC Communities – LSW-2*

ELC Community	Vegetation Removal Area within Metrolinx owned ROW (ha)	Vegetation Removal Area outside Metrolinx owned ROW (ha)	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.634	0.056	0.690	Minor
Transportation and Utilities (CVI)	30.851	1.934	32.785	Minor
Residential (CVR)	0.589	0.003	0.592	Fair
Green Land (CGL)	0.107	0.097	0.204	Minor
Deciduous Thicket (THD)	0.031	0	0.031	Minor
Deciduous Woodland (WOD)	0.065	0	0.065	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.

- **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1for detailed tree protection measures during construction.
- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Islington Avenue (Oakville Sub Mile 7.46)
- Brown's Line (Oakville Sub Mile 9.41)

Bridges below the Absolute Minimum vertical clearance (6937 mm) will require additional modifications and/or solutions, to accommodate electrification, including unique engineering designs, lowering tracks, raising the bridge, bridge replacement or improving the quality of maintenance to reduce the track maintenance allowance (TMA). Bridges under the Absolute Minimum vertical clearance include:

- Brown's Line (Oakville Sub Mile 9.41) – lower tracks

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

4.1.7.1.2 Aquatic

There are no aquatic features within this corridor segment, and therefore no aquatic footprint impacts.

4.1.7.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift, Monarch, Eastern Flowering Dogwood, and American Chestnut there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CVR, CGL, and THD communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CVR communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CVR is not anticipated to have an impact on this species.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

4.1.7.1.4 Designated Areas

Footprint impacts to CVI, CVR and CGL lands within Toronto and Region Conservation Authority Regulated Areas are identified in **Table 4-12**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 4-12: Summary of Vegetation Removal Areas within Designated Areas LSW-2*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	0.058	0	0.058	Minor
Residential (CVR)	0.001	0	0.001	Minor
Green Land (CGL)	0.040	0	0.040	Minor
Deciduous Thicket (THD)	0	0	0	N/A
Deciduous Woodland (WOD)	0	0	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

4.1.7.2 Net Effects

4.1.7.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVC, CVI, THD, CGL and CVR lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

4.1.7.2.2 Aquatic

There are no net adverse effects as there are no watercourses within this corridor segment.

4.1.7.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift, Monarch, Eastern Flowering Dogwood, or American Chestnut. While there are footprint impacts to the WOD and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detail Design.

4.1.7.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVR and CGL communities are identified in **Table 4-12**. No vegetation clearing within the TRCA Regulated area is required within any of these communities outside of the Metrolinx owned ROW.

4.1.8 OCS & Bridges: Section LSW-3 – Long Branch Station to Port Credit Station

4.1.8.1 Potential Effects and Mitigation Measures

4.1.8.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSW-3 are presented in **Table 4-13**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including, Residential (CVR), Cultural Meadow (CUM), Green Land (CGL), Deciduous Thicket (THD), and Commercial and Institutional (CVC) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM, THD, and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation clearing identified below.

Table 4-13: Summary of Vegetation Removal Areas within ELC Communities LSW-3*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.007	0	0.007	Minor
Transportation and Utilities (CVI)	9.191	0.204	9.395	Minor
Residential (CVR)	2.779	0.038	2.817	Fair
Green Land (CGL)	1.408	0	1.408	Minor

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0.151	0.005	0.156	Minor
Deciduous Thicket (THD)	0.181	0	0.181	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx’s property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Etobicoke Creek (Oakville Sub Mile 9.82)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

4.1.8.1.2 Aquatic

There are five watercourses in this corridor segment: Etobicoke Creek, Applewood Creek, Serson Creek, Cooksville Creek, and Mary Fix Creek. Bridge modifications will occur within the existing Lakeshore West route/corridor on the existing Etobicoke Creek Bridge (Oakville Sub Mile 9.82). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Etobicoke Creek or fish/fish habitat. No attachments are required on the Cooksville Creek Bridge and therefore there are no footprint impacts to Cooksville Creek. Applewood Creek, Serson Creek, and Mary Fix Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

4.1.8.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift, Monarch, Eastern Flowering Dogwood, and American Chestnut there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL, THD, and CVR communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. Etobicoke Creek Bridge (Oakville Sub Mile 9.82) and Cooksville Creek Bridge (Oakville Sub Mile 11.80) were surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at Etobicoke Creek Bridge or Cooksville Creek Bridge. Due to bridge modifications (OCS wires) required at Etobicoke Creek Bridge, a follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. Although the Red-headed Woodpecker has a moderate potential of occurrence in the CGL communities and a low potential in CVR communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CVR and CGL is not anticipated to have an impact on this species.

While Snapping Turtle have a moderate potential of occurrence within the Open Water (OA), there are no footprint impacts to these areas.

4.1.8.1.4 Designated Areas

Footprint impacts to CVR, CGL and CVI lands within Toronto Region Conservation Authority (TRCA) and CVC, CVI, CVR, CGL, THD and CUM lands within Credit Valley Conservation (CVC) Regulated Areas are identified are identified in **Table 4-14**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 4-14: Summary of Vegetation Removal Areas within Designated Areas LSW-3*

ELC Community	TRCA Regulation Limit			CVC Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0	0	0	0.007	0	0.007	Minor
Transportation and Utilities (CVI)	0.555	0	0.555	3.219	0	3.219	Minor
Residential (CVR)	0.006	0	0.006	0.764	0.001	0.765	Fair
Green Land (CGL)	0.353	0	0.353	0.440	0	0.440	Minor
Deciduous Thicket (THD)	0	0	0	0.181	0	0.181	Minor
Cultural Meadow (CUM)	0	0	0	0.076	0	0.076	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

4.1.8.2 Net Effects

4.1.8.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CUM, CGL, CVC, CVI, and CVR lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

4.1.8.2.2 Aquatic

There are no net adverse effects on Etobicoke Creek, Cooksville Creek, Applewood Creek, Serson Creek, or Mary Fix Creek as there are no anticipated footprint impacts.

4.1.8.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift, Barn Swallow, Monarch, Eastern Flowering Dogwood, American Chestnut, or Snapping Turtle. While there are footprint impacts to the WOD, CGL, and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Net effects to Butternut will be determined during Detailed Design.

4.1.8.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA and CVC Regulated Areas associated with CGL, CUM, CVI, CVC, CVR, and THD lands are depicted in **Table 4-14.** No vegetation clearing within the TRCA or CVC Regulated Areas within the CVC, CVI, CGL, CUM, or THD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVR communities are required outside of the ROW.

4.1.9 OCS & Bridges: Section LSW-4 – Port Credit Station to Clarkson Station

4.1.9.1 Potential Effects and Mitigation Measures

4.1.9.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSW-4 are presented in **Table 4-15**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone is within the

Transportation and Utility (CVI) lands and clearance zones will require vegetation removals/clearing within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. Mitigation for CVI areas include ensuring vegetation removals follow the general mitigation measures for vegetation/tree removal outlined below.

In addition, vegetation removals within several other ELC communities including, Residential (CVR), Cultural Meadow (CUM), Green Land (CGL), and Commercial and Institutional (CVC) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) communities will result in a loss of vegetation along the edge of these natural vegetation communities. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. The WOD communities within the corridor segment are located mainly adjacent to the rail corridor, CGL, and CVR communities. These areas provide only non-specialized habitat for wildlife which result in low potential ecological impacts. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

A small portion of Marsh (MA) within the existing Metrolinx ROW is within the vegetation clearing zone. An amphibian survey was conducted during the 2016 field season to identify species present within the MA community. No species were recorded during the field survey. Vegetation clearing with the MA community will not impact any specialized amphibian habitat as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. As such, ecological impacts to these areas are low. Due to the minimal canopy cover in the MA community, the extent of tree removals in these areas is minor. No additional mitigation measures are proposed, aside from adherence to the general mitigation measures for vegetation/tree clearing identified below.

Table 4-15: Summary of Vegetation Removal Areas within ELC Communities LSW-4*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.336	0	0.336	Minor
Transportation and Utilities (CVI)	10.806	0.960	11.766	Minor
Residential (CVR)	2.542	0.014	2.557	Fair
Green Land (CGL)	0.626	0	0.626	Minor

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Deciduous Woodland (WOD)	0.805	0	0.805	Extensive
Cultural Meadow (CUM)	0.218	0	0.218	Minor
Marsh (MA)	0.026	0	0.026	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and

- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Credit River (Oakville Sub Mile 13.27)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

4.1.9.1.2 Aquatic

There are six watercourses within the corridor segment: Kenollie Creek, Credit River, Tecumseh Creek, Lornewood Creek, Birchwood Creek (East and West) and Turtle Creek. Bridge modifications will occur within the existing Lakeshore West route/corridor on the existing Credit River Bridge (Oakville Sub Mile 13.27). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to the Credit River or fish/fish habitat. Similarly, no adverse effects to the Credit River are anticipated to result from the installation of OCS structures as they are located within the existing Metrolinx rail corridor ROW away from the watercourses. Kenollie Creek, Tecumseh Creek, Lornewood Creek, Birchwood Creek (East and West) and Turtle Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

4.1.9.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift, Monarch, Eastern Flowering Dogwood, and American Chestnut there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL and CVR communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Credit River Bridge (Oakville Sub Mile 13.27) was surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed. Due to bridge modifications (OCS wires) required at the Credit River Bridge, a follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. Bank Swallow have a moderate potential to occur in areas adjacent to OA; however, there are no footprint impacts to these areas. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD, CGL, and CVR communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CVR and CGL is not anticipated to have an impact on this species.

Snapping Turtle have a moderate potential of occurrence within the OA and MA communities, and footprint impacts within the MA are anticipated. However, the MA areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

While American Eel have been identified within the Credit River, there are no footprint impacts to the watercourse and therefore no impacts to American Eel.

4.1.9.1.4 Designated Areas

Footprint impacts to CGL, CVI, CVC, CVR, MA, and WOD lands within CVC Regulated Areas are identified in **Table 4-16**.

There are no footprint impacts within the Credit River Marshes Wetland Complex Provincially Significant Wetland (PSW), Fudger's Marsh Evaluated Wetland, or Credit River Marsh Area of Natural and Scientific Interest (ANSI). There are footprint impacts to the CVR, CVI, CGL, CVC, CUM, and WOD lands within the Lorne Park Prairie ANSI as identified in **Table 4-16**. Most of these areas of impact occur adjacent to anthropogenically influenced land uses associated with the rail corridor. However, vegetation clearing within areas that are part of the Lorne Park Prairie ANSI should be minimized to the extent possible, particularly within the WOD.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 4-16: Summary of Vegetation Removal Areas within Designated Areas LSW-4*

ELC Community	CVCA Regulation Limit			Lorne Park Prairie ANSI			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.005	0	0.005	0.207	0	0.207	Minor
Transportation and Utilities (CVI)	3.846	0.159	4.005	6.862	0	6.862	Minor
Residential (CVR)	0.457	0.007	0.463	2.134	0	2.134	Fair
Green Land (CGL)	0.005	0	0.005	0.425	0	0.425	Minor
Deciduous Woodland (WOD)	0.593	0	0.593	0.591	0	0.591	Extensive
Cultural Meadow (CUM)	0	0	0	0.218	0	0.218	Minor
Marsh (MA)	0.026	0	0.026	0	0	0	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

4.1.9.2 Net Effects

4.1.9.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CUM, CGL, CVC, CVI, and CVR lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD communities adjacent to the existing rail corridor within the existing ROW. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. The vegetation removals within the MA community may result in a net loss of vegetation along the perimeter the MA within the existing ROW. However, this area does not contain suitable amphibian habitat. Since specialized habitat within the wetland will not be impacted and the current ecological function of the wetland area will be maintained, there are no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net adverse effects.

4.1.9.2.2 Aquatic

There are no net adverse effects on Credit River, Kenollie Creek, Tecumseh Creek, Lornewood Creek, Birchwood Creek (East and West) and Turtle Creek as there are no anticipated footprint impacts.

4.1.9.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift, Barn Swallow, Monarch, Bank Swallow, Eastern Flowering Dogwood, American Chestnut, or American Eel. While there are footprint impacts to the WOD, CGL and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. No net adverse effects are expected to result to Snapping Turtles or their habitat as the MA areas to be impacted do not contain specialized habitat. Net effects to Butternut will be determined during Detailed Design.

4.1.9.2.4 Designated Areas

Net effects relating to footprint impacts within CVC Regulated Areas associated with CGL, CVI, CVC, CVR, MA, and WOD lands are depicted in **Table 4-16**. No vegetation clearing within the Credit Valley Conservation Regulated Area within the CVC, CGL, WOD, or MA communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI and CVR communities are required outside of the ROW.

There are no net adverse effects to the Credit River Marshes Wetland Complex PSW, Fudger's Marsh Evaluated Wetland, or Credit River Marsh ANSI, as there are no footprint impacts. The majority of footprint impacts within Lorne Park Prairie ANSI are culturally influenced non-natural communities (CVI, CVC, CUM, CVR, CGL). A small area of WOD will also be impacted. None of the vegetation removal impacts within the Lorne Park Prairie ANSI are outside of the Metrolinx owned ROW.

4.1.10 OCS & Bridges: Section LSW-5 – Clarkson Station to Oakville Station

4.1.10.1 Potential Effects and Mitigation Measures

4.1.10.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSW-5 are presented in **Table 4-17**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation removals follow the general mitigation measures for vegetation/tree removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Cultural Meadow (CUM), Green Land (CGL), and Commercial and Institutional (CVC) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CUM, CVC, and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 4-17: Summary of Vegetation Removal Areas within ELC Communities LSW-5*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	2.067	0.759	2.826	Minor
Transportation and Utilities (CVI)	14.243	2.868	17.112	Minor
Residential (CVR)	0.037	0.163	0.200	Fair
Green Land (CGL)	0.333	0.150	0.484	Minor
Cultural Meadow (CUM)	0.241	0	0.241	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Royal Windsor Drive (Oakville Sub Mile 18.77)

Bridges below the Absolute Minimum vertical clearance (6937 mm) will require additional modifications and/or solutions, to accommodate electrification, including unique engineering designs, lowering tracks, raising the bridge, bridge replacement, or improving the quality of maintenance to reduce the track maintenance allowance (TMA). Bridges under the Absolute Minimum vertical clearance include:

- Royal Windsor Drive (Oakville Sub Mile 18.77) – reduce track maintenance allowance (TMA)

Due to possible potential impacts to Ford Drive (Oakville Sub Mile 18.67) and Joshua Creek (Oakville Sub Mile 18.90) solutions may include using a ballast mat, changing from a ballasted deck to direct fixation, possible replacement with a shallower superstructure or lowering the roadway.

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

4.1.10.1.2 Aquatic

There are five watercourses within the corridor segment: Sheridan Creek, Avonhead Creek, Joshua's Creek (East and West Branch), Wedgewood Creek and Morrison Creek (East and West Branch). Due to impacts associated with Oakville Sub Mile 18.77, there may be possible impacts to Joshua Creek Bridge (Oakville Sub Mile 18.90). However, the impacts to Joshua Creek (East Branch) cannot be determined until further design work is completed. No bridge modifications are required on the Sheridan Creek Bridge (Oakville Sub Mile 16.68) and therefore there are no footprint impacts to Sheridan Creek. Similarly, no adverse effects to Sheridan Creek are anticipated to result from the installation of OCS structures as they are located within the existing Metrolinx rail corridor ROW away from the watercourse. Avonhead Creek, Wedgewood Creek (East and West Branch), Joshua Creek (West Branch) and Morrison Creek (East and West Branch) are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

4.1.10.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift, Bank Swallow and Monarch there are no anticipated footprint impacts to these species or their habitat. Butternuts have a low potential for occurrence within the CGL and CVR communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit.

Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. Sheridan Creek Bridge (Oakville Sub Mile 16.68) and Joshua Creek Bridge (Oakville Sub Mile 18.90) were surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at Sheridan Creek Bridge or Joshua Creek Bridge. As there are no bridge modifications required at these bridge structures and no evidence of Barn Swallow nesting was found, there are no anticipated impacts. While the Red-headed Woodpecker has a moderate potential of occurrence in the CGL, and CVR communities, this species is generally tolerant of disturbance and individual tree removals within the CVR and CGL are not anticipated to have an impact on this species.

While Snapping Turtle have a moderate potential of occurrence within the OA there are no footprint impacts to these areas.

4.1.10.1.4 Designated Areas

Footprint impacts to CVI and CVC lands within CVC Regulated Areas and CVI, CVC, CGL, and CUM areas within Halton Region Conservation Authority (HRCA) are identified in **Table 4-18**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 4-18: Summary of Vegetation Removal Areas within Designated Areas LSW-5*

ELC Community	CVC Regulation Limit			HRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area inside ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.019	0.006	0.025	0.240	0.207	0.447	Minor
Transportation and Utilities (CVI)	0.182	0.106	0.288	2.500	0.203	2.703	Minor
Residential (CVR)	0	0	0	0	0	0	N/A
Green Land (CGL)	0	0	0	0.031	0.035	0.067	Minor
Cultural Meadow (CUM)	0	0	0	0.006	0	0.006	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

4.1.10.2 Net Effects

4.1.10.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CUM, CGL, CVC, CVI, and CVR lands as these communities contain limited habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

4.1.10.2.2 Aquatic

There are no net adverse effects on Sheridan Creek, Avonhead Creek, Joshua Creek (West Branch), Wedgewood Creek (East and West Branch) and Morrison Creek (East and West Branch) as there are no anticipated footprint impacts. Net adverse effects to Joshua Creek associated with the Joshua Creek Bridge (Oakville Sub Mile 18.90) will be determined once design information is available.

4.1.10.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift, Barn Swallow, Monarch, Bank Swallow, or Snapping Turtle. While there are footprint impacts to the CGL and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Net effects to Butternut will be determined during Detailed Design.

4.1.10.2.4 Designated Areas

Net effects relating to footprint impacts within CVC Regulated Areas associated with CVI and CVC and HRCA areas within CVI, CVC, CGL, and CUM lands are identified in **Table 4-18**. No vegetation clearing within the HRCA Regulated Area within the CUM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, and CGL communities are required outside of the ROW. Minor removals within the CVI and CVC communities within the CVC Regulated Area are required outside of the ROW.

4.1.11 OCS & Bridges: Section LSW-6 – Oakville Station to Bronte Station

4.1.11.1 Potential Effects and Mitigation Measures

4.1.11.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSW-6 are presented in **Table 4-19**. As depicted in mapping provided in Appendix A2, the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

Vegetation removals are also required within other ELC communities, mainly Commercial and Institutional (CVC) with a small area of Cultural Meadow (CUM). While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CUM communities, the extent of tree removals in these areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) communities will result in a loss of vegetation along the edge of these natural vegetation communities. Portions of the WOD communities are classified as Woodlands by the Town of Oakville. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. The WOD communities are associated with the Sixteen Mile Creek corridor which is classified as Valleylands by the Town of Oakville. Due to the natural attributes of the woodland community and its association with the watercourse corridor, ecological impacts to these areas are considered moderate. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 4-19: Summary of Vegetation Removal Areas within ELC Communities LSW-6*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	2.427	0.028	2.455	Minor
Transportation and Utilities (CVI)	11.722	0.226	11.948	Minor
Deciduous Woodland (WOD)	0.105	0	0.105	Extensive
Cultural Meadow (CUM)	0.039	0	0.039	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:

- **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
- **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1for detailed tree protection measures during construction.
- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA).

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires, include:

- Sixteen Mile Creek (Oakville Sub Mile 21.71)
- Cross Avenue (Oakville Sub Mile 21.70)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

4.1.11.1.2 Aquatic

There are three watercourses within the corridor segment: Sixteen Mile Creek, Fourteen Mile Creek and McCraney Creek (two crossings). Sixteen Mile Creek and Fourteen Mile Creek corridors are considered Valleylands by the Town of Oakville. Bridge modifications will occur within the existing Lakeshore West route/corridor on the existing Sixteen Mile Creek Bridge (Oakville Sub Mile 21.71). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Sixteen Mile Creek or fish/fish habitat. No attachments are required on Fourteen Mile Creek Bridge or McCraney Creek Bridge and therefore there are no footprint impacts to Fourteen Mile Creek and McCraney Creek. Similarly, no adverse effects to these creeks are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. The second crossing of McCraney Creek is conveyed under the corridor by a culvert therefore no footprint impact to the culvert or watercourse is anticipated to result from the installation of OCS within the existing corridor above the culvert. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

4.1.11.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift, Monarch, Eastern Flowering Dogwood, and American Chestnut there are no anticipated footprint impacts to these species or their habitat. Butternuts have a low potential in the CVR and a moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. Sixteen Mile Creek Bridge (Oakville Sub Mile 21.71), McCraney Creek Bridge (Oakville Sub Mile 22.99), and Fourteen Mile Creek Bridge (Oakville Sub Mile 24.18) were surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed Sixteen Mile Creek Bridge, McCraney Creek Bridge, or Fourteen Mile Creek Bridge. Due to bridge modifications (OCS wires) required at Sixteen Mile Creek Bridge, a follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CVR communities this species is generally tolerant of disturbance and a small amount of woodland edge removals within the WOD or individual tree removal in the CVR are not anticipated to have an impact on this species. While Bank Swallow has a moderate potential of occurrence within areas adjacent to Open Water (OA), there are no footprint impacts to these areas.

While Snapping Turtle have a moderate potential of occurrence within the OA, there are no footprint impacts to these areas.

Habitat for Silver Shiner and American Eel has been identified within Sixteen Mile Creek, while habitat for Redside Dace was identified within Fourteen Mile Creek. No footprint impacts to these watercourses will occur. The regulation for Redside Dace under the ESA, 2007 includes the meander belt width plus thirty (30) metres, therefore further consultation with the MNRF during Detailed Design will be required for any work that occurs within the regulated area, especially as it relates to sediment and erosion control measures associated with construction or site disturbance activities. Footprint impacts within Redside Dace regulated areas should be minimized to the greatest extent possible.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

4.1.11.1.4 Designated Areas

Footprint impacts to CVI, CVC, WOD, and CUM areas within HRCA Regulated areas and Sixteen Mile Creek Valley ESA are identified in **Table 4-20**. Vegetation clearing within areas that are part of the Sixteen Mile Creek Valley ESA should be minimized to the extent possible, particularly within the WOD.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 4-20: Summary of Vegetation Removal Areas within Designated Areas LSW-6*

ELC Community	HRCA Regulation Limit			Sixteen Mile Creek Valley ESA			Extent of Tree Removals (based on canopy cover within ELC community)
	Area inside ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area inside ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.520	0	0.520	0.006	0	0.006	Minor
Transportation and Utilities (CVI)	3.932	0.007	3.939	0.451	0	0.451	Minor
Deciduous Woodland (WOD)	0.105	0	0.105	0.072	0	0.072	Extensive
Cultural Meadow (CUM)	0.039	0	0.039	0.039	0	0.039	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

4.1.11.2 Net Effects

4.1.11.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC and CUM lands as these communities provide limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD communities adjacent to the existing rail corridor within the existing ROW. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

4.1.11.2.2 Aquatic

There are no net adverse effects on Sixteen Mile Creek, Fourteen Mile Creek, and McCraney Creek as there are no anticipated footprint impacts. There are no net adverse effects on the second crossing of McCraney Creek as there are no anticipated footprint impacts.

4.1.11.2.3 Species at Risk

There are no footprint impacts for Chimney Swift, Barn Swallow, Monarch, Eastern Flowering Dogwood, American Chestnut, Bank Swallow, Snapping Turtle, Silver Shiner, or American Eel and therefore no net adverse effects. While there are footprint impacts to the WOD community, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species.. Net effects to Butternut will be determined during Detailed Design. Net adverse effects on habitat for Redside Dace, as defined under the ESA, 2007 will be addressed in consultation with the MNRF during Detailed Design.

4.1.11.2.4 Designated Areas

Net effects relating to footprint impacts within HRCA Regulated Areas and Sixteen Mile Creek Valley ESA within CVI, CVC, WOD, and CUM lands are depicted in **Table 4-20.** No vegetation clearing within the HRCA Regulated Area within the CVC, WOD, or CUM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI communities are required outside of the ROW. Within the Sixteen Mile Creek Valley ESA, there are no vegetation removals required outside of the Metrolinx owned ROW.

4.1.12 OCS & Bridges: Section LSW-7 – Bronte Station to Appleby Station

4.1.12.1 Potential Effects and Mitigation Measures

4.1.12.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSW-7 are presented in **Table 4-21**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Green Land (CGL) and Commercial and Institutional (CVC) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CGL communities, the extent of tree removals in these areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) associated with Bronte Creek will result in a loss of vegetation along the edge of this natural vegetation community which provides habitat for wildlife and acts as a migratory corridor. The Bronte Creek corridor is classified as Valleylands by the Town of Oakville and portions of the WOD communities are also classified as Woodlands by the Town of Oakville. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. Due to the natural attributes of the woodlands community and the valleyland habitat, ecological impacts to these areas are considered moderate. The high amount of canopy cover in the WOD community will result in extensive tree removals within this community. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 4-21: Summary of Vegetation Removal Areas within ELC Communities LSW-7*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	1.602	0.124	1.727	Minor
Transportation and Utilities (CVI)	12.618	0.805	13.423	Minor

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Green Land (CGL)	0.545	0.001	0.546	Minor
Deciduous Woodland (WOD)	0.126	0	0.126	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and

- Compliance with the *Migratory Birds Convention Act* (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Bronte Creek (Oakville Sub Mile 25.87)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

4.1.12.1.2 Aquatic

There are three watercourses within the corridor segment: Bronte Creek, Sheldon Creek (two crossings) and Appleby Creek. Bridge modifications will occur within the existing Lakeshore West route/corridor on the existing Bronte Creek Bridge (Oakville Sub Mile 25.87). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Bronte Creek or fish/fish habitat. Similarly, no adverse effects to the Bronte Creek are anticipated to result from the installation of OCS structures as they are located within the existing Metrolinx rail corridor ROW away from the watercourses. No attachments are required on the Sheldon Creek East Bridge (Oakville Sub Mile 26.71) and the Sheldon Creek Bridge (Oakville Sub Mile 27.45) and therefore there are no footprint impacts to Sheldon Creek. Appleby Creek is conveyed under the corridor by a culvert therefore no footprint impact to the culvert or watercourse is anticipated to result from the installation of OCS within the existing corridor above the culvert. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

4.1.12.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift, Monarch, Eastern Flowering Dogwood, and American Chestnut there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. Bronte Creek Bridge (Oakville Sub Mile 25.87) and Sheldon Creek East (Oakville Sub Mile 26.71) were surveyed for active nests and individuals. One (1) active Barn Swallow nest was observed at Bronte Creek Bridge. No Barn Swallow nests or individuals were observed at Sheldon Creek East. Due to bridge modifications required at Bronte Creek Bridge, an inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration and associated Mitigation and Monitoring plan to be implemented including provision of alternative nesting habitat per the requirements of the ESA, 2007. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CGL is not anticipated to have an impact on this species. While Bank Swallow have a moderate potential of occurrence within areas adjacent to Open Water (OA), there are no footprint impacts to these areas.

While Snapping Turtle and Blanding's Turtle have a moderate potential of occurrence within the OA, there are no footprint impacts to these areas.

American Eel and Silver Shiner have been identified within Bronte Creek. However, there are no footprint impacts to the watercourse and therefore no impacts to American Eel or Silver Shiner.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

4.1.12.1.4 Designated Areas

Footprint impacts to CVI, CVC, WOD, and CGL areas within HRCA Regulated areas and CVI and WOD areas within Bronte Creek Valley ESA are identified in **Table 4-22**. Vegetation clearing within areas that are part of the Bronte Creek Valley ESA should be minimized to the extent possible, particularly within the WOD.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 4-22: Summary of Vegetation Removal Areas within Designated Areas LSW-7*

ELC Community	HRCA Regulation Limit			Bronte Creek Valley ESA			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.103	0.040	0.143	0	0	0	Minor
Transportation and Utilities (CVI)	1.861	0.423	2.284	0.324	0	0.324	Minor
Green Land (CGL)	0.047	0	0.047	0	0	0	Minor
Deciduous Woodland (WOD)	0.126	0	0.126	0.107	0	0.107	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

4.1.12.2 Net Effects

4.1.12.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, and CGL lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor within the existing ROW. The WOD is part of the Bronte Creek valley. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD community including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

4.1.12.2.2 Aquatic

There are no net adverse effects on Bronte Creek, Sheldon Creek (two crossings) and Appleby Creek as there are no anticipated footprint impacts.

4.1.12.2.3 Species at Risk

There are no footprint impacts for Chimney Swift, Monarch, Eastern Flowering Dogwood, American Chestnut, Bank Swallow, Snapping Turtle, Blanding's Turtle, Silver Shiner, or American Eel and therefore no net adverse effects. Should Barn Swallow nests be found prior to construction on the Bronte Creek Bridge (Oakville Sub Mile 25.87), registration and mitigation under the Environmental Site Assessment will ensure no net adverse effects to Barn Swallows. While there are footprint impacts to the WOD and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detailed Design.

4.1.12.2.4 Designated Areas

Net effects relating to footprint impacts within HRCA Regulated Areas within CVI, CVC, WOD, and CGL lands and CVI and WOD lands within Bronte Creek Valley ESA are identified in **Table 4-22**. No vegetation clearing within the HRCA Regulated Area within the CGL or WOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI and CVC communities are required outside of the ROW. Within the Bronte Creek Valley ESA, there are no vegetation removals required outside of the Metrolinx owned ROW.

4.1.13 OCS & Bridges: Section LSW-8 – Appleby Station to Burlington (MP 31.5)

4.1.13.1 Potential Effects and Mitigation Measures

4.1.13.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSW-8 are presented in **Table 4-23**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Cultural Meadow (CUM), and Agricultural (AG) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, these communities and they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM, and AG communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) associated with Shoreacres Creek will result in a loss of vegetation along the edge of this natural vegetation community which provides habitat for wildlife and acts as a migratory corridor. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. Due to the natural attributes of the woodlands community and its association with the Shoreacres Creek corridor, ecological impacts to these areas are considered moderate. The high amount of canopy cover in the WOD community will result in extensive tree removals within this community. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified in **Table 4-23**.

Table 4-23: Summary of Vegetation Removal Areas within ELC Communities LSW-8*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	3.229	0.165	3.394	Minor
Transportation and Utilities (CVI)	11.362	0.085	11.45	Minor
Residential (CVR)	0.062	0	0.062	Fair
Deciduous Woodland (WOD)	0.105	0	0.105	Extensive
Agriculture (AG)	0.194	0.001	0.195	Minor
Cultural Meadow (CUM)	0.023	0	0.023	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx’s property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.

- **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
- **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Guelph Line (Oakville Sub Mile 30.81)
- Burlington GO Station Pedestrian Bridge (Oakville Sub Mile 31.65)

Bridges where the preferred alternative to address issues related to bridge modifications and vertical clearance issues is bridge replacement include:

- Drury Lane – Pedestrian Bridge (Oakville Sub Mile 31.28)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

4.1.13.1.2 Aquatic

There are four watercourses within the corridor segment: Shoreacres Creek, Tuck Creek, Roseland Creek, and Indian Creek. No bridge modifications are required on the Shoreacres Creek Bridge (Mile 29.04), Tuck Creek Bridge (Oakville Sub Mile 29.64) or Roseland Creek Bridge (Oakville Sub Mile 30.67) and therefore there are no footprint impacts to Shoreacres Creek, Tuck Creek and Roseland Creek. Similarly, no adverse effects to these creeks are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. The crossing of Indian Creek is conveyed under the corridor by a culvert therefore no footprint impacts to the culvert or watercourse are anticipated to result from the installation of OCS within the existing corridor above the culvert. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

4.1.13.1.3 Species at Risk

Given the low potential of occurrence of Chimney Swift, Monarch, Eastern Flowering Dogwood, American Chestnut, Eastern Meadowlark, and Bobolink, there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CVR communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. Sheldon Creek Bridge (Oakville Sub Mile 27.45) was surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed. As there are no bridge modifications required at this bridge structure and no evidence of Barn Swallow nesting was found, there are no anticipated impacts. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CVR communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CVR is not anticipated to have an impact on this species.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

4.1.13.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, and WOD areas within HRCA areas are identified in **Table 4-24**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 4-24: Summary of Vegetation Removal Areas within Designated Areas LSW-8*

ELC Community	HRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area within HRCA Regulation Limit (ha)	
Commercial and Institutional (CVC)	0.546	0.045	0.591	Minor
Transportation and Utilities (CVI)	2.570	0.060	2.630	Minor
Residential (CVR)	0.006	0	0.006	Fair
Deciduous Woodland (WOD)	0.105	0	0.105	Extensive
Agriculture (AG)	0	0	0	N/A
Cultural Meadow (CUM)	0	0	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

4.1.13.2 Net Effects

4.1.13.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CUM, CVR, CVC, and AG lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor within the existing ROW. The WOD is part of the Shoreacres Creek corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD community including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

4.1.13.2.2 Aquatic

There are no net adverse effects on Shoreacres Creek, Tuck Creek, Roseland Creek and Indian Creek as there are no anticipated footprint impacts.

4.1.13.2.3 Species at Risk

There are no footprint impacts for Chimney Swift, Barn Swallow, Monarch, Eastern Flowering Dogwood, American Chestnut, Eastern Meadowlark, or Bobolink and therefore no net impacts. While there are footprint impacts to the WOD, CGL and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detailed Design.

4.1.13.2.4 Designated Areas

Net effects relating to footprint impacts within HRCA Regulated Areas within CVI, CVC, CVR, and WOD lands are identified in **Table 4-24**. No vegetation clearing within the HRCA Regulated Area within the CVR and WOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI and CVC communities are required outside of the ROW.

4.2 Preliminary Environmental Site Assessment

Please refer to Appendix B for a description of the methodology followed for Environmental Site Assessment work. Additional details can be found in the Preliminary Environmental Site Assessment Report contained in **Appendix B**.

4.2.1 Burlington Tap Location

4.2.1.1 Potential Effects and Mitigation Measures

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

4.2.1.2 Net Effects

No net adverse effects are anticipated.

4.2.2 Burlington TPS

4.2.2.1 Potential Effects and Mitigation Measures

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

4.2.2.2 Net Effects

No net adverse effects are anticipated.

4.2.3 Mimico Tap

4.2.3.1 Potential Effects and Mitigation Measures

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

4.2.3.2 Net Effects

No net adverse effects are anticipated.

4.2.4 Mimico TPS

4.2.4.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown composition may be present across the Site;
- The use of the Site as part of a former rail yard; and,
- The industrial operations to the north and east of the Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment as required to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses.

4.2.4.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

4.2.5 Canpa 25kV Feeder Route

4.2.5.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Various industrial land uses surrounding the Site, including several Underground Storage Tanks (USTs) and two waste disposal sites.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Characterize the quality of excess soil generated at the time of installation to determine management options. A subsurface investigation prior to construction is not considered necessary since the installation of the aerial feeder route is not anticipated to required property acquisition or large scale excavation activities that have the potential to disturb subsurface contamination, if present.

4.2.5.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

4.2.6 Mimico SWS

4.2.6.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Historical and current industrial uses of the Site and surrounding properties;
- Potential fill materials of unknown composition may be present across the Site;
- On-Site chemical and solvent manufacturing; and,
- One on-Site AST potentially containing fuel oil.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Phase I Environmental Site Assessment if the property is to be acquired;
- Complete a Subsurface Investigation to assess the presence and quality of fill and potential impacts resulting from current and former on-site and adjacent/nearby land uses; and,
- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of the Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

4.2.6.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

4.2.7 Oakville SWS

4.2.7.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown composition may be present across the Site; and,
- The potential use of the Site for the vehicle servicing.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,

- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment as required to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses.

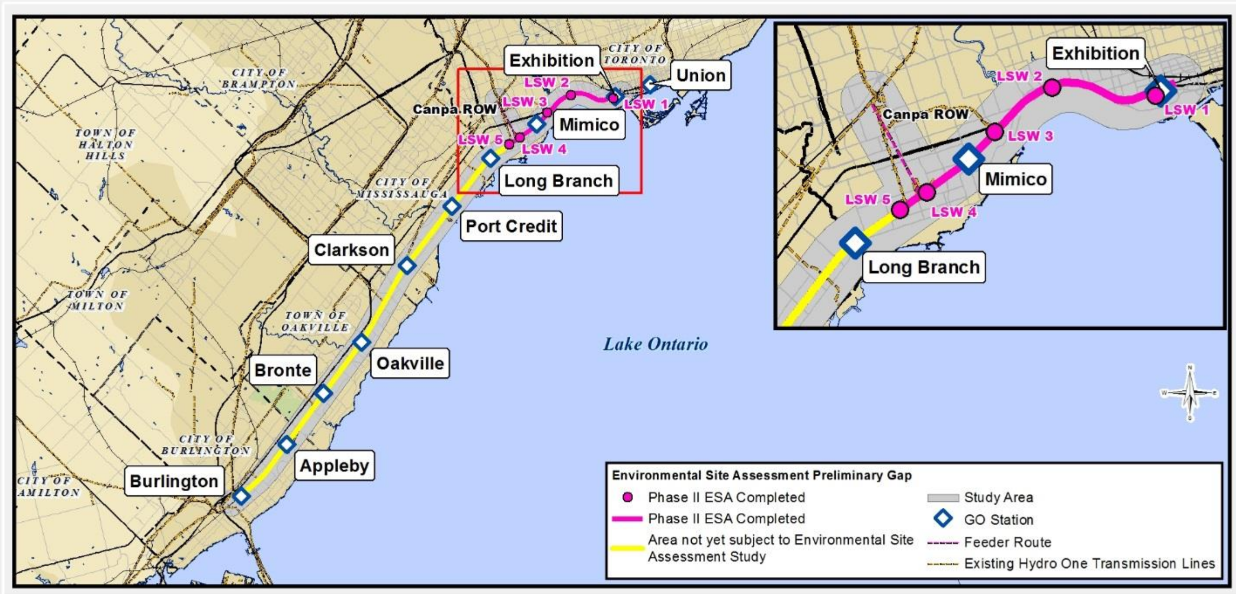
4.2.7.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

4.2.8 OCS & Bridges: LSW Corridor

The scope of the study undertaken as part of the GO Rail Network Electrification TPAP was limited to a gap analysis review of previous Environmental Site Assessment work within the OCS Impact Zones along the corridors. Based on the available background reports reviewed, the LSW corridor has been the subject of Phase I and II ESAs from Strachan Ave (eastern boundary of current study) to 29th St. (west of the Mimico TPS). The corridor west of this point has not been assessed (see **Figure 4-13**). Approximately 37 km of this corridor have not been subject to a ESA. Additional gaps include the Willowbrook Maintenance Facility.

Figure 4-13: Lakeshore West Corridor Gap Analysis Map



Mitigation Measures

Implement the mitigation measures and/or carry out further study as documented in the applicable LSW studies listed in **Table 4-25**.

Table 4-25: Phase I/II or Other Contaminated Site Related Documents Reviewed - Lakeshore West Corridor

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
Coffey 2009	Letter Report Chemical Characterization of Soils - Proposed Parking Structure Oakville Go Station, Trafalgar Road & Cornwall Road, Oakville, Ontario	Read Jones Chirstofferse n Ltd.	Coffey Geotechnics Specialists Managing the Earth	13-Aug-09	SP8540	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Phase II - Soils Testing
Englobe 2015	Phase II Environmental Site Assessment Report, CP Canpa Subdivision Milton Corridor to Queensway (1.8 kilometer) and Queensway to Lakeshore Corridor (2.2 kilometer) Toronto, Ontario	Metrolinx	Englobe Soils Materials Environment	7-Aug-15	124-P-0004533-0-01-016-HG-R-0001-01	LSW	N/S piece of rail West of Mimico TPS	Phase II
Sarafinchin 1991	Geoenvironmental Assessment Proposed Condominium Development Trafalgar Road and Old Mill Road, Oakville, Ontario	Kaneff Properties Ltd.	Sarafinchin Associates Ltd. GeoEngineering Consultants	20-Dec-91	T1020.1	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Geotech Investigation for new building.
Sarafinchin 1994a	Geoenvironmental Investigation and Excavation Management Plan Proposed Residential Development Trafalgar Road and Cornwall	Kaneff Properties Ltd.	Sarafinchin Associates Ltd. GeoEngineering Consultants	24-Aug-94	T1020.7	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Excavation Management Plan

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
	Road Oakville, Ontario, Volume I							
Sarafinchin 1994b	Geoenvironmental Investigation and Excavation Management Plan Proposed Residential Development Trafalgar Road and Cornwall Road Oakville, Ontario, Volume II	Kaneff Properties Ltd.	Sarafinchin Associates Ltd. GeoEngineering Consultants	24-Aug-94	T1020.7	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Excavation Management Plan
Sarafinchin 2005	Proposed Site Remediation Plan Proposed Multi-Storey Seniors Residence Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Sunrise Senior Living	Sarafinchin Associates Ltd. GeoEngineering Consultants	20-Dec-05	T1619C	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Proposed Site Remediation Plan
Sarafinchin 2005a	Phase I and II ESAs Trafalgar and Cornwall Roads, Parts of Lots 13 and 14, Concession 3 Oakville, Ontario	Sunrise Senior Living	Sarafinchin Associates Ltd. GeoEngineering Consultants	5-Dec-05	T1619A	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Phase I and Phase II
Sarafinchin 2006	Letter Report Soil Leachate Quality Testing Proposed Site Remediation and Soil Disposal Trafalgar Road	Sunrise Developments Inc.	Sarafinchin Associates Ltd. GeoEngineering Consultants	31-Oct-06	T1619C	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Phase II soil testing.

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
	and Cornwall Road Oakville, Ontario							
Sarafinchin 2006a	Letter Report: Supplementary Groundwater Monitoring, Phase II Environmental Site Assessment Trafalgar Road and Cornwall Road, Oakville, Ontario	Sunrise Developments Inc.	Sarafinchin Associates Ltd. GeoEngineering Consultants	28-Sep-06	T1619A	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Phase II - Additional Testing
Sarafinchin 2007	Letter Report Re: Additional Remediation Zone No. 7 Proposed Site Remediation Plan, Multi-Storey Seniors Residence, 155 Cornwall Road, Oakville, Ontario	Sunrise Senior Living	Sarafinchin Associates Ltd. GeoEngineering Consultants	30-Oct-07	T1619C	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Phase II - Additional Testing
Sarafinchin 2008	Soil Remediation Report 115 Cornwall Road, Formerly 466 Trafalgar Road, Oakville, Ontario	SZR Oakville II Inc.	Sarafinchin Associates Ltd. GeoEngineering Consultants	11-Feb-08	T1619C	LSW	Trafalgar and Cornwall Roads Parts of Lots 13 and 14, Concession 3, Oakville, Ontario	Soil Remediation Report
SPL 2010a	Phase I Environmental Site Assessment Lakeshore West Rail Corridor, Yonge Street to 29th Street, Toronto, Ontario	Metrolinx	SPL Beatty, A Division of SPL Consultants Limited	30-Apr-10	G-09.12.016	LSW	Lakeshore West Rail Corridor, Yonge Street to 29th Street, Toronto, Ontario	Phase I

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
SPL 20110b	Phase II Environmental Soil and Groundwater Investigation Lakeshore West Rail Corridor, Yonge Street to 29th Street, Toronto, Ontario	Metrolinx	SPL Beatty, A Division of SPL Consultants Limited	31-Mar-10	G09.12.016	LSW	Lakeshore West Rail Corridor, Yonge Street to 29th Street, Toronto, Ontario	Phase II
SPL 2012	Letter Report Chemical Characterization of Soil - Port Credit Go Station Parking Lot North and South Expansions, Mississauga, ON	Planmac Engineering Inc.	SPL Consultants Limited	5-Nov-12	1336-610	LSW	Port Credit Go Train Station Parking Lot	Phase II

Further work is recommended along the LSW corridor to assess/characterize potential soil and/or groundwater contamination and develop appropriate mitigation measures. As a result, additional Environmental Site Assessment studies including Phase I ESAs, Phase II ESAs, etc. will be carried out by Metrolinx as required along the corridors/OCS Impact Zone during the Detailed Design phase. Should these further assessments confirm the presence of subsurface contamination at these sites, recommendations for mitigation will be developed and implemented as appropriate which may include but are not limited to:

- Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site;
- Undertake remediation and/or implementation of management measures to address contaminated soils and/or groundwater during construction and long term operations and maintenance. Management measures will be carried out in accordance with applicable environmental legislation.

Furthermore, the mitigation measures as outlined in Section 9.2 will be adhered to and implemented during Detailed Design and construction.

4.2.8.1 Net Effects

Based on the implementation of the mitigation measures outlined above, no net adverse effects are anticipated.

4.3 Cultural Heritage

Please refer to Appendix C2 for a description of the methodology followed for assessment of cultural heritage impacts. Additional details can be found in the Cultural Heritage Impact Assessment Report contained in **Appendix C2**.

4.3.1 Burlington Tap Location

There are no heritage properties identified at the Burlington Tap Location. There are no further concerns from a cultural heritage perspective.

4.3.1.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

4.3.1.2 Net Effects

No net effects will be experienced as a result of this undertaking.

4.3.2 Mimico Tap/TPS Location & 25kV Feeder Route

There are no heritage properties identified at the Mimico Tap/TPS Location or the Feeder Route. There are no further concerns from a cultural heritage perspective.

4.3.2.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

4.3.2.2 Net Effects

No net effects will be experienced as a result of this undertaking.

4.3.3 Burlington TPS

There are no heritage properties identified at the Burlington TPS. There are no further concerns from a cultural heritage perspective.

4.3.3.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

4.3.3.2 Net Effects

No net effects will be experienced as a result of this undertaking.

4.3.4 Mimico SWS

There are no heritage properties identified at the Mimico SWS. There are no further concerns from a cultural heritage perspective.

4.3.4.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

4.3.4.2 Net Effects

No net effects will be experienced as a result of this undertaking.

4.3.5 Oakville SWS

There are no heritage properties identified at the Oakville SWS. There are no further concerns from a cultural heritage perspective.

4.3.5.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

4.3.5.2 Net Effects

No net effects will be experienced as a result of this undertaking.

4.3.6 Corridor & Bridges: Section LSW-1 – West of Bathurst Street (Mile 1.20) to Mimico Station

The cultural heritage resources within this section include:

- Dufferin Street Bridge (LSW-1-1)
- Dunn Avenue Bridge (LSW-1-2)
- Dowling Avenue Bridge (LSW-1-3)
- Humber River Bridge (LSW-1-4)
- Fort York Heritage Conservation District (LSW-1-5)
- Palais Royale (LSW-1-6)

A summary of impacts and mitigation measures is provided in **Table 4-26** below. Feature mapping of resources is provided in **Appendix C2**.

4.3.6.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 4-26: Summary of LSW-1 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Dufferin Street Bridge LSW-1-1 (CHP)	Preferred solution to vertical clearance issue is to raise the roadway profile and replace the bridge, no track lowering is proposed. OCS wires will be attached to the new bridge and new bridge will be built with required barrier.	None. The heritage bridge was previously demolished	• A CHER was previously completed as part of a separate project for the City of Toronto • The bridge was demolished in November 2013 • No further work recommended
Dunn Avenue Bridge LSW-1-2 (PHP)	Preferred solution to vertical clearance issue is to raise the roadway profile and replace the bridge. OCS wires will be attached to the new	None. The heritage bridge was demolished.	• A CHER and HIA was previously completed as part of a separate

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
	bridge and new bridge will be built with required barrier..		project, and this bridge was demolished in November 2015 • No further work to be undertaken
Dowling Avenue Bridge LSW-1-3 (PHP)	Bridge protection barrier to be added; OCS wires to be attached to the new bridge; preferred solution to address impacts due to attachment of protective barrier is to replace the pedestrian bridge.	None. The heritage bridge was demolished.	• A CHER and HIA was previously completed as part of a separate project, and this bridge was demolished in November 2015 • No further work to be undertaken
Humber River Bridge LSW-1-4 (PHP)	Structure is over 60 metres, therefore OCS wires are to be attached to the bridge and installation of track portals are possible	Alteration: Displacement of heritage attributes and/or disruption of setting	• A CHER was completed and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the City of Toronto Heritage Preservation Services
Fort York HCD & NHS LSW-1-5 (Adjacent Protected Property to the rail corridor and Strachan Avenue Bridge)	The OCS impact zone is confined to the rail corridor and as such, no direct or indirect impacts to heritage attributes associated with the Fort York HCD and NHS or were identified. In particular, no views north from the Fort, to or across the railway tracks, were noted as heritage attributes. No impacts to the heritage attributes associated with the Fort York HCD were identified as a result of OCS infrastructure or alterations to Strachan Avenue Bridge (see Appendix C2).[10]	N/A	N/A
Palais Royale LSW-1-6 (Adjacent Protected Property to the Sunnyside Pedestrian Bridge)	No impacts to the heritage attributes associated with the Palais Royale in Toronto were identified as a result of OCS infrastructure or replacement of the adjacent pedestrian bridge.	N/A	N/A

[10] Impacts to the Fort York HCD were also discussed as part of the UP Express Electrification EA (2014).

4.3.6.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at Humber River Bridge will be minimized by carrying out a HIA during Detailed Design. The HIA will identify potential impacts and recommend appropriate mitigation measures for heritage attributes to be incorporated into the final design. During detail design, the HIA should be updated, if necessary based on final design in consultation with MTCS and City of Toronto Heritage Preservation Services.

4.3.7 OCS & Bridges: Section LSW-2 – Mimico Station to Long Branch Station

The cultural heritage resources within this section include:

- Islington Avenue Bridge (LSW-2-1)

A summary of impacts and mitigation measures is provided in **Table 4-27** and feature mapping of resources is provided in **Appendix C2**.

4.3.7.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 4-27: Summary of LSW-2 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Islington Avenue Bridge LSW-2-1 (CHP)	Bridge protection barrier to be added; installation of OCS wire attachments (but not over LSW corridor); installation of flash plates	Alteration: Displacement of heritage attributes and/or disruption of setting	• A CHER was completed and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the City of Toronto Heritage Preservation Services

Figure 4-14: Islington Avenue Bridge – East Elevation

4.3.7.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at Islington Avenue Bridge will be minimized by carrying out a HIA. The HIA will identify potential impacts and appropriate mitigation measures for heritage attributes to be incorporated into the final design. The HIA will be undertaken as part of Detailed Design and will be developed in consultation with MTCS and the City of Toronto Heritage Preservation Services.

4.3.8 OCS & Bridges: Section LSW-3 – Long Branch Station to Port Credit Station

The cultural heritage resources within this section include: Etobicoke Creek Bridge (LSW 3-1).

A summary of impacts and mitigation measures is provided in **Table 4-28** and feature mapping of resources is provided in **Appendix C2**.

4.3.8.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 4-28: Summary of LSW-3 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Etobicoke Creek Bridge LSW-3-1 (PPHP)	Structure is over 60 metres, therefore OCS wires are to be attached to the bridge and installation of track portals are possible	Alteration: displacement of heritage attributes and/or disruption of setting	• A draft CHER was completed (as part of Electrification TPAP) and the preliminary recommendation is that is a Provincial Heritage Property. The evaluation is still pending MHC review and is subject to change. • Conduct a HIA (if confirmed to be PHP property) to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the City of Toronto.

See **Figure 4-15** for a visual representation of this CHR.

Figure 4-15: Etobicoke Creek Bridge - North Elevation

4.3.8.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Etobicoke Creek Bridge will be minimized by carrying out a HIA. The HIA will identify potential impacts and appropriate mitigation measures for heritage attributes to be incorporated into the final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the City of Toronto.

4.3.9 OCS & Bridges: Section LSW-4 – Port Credit Station to Clarkson Station

The cultural heritage resources within this section include:

- Credit River Bridge (LSW-4-1)
- Port Credit Memorial Arena (LSW-4-2)

A summary of impacts and mitigation measures is provided in **Table 4-29** and feature mapping of resources is provided in **Appendix C2**.

4.3.9.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 4-29: Summary of LSW-4 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Credit River Bridge LSW-4-1 (PHPPS)	Structure is over 60 metres, therefore OCS wires are to be attached to the bridge and installation of track portals are possible	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was completed (as part of Electrification TPAP) and it was determined to be a Provincial Heritage Property of Provincial Significance • Conduct a HIA as part of TPAP to identify potential impacts and appropriate mitigation measures • The HIA should be updated during Detailed Design, if necessary in consultation with the MTCS and the City of Mississauga
Port Credit Memorial Arena LSW-4-2 (Protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the Port Credit Memorial Arena at 40 Stavebank Road were identified as a result of OCS infrastructure.	N/A	N/A

Figure 4-16: Credit River Bridge – South Elevation

4.3.9.1.1 Credit River Bridge

For a summary of the Credit River Bridge's Cultural Heritage Value a copy of the CHER and Statement of Cultural Heritage Value for the Credit River Bridge is provided in **Appendix M.** The Credit River Bridge was identified by Metrolinx as a provincial heritage property of provincial significance (2016) and a HIA was conducted. The HIA for the Credit River Bridge was completed August 2017 by ASI. The purpose of the HIA was to consider the potential impacts of proposed interventions. The Credit River Bridge requires modifications to allow for the installation of the OCS. In order to accommodate the OCS wires, OCS attachments will be required on the bridge.

Introduction of the OCS attachments is not expected to result in significantly adverse impacts on the bridge's identified heritage attributes. OCS attachments will be installed to the substructure or superstructure of the bridge. According to existing material, the intervention is reversible. However, the OCS attachments do have the potential to alter the legibility of Credit River Bridge as a unique example of an inverted bowstring arch deck truss bridge constructed of steel and stone masonry. In addition, the placement of the OCS attachments on the superstructure could result in the introduction of bracing/plates/structural supports. As such, the following mitigation measures should be undertaken:

- The OCS Attachments should be installed to be compatible with the bridge's type and massing and to minimize material interventions. Mitigations may include sitting OCS attachments at the edges of the bridge and using materials and finishes that would make the new infrastructure physically and visually compatible with, but subordinate to and distinguishable from the bridge.

- The number of connections used to attach electrification infrastructure to the Credit River Bridge should be minimized. It is anticipated that installation of OCS Attachments at abutments/piers would be bolted to the substructure whereas installation at the superstructure level may require introduction of additional bracing, plates, and or structural elements.
- All interventions should be designed to be reversible. Where interventions are undertaken that will result in alterations to material and fabric, documentation should be undertaken in advance of installation activities. The purpose of documentation is to record existing conditions of the bridge at a level of detail for the purposes of implementing a program to reverse impact should OCS attachments be removed in future due to changes in technology or operational priorities.
- Municipal or federal heritage approvals are not anticipated to be required as a result of the proposed undertaking. As the Credit River Bridge is a Provincial Heritage Property of Provincial Heritage Significance, any request for demolition or transfer from provincial control will require Ministerial consent from the MTCS.
- Detailed Design and implementation of interventions at the Credit River Bridge should be guided by a qualified heritage professional who is a member of the Canadian Association of Heritage Professionals and who has demonstrated experience developing impact assessments and conservation plans for culturally significant road and rail bridges.

Refer to **Appendix M** for a copy of the HIA prepared for the Credit River Bridge.

4.3.9.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Credit River Bridge will be minimized by carrying out a HIA during the TPAP. The HIA will identify potential impacts and appropriate mitigation measures for heritage attributes to be incorporated into the final design. During Detailed Design, the HIA should be updated, if necessary based on final design in consultation with MTCS and City of Mississauga.

4.3.10 OCS & Bridges: Section LSW-5 – Clarkson Station to Oakville Station

The cultural heritage resources within this section include:

- The General Electric Company (LSW-5-1)

A summary of impacts and mitigation measures is provided in **Table 4-30** and feature mapping of resources is provided in **Appendix A**.

4.3.10.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 4-30: Summary of LSW-5 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
The General Electric Company LSW-5-2 (Protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the General Electric Company at 420 South Service Road in Oakville were identified as a result of OCS infrastructure.	N/A	N/A

4.3.10.2 Net Effects

Given that the Project will have no impact on the heritage value of this property and no further impact assessment is required.

4.3.11 OCS & Bridges: Section LSW-6 – Oakville Station to Bronte Station

The cultural heritage resources within this section include:

- Sixteen Mile Creek Bridge (LSW-6-1)

A summary of impacts and mitigation measures is provided in **Table 4-31** and feature mapping of resources is provided in **Appendix C2**.

4.3.11.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 4-31: Summary of LSW-6 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Sixteen Mile Creek Bridge LSW-6-1 (PPHP)	Structure is over 60 metres, therefore OCS impacts are expected	Alteration: Displacement of heritage attributes and/or disruption of setting	• A CHER was undertaken (as part of the Electrification TPAP) and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the Town of Oakville

See **Figure 4-17** for a visual representation of this CHR. A summary of the Sixteen Mile Creek Bridge's cultural heritage value is provided below:

The Sixteen Mile Creek Bridge retains design value due to its Warren deck truss construction, held together with steel rivets, as well as stone piers and abutments. According to existing plans, the stone piers were constructed in 1892 and encase portions of the original brick piers which date to 1855. The design and materials utilized in the bridge provide a representative example of early twentieth century deck truss construction. The structure also retains historical value due to its association with the construction of the Great Western Railway corridor, the double tracking program of the late 1890s/early 1900s, and with Joseph Hobson, Chief Engineer of the Grand Trunk Railway, who is also associated with major rail infrastructure projects such as the St. Claire Tunnel, the International Bridge at Fort Erie, and the Victoria Bridge in Montreal. In addition, the bridge retains contextual value due to it being a defining built feature in the area, as well as its prominent location and accessibility, for which it is considered a local landmark.

Heritage attributes associated with the subject resource include, but are not limited to:

- Steel Warren deck truss construction with rivets used to secure steel members;
- Stone abutments and piers built in 1892 and encasing portions of the original, 1855 brick piers;
- Intact alignment/right-of-way of the former Great Western Railway, now the Lakeshore West rail corridor;
- Physical, functional, and historical links to the character of the Sixteen Mile Creek.

A copy of the CHER and Statement of Cultural Heritage Value is provided in **Appendix M**.

Figure 4-17: Sixteen Mile Creek Bridge – South Elevation

4.3.11.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Sixteen Mile Creek Bridge will be minimized by carrying out a HIA. The HIA will identify potential impacts and appropriate mitigation measures for heritage attributes to be incorporated into the final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the Town of Oakville.

4.3.12 OCS & Bridges: Section LSW-7 – Bronte Station to Appleby Station

The cultural heritage resources within this section include:

- Bronte Creek Bridge (LSW-7-1)

A summary of impacts and mitigation measures is provided in **Table 4-32** and feature mapping of resources is provided in **Appendix C2**.

4.3.12.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 4-32: Summary of LSW-7 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Bronte Creek Bridge LSW-7-1 (PPHP)	Structure is over 60 metres, therefore OCS wires are to be attached to the bridge and installation of track portals are possible	Alteration: Displacement of heritage attributes and/or disruption of setting	• A CHER was undertaken (as part of the Electrification TPAP) and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the Town of Oakville

See **Figure 4-18** for a visual representation of this CHR.A summary of the cultural heritage value of the Bronte Creek Bridge is provided below:

The Bronte Creek Bridge retains design value due to its Warren deck truss construction, held together with steel rivets, as well as stone piers and abutments. The design and materials utilized in the bridge provide a representative example of early twentieth century deck truss construction. The structure also retains historical value due to its association with the construction of the Great Western Railway corridor, the double tracking program of the late 1890s/early 1900s, and with Joseph Hobson, Chief Engineer of the Grand Trunk Railway, who is also associated with major rail infrastructure projects such as the St. Claire Tunnel, the International Bridge at Fort Erie, and the Victoria Bridge in Montreal.

Heritage attributes associated with the subject resource include, but are not limited to:

- Steel Warren deck truss construction with rivets used to secure steel members; and
- Stone abutments and piers.

A copy of the CHER and Statement of Cultural Heritage Value is provided in **Appendix M**.

Figure 4-18: Bronte Creek Bridge – North Elevation

4.3.12.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Bronte Creek Bridge will be minimized by carrying out a HIA. The HIA will identify potential impacts and appropriate mitigation measures for heritage attributes to be incorporated into final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the Town of Oakville.

4.3.13 OCS & Bridges: Section LSW-8 – Appleby Station to Burlington (MP 31.5)

There are no heritage properties identified in the Section LSW-8 study area. There are no further concerns from a cultural heritage perspective.

4.3.13.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

4.3.13.2 Net Effects

No net effects will be experienced as a result of this undertaking.

4.4 Archaeology

A Stage 1 Archaeological Assessment was undertaken for the GO Rail Network Electrification Project. A summary of the findings and recommendations for the Lakeshore West Corridor can be found in the sections below. Refer to **Appendix D2** for complete details.

4.4.1 Burlington Tap Location and TPS

A property inspection of the proposed facility site for the Burlington TPS and Tap Location was conducted by Robert Pihl (P057), ASI on June 13, 2015 after Permission-To-Enter (PTE) was secured.

The proposed Burlington TPS and Tap Location site includes an active hydro station within a fenced-off compound and the lands surrounding it. Construction of the existing Hydro One compound has severely disturbed the building footprint. However, the surrounding lands were the Tap/TPS are proposed are relatively flat, grass-covered, vacant land, either within or associated with the hydro ROW. Disturbance appears to be generally relatively minimal.

4.4.1.1 Potential Effects and Mitigation Measures

Archaeological potential has been removed from the portion of the facility site containing the existing Hydro One Transmission Station where the Burlington Tap location is proposed.

Portions of the Tap/TPS site have the potential to create a disturbance to potential Indigenous and Euro-Canadian archaeological resources. Mitigation measures include conducting a Stage 2 Archaeological Assessment of the portion of the TPS facility site with archaeological potential.

4.4.1.2 Net Effects

No net effects will be experienced as a result of the installation of the Burlington Tap. Net effects associated with the Burlington TPS will be determined upon further assessment.

4.4.2 Mimico Tap/TPS Location & 25kV Feeder Route

A property inspection of the proposed facility site for the Mimico Tap/TPS Location was conducted by Robert Pihl (P057), ASI on May 13, 2016. A property inspection of the feeder route between the Mimico SWS and the Tap/TPS Location was conducted by Robert Pihl (P057), ASI on July 13, 2016.

The proposed Mimico Tap/TPS Location site consists of grass-covered, relatively level, vacant land beside a hydro station and ROW. Current land use is unknown although attached to the hydro facility, but public access is available. Disturbance appears to be relatively minimal.

4.4.2.1 Potential Effects and Mitigation Measures

Portions of the Tap/TPS site have the potential to create disturbance to potential Indigenous and Euro-Canadian archaeological resources. Mitigation Measures include conducting a Stage 2 Archaeological Assessment of the portion of the Tap/TPS site with archaeological potential.

The proposed Mimico Feeder Route has been severely disturbed by previous railway construction. Archaeological potential has been removed.

4.4.2.2 Net Effects

Net effects associated with the Mimico Tap and TPS will be determined upon further assessment.

No net effects will be experienced as a result of the installation of the Mimico Feeder Route.

4.4.3 Mimico SWS

A property inspection of the proposed facility site for the Mimico SWS was conducted by Robert Pihl (P057), ASI on May 13, 2016.

The proposed Mimico SWS site is located adjacent to the study corridor and includes a materials storage area and truck yard. Although the property inspection had limited access, the entire site appears to have been severely disturbed by land-grading to construct the storage and truck parking area. The corridor of the Feeder Route includes an active GO Railway line and existing bridges, and corridor lands have been previously disturbed by past railway construction.

4.4.3.1 Potential Effects and Mitigation Measures

Archaeological potential has been removed from the Mimico SWS site. As such, no potential effects are anticipated and no further assessment is recommended.

4.4.3.2 Net Effects

No net effects will be experienced as a result of this undertaking.

4.4.4 Oakville SWS

A property inspection of the proposed facility site for the Oakville SWS was conducted by Robert Pihl (P057), ASI, on June 9, 2016.

The proposed Oakville SWS site includes an active container storage area. The entire site appears to have been severely disturbed by land-grading to construct the storage area.

4.4.4.1 Potential Effects and Mitigation Measures

Archaeological potential has been removed from the Oakville SWS site. As such, no potential effects are anticipated and no further assessment is recommended.

4.4.4.2 Net Effects

No net effects will be experienced as a result of this undertaking.

4.4.5 OCS & Bridges: Lakeshore West Corridor

The OCS footprint for the Lakeshore West study corridor (Refer to **Appendix D2** for detailed mapping) includes active GO Railway lines and existing bridges and rail overpasses. A property inspection of the study corridor was conducted by Robert Pihl (P057), ASI on May 12, 2016. Access points for the property inspection consisted of road crossings at grade or bridges, or at one of the many GO station platforms along the way.

4.4.5.1 Potential Effects and Mitigation Measures

OCS Footprint

The Stage 1 Archaeological Assessment confirmed that the OCS footprint includes an active GO Railway line on disturbed lands. Archaeological potential has therefore been removed, as such no further Archaeological Assessment is recommended. However, it should be noted that although it is beyond the project limits, the Fort York National Historic site is an archaeologically sensitive area and there is archaeological potential in the small gore west of Strachan, south and outside of the OCS/Vegetation zone footprint.

Bridge Modifications

For overhead and pedestrian bridges along the LSW corridor that will require modifications (e.g., lower tracks) to achieve required vertical clearances and/or to accommodate the addition of a protective bridge barrier, the Stage 1 Archaeological Assessment confirmed that the existing footprint of these bridges within the GO rail ROW/7 metre zone is within an active railway line on disturbed lands, therefore no further Archaeological Assessment is recommended. .

If during detailed, potential impacts to areas that extend outside the 7 metre OCS/Vegetation Removal zone are identified, a review will be undertaken of potential disturbance to Indigenous and Euro-Canadian archaeological resources for these areas. As part of this review, further archaeological assessment work will be identified and undertaken for any areas anticipated to be impacted outside the 7 metre OCS/Vegetation Removal zone, such as Stage 1 and/or 2 Archaeological Assessment.

In addition, it should be noted that Dufferin Street, Dunn Avenue, Jameson Avenue, Dowling Avenue bridges will require replacement to address vertical clearance issues. Based on the detailed design to be completed for these bridges, further Archaeological Assessment studies will be undertaken for any impacted areas outside of the 7 metre OCS/Vegetation Clearing Zone; this additional archaeological work will be completed as part of a separate EA/TPAP Addendum process.

4.4.5.2 Net Effects

No adverse net effects are anticipated due to installation of the OCS. If during detailed, potential impacts to areas that extend outside the 7 metre OCS/Vegetation Removal zone are identified, a review will be undertaken of potential disturbance to Indigenous and Euro-Canadian archaeological resources for these areas. As part of this review, further archaeological assessment work will be identified and undertaken (as required) for any areas anticipated to be impacted outside the 7 metre OCS/Vegetation Removal zone, such as Stage 1 and/or 2 Archaeological Assessment.

4.5 Land Use

Please refer to Appendix E2 for a description of the methodology followed for assessment of land use impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in **Appendix E2**.

4.5.1 Burlington Tap & TPS Location

4.5.1.1 Potential Effects and Mitigation Measures

The proposed Burlington Tap & TPS location is located within the City of Burlington in an area currently designated as Employment/industrial; the facility will be located next to Hydro One's existing Cumberland Transmission Station (TS). The property is zoned *Utility Services*, which permits transportation, communication and utility uses; the TPS and Tap are thus not in conflict with current zoning designations and adjacent land uses.

A permit has been issued to expand the Cumberland TS adjacent to the proposed TPS/Tap location, however this work is not expected to affect the footprint of the proposed Burlington Tap/TPS location. Additionally, an industrial development at 860 Cumberland is currently in the building permit stage. The property boundary is 40 metres away and is not expected to be affected by the TPS or Tap location.

Mitigation Measures

The TPS and Tap is located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Burlington will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners regarding the use of this property and will reach an agreement prior to the commencement of construction activities.

4.5.1.2 Net Effects

The Burlington TPS and Tap location are compatible with the existing zoning for the property, and are also compatible with the site’s adjacent utility uses; therefore no adverse net effects on land use are anticipated.

4.5.2 Mimico Tap & TPS Location

4.5.2.1 Potential Effects and Mitigation Measures

The Mimico Tap and TPS location is located approximately 3 km north of the Lakeshore West Corridor, in the City of Toronto on lands adjacent to the Milton Corridor. The site is also approximately 110 metres west of the Manby TS. The site primarily consists of vacant lot / open space, with a building and associated parking lots/storage areas. It is in an area generally characterized by rail infrastructure and commercial/industrial buildings, with no recreational amenities nearby.

The Mimico Tap and TPS location is zoned *Employment Industrial (E)* and Utility and Transportation (UT). Both zoning designations permit a public utility, but the *Employment Industrial* designation comes with a set of conditions at the site. The conditions state that the public utility:

- Cannot be a sewage treatment plant.
- Must be enclosed by walls and comply with the permitted maximum lot coverage, required minimum building setbacks and permitted maximum height for a building.

The location is not anticipated to impact the footprint of Manby TS. Further information on this consultation can be found in the Utilities Report (Appendix I of the EPR).

Mitigation Measures
The Tap and TPS is located in an area of compatible land use within the existing land use designation and zoning of the property, with the exception of the requirement for the facility to be enclosed by walls (as it meets the definition of a public utility in the City of Toronto Zoning By-Law). However, given the conceptual design of the Tap and TPS facility and the adjacent land uses it would be reasonable to propose that walls are not necessary. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Toronto will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses.

4.5.2.2 Net Effects

The Tap and TPS location is not anticipated to negatively affect future development within this zoning context and no net effects are expected.

4.5.3 Canpa 25 kV Feeder Route

4.5.3.1 Potential Effects and Mitigation Measures

A 25 kV Feeder Route will run along the existing Canpa Rail corridor, within the City of Toronto, which connects the Milton and Lakeshore West Corridors. As the Feeder Route is a proposed above ground connection route within the existing railway corridor, no footprint impacts are expected. The Feeder

Route is zoned for *Utility Transportation* which permits both Public Utilities and Transportation Uses. As a result, there is no expected conflict with current zoning provisions.

Mitigation Measures
The Feeder is located in an area of compatible land use within the existing land use designation and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Toronto will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners regarding the use of this property and will reach an agreement prior to the commencement of construction activities.

4.5.3.2 Net Effects

The Feeder Route is not anticipated to negatively affect future development within this zoning context and therefore no net effects are expected.

4.5.4 Mimico SWS

4.5.4.1 Potential Effects and Mitigation Measures

The proposed Mimico SWS site is currently located in the City of Toronto in an industrial storage area surrounded by the rail corridor and similar industrial storage areas and commercial use with the exception of a low-rise residential development directly south of the rail corridor. As this residential development is more than 50 metres away from the proposed SWS, footprint impacts are not anticipated.

Mitigation Measures
The SWS is located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Toronto will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners regarding the use of this property and will reach an agreement prior to the commencement of construction activities.

4.5.4.2 Net Effects

The SWS is not anticipated to negatively affect future development within this zoning context and therefore no net effects are expected.

4.5.5 Oakville SWS

4.5.5.1 Potential Effects and Mitigation Measures

The site of the proposed Oakville SWS is currently located in the Town of Oakville in a storage and parking area, surrounded by the rail corridor and commercial/office buildings.

The Oakville SWS site is zoned *Business Employment*, which permits a wide range of employment, retail, service, community, hospitality, and motor vehicle uses, as well as outside storage of railway and transport truck containers, provided such storage is not unsightly. Since the permitted uses in this area neither include nor preclude public utilities, a potential zoning conflict may be present.

Mitigation Measures
The SWS is located in an area with a potential land use and zoning conflict. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the Town of Oakville will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. It is assumed that following this discussion and a review of the Detailed Design of the facility the SWS will be deemed consistent with adjacent uses due to the proximity to the rail corridor and the proposed location in a highly developed area characterized by commercial/utility uses. The site is currently owned by Metrolinx.

4.5.5.2 Net Effects

The potential SWS is not compatible with existing zoning for the property; however, it is compatible with existing commercial/industrial uses in and adjacent to the site and therefore no net effects are expected.

4.5.6 OCS & Bridges: Section LSW 1 – West of Bathurst Street (Mile 1.20) to Mimico Station

4.5.6.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

Of the eight structures in LSW-1, being modified, four bridges (Strachan Avenue Bridge, Dufferin Street Bridge, Dunn Avenue Bridge, and Jameson Avenue Bridge) have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification) which may require replacement, bridge modifications or track lowering in order to accommodate electrification infrastructure. Additionally two pedestrian bridges (Sunnyside Pedestrian Bridge and Dowling Avenue Bridge,) may require replacement or modification in order to accommodate the inclusion of bridge barriers. Based on the conceptual design for these modifications it has been assumed that impacts are likely to be contained within the Metrolinx Right of Way (ROW), and no land use effects are anticipated.

In addition, bridge barriers and/or OCS attachments are also required on certain structures, though there are no land use effects associated with these modifications. A full listing of the bridges within the Lakeshore West Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures
No mitigation measures are required.

4.5.6.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSW-1. There are no anticipated net effects from the replacement, modifications or track lowering of bridges within LSW-1.

4.5.7 OCS & Bridges: Section LSW 2 – Mimico Station to Long Branch Station

4.5.7.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

Of the seven structures in LSW-2, one bridge (Browns Line Bridge) has a vertical clearance issue (i.e., does not meet the minimum clearance requirement for electrification) which may require track lowering in order to accommodate electrification infrastructure. Based on the conceptual design for this modification it has been assumed that impacts are likely to be contained within the Metrolinx Right of Way (ROW), and no land use effects are anticipated.

Additionally, one bridge will require wire attachments (Browns Line Bridge), there are no land use effects associated with this modification. A full listing of the bridges within the Lakeshore West Corridor is provided in Section 3 of Volume 1 of the EPR.

4.5.7.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSW-2. There are no anticipated net effects from the modifications or track lowering of bridges within LSW-2.

4.5.8 OCS & Bridges: Section LSW 3 – Long Branch Station to Port Credit

4.5.8.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the five structures within LSW-3 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification). One rail overpass (Etobicoke Creek) requires OCS attachments in order to accommodate electrification infrastructure. A full listing of the bridges within the Lakeshore West Corridor is provided in Section 3 of **Volume 1** of the EPR.

Mitigation Measures

No mitigation measures are required.

4.5.8.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSW-3. There are no anticipated net effects associated with bridges within LSW-3.

4.5.9 OCS & Bridges: Section LSW 4 – Port Credit Station to Clarkson Station

4.5.9.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

Neither of the three structures within LSW-4 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification)

However, one bridge (Credit River Bridge) will require wire attachments**,** there are no land use effects associated with this modification. A full listing of the bridges within the Lakeshore West Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

4.5.9.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSW-4. There are no anticipated net effects from the modification of the Credit River Bridge.

4.5.10 OCS & Bridges: Section LSW 5 – Clarkson Station to Oakville Station

4.5.10.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

Of the six structures in LSW-5, one bridge (Royal Windsor Drive Bridge) within this section has a vertical clearance issue (i.e., does not meet the minimum clearance requirement for electrification) which may require track lowering in order to accommodate electrification infrastructure. Based on the conceptual design for these modifications it has been assumed that impacts are likely to be contained within the Metrolinx Right of Way (ROW), and no land use effects are anticipated.

No other structures in LSW-5 require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure. A full listing of the bridges within the Lakeshore West Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

4.5.10.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSW-5. There are no anticipated net effects from the track lowering of Royal Windsor Drive Bridge.

4.5.11 OCS & Bridges: Section LSW 6 – Oakville Station to Bronte Station

4.5.11.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

Of the six structures within LSE-6 no bridges are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However, two bridges (Cross Avenue Bridge and Sixteen Mile Creek Bridge) will require wire attachments, there are no land use effects associated with these modifications. A full listing of the bridges within the Lakeshore West Corridor is provided in Section 3 of **Volume 1** of the EPR.

Mitigation Measures

No mitigation measures are required.

4.5.11.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSW-6. There are no anticipated net effects from the modification of the Cross Avenue Bridge and Sixteen Mile Creek Bridge.

4.5.12 OCS & Bridges: Section LSW 7 – Bronte Station to Appleby Station

4.5.12.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the four structures within LSE-7 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However, one bridge will require wire attachments (Bronte Creek Bridge) there are no land use effects associated with this modification. A full listing of the bridges within the Lakeshore West Corridor is provided in Section 3 of **Volume 1** of the EPR.

Two road widening projects are proposed by Halton Region within this area:

- Burloak Drive from Harvester Road to Upper Middle Road, proposed to begin in 2029; and
- Bronte Road from Speers Road to Highway 407, proposed to begin in 2025.

Both of these road widening projects will be planned in more detail following the completion of Detailed Design for the Electrification Project. Municipal Class Environmental Assessment studies will be required and undertaken by Halton Region for the above noted road widening projects. Based on the study area description provided, the Burloak Drive Widening from Harvester Road to Upper Middle Road is not proposed to be undertaken over the LSW Rail Corridor. Therefore, no impacts as a result of the GO Rail Network Electrification are anticipated.

Mitigation Measures
Consultation with Halton Region will be required during Detailed Design to discuss the progress of the Municipal Class Environmental Assessments and to finalize design details related to road and bridge projects. OCS attachments may be required in cases where bridges are widened.

4.5.12.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSW-7. There are no anticipated net effects from the modification of the Bronte Creek Bridge.

4.5.13 OCS & Bridges: Section LSW 8 – Appleby Station to Burlington Station (MP 31.5)

4.5.13.1 Potential Effects and Mitigation Measures

OCS
The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges
Of the eight structures in LSW-8, one pedestrian bridge (Drury Lane Pedestrian Bridge) has a vertical clearance issue (i.e., does not meet the minimum clearance requirement for electrification) which may require replacement in order to accommodate electrification infrastructure. Based on the conceptual design for this modification it has been assumed that impacts are likely to be contained within the Metrolinx Right of Way (ROW), and no land use effects are anticipated.

Two additional structures (Guelph Line Bridge and Burlington GO Station Pedestrian Bridge) may require wire attachments and modification in order to accommodate the inclusion of bridge barriers, there are no land use effects associated with this modification. A full listing of the bridges within the Lakeshore West Corridor is provided in Section 3 of Volume 1 of the EPR.

One road widening project is proposed by Halton Region within this area:

- Appleby Line from Fairview Street to Taywood Drive, proposed to begin in 2024.

This road widening project will be planned in more detail following the completion of Detailed Design for the Electrification Project. Municipal Class Environmental Assessment studies will be required and undertaken by Halton Region for the above noted road widening project.

<u>*Mitigation Measures*</u>
Consultation with Halton Region will be required during Detailed Design to discuss the progress of the Municipal Class Environmental Assessment and to finalize design details related to road and bridge projects. OCS attachments may be required in cases where bridges are widened.

4.5.13.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSW-8. There are no anticipated net effects from the replacements or modifications of bridges within LSW-8.

4.6 Socio-Economic

Please refer to Appendix E2 for a description of the methodology followed for assessment of socio-economic impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in **Appendix E2**.

4.6.1 Burlington Tap/TPS

4.6.1.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed Burlington TPS and Tap location and therefore there will be no footprint impacts to sensitive facilities.

Other potential effects on the socio-economic environment associated with the LSW corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 4.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 4.8 and 4.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 4.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 4.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

<u>*Mitigation Measures*</u>
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSW corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

4.6.1.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

4.6.2 Mimico Tap/TPS

4.6.2.1 Potential Effects and Mitigation Measures

There are no sensitive within 500m of the Mimico Tap and TPS location and therefore there will be no footprint impacts to sensitive facilities.

Other potential effects on the socio-economic environment associated with the LSW corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 4.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 4.8 and 4.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 4.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 4.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSW corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

4.6.2.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

4.6.3 Canpa 25kV

4.6.3.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 300m of the Canpa Feeder Route and therefore there will be no footprint impacts to sensitive facilities.

Other potential effects on the socio-economic environment associated with the LSW corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 4.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 4.8 and 4.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 4.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 4.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

A Municipal Park, Connorvale Park, is located north of Horner Avenue along the west side of the feeder route. Work within the OCS Impact Zone may effect users of the park.

There are no anticipated adverse effects on this recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the City of Toronto will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSW corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

4.6.3.2 Net Effects

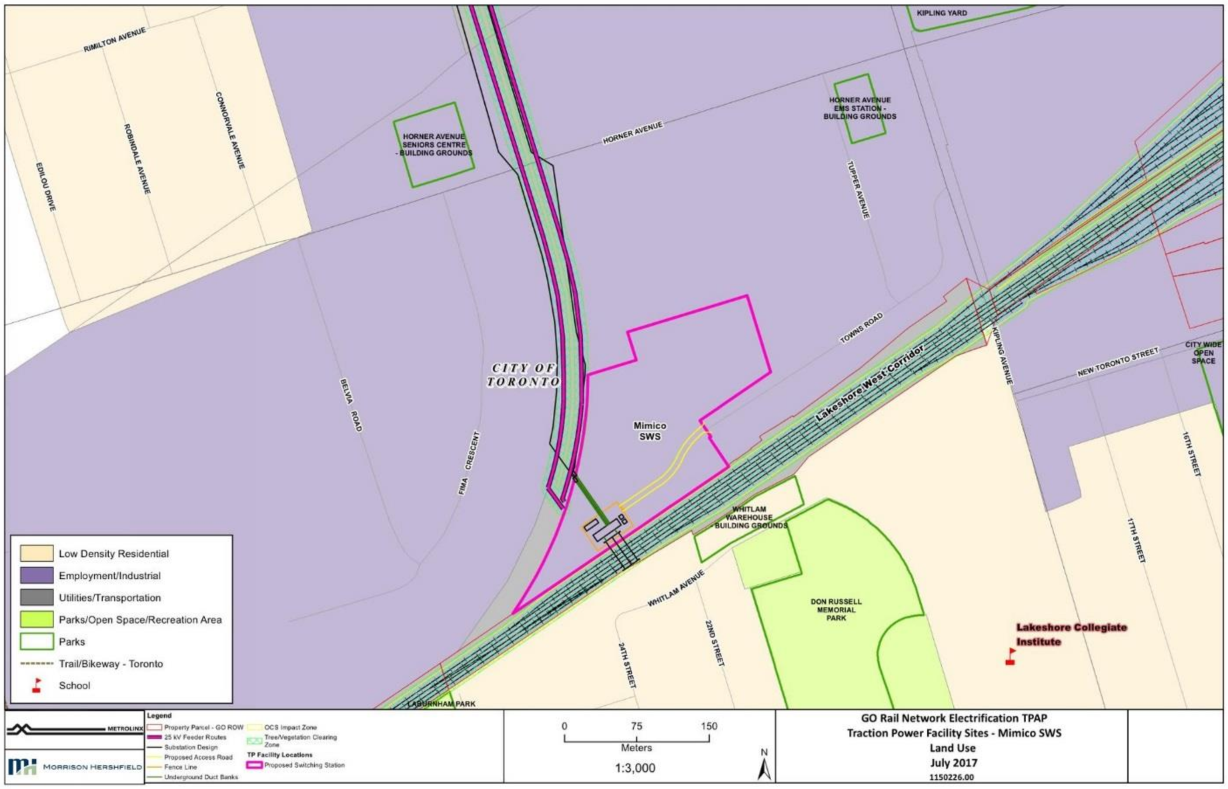
Net effects to sensitive facilities and Connervale Park are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

4.6.4 Mimico SWS

4.6.4.1 Potential Effects and Mitigation Measures

The closest sensitive facility is within 300 metres of the proposed Mimico SWS location and therefore there will be no footprint impacts to sensitive facilities as shown in **Figure 4-19.**

Figure 4-19: Sensitive Facilities in vicinity to Mimico SWS



Other potential effects on the socio-economic environment associated with the LSW corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 4.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 4.8 and 4.9,as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 4.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 4.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures

Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSW corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

4.6.4.2 Net Effects

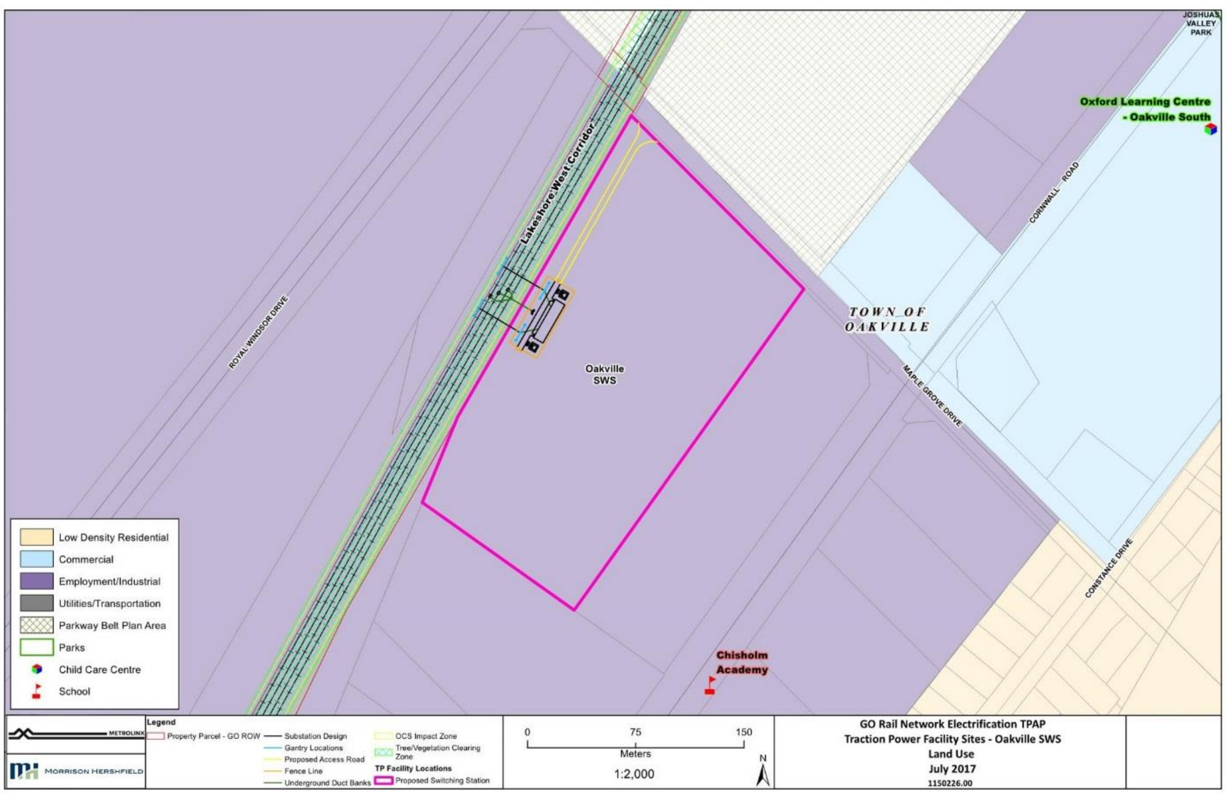
Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

4.6.5 Oakville SWS

4.6.5.1 Potential Effects and Mitigation Measures

The closest sensitive facility is within 160 metres of the proposed Oakville SWS location and therefore there will be no footprint impacts to sensitive facilities as shown in **Figure 4-20.**

Figure 4-20: Sensitive Facilities in the vicinity of Oakville SWS



Other potential effects on the socio-economic environment associated with the LSW corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 4.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 4.8 and 4.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 4.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 4.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSW corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

4.6.5.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

4.6.6 OCS & Bridges: Sections LSW-1 to LSW-8

4.6.6.1 Potential Effects and Mitigation Measures

There are three sensitive facilities (two child care centers and a school) in the vicinity of LSW-3, and LSW-4 as shown in **Table 4-33**. These are all 25 metres or more from the OCS impact zone, and therefore there will be no footprint effects to sensitive facilities.

Table 4-33: Sensitive Facilities in the LSW-1 – LSW-8

Corridor Segment	Type	Name	Address	Distance from 5 metre OCS Impact Zone
LSW-3	Child Care Centre	Caring for Kids	1110 Caven Street, Mississauga	25 metres
LSW-3	School	Mentor College Primary Campus	56 Cayuga Ave, Mississauga	25 metres
LSW-4	Child Care Centre	Clarkson Angels Child Care and Educational Centre	1146 Clarkson Rd N, Mississauga	55 metres

Other potential effects on the socio-economic environment associated with the LSW-3 and LSW-4 corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 4.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 4.8 and 4.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 4.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 4.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

There are a number of existing and proposed recreational amenities (parks and trails) within the vicinity of the Lakeshore West rail corridor. There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the relevant municipalities will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities. For more information on recreational amenities please see the Land Use and Socio-Economic Report contained in Appendix E.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSW corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

4.6.6.2 Net Effects

Net effects to sensitive facilities and recreational amenities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

4.7 Air Quality

Please refer to Appendix F2 for a description of the methodology followed for assessment of air quality impacts. Additional details can be found in the Air Quality Impact Assessment Report contained in **Appendix F2**.

Electrification of the GO Rail Network will result in the reduction of diesel emissions (due to electric powered trains) which will have a benefit to local air quality near the rail corridors. The increased electricity generation will generate some pollutants through the combustion of fossil fuels, but overall the total air emissions will be lower as a result of the electrification. Similarly, the distribution of electricity via the Traction Power Facilities (and ancillary components such as gantries) and 25kV feeder routes does not produce air pollutants and therefore no impacts are anticipated and no mitigation measures are required. No significant changes to emissions or new sources of air emissions are expected as a result of modifying the existing Willowbrook maintenance facility to accommodate electric GO Trains. As such, no impacts are anticipated and no mitigation measures are required. As there will be a net benefit to air quality, post-construction monitoring is not necessary.

Further details related to the air quality assessment undertaken as part of the TPAP have been included in **Section 9.7.**

4.8 Noise

Recognizing that electrification of the GO network is a component of the over-arching Regional Express Rail plan, a comprehensive noise study was undertaken to examine the noise effects of the conversion to increased electric service[11] as part of the GO Rail Network Electrification TPAP.

The objective of the Noise study was to assess the effects on noise levels due to the conversion from existing/present day (2015) diesel-based GO service levels (referred to as the Future No-Build scenario) to the Electric (2025) GO RER electric-based service levels (referred to as the Future Build Scenario), and to subsequently determine whether mitigation measures may be required to address adverse noise effects. The scope of the study examined noise effects due to electric RER GO service along the rail corridors as well as noise effects related to the proposed Tap locations and Traction Power Facilities.

It is noted that numerous (i.e., thousands of) receptors were included in the noise model and considered as part of the analysis; however in order to present the results in a comprehensible way for purposes of reporting, representative receptors were chosen to demonstrate the general conditions and sound levels modelled in the area.

In order to carry out this detailed noise modeling exercise, several assumptions were established. Some of the key assumptions were as follows (note - this is not an exhaustive list, please refer to **Appendix G – Noise and Vibration Modelling Reports**):

- Present day 2015 diesel based GO service was modelled as the 'base case'. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Future (2025) electric based GO RER service levels were modelled as the 'future case'. It should be noted that the 2025 scenario includes a mixed GO fleet of diesel and electric trains. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Freight traffic was included/considered in the modelling. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports.**

[11] *The electric RER scenario will entail a mixed diesel and electric fleet.*

- Data was gathered on existing noise barriers as well as planned noise barriers along the rail corridors and were included/considered in the modelling. Planned barriers were defined as: noise barriers that were identified/proposed as part of previously completed Metrolinx/GO Transit Environmental Assessment/TPAP studies. While it is recognized that not all of these barriers have been implemented at the time the assessment was completed, they were included/considered in the modelling. It should be noted these 'planned barriers' were not evaluated for technical feasibility.

- The scope of the study did not include a comprehensive analysis of the technical, operational, economical, or administrative feasibility of implementing noise mitigation measures. Rather, a preliminary assessment of technical feasibility was completed.

- Noise sources associated with GO diesel and/or GO electric rail activity include:
  - Moving trains (applicable to all trains);
  - Idling trains at each station (applicable to all trains);
  - Road crossings signals (applicable to all trains);
  - Crossovers and Switches (applicable to all trains);
  - Wheel squeal (applicable to all trains); and
  - Pantograph (applicable to electric trains only).

A complete list of all assumptions applied can be found in **Appendix G – Noise and Vibration Assessment Reports.**

Future/Committed Land Use

As per the 1995 MOEE / GO Transit Protocol, noise and vibration impacts are evaluated at lands which have been committed for (future) sensitive land uses. Committed uses beyond existing developments include: approved site plans, approved condominium plans or draft approved plans of subdivision. As part of carrying out the noise/vibration modelling work, this data was requested from the municipalities located within the Electrifciation TPAP study area. It should be noted that the only data that was available/provided was from the City of Toronto for approved building permits for new residential uses, therefore this data was reviewed and included in the assessment. Modelling was completed for all receptors identified through review of this data; results are presented for selected representative receptors.

For those sections of the corridor outside of the City of Toronto, a screening level assessment was conducted based on the limited detail provided in the available data on planned developments provided for municipalities other than the City of Toronto. The screening level assessment was designed to flag potential planned areas of development that may experience Adjusted Noise Impacts of greater than 5 dB based on the limited information available. This assessment was completed for the Electric RER scenario only and does not include the investigation of barriers within these areas. Notwithstanding this, the reports contained in **EPR Appendix G** include figures showing flagged potential planned areas of (future) development that were provided by their respective municipalities. Metrolinx will use this information for consideration of noise mitigation for new planned developments (if approved by the relevant municipalities) during the detail design stage as appropriate.

4.8.1 Credible Worst Case Scenario

The credible worst-case scenario is based on established service goals upon which the minimum infrastructure needs were determined. Increase to the service levels would require additional infrastructure due to operational and safety considerations. Current rail regulations are principally governed by Transport Canada and the US Federal Rail Administration; while Metrolinx, CN and CP are the principal sources of operational policies, standards, and rules. Other contributors to rail policy are the American Railway Engineering and Maintenance of Way Association (AREMA) and the American Public Transportation Association (APTA). Collectively, these regulators and associations set limits on how railways are designed, operated and maintained. Therefore the proposed infrastructure and service levels represent a credible worst-case scenario.

4.8.2 Ambient Sound Levels

4.8.2.1 Along the Rail Corridors

According to the MOEE/GO Protocol, ambient noise is the sound existing at a receptor in the absence of all noise from the GO Transit rail project. Ambient noise can be used as a component of the sound level objective, in combination with the sound level from any existing rail activity. The ambient levels are primarily due to noise from local road traffic and surrounding industry.

Ambient noise from road traffic and other background noise sources including industry was assumed to be negligible compared to existing rail traffic noise at most receptors near the rail corridor, and not a significant factor in determining the desirable sound level objective. Therefore, ambient noise was not assessed.

4.8.2.2 At Traction Power Facilities

The sound level objective for traction power facilities is the higher of the exclusion limit values for L_{EQ} (1-hr) in NPC-300 or the minimum background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the traction power facilities. Therefore, the exclusion limits were adopted as the desired sound level objectives.

4.8.2.3 At Layover Sites

The sound level objectives for layover sites are the higher of the exclusion limits for L_{EQ} (1-hr) in the MOEE/GO Protocol or the minimum 1-hr L_{EQ} background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the layover sites. Therefore, the exclusion limits were adopted as the desired sound level objectives.

4.8.3 Rail Activity Sound Levels

4.8.3.1 Cadna/A Modelling

The MOEE/GO Protocol stipulates the use of a model known as Sound from Trains Environmental Analysis Method (STEAM) for predicting rail traffic noise levels. STEAM was developed by the MOECC (MOECC, 1990). The present study deviated from this guidance in that the rail traffic noise levels were modelled using the "Federal Noise and Vibration Impact Assessment" (FTA Protocol) (FTA, 2006) incorporated in Cadna/A. Cadna/A allows for the modelling of complex railway schemes including curves, parallel and intervening tracks which cannot be easily assessed using STEAM. Cadna/A is software that includes the implementation of the FTA noise propagation algorithms and as well as aspects of ISO 9613 algorithms (ISO 1994, ISO 1996). Refer to EPR Appendix G for a copy of the correspondence from Metrolinx to MOECC on the use of CADNA/A.

The existing, Diesel RER and Electric RER noise levels were modelled for the entire Study Area. Results at each discrete receptor were used to establish the adjusted noise impact of the Diesel RER scenario relative to the existing scenario, as well as that of the Electric RER scenario relative to the existing scenario.

As per the FTA Protocol, the diesel trains and electric trains were modelled with a noise source height of 2.4 metres (8 ft) and 0.6 metres (2ft), respectively. The noise from a diesel train is dominated by the engine (located at approximately 2.4 metres above the rail) with a lesser contribution from the wheels (located at approximately 0.6 metres above the rail). The noise from an electric train, on the other hand, is dominated by wheel noise (emitted approximately 0.6 metres above the rail), since the electric engine is relatively quiet.

Topography was included in the Cadna/A model to take into consideration the elevation differences of the railway, receptors and the intervening terrain. The topographical features were assumed to be the same in the existing and future scenarios. High-resolution (i.e., 5 m) topographical information was obtained from public databases (Ministry of Natural Resources and Forestry, 2016).

"Retained" Noise Barriers

The diesel and electric locomotives were defined using the FTA standards implemented into Cadna/A. At the time of the original assessment, the electric locomotive train type was defined mathematically within Cadna/A with a "K" constant[12] that differed from the "K" constant defined in the FTA model. Metrolinx presented the results of the original noise modelling for electric RER service at a series of public consultations throughout the TPAP. Following the original assessment, an option within Cadna/A to use

[12] The "K" constant is un unnamed parameter in the FTA calculations, which describes the locomotive type (i.e., passenger diesel, electric, DMU, etc.).

the "K" constant which corresponds to the FTA model was created by Datakustik, the developers of the Cadna/A software. Re-assessment using this updated Cadna/A option showed that a limited number of areas where mitigation was previously identified using the preliminary noise modelling no longer achieves an increase of 5 dB or more with the updated Cadna/A noise modelling. This was a result of the correction to the noise modelling input that more accurately reflects the quieter nature of electrified locomotives. Metrolinx believes these supplemental areas should still be included for consideration of noise mitigation. As a result, the locations of these particular mitigation barriers throught EPR Appendix G.are identified and in the mapping provided in **Appendix S.** It should be noted there are no identified retained migiation barriers that are applicable to the Lakeshore West Rail Corridor.

4.8.4 Traction Power Facilities – Predicted Noise Impacts

Generally, the traction power substations are comprised of two power transformers and a control / switchgear room and the paralleling stations and switching stations are comprised of two autotransformers and a control / switchgear room.

The sound power level generated by a typical 10 MVA transformer, estimated at approximately 87 dBA (Metrolinx, 2014), was used as an estimate for the power transformers at the traction power substations and the autotransformers at the switching stations. The MOECC requires that a 5 dB tonal penalty be applied to sources exhibiting a humming characteristic. As transformers are known to exhibit tonal characteristics, the 5 dB penalty was applied to all the transformers.

The noise impacts from the traction power facilities were evaluated at nearby receptors and are summarized in **Table 4-34.** The predicted noise impacts from the traction power facilities at nearby receptors were below the MOECC applicable exclusion limits. Therefore, no mitigation measures were investigated for these facilities.

Table 4-34: Noise Impacts – Lakeshore West Traction Power Facilities

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit[2][3] (dBA)	Compliance with Performance Limit (Yes/No)
R17	Mimico SWS	Plane of Window	Daytime\Evening	22.4	50	Yes
			Nighttime	22.4	45	Yes
		Outdoor Area	Daytime\Evening	18.2	50	Yes
R18		Plane of Window	Daytime\Evening	43.9	50	Yes
			Nighttime	43.9	45	Yes
		Outdoor Area	Daytime\Evening	42.6	50	Yes
R19		Plane of Window	Daytime\Evening	36.8	50	Yes
			Nighttime	36.8	45	Yes
		Outdoor Area	Daytime\Evening	32.5	50	Yes
R20		Plane of Window	Daytime\Evening	30.9	50	Yes
			Nighttime	30.9	45	Yes
		Outdoor Area	Daytime\Evening	29.4	50	Yes
R21		Plane of Window	Daytime\Evening	27.9	50	Yes
			Nighttime	27.9	45	Yes
		Outdoor Area	Daytime\Evening	26.4	50	Yes
R22		Plane of Window	Daytime\Evening	25.8	50	Yes
			Nighttime	25.8	45	Yes
		Outdoor Area	Daytime\Evening	24.2	50	Yes
R23		Façade	Daytime\Evening	13.3	50	Yes
			Nighttime	13.3	45	Yes
		Outdoor Area	Daytime\Evening	11.7	50	Yes
R24a		Façade	Daytime\Evening	18	50	Yes
			Nighttime	18	45	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit[2][3] (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Daytime\Evening	16.1	50	Yes
R24b		Façade	Daytime\Evening	12.4	50	Yes
			Nighttime	12.4	45	Yes
		Outdoor Area	Daytime\Evening	10.9	50	Yes
R52	Oakville SWS	Façade	Daytime\Evening	11.7	50	Yes
			Nighttime	11.7	45	Yes
		Outdoor Area	Daytime\Evening	10.2	50	Yes
R53		Façade	Daytime\Evening	25	50	Yes
			Nighttime	25	45	Yes
		Outdoor Area	Daytime\Evening	18.9	50	Yes
R54		Façade	Daytime\Evening	33.1	50	Yes
			Nighttime	33.1	45	Yes
		Outdoor Area	Daytime\Evening	31.9	50	Yes
R55		Façade	Daytime\Evening	22.5	50	Yes
			Nighttime	22.5	45	Yes
		Outdoor Area	Daytime\Evening	20.8	50	Yes
R56		Façade	Daytime\Evening	16.4	50	Yes
			Nighttime	16.4	45	Yes
		Outdoor Area	Daytime\Evening	14.6	50	Yes
R68	Burlington TPS	Façade	Daytime\Evening	19	50	Yes
			Nighttime	19	45	Yes
		Outdoor Area	Daytime\Evening	17.1	50	Yes
R69		Façade	Daytime\Evening	23.3	50	Yes
			Nighttime	23.3	45	Yes
		Outdoor Area	Daytime\Evening	21.7	50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit[2][3] (dBA)	Compliance with Performance Limit (Yes/No)
R70		Façade	Daytime\Evening	30.7	50	Yes
			Nighttime	30.7	45	Yes
		Outdoor Area	Daytime\Evening	24.9	50	Yes
R71		Plane of Window	Daytime\Evening	31.5	50	Yes
			Nighttime	31.5	45	Yes
		Outdoor Area	Daytime\Evening	30.3	50	Yes
R72		Plane of Window	Daytime\Evening	23.3	50	Yes
			Nighttime	23.3	45	Yes
		Outdoor Area	Daytime\Evening	21.6	50	Yes
R74		Plane of Window	Daytime\Evening	16.3	50	Yes
			Nighttime	16.3	45	Yes
		Outdoor Area	Daytime\Evening	14.4	50	Yes
R75	Mimico TPS	Plane of Window	Daytime\Evening	42.4	50	Yes
			Nighttime	42.4	45	Yes
		Outdoor Area	Daytime\Evening	41.1	50	Yes
R76		Plane of Window	Daytime\Evening	44.0	50	Yes
			Nighttime	44.0	45	Yes
		Outdoor Area	Daytime\Evening	42.7	50	Yes

Notes:
[1] Daytime occurs from 0700-1900h. Evening occurs from 1900h-2300h. Nighttime occurs from 2300-0700h.

4.8.5 Noise Impacts from Layover Sites

The noise impacts from the layover sites including Willowbrook Maintenance Facility and Mimico South Layover were evaluated at nearby receptors and are summarised **Table 4-35**. The predicted noise impacts from the layover sites at nearby receptors were below the MOEE/GO Protocol applicable exclusion limit of 55 dBA. Therefore, no mitigation measures were investigated for these facilities.

Table 4-35: Noise Impacts from Existing and Electric RER Layover Sites

Receptor ID	Existing					Electric RER			
	Nearby	Evaluation Location	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit [1] (dBA)	Compliance with Performance Limit (Yes/No)	Nearby	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit[1] (dBA)	Compliance with Performance Limit (Yes/No)
R09	Willowbrook Maintenance Facility	Outdoor Area	31	55	Yes	Willowbrook Maintenance Facility / Mimico Layover	31	55	Yes
		Façade	33	55	Yes		33	55	Yes
R10		Outdoor Area	31	55	Yes		31	55	Yes
		Façade	33	55	Yes		33	55	Yes
R11		Outdoor Area	36	55	Yes		36	55	Yes
		Façade	38	55	Yes		38	55	Yes
R12		Outdoor Area	37	55	Yes		38	55	Yes
		Façade	40	55	Yes		40	55	Yes
R13		Outdoor Area	36	55	Yes		37	55	Yes
		Façade	41	55	Yes		41	55	Yes
R14		Outdoor Area	41	55	Yes		42	55	Yes
		Façade	44	55	Yes		44	55	Yes
R15		Outdoor Area	40	55	Yes		40	55	Yes
		Façade	44	55	Yes		44	55	Yes
R16		Outdoor Area	44	55	Yes		44	55	Yes
		Façade	46	55	Yes		47	55	Yes
R17		Outdoor Area	44	55	Yes		49	55	Yes
		Façade	49	55	Yes		52	55	Yes
R18		Outdoor Area	39	55	Yes		42	55	Yes
		Façade	43	55	Yes		45	55	Yes
R19		Outdoor Area	42	55	Yes		44	55	Yes

Receptor ID	Existing					Electric RER			
	Nearby	Evaluation Location	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit [1] (dBA)	Compliance with Performance Limit (Yes/No)	Nearby	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit[1] (dBA)	Compliance with Performance Limit (Yes/No)
		Façade	44	55	Yes		46	55	Yes
R20		Outdoor Area	40	55	Yes		41	55	Yes
		Façade	43	55	Yes		44	55	Yes
R21		Outdoor Area	33	55	Yes		37	55	Yes
		Façade	38	55	Yes		41	55	Yes
R22		Outdoor Area	24	55	Yes		30	55	Yes
		Façade	31	55	Yes		34	55	Yes

Notes:
[1] The LEQ is evaluated for any 1-hour period.

4.8.6 Lakeshore West Corridor - Adjusted Noise Impact of the Electric RER Scenario

The following section summarizes the results of the noise modelling analysis for the Lakeshore West corridor. The Adjusted Noise Impact between Existing and Electric RER noise levels for LSW is summarised in **Table 4-36.**

Impact ratings for the evaluated 77 representative receptors listed in the table can be summarised as follows:

- 77 daytime Adjusted Noise Impacts were deemed to be insignificant (i.e., less than 2.99 dB);
- 67 nighttime Adjusted Noise Impacts were deemed to be insignificant (i.e., less than 2.99 dB); and
- 10 nighttime Adjusted Noise Impacts were deemed to be noticeable (i.e., between 3 and 4.99 dB).

There are no Adjusted Noise Impacts in the Electric RER scenario that were deemed to be significant (i.e., between 5 and 9.99 dB increase) or very significant (i.e., greater than 10 dB increase).

As all Adjusted Noise Impacts for the Electric RER scenario were predicted to be not significant (i.e. there was less than 5 dB increase); investigation of noise mitigation was not required.

Table 4-36: Adjusted Noise Impacts of the Electric RER in Comparison to Existing GO Service – Lakeshore West Corridor

Receptor ID	Period [1]	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Post-Project Noise (dBA)				
R01	Daytime	78.9	61.1	79.0	78.9	62.8	79.0	0.0	Insignificant	No	No
	Nighttime	71.7	58.2	71.9	71.7	60.1	72.0	0.1	Insignificant	No	
R02	Daytime	80.6	63.2	80.7	80.6	64.0	80.7	0.0	Insignificant	No	No
	Nighttime	73.4	61.9	73.7	73.4	63.2	73.8	0.1	Insignificant	No	
R03	Daytime	N/A	63.6	63.6	N/A	65.5	65.5	1.9	Insignificant	No	No
	Nighttime	N/A	62.5	62.5	N/A	65.2	65.2	2.7	Insignificant	No	
R04	Daytime	N/A	60.2	60.2	N/A	62.0	62.0	1.8	Insignificant	No	No
	Nighttime	N/A	57.5	57.5	N/A	60.4	60.4	2.9	Insignificant	No	
R05	Daytime	N/A	64.7	64.7	N/A	67.0	67.0	2.3	Insignificant	No	No
	Nighttime	N/A	62.3	62.3	N/A	65.5	65.5	3.2	Noticeable	No	
R06	Daytime	N/A	56.9	56.9	N/A	59.0	59.0	2.1	Insignificant	No	No
	Nighttime	N/A	55.5	55.5	N/A	57.7	57.7	2.2	Insignificant	No	
R07	Daytime	N/A	61.3	61.3	N/A	63.5	63.5	2.2	Insignificant	No	No
	Nighttime	N/A	60.8	60.8	N/A	62.9	62.9	2.1	Insignificant	No	
R08	Daytime	N/A	60.1	60.1	N/A	62.0	62.0	1.9	Insignificant	No	No
	Nighttime	N/A	59.5	59.5	N/A	60.5	60.5	1.0	Insignificant	No	
R09	Daytime	N/A	62.6	62.6	N/A	64.1	64.1	1.5	Insignificant	No	No
	Nighttime	N/A	60.6	60.6	N/A	61.5	61.5	0.9	Insignificant	No	
R10	Daytime	N/A	62.1	62.1	N/A	64.0	64.0	1.9	Insignificant	No	No
	Nighttime	N/A	60.2	60.2	N/A	61.6	61.6	1.4	Insignificant	No	
R11	Daytime	N/A	67.6	67.6	N/A	67.2	67.2	-0.4	Insignificant	No	No
	Nighttime	N/A	64.0	64.0	N/A	63.5	63.5	-0.5	Insignificant	No	
R12	Daytime	N/A	59.3	59.3	N/A	60.4	60.4	1.1	Insignificant	No	No
	Nighttime	N/A	57.9	57.9	N/A	57.7	57.7	-0.2	Insignificant	No	

Receptor ID	Period [1]	Existing: Predicted Ambient Noise Levels (dBA) [2]	Existing: Predicted Rail Noise Levels (dBA) [1]	Existing: Pre-Project Noise (dBA) [3]	Electric RER: Predicted Ambient Noise Levels (dBA) [2]	Electric RER: Predicted Rail Noise Levels (dBA) [1]	Electric RER: Post-Project Noise (dBA)	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
R13	Daytime	N/A	60.2	60.2	N/A	60.7	60.7	0.5	Insignificant	No	No
	Nighttime	N/A	58.5	58.5	N/A	58.3	58.3	-0.2	Insignificant	No	
R14	Daytime	N/A	53.0	55.0	N/A	54.5	54.5	-0.5	Insignificant	No	No
	Nighttime	N/A	51.3	51.3	N/A	52.0	52.0	0.7	Insignificant	No	
R15	Daytime	N/A	55.0	55.0	N/A	55.7	55.7	0.7	Insignificant	No	No
	Nighttime	N/A	54.1	54.1	N/A	53.6	53.6	-0.5	Insignificant	No	
R16	Daytime	N/A	49.5	55.0	N/A	50.5	50.5	-4.5	Insignificant	No	No
	Nighttime	N/A	48.8	50.0	N/A	48.6	48.6	-1.4	Insignificant	No	
R17	Daytime	N/A	50.9	55.0	N/A	51.7	51.7	-3.3	Insignificant	No	No
	Nighttime	N/A	47.6	50.0	N/A	50.2	50.2	0.2	Insignificant	No	
R18	Daytime	N/A	59.7	59.7	N/A	61.5	61.5	1.8	Insignificant	No	No
	Nighttime	N/A	57.1	57.1	N/A	59.9	59.9	2.8	Insignificant	No	
R19	Daytime	N/A	58.2	58.2	N/A	59.9	59.9	1.7	Insignificant	No	No
	Nighttime	N/A	55.4	55.4	N/A	58.2	58.2	2.8	Insignificant	No	
R20	Daytime	N/A	61.6	61.6	N/A	63.6	63.6	2.0	Insignificant	No	No
	Nighttime	N/A	59.6	59.6	N/A	62.0	62.0	2.4	Insignificant	No	
R21	Daytime	N/A	58.3	58.3	N/A	60.2	60.2	1.9	Insignificant	No	No
	Nighttime	N/A	56.4	56.4	N/A	58.8	58.8	2.4	Insignificant	No	
R22	Daytime	N/A	56.2	56.2	N/A	57.8	57.8	1.6	Insignificant	No	No
	Nighttime	N/A	54.3	54.3	N/A	56.5	56.5	2.2	Insignificant	No	
R23	Daytime	N/A	62.5	62.5	N/A	62.7	62.7	0.2	Insignificant	No	No
	Nighttime	N/A	59.8	59.8	N/A	61.0	61.0	1.2	Insignificant	No	
R24a	Daytime	N/A	54.1	55.0	N/A	53.4	53.4	-1.6	Insignificant	No	No
	Nighttime	N/A	52.3	52.3	N/A	53.7	53.7	1.4	Insignificant	No	
R24b	Daytime	N/A	70.1	70.1	N/A	69.4	69.4	-0.7	Insignificant	No	No

Receptor ID	Period [1]	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Post-Project Noise (dBA)				
	Nighttime	N/A	66.3	66.3	N/A	67.7	67.7	1.4	Insignificant	No	
R24c	Daytime	N/A	58.5	58.5	N/A	56.6	56.6	-1.9	Insignificant	No	No
	Nighttime	N/A	55.0	55.0	N/A	55.9	55.9	0.9	Insignificant	No	
R24d	Daytime	N/A	71.1	71.1	N/A	69.2	69.2	-1.9	Insignificant	No	No
	Nighttime	N/A	66.8	66.8	N/A	67.8	67.8	1.0	Insignificant	No	
R25	Daytime	N/A	67.4	67.4	N/A	65.2	65.2	-2.2	Insignificant	No	No
	Nighttime	N/A	63.5	63.5	N/A	64.1	64.1	0.6	Insignificant	No	
R26	Daytime	N/A	67.4	67.4	N/A	68.9	68.9	1.5	Insignificant	No	No
	Nighttime	N/A	65.2	65.2	N/A	67.3	67.3	2.1	Insignificant	No	
R27	Daytime	N/A	66.8	66.8	N/A	69.0	69.0	2.2	Insignificant	No	No
	Nighttime	N/A	64.6	64.6	N/A	67.5	67.5	2.9	Insignificant	No	
R28	Daytime	N/A	65.2	65.2	N/A	67.1	67.1	1.9	Insignificant	No	No
	Nighttime	N/A	63.1	63.1	N/A	65.9	65.9	2.8	Insignificant	No	
R29	Daytime	N/A	69.4	69.4	N/A	71.0	71.0	1.6	Insignificant	No	No
	Nighttime	N/A	66.5	66.5	N/A	69.6	69.6	3.1	Noticeable	No	
R30	Daytime	N/A	52.9	55.0	N/A	53.9	53.9	-1.1	Insignificant	No	No
	Nighttime	N/A	56.0	56.0	N/A	58.1	58.1	2.1	Insignificant	No	
R31	Daytime	N/A	69.2	69.2	N/A	70.9	70.9	1.7	Insignificant	No	No
	Nighttime	N/A	66.6	66.6	N/A	69.7	69.7	3.1	Noticeable	No	
R32	Daytime	N/A	63.6	63.6	N/A	65.3	65.3	1.7	Insignificant	No	No
	Nighttime	N/A	61.0	61.0	N/A	64.1	64.1	3.1	Noticeable	No	
R33	Daytime	N/A	60.2	60.2	N/A	61.8	61.8	1.6	Insignificant	No	No
	Nighttime	N/A	58.4	58.4	N/A	60.7	60.7	2.3	Insignificant	No	
R34	Daytime	N/A	63.6	63.6	N/A	64.3	64.3	0.7	Insignificant	No	No
	Nighttime	N/A	61.7	61.7	N/A	63.0	63.0	1.3	Insignificant	No	

Receptor ID	Period [1]	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Post-Project Noise (dBA)				
R35	Daytime	N/A	65.2	65.2	N/A	63.7	63.7	-1.5	Insignificant	No	No
	Nighttime	N/A	61.8	61.8	N/A	62.5	62.5	0.7	Insignificant	No	
R36	Daytime	N/A	66.0	66.0	N/A	64.2	64.2	-1.8	Insignificant	No	No
	Nighttime	N/A	62.7	62.7	N/A	63.2	63.2	0.5	Insignificant	No	
R37	Daytime	N/A	62.8	62.8	N/A	63.9	63.9	1.1	Insignificant	No	No
	Nighttime	N/A	61.0	61.0	N/A	62.5	62.5	1.5	Insignificant	No	
R38	Daytime	N/A	66.7	66.7	N/A	69.0	69.0	2.3	Insignificant	No	No
	Nighttime	N/A	64.6	64.6	N/A	67.6	67.6	3.0	Noticeable	No	
R39	Daytime	N/A	59.6	59.6	N/A	59.8	59.8	0.2	Insignificant	No	No
	Nighttime	N/A	59.6	59.6	N/A	62.2	62.2	2.6	Insignificant	No	
R40	Daytime	N/A	55.3	55.3	N/A	56.7	56.7	1.4	Insignificant	No	No
	Nighttime	N/A	57.9	57.9	N/A	60.3	60.3	2.4	Insignificant	No	
R41	Daytime	N/A	60.0	60.0	N/A	61.9	61.9	1.9	Insignificant	No	No
	Nighttime	N/A	58.0	58.0	N/A	61.0	61.0	3.0	Noticeable	No	
R42	Daytime	N/A	60.6	60.6	N/A	61.4	61.4	0.8	Insignificant	No	No
	Nighttime	N/A	59.3	59.3	N/A	62.1	62.1	2.8	Insignificant	No	
R43	Daytime	N/A	58.8	58.8	N/A	60.1	60.1	1.3	Insignificant	No	No
	Nighttime	N/A	57.6	57.6	N/A	60.1	60.1	2.5	Insignificant	No	
R44	Daytime	N/A	65.6	65.6	N/A	67.3	67.3	1.7	Insignificant	No	No
	Nighttime	N/A	63.4	63.4	N/A	66.0	66.0	2.6	Insignificant	No	
R45	Daytime	N/A	66.5	66.5	N/A	68.1	68.1	1.6	Insignificant	No	No
	Nighttime	N/A	64.9	64.9	N/A	67.2	67.2	2.3	Insignificant	No	
R46	Daytime	N/A	64.5	64.5	N/A	66.2	66.2	1.7	Insignificant	No	No
	Nighttime	N/A	62.9	62.9	N/A	65.2	65.2	2.3	Insignificant	No	
R47	Daytime	N/A	48.2	55.0	N/A	50.0	50.0	-5.0	Insignificant	No	No

Receptor ID	Period [1]	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Post-Project Noise (dBA)				
	Nighttime	N/A	58.0	58.0	N/A	59.8	59.8	1.8	Insignificant	No	
R48	Daytime	N/A	65.4	65.4	N/A	67.6	67.6	2.2	Insignificant	No	No
	Nighttime	N/A	64.2	64.2	N/A	66.2	66.2	2.0	Insignificant	No	
R49	Daytime	N/A	60.2	60.2	N/A	59.9	59.9	-0.3	Insignificant	No	No
	Nighttime	N/A	58.8	58.8	N/A	59.1	59.1	0.3	Insignificant	No	
R50	Daytime	N/A	66.1	66.1	N/A	66.8	66.8	0.7	Insignificant	No	No
	Nighttime	N/A	64.8	64.8	N/A	65.2	65.2	0.4	Insignificant	No	
R51	Daytime	N/A	60.7	60.7	N/A	61.9	61.9	1.2	Insignificant	No	No
	Nighttime	N/A	59.5	59.5	N/A	60.9	60.9	1.4	Insignificant	No	
R52	Daytime	N/A	54.9	55.0	N/A	56.8	56.8	1.8	Insignificant	No	No
	Nighttime	N/A	54.1	54.1	N/A	56.4	56.4	2.3	Insignificant	No	
R53	Daytime	N/A	50.3	55.0	N/A	52.0	52.0	-3.0	Insignificant	No	No
	Nighttime	N/A	49.8	50.0	N/A	52.4	52.4	2.4	Insignificant	No	
R54	Daytime	N/A	50.9	55.0	N/A	52.7	52.7	-2.3	Insignificant	No	No
	Nighttime	N/A	49.5	50.0	N/A	52.1	52.1	2.1	Insignificant	No	
R55	Daytime	N/A	58.0	58.0	N/A	59.6	59.6	1.6	Insignificant	No	No
	Nighttime	N/A	56.4	56.4	N/A	59.0	59.0	2.6	Insignificant	No	
R56	Daytime	N/A	59.7	59.7	N/A	61.2	61.2	1.5	Insignificant	No	No
	Nighttime	N/A	57.8	57.8	N/A	60.1	60.1	2.3	Insignificant	No	
R57	Daytime	N/A	54.9	55.0	N/A	55.1	55.1	0.1	Insignificant	No	No
	Nighttime	N/A	53.9	53.9	N/A	55.4	55.4	1.5	Insignificant	No	
R58	Daytime	N/A	62.5	62.5	N/A	62.2	62.2	-0.3	Insignificant	No	No
	Nighttime	N/A	60.3	60.3	N/A	61.2	61.2	0.9	Insignificant	No	
R59	Daytime	N/A	53.0	55.0	N/A	53.9	53.9	-1.1	Insignificant	No	No
	Nighttime	N/A	51.7	51.7	N/A	53.0	53.0	1.3	Insignificant	No	

Receptor ID	Period [1]	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Post-Project Noise (dBA)				
R60	Daytime	N/A	51.4	55.0	N/A	53.0	53.0	-2.0	Insignificant	No	No
	Nighttime	N/A	50.6	50.6	N/A	52.3	52.3	1.7	Insignificant	No	
R61	Daytime	N/A	52.6	55.0	N/A	54.4	54.4	-0.6	Insignificant	No	No
	Nighttime	N/A	51.4	51.4	N/A	53.7	53.7	2.3	Insignificant	No	
R62	Daytime	N/A	51.7	55.0	N/A	53.3	53.3	-1.7	Insignificant	No	No
	Nighttime	N/A	50.6	50.6	N/A	52.8	52.8	2.2	Insignificant	No	
R63	Daytime	N/A	50.9	55.0	N/A	51.5	51.5	-3.5	Insignificant	No	No
	Nighttime	N/A	49.7	50.0	N/A	50.9	50.9	0.9	Insignificant	No	
R64	Daytime	N/A	49.6	55.0	N/A	50.9	50.9	-4.1	Insignificant	No	No
	Nighttime	N/A	48.9	50.0	N/A	50.6	50.6	0.6	Insignificant	No	
R65	Daytime	N/A	54.5	55.0	N/A	56.3	56.3	1.3	Insignificant	No	No
	Nighttime	N/A	54.1	54.1	N/A	55.8	55.8	1.7	Insignificant	No	
R66	Daytime	N/A	53.5	55.0	N/A	53.6	53.6	-1.4	Insignificant	No	No
	Nighttime	N/A	52.3	52.3	N/A	53.3	53.3	1.0	Insignificant	No	
R67	Daytime	N/A	53.9	55.0	N/A	56.7	56.7	1.7	Insignificant	No	No
	Nighttime	N/A	53.7	53.7	N/A	55.5	55.5	1.8	Insignificant	No	
R68	Daytime	N/A	57.4	57.4	N/A	58.8	58.8	1.4	Insignificant	No	No
	Nighttime	N/A	54.9	54.9	N/A	58.2	58.2	3.3	Noticeable	No	
R69	Daytime	N/A	55.8	55.8	N/A	57.4	57.4	1.6	Insignificant	No	No
	Nighttime	N/A	53.4	53.4	N/A	56.8	56.8	3.4	Noticeable	No	
R70	Daytime	N/A	52.8	55.0	N/A	54.4	54.4	-0.6	Insignificant	No	No
	Nighttime	N/A	52.4	52.4	N/A	55.6	55.6	3.2	Noticeable	No	
R71	Daytime	N/A	52.9	55.0	N/A	54.3	54.3	-0.7	Insignificant	No	No
	Nighttime	N/A	50.9	50.9	N/A	53.9	53.9	3.0	Noticeable	No	
R72	Daytime	N/A	54.8	55.0	N/A	56.1	56.1	1.1	Insignificant	No	No

Receptor ID	Period [1]	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA) [1]	Post-Project Noise (dBA)				
	Nighttime	N/A	52.6	52.6	N/A	55.4	55.4	2.8	Insignificant	No	
R73	Daytime	N/A	51.5	55.0	N/A	51.4	51.4	-3.6	Insignificant	No	No
	Nighttime	N/A	52.6	52.6	N/A	54.5	54.5	1.9	Insignificant	No	
R74	Daytime	N/A	61.2	61.2	N/A	61.0	61.0	-0.2	Insignificant	No	No
	Nighttime	N/A	58.1	58.1	N/A	59.9	59.9	1.8	Insignificant	No	

Notes:
[1] The LEQ (Day) is evaluated for a 16-hour period (i.e., from 0700h to 2300h) and the LEQ (Night) is evaluated for an 8 hour period (i.e., from 2300h to 0700h).
[2] Predicted ambient noise levels are from the Gardiner Expressway where it is located in close proximity to receptors. "N/A" means the ambient noise was assumed to be significantly lower than noise from existing rail activity and was therefore not assessed.
[3] The pre-project noise is the higher of the ambient sound level, combined with the existing rail activity, or 55 dBA (Daytime) / 50 dBA (Nighttime).
[4] The potential to mitigate is considered when a significant (or greater) impact is predicted. This is equivalent to an increase of 5 dB or greater, relative to the objective level, as per the MOEE / GO Protocol for Noise and Vibration Assessments. An adjusted noise impact greater than 5 dB requires the investigation of mitigation.

4.8.7 Approach to Investigation of Mitigation - Operational Noise

Based on the Adjusted Noise Impacts resulting from a project, an investigation of noise mitigation measures is required. MOEE/GO Protocol includes the following mitigation guidance:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering, economic and administrative feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

For the purposes of this study, it was assumed that noise mitigation would be limited to locations within the GO Transit right-of-way, and to be considered feasible, the mitigation measures should achieve at least a 5 dB reduction in noise at the first row of affected receptors. The ID numbers of the barriers correspond to the ID numbers of the representative first row receptors.

If the Adjusted Noise Impact at a receptor is deemed significant during the daytime period, technical feasibility of a noise barrier was evaluated based on the noise reduction achieved during the daytime period only. Similarly, if the Adjusted Noise Impact at a receptor was deemed significant during nighttime period, technical feasibility of a noise barrier is evaluated based on the noise reduction achieved during the nighttime period only. If the Adjusted Noise Impacts at a receptor were deemed significant during both the daytime and nighttime periods and noise reduction resulting from a noise barrier is at least 5 dB in either the daytime or nighttime period, the noise barrier was deemed technically feasible.

Noise barriers can be formed of earthen berms, engineered noise walls, or some combination of the two. Where earthen berms are used, side slopes of 3:1 should be used for drainage and erosion control and right-of-way maintenance. Where noise walls are to be used, they should be free of gaps and cracks, and have a minimum surface density (mass per unit of face area) of 20 kg/m^2 (4 lb. per sq. ft.). It is preferable that barriers are sound absorptive at least on the railway side, and this is mandatory in situations where parallel barriers (e.g., barriers on both sides of a railway) are proposed.

GO Transit will use barriers with a height of 5 metres for all new or replacement noise barriers. Higher noise barriers require specially engineered footings, which may not be technically and/or economically feasible to implement. The investigation of mitigation was limited to noise barriers with heights of 5 metres.

During detailed design, each location identified as a technically feasible noise mitigation location along each rail corridor will be further reviewed to determine the administrative, operational, economic and technical feasibility and to further define what type of mitigation will be implemented.

4.8.8 Lakeshore West Corridor - Investigation of Mitigation

No noise barriers were investigated as Adjusted Noise Impacts for the Electric RER scenario were predicted to be not significant (i.e., there was less than a 5 dB increase) in accordance to the MOEE/GO Protocol Impact Rating. Refer to mapping contained in **Appendix S.**

4.9 Vibration

The MOEE/GO Protocol outlines desired objectives for vibration levels from GO Transit projects. The requirement to investigate vibration mitigation focuses on the change between the existing vibration levels and the future vibration levels. Change in vibration levels may occur under the following circumstances: change in track alignment, addition of track, and change/addition of special track work (such as switches).

It should be noted that vibration impacts are associated with the characteristics of individual trains (especially the weight of the locomotive) and are not related to the increased rail traffic associated with future RER service.

Vibration effects were predicted in accordance with the methods of the United States Department of Transportation - Federal Transit Administration (FTA, 2006). Vibration levels were expressed in terms of root-mean-square (RMS) velocity in the vertical direction, which is the dominant axis for vibration generated from mobile sources such as trains and most closely correlated with human annoyance and perceptibility. The relative change between existing and future vibration levels is presented as a percentage. For further details ad supporting information please refer to Appendix G - Noise and Vibration Assessment Report.

4.9.1 Applicable Criteria

The desirable objective of the MOEE/GO Protocol is that the RMS velocity of vibration produced by the future GO Transit operations at a sensitive receptor should not exceed:

- 0.14 mm/s; or
- The existing vibration levels where existing operations already produce vibration that exceeds 0.14 mm/s.

Furthermore, the MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the RMS velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

The FTA vibration level predictions were calibrated by measuring existing vibration levels at a small selection of locations in the vicinity of the GO network. The measurements informed the selection of appropriate adjustment factors. The adjustment factors in the FTA vibration calculations account for:

- Vehicle speed;

- Track type and track conditions;
- Type of locomotive power; and
- Condition of wheels (i.e., wheel wear).

The intent of the MOEE/GO protocol's impact assessment is to evaluate change in vibration between the pre-project and post-project scenarios. One method (i.e. modelling) was chosen to evaluate both scenarios to ensure consistency. Comparing existing measured vibration levels to future modelled vibration levels inherently introduces an additional source of uncertainty into the impact assessment. For this reason, the assessment evaluates modelled existing vibration levels against modelled future vibration levels, as opposed to measured existing vibration levels against modelled future vibration level. At the detailed design stage, verification measurements of existing conditions at receptors where the greatest effect is expected and a reasonable number of additional receptors will be conducted to validate FTA vibration calculations.

A literature review was conducted to compare the gross weight of a diesel MP40 locomotive and an electric locomotive with a similar horsepower rating. It was determined that the difference in locomotive weight was not significant enough to have an impact on the vibration levels; therefore, a single set of predicted vibration levels applies to both diesel trains and electric trains.

4.9.2 Lakeshore West Corridor - Vibration Impacts Electric RER Scenario

Within the Lakeshore West Corridor, it was identified that receptor R01, near the addition of a fifth track between Strachan Avenue and Exhibition GO Station, was the closest receptor to the change; therefore, the vibration assessment focused on the Vibration Adjusted Impacts at R01.

The predicted existing and future vibration levels and change in vibration levels for a GO train pass-by, passenger train and a freight train are presented in **Table 4-37.**

Changes in the anticipated vibration levels for the selected receptor (R01) were calculated using the existing and future vibration levels for GO train, passenger train and freight train traffic using the FTA model. Neither, the existing or future vibration levels at the receptor near the track upgrade exceed the lowest MOEE/GO Protocol objective of 0.14 mm/s; and therefore, mitigation has not been recommended.

Table 4-37: Vibration Impact Assessment Results of the Electric RER Scenario – Lakeshore West Rail Corridor

Train Type Assessed	Receptor	Speed Over Track (km/h)	Special Trackwork Present?	Distance to Rail Component		Predicted Vibration Level		Objective (mm/s)	% Above Objective	Mitigation Required? [1]
				Existing (m)	Future (m)	Existing (mm/s)	Future (mm/s)			
GO Train	R01	69	No	59	55	0.024	0.026	0.14	N/A	No
VIA Train		97				0.034	0.037	0.14	N/A	No
Freight Train		32				0.11	0.12	0.14	N/A	No

Notes:
[1] The MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the vibration velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

4.10 Visual

Please refer to Section **3.10** for a description of the methodology followed for assessment of visual impacts. Additional details can be found in the Visual Impact Assessment Report contained in **Appendix H2**.

4.10.1 Burlington Tap/TPS Location

4.10.1.1 Potential Effects and Mitigation Measures

The Burlington Tap is located on the same parcel of land as the Burlington Traction Power Substation (TPS) and is located in an industrial area behind a Hydro One transformer on vacant land on the north side of the railroad. The site is visible from Fairview Street on the south side of the railroad. This street is a local road with commercial and industrial properties on both sides. Immediately opposite the proposed site there is a vacant parcel of land on Fairview Street which allows views across the railroad to the Tap and TPS. Screening or fencing along the back of the sidewalk in this area would minimize visual impacts but will not completely eliminate views of the Tap due to the height of the infrastructure.

Figure 4-21: Typical TAP Infrastructure

Figure 4-22: Typical Traction Power Substation (TPS)

4.10.1.2 Net Effects

The introduction of screening and/or fencing along the Fairview Street sidewalk will make the Tap location less visible from the street if feasible. However, there will be low net visual effects due to the height of the infrastructure that cannot be completely screened from view.

4.10.2 Mimico Tap/TPS Location & 25kV Feeder Route

4.10.2.1 Potential Effects and Mitigation Measures

The Mimico Tap/TPS (see Visual Impact Assessment Report) is located approximately 1,000 metres north of the Mimico SWS adjacent to the Milton Rail Corridor. The site is covered in scrub vegetation and in a "Y-shaped" junction where an industrial track branches off the Milton corridor. Most of the development surrounding the Tap facility is industrial, and includes parking lots, commercial buildings, and electrical system infrastructure. The 25kV feeder route follows a north-south rail corridor through an industrial area that already has electric transmission lines on both sides of the corridor. The feeder line will have negligible visual impact to the corridor.

However, immediately north of the Milton corridor there is a high-rise residential building with a second residential complex under construction on its west side, both fronting on Dundas Street. The Tap/TPS will be visible from the south-facing windows of the existing building. However, the building is oriented so that most of its windows do not overlook the Tap/TPS. There is already a lot of electrification equipment visible from this building, albeit farther away, as it is adjacent to the Hydro One Manby Transformer

Station, where the electrification equipment is much more extensive. The new Tap/TPS facility will be visible from the existing residential building, but mitigation is not an option as the new equipment is too tall to screen with vegetation. Refer to **Figure 4-21** for typical Tap infrastructure.

The Canpa 25kV Feeder Route (see Visual Impact Assessment Report) follows a railway corridor that connects the Milton Line with the Lakeshore West Line. The corridor is in a primiarly industrial area between the Mimico Tap/TPS and the Mimico SWS location.

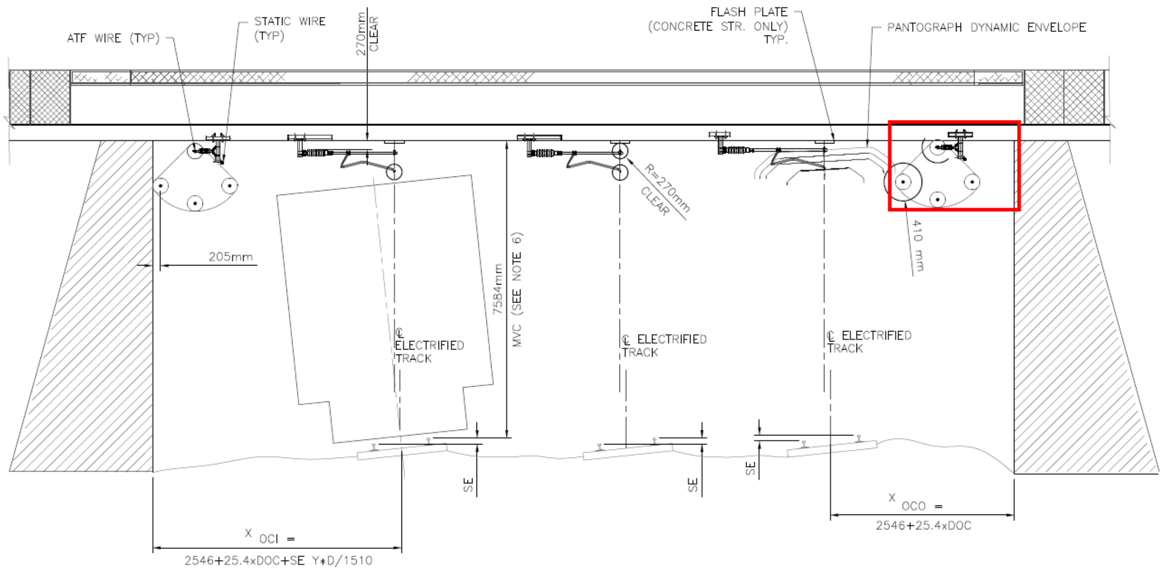
It is acknowledged that Connorvale Park is situated in the vicinity of the proposed feeder route. As outlined above, a Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the area encompassed by the overhead contact system/2 X 25 kV feeders plus an additional 2 metre offset area on either side of the OCS components or 2 X 25 kV feeders. As a result, the total clearing area is defined as 7 metres measured from the centerline of the outermost tracks to be electrified/feeder routes on either side of each rail corridor/feeder route. The 7 metre zone is considered a maximum removal zone; during detailed design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

The Tree Compensation Protocol requirements will entail offsetting tree loss as much as possible/feasible through planting of trees in other areas of affected parks wherever possible; which will also help minimize visual effects due to tree removal. During Detailed Design, municipalities will be engaged as appropriate in the further development of the Tree Compensation Protocol.

With these mitigation measures in mind, the installation of the feeder route in this area will have a minimal visual impact on views from the surrounding area.

It is also noted that the installation of the Canpa feeder route at the Gardiner Expressway and Queensway bridges will require mechanical fastening of feeder cable to the underside of the structures due to the existing bridge clearance and width of multi lane bridges. The figure below depicts Typical Fastening of Feeder Cable. There will be a minimal visual impact related to the installation of the mechanical fastening and no mitigation measures are required/proposed.

Figure 4-23: Typical Fastening of Feeder Cable



4.10.2.2 Net Effects

There will be net visual effects to the residential building between Dundas Street and the Milton rail corridor. Mitigation of visual impacts is not possible due to the sight lines from windows to the Tap, which is too tall to hide with vegetation. Based on implementation of the above noted mitigation measures, the installation of the feeder route in this area will have a minimal visual impact on views from the surrounding area.

4.10.3 Mimico SWS

4.10.3.1 Potential Effects and Mitigation Measures

The Mimico SWS (see Visual Impact Assessment Report) is located in a triangle of land north of the Lakeshore West Corridor in an entirely industrial area. The site is currently a pipe storage yard located at the end of an industrial cul de sac named Towns Road. Access to the facility will be from the end of this cul de sac. Due to the industrial nature of the environment there will be negligible visual impacts from this facility.

Refer to **Figure 4-22** for a photograph of a typical Traction Power Substation (TPS).

4.10.3.2 Net Effects

There are no anticipated net visual effects.

4.10.4 Oakville SWS

4.10.4.1 Potential Effects and Mitigation Measures

The Oakville SWS (see **Appendix H2**) is located on the south side of the railroad in a storage yard behind a commercial development that fronts on Cornwall Road. The facility is not close to any other development and will not be visible from the surroundings. There are negligible visual impacts associated with this facility and no mitigation measures are required.

Figure 4-24: Typical Switching Station (SWS)

4.10.4.2 Net Effects

There will be no anticipated net visual effects.

4.10.5 OCS & Bridges: Section LSW-1 – West of Bathurst Street (Mile 1.20) to Mimico Station

4.10.5.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section LSW-1 (see **Appendix H2**) passes through a wide variety of environments that range from negligible visual impact to potential low visual impact. This is an urbanized area where electric infrastructure already exists as part of the general visual environment. While some of the railroad is surrounded by industrial development or heavily vegetated land, resulting in negligible visual impact and requiring no mitigation, there are also areas where the new infrastructure will have a potential low visual impact, such as single-family residential neighborhoods where houses are more than 20 metres from the railroad.

This section starts at Garrison Common which contains historic Fort York. The boundary of Garrison Common is adjacent to the rail corridor and is heavily vegetated with a band of mature trees and other vegetation. The vegetative clearing area for the proposed OCS infrastructure appears to be within the rail right-of-way and will not affect this vegetation except possibly close to the Strachan Avenue Bridge and away from the buildings on the Fort York site. However, the vegetation is not consistently tall enough to screen views of the proposed OCS infrastructure from Fort York. Therefore, Fort York is classified as a moderate impact area, as a scenic view that will be altered by the introduction of OCS infrastructure.

A significant part of this section passes along the lakeshore, through close to Lakeshore Boulevard Parklands, a continuous open space where several cultural facilities are located. Because the Gardiner Expressway already intrudes into the view from this area to the railroad, this viewshed is classified as potential low visual impact.

However, across the railroad from the Gardiner Expressway between Dowling Avenue and the Queensway there is a series of iconic topiary signs advertising various private companies (see **Appendix H2**). The view of these signs from the Expressway will be altered by the introduction of OCS infrastructure along the railroad. This is classified as a potential low visual impact, as the signs will remain visible but the views will be somewhat impacted by the OCS structures in the background.

A number of high-rise residential buildings overlook the railroad but are more than 30 metres away from the railroad ROW, and are therefore classified as potential low visual impact.

Mitigation Measures

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. No mitigation is possible for the potential low visual impact to the topiary signs along the Gardiner Expressway.

GO Stations

There are two stations in this section, Exhibition and Mimico, and the viewshed in these areas is classified as potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed within it but the visual environment is not sensitive.

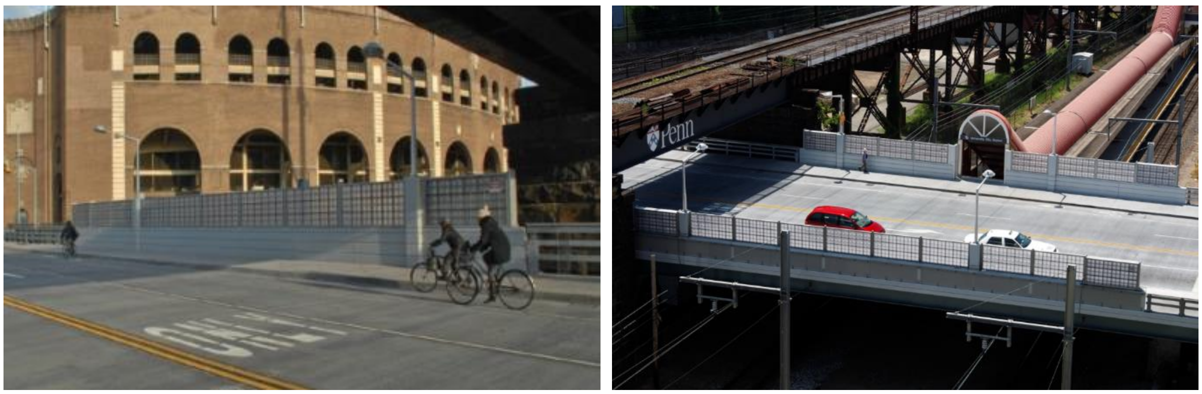
Mitigation Measures

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Bridges/Rail Overpasses

Seven bridges (i.e., rail under road, rail or pedestrian walkway) pass over the rail corridor in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

Figure 4-25: Typical Bridge Barriers



Six roadway bridges are located in this section. Of particular note in this section are the Strachan Avenue Bridge (see **Figure 4-26** and **Map B-1 in Appendix H2**) and the Dufferin Street Bridge (see **Figure 4-27** and **Map B-1 in Appendix H2**). These bridges currently provide views of the downtown skyline for people walking across them, and the sidewalks on these bridges will require protection from the new OCS infrastructure by tall barriers. As such these bridges are classified as potential moderate visual impact and will require mitigation.

The remaining roadway bridges in this section are classified as potential low visual impacts due to the addition of bridge barriers (see **Table 4-38**).

Figure 4-26: Current View of the Strachan Avenue Bridge

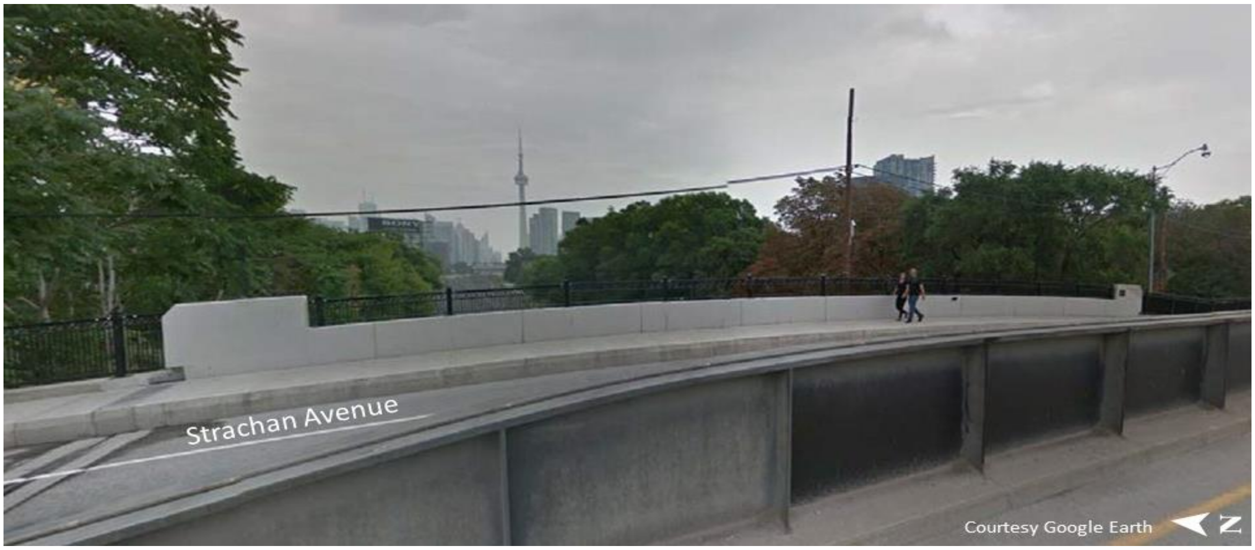


Figure 4-27: Current View of the Dufferin Street Bridge

There is one pedestrian bridge in this corridor segment, i.e., Sunnyside Pedestrian Bridge (see **Map B-3** in the Visual Impact Assessment Report) which is recommended for modification as part of this project. Pedestrian bridges require protective barriers on both sides and are classified as potential moderate visual impact. Pedestrian bridges should be designed to allow views to and from people walking across the bridge to avoid a claustrophobic tunnel effect and maintain a safe environment.

Table 4-38: Summary of Bridges – Section LSW-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSW-1	B-2	Strachan Avenue (#559)	Bridge	Yes. Preferred solution to vert. clearance issue: Lower tracks.	Yes Moderate visual Impact
LSW-1	B-2	Dufferin Street (#509)	Bridge	Yes .Preferred solution to vert. clearance issue: Raise roadway and replace bridge.	Yes Moderate visual Impact
LSW-1	B-2	Dunn Avenue (#511)	Bridge	Yes. Preferred solution to vert. clearance issue: Raise roadway and replace bridge. In order to reduce the magnitude of the bridge/roadway profile raise, the tracks will be lowered.	Yes Moderate Visual Impact
LSW-1	B-3	Jameson Avenue (#533)	Bridge	Yes. Preferred solution to vert. clearance issue: Raise roadway and replace bridge. In order to reduce the magnitude of the bridge/roadway profile raise, the tracks will be lowered.	Yes Moderate Visual Impact
LSW-1	B-3	Dowling Avenue (#507)	Bridge	No, but replace pedestrian bridge.	Yes Moderate Visual Impact
LSW-1	B-3	Sunnyside (#175)	Pedestrian Bridge	Yes, reduce track maintenance allowance.	Yes Moderate Visual Impact
LSW-1	B-5	Gardiner Expressway (#418)	Bridge	Yes, reduce track maintenance allowance	No Negligible Visual Impact

In addition, there are eleven rail overpasses (i.e., rail over road, rail or water) in this section. The overpasses are very visible from the roadway as pedestrians and traffic approach them.Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

The Humber River Bridge has been classified as having a moderate visual impact due to the installation of OCS support structures on or in the vicinity of the rail overpass based on the heritage nature of the structure. All other rail overpass structures have been classified as having a negligible visual impact (see **Table 4-39**).

Table 4-39: Summary of Rail Overpasses - Section LSW-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-1	B-3	Parkside Drive	Rail Overpass	N/A	No NegligibleVisual Impact
LSW-1	B-4	Colborne Lodge Drive	Rail Overpass	N/A	No Negligible Visual Impact
LSW-1	B-4	Ellis Avenue	Rail Overpass	N/A	No Negligible Visual Impact
LSW-1	B-4	Windemere Avenue	Rail Overpass	N/A	No Negligible Visual Impact
LSW-1	B-4	Gardiner Expressway ramp	Rail Overpass	N/A	No Negligible Visual Impact
LSW-1	B-4	Riverside Drive	Rail Overpass	N/A	No Negligible Visual Impact
LSW-1	B-4	Humber River	Rail Overpass	N/A.	Yes ModerateVisual Impact
LSW-1		Queen Street	Rail Overpass	N/A	No Negligible Visual Impact
LSW-1	B-4	TTC Humber Loop	Rail Overpass	N/A	No Negligible Visual Impact
LSW-1	B-5	Park Lawn Road	Rail Overpass	N/A	No Negligible Visual Impact
LSW-1	B-5	Mimico Creek	Rail Overpass	N/A	No Negligible Visual Impact

Mitigation Measures

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

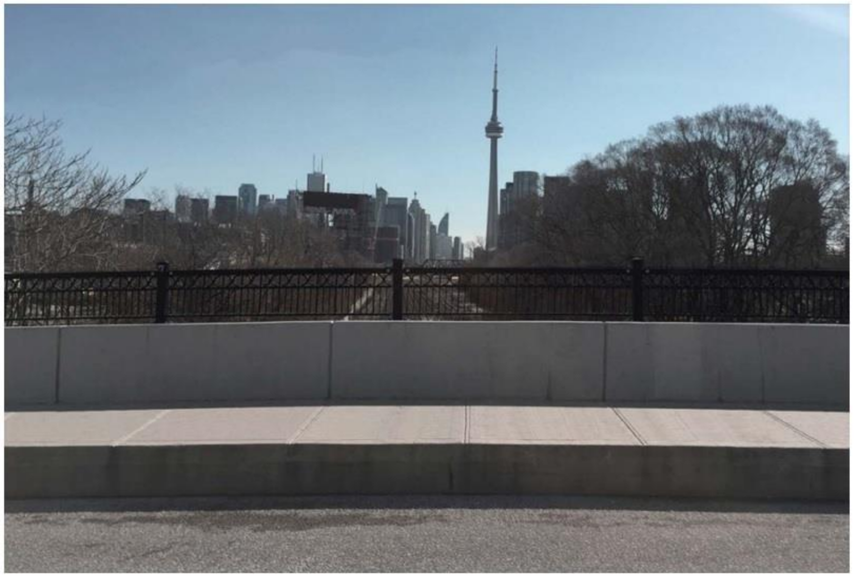
As part of detailed design, Metrolinx's Design Excellence Committee will be engaged to review possible design treatments/option for enhancing the aesthetics of bridge barriers where feasible/required. It is anticipated that the basis of the protection barrier will be a post and panel (solid-faced) design with customizable panels toward suiting visual preferences (in consultation with the applicable bridge owners as appropriate), such as:

- Multilane, restricted access highways and non-visually sensitive locations;
- Visually sensitive locations;
- Structures of heritage value or sensitivity.

An example of a bridge barrier in a visually sensitive location has been provided in **Figure 4-28**. Additional design option examples have been provided in **Figure 4-29** and **Figure 4-30.** It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

Figure 4-28: Example Of Bridge Barrier In A Visually Sensitive Location

Before



After

Figure 4-29: Illustrative Bridge Barrier Design Options (Examples)

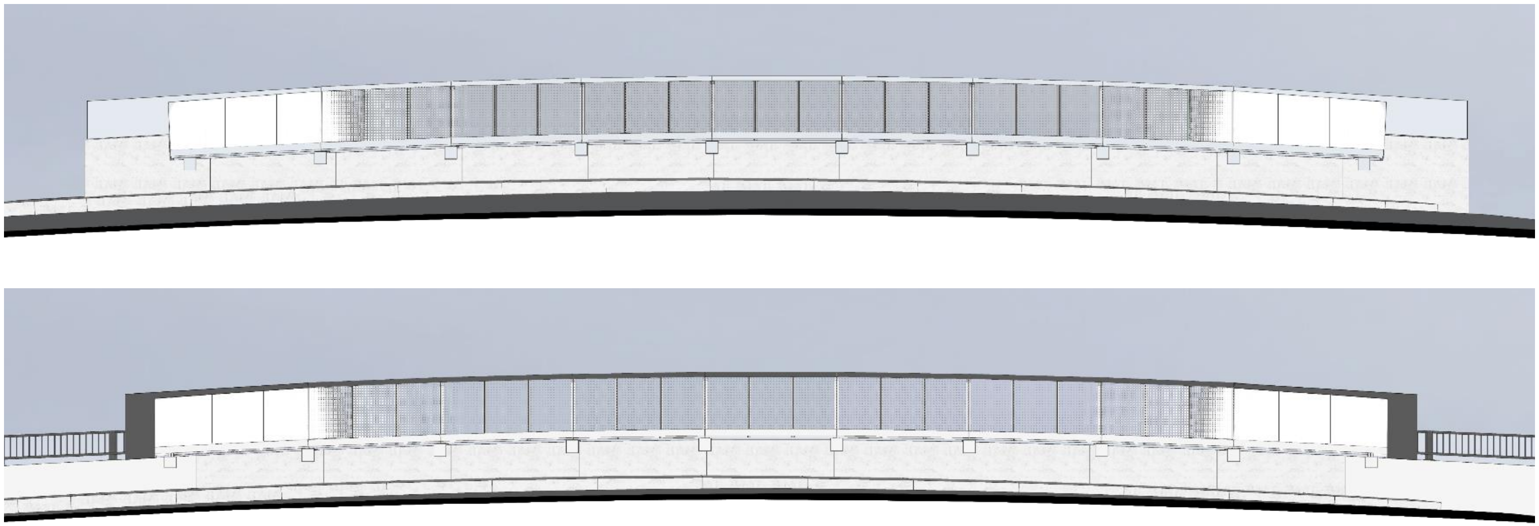


Figure 4-30: Bridge Barrier Design Option Example (Glass Back View)

Parallel Barriers

A parallel barrier will be required on the north side of the track where there is an existing wall (see **Appendix B, Map B-1** of the Visual Impact Assessment Report) as well as to the west of the Strachan Avenue and Dufferin Street Bridges alongside stairs on the north side of the tracks (see **Appendix B, Map B-2** of the Visual Impact Assessment Report) to protect pedestrians from possible accidental contact with live parts of the OCS. These barriers will be a minimum of 2 metres in height and solid material. These barriers are typically short in length and will result in negligible visual impact.

Mitigation Recommendations:
None required.

4.10.5.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSW-1 will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Exhibition and Mimico GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

Parallel Barriers

Residual visual effects will be negligible due to the relatively small area affected by the barriers.

4.10.6 OCS & Bridges: Section LSW-2 – Mimico Station to Long Branch Station

4.10.6.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

In Section LSW-2 the land use on either side of the railroad is generally not sensitive to visual intrusion. Most of the area is industrial, resulting in negligible visual impact and requiring no visual screening or mitigation. There are also several short stretches of residential development, mostly single-family homes more than 8 metres from the railroad as well as a neighbourhood park called Laburnham Park. These are areas where the new OCS infrastructure will have a potential low to moderate visual impact on the existing viewshed.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There is only one station in this section, Long Branch GO Station, and the viewshed in this area is classified as potential low visual impact. Platforms and the approaches to platforms provide clear close up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

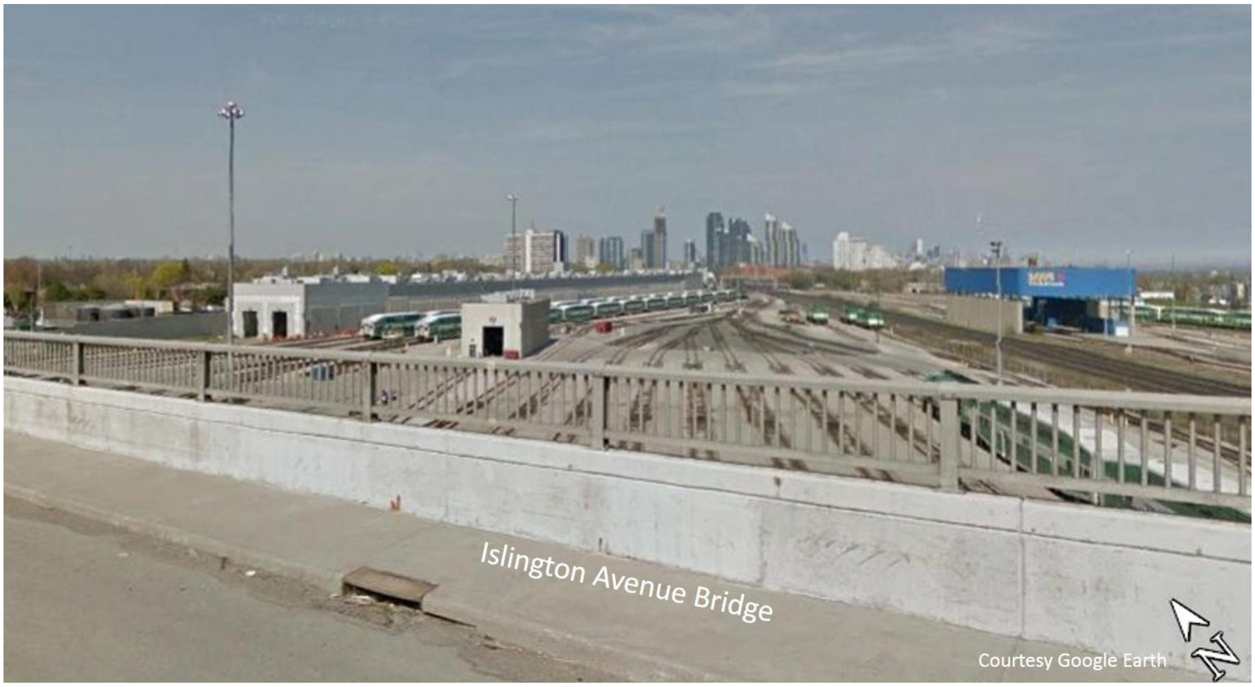
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Bridges/Rail Overpasses

There are two bridges which pass over the railroad in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge.

Of particular note is the Islington Avenue Bridge (see **Figure 4-31** and Map B-6 in the Visual Impact Assessment Report), a long viaduct that crosses over the railyard. This bridge affords particularly good views of the downtown skyline and is therefore classified as having a potential moderate visual impact. The second bridge at Brown's Line (see Map B-8 in the Visual Impact Assessment Report) requires the railroad tracks to be lowered to provide vertical clearance and has no significant views resulting in low visual impact.

Figure 4-31: Current View from Islington Avenue Bridge



Refer to **Figure 4-25** for photographs of typical bridge barriers.

Therefore, there are potential low to moderate visual impacts due to the addition of protective barriers on these bridge structures (see **Table 4-40**).

Table 4-40: Summary of Bridges – Section LSW-2

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSW-2	B-6	Islington Avenue (#371)	Bridge	No	Yes Moderate Visual Impact
LSW-2	B-8	Brown's Line (#002)	Bridge	Yes. Preferred solution to vert. clearance issue: Lower tracks	Yes Low Visual Impact

There are four rail overpasses in this section and areclassified as having negligible visual impacts. (See **Table 4-41**). Refer to **Figure 3-7** for a current view of a typical rail overpass.

Table 4-41: Summary of Rail Overpasses – Section LSW-2

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-2	B-6	Royal York Road	Rail Overpass	N/A	No Negligible Visual Impact

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-2	B-6	Brant Street	Rail Overpass	N/A	No Negligible Visual Impacts
LSW-2	B-7	Kipling Avenue (#003)	Rail Overpass	N/A	No Negligible Visual Impact
LSW-2	B-8	30th Street	Rail Overpass	N/A	No Negligible Visual Impact

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible. In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the views from the surrounding area. Among these areas, the Islington Avenue Bridge is the most important feature requiring careful design consideration.

Refer to Section 4.10.5 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

4.10.6.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSW-2 where adjacent land use is either industrial or residential will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Long Branch GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

4.10.7 OCS & Bridges: Section LSW-3 – Long Branch Station to Port Credit Station

4.10.7.1 Potential Effects and Mitigation Measures

LSW-3 passes through mostly single-family residential neighborhoods and adjacent to neighbourhood parks (The Village Green and Spruce Park), where homes are located at least 8 metres away from the railroad tracks. These are areas where the new OCS infrastructure will have a potential low to moderate visual impact on the existing viewshed. In addition there are several golf courses that are classified as negligible visual impact. The railroad crosses Etobicoke Valley Park on a viaduct. This area is classified as moderate visual impact sue to the scenic nature of the Etobicoke Valley.

Figure 4-32: Typical Overhead Contact System (OCS) infrastructure in Suburban Setting

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There is only one station in this section, Port Credit GO Station, and the viewshed in this area is classified as potential low visual impact. Platforms and the approaches to platforms provide clear close up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there are five rail overpasses. One of the rail overpasses is a stone viaduct which crosses Etobicoke Creek and Long Branch Road that is classified as potential moderate visual impact due to the scenic and heritage nature of the Etobicoke Creek valley and structure (see **Table 4-42**).

Figure 4-33: Current View of the Etobicoke Creek Rail Overpass.

Three of the remaining overpasses cross over roads at Dixie Road, Cawthra Road and Hurontario Street and the remaining overpasses crosses over Cooksville Creek. These overpasses are classified as negligible visual impact. Refer to **Figure 4-36** for a visualization of typical OCS infrastructure at a scenic viaduct.

Table 4-42: Summary of Rail Overpasses – Section LSW-3

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-3	B-8	Long Branch	Rail Overpass	N/A.	Yes

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
		Etobicoke Creek			Moderate Visual Impact
LSW-3	B-9	Dixie Road	Rail Overpass	N/A	No Negligible Visual Impact
LSW-3	B-10	Cawthra Road	Rail Overpass	N/A	No Negligible Visual Impact
LSW-3	B-11	Cooksville Creek	Rail Overpass	N/A	No Negligible Visual Impact
LSW-3	B-12	Hurontario Street	Rail Overpass	N/A	No Negligible Visual Impact

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there is one moderate impact viewshed to protect in Section LSW-3, that of the Etobicoke Creek Viaduct. In addition, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area such as the Port Credit GO Station.

4.10.7.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSW such as in residential areas will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Port Credit GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses, especially at the Etobicoke Creek crossing, will be minimized based on the implementation of mitigation measures outlined above including design considerations for placement of OCS poles away from rail overpasses where possible. Residual visual effects will typically be negligible, except for the Etobicoke Creek crossing, which will be moderate since, despite mitigation measures, the OCS infrastructure will be clearly visible from the surrounding viewshed.

4.10.8 OCS & Bridges: Section LSW-4 – Port Credit Station to Clarkson Station

4.10.8.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

LSW-4 passes through mostly single-family residential neighborhoods, where homes are located at least 8 metres away from the railroad tracks. These are areas where the new OCS infrastructure will have a potential low to moderate visual impact on the existing viewshed. Some form of screening may be beneficial in these areas, especially where vegetation will be removed to accommodate the new OCS infrastructure; however this will need to be reviewed during detailed design on a case-by-case basis for feasibility. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

However, there are several places where single family homes are located less than 8 metres from the railroad and are therefore classified as potential high visual impact due to the closeness of the vegetative clearing and installation of OCS infrastructure to the back yards and rear windows of these homes.

Birchwood Park is a significant park in this section. The park consists of ball fields and some passive recreation areas that are screened from the railroad by vegetation. Therefore, this area is classified as negligible visual impact.

The area immediately west of the Port Credit GO Station is classified as moderate impact where the railroad is adjacent to Memorial Park and crosses over the Credit River. The Credit River is used for recreational boating activities.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are no stations within this section.

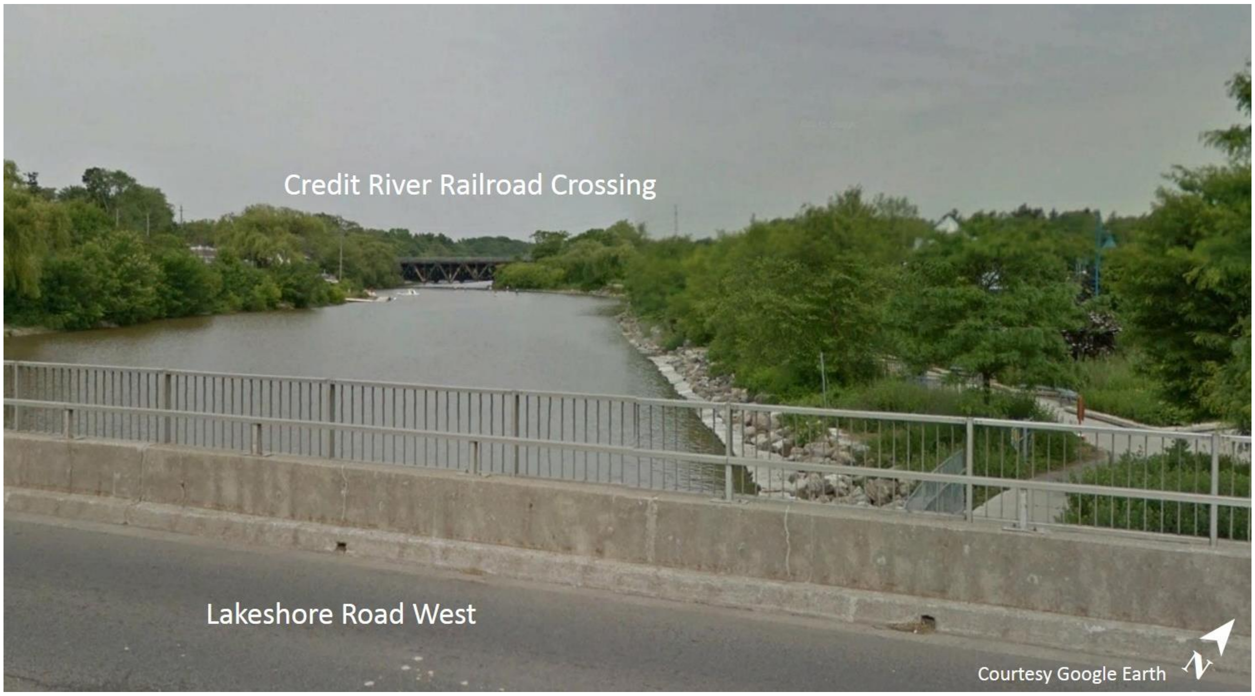
Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there are three rail overpasses.

The two overpasses that cross over Mississauga and Southdown Roads are classified as negligiblevisual impact. However, the overpass across the Credit River is classified as potential moderate visual impact due to the scenic and historic nature of the river/structure and its environs and the recreational activity that takes place in the river and along its banks (see **Figure 4-34**).

Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure on a typical rail overpass.

Figure 4-34: Current View of the Credit River Rail Overpass



Therefore, there are potential negligible to moderate visual impacts due to the installation of OCS support structures on or in the vicinity of these rail overpass structures (see **Table 4-43**).

Table 4-43: Summary of Rail Overpasses – Section LSW-4

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-4	B-12	Credit River	Rail Overpass	N/A.	Yes *Moderate Visual Impact*
LSW-4	B-12	Mississauga Road	Rail Overpass	N/A	No *Negligible Visual Impact*
LSW-5	B-16	Southdown Road	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, the Memorial Park area and the Credit River Viaduct are the most important features requiring careful design consideration.

4.10.8.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSW-4 such as the park area adjacent to the Credit River will be minimized based on the implementation of the mitigation measures outlined above. Residual effects in this area are considered low. In areas where homes are less than 8 metres from the railroad t OCS infrastructure will be very visible to those homes, therefore, residual visual effects are considered moderate in these areas.

GO Stations

There are no stations within this section.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for placement of OCS poles away from rail overpasses where possible. Residual visual effects will typically be negligible, except for the Credit River crossing, which will be moderate since, despite mitigation measures, the OCS infrastructure will be clearly visible from the scenic viewshed.

4.10.9 OCS & Bridges: Section LSW-5 – Clarkson Station to Oakville Station

4.10.9.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

The LSW-5 section passes almost entirely through areas of light industrial buildings alongside the railroad where there are negligible visual impacts. There are a few areas of single-family residential neighborhoods, where homes are located at least 20 metres from the railroad tracks close to Clarkson GO Station. These are areas where the new OCS infrastructure will have a potential low visual impact on the existing viewshed. Two parks, Clarkson Park and Cornwall Road Sports Park are active recreation facilities and as re classified as negligible visual impact.

Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area

allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There is only one station in this section, Clarkson GO Station, and the viewshed in this area is classified as potential low visual impact. Platforms and the approaches to platforms provide clear close up views of the rail corridor and any infrastructure placed in it. New OCS structures must be carefully placed to avoid overhead covers and other existing structures on the platforms.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Bridges/Rail Overpasses

One bridge passes over the railroad in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

Royal Windsor Drive (see Map B-18 in Visual Impact Assessment Report) crosses the railroad, but there are no sidewalks or scenic views from the bridge that would warrant special treatment of the OCS protective barriers, resulting in a potential low visual impact (see **Table 4-44**).

Table 4-44: Summary of Bridges – Section LSW-5

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSW-5	B-18	Royal Windsor Drive	Bridge	Yes. Preferred solution to vert. clearance issue: reduce track maintenance allowance	Yes Low Visual Impact

There are five rail overpasses in this section, three over roads (Winston Churchill Boulevard, Ford Drive and Trafalgar Road) and two over creeks (Sheridan and Joshua Creeks) and are all classified as having a negligible visual impact(see **Table 4-45**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Table 4-45: Summary of Rail Overpasses – Section LSW-5

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-5	B-16	Sheridan Creek divert	Rail Overpass	N/A	No Negligible Visual Impact
LSW-5	B-17	Winston Churchill Boulevard	Rail Overpass	N/A	No Negligible Visual Impact
LSW-5	B-18	Ford Drive	Rail Overpass	N/A.	No Negligible Visual Impact
LSW-5	B-18	Joshua Creek	Rail Overpass	N/A.	No Negligible Visual Impact
LSW-5	B-21	Trafalgar Road	Rail Overpass	N/A	No Negligible Visual Impact

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the views from the surrounding area. Among these areas, Oakville GO Station is the most important feature requiring careful design consideration. Refer to Section 4.10.5 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

4.10.9.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSW-5 will only exist close to Clarkson GO Station where there is some residential development and will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Clarkson GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible.

4.10.10 OCS & Bridges: Section LSW-6 – Oakville Station to Bronte Station

4.10.10.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

This section is mostly classified as negligible visual impact beyond the station and an adjacent residential complex which are classified as low visual impact. The entire section is industrial with no visual sensitivities. The one exception is the crossing of Sixteen Mile Creek and Hogs Back Park which is classified as moderate visual impact due to the scenic nature of the valley and the visibility of the OCS on the viaduct from the park below.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Oakville GO Station is classified as potential low visual impact. Platforms and the approaches to platforms provide clear close up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there are five rail overpasses. The viaduct over the Sixteen Mile Creek Valley which also crosses over Cross Avenue is highly visible from the surrounding area. The viaduct itself is an attractive heritage structure resting on stone piers and the creek valley is scenic open space. Thus this segment is classified as potential moderate visual impact. Refer to **Figure 4-36** for a visualization of typical OCS infrastructure at this scenic rail viaduct.

Figure 4-35: Current View of the Sixteen Mile Creek Viaduct

Figure 4-36: Visualization of new OCS Infrastructure at Sixteen Mile Creek Viaduct

With respect to the remaining rail overpass structures there are negligible visual impacts due to the industrial nature of the surrounding land use. (see **Table 4-46**).

Table 4-46: Summary of Rail Overpasses – Section LSW-6

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-6	B-22	Cross Avenue Sixteen Mile Creek	Rail Overpass	N/A.	Yes Moderate Visual Impact
LSW-6	B-22	Dorval Drive	Rail Overpass	N/A	No Negligible Visual Impact
LSW-6	B-23	McCraney Creek	Rail Overpass	N/A	No Negligible Visual Impact
LSW-6	B-24	Fourteen Mile Creek	Rail Overpass	N/A	No Negligible Visual Impact
LSW-6	B-25	Third Line	Rail Overpass	N/A	No Negligible Visual Impact

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the views from the surrounding area. Among these areas, the Sixteen Mile Creek Viaduct and Oakville GO Station are the most important features requiring careful design consideration.

4.10.10.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

There are no residual visual effects in LSW-6 since the entire section is classified as negligible visual impacts.

GO Stations

Residual visual effects due to OCS installation within the Oakville GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for placement of OCS poles away from rail overpasses where possible. Residual visual effects range from negligible to moderate, except at the Sixteen Mile Creek crossing, which will be moderate since despite mitigation measures, the OCS infrastructure will be clearly visible from the surrounding viewshed.

4.10.11 OCS & Bridges: Section LSW-7 – Bronte Station to Appleby Station

4.10.11.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

This section is classified as negligible impact. The entire section is industrial or vacant land with the exception of Petro Canada Park and Sherwood Forest Park. Petro Canada Park is heavily wooded and Sherwood Forest Park has active sports fields and more passive areas, but these are distant from the railroad and not likely to be impacted by the new OCS infrastructure project.

Mitigation Recommendations:
No mitigation is required.

GO Stations

Two stations are located within this section. Bronte GO Station and Appleby GO Station are classified as potential low visual impact. Platforms and the approaches to platforms provide clear close up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructures as much as possible.

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there are four rail overpasses. Three of the rail overpasses, at Bronte Road, Bronte Creek and Sheldon Creek East, are in industrial areas. The overpass at Sheldon Creek is adjacent to the Appleby GO Station. Refer **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Therefore, there are negligible to potential low visual impacts due to the installation of OCS support structures on or in the vicinity of these rail overpass structures (see **Table 4-47**).

Table 4-47: Summary of Rail Overpasses – Section LSW-7

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-7	B-26	Bronte Road	Rail Overpass	N/A	No Negligible Visual Impact
LSW-7	B-26	Bronte Creek	Rail Overpass	N/A.	Yes LowVisual Impact

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-7	B-27	Sheldon Creek East	Rail Overpass	N/A	No Negligible Visual Impact
LSW-7	B-28	Sheldon Creek	Rail Overpass	N/A	No Negligible Impact

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are two stations where carefully placed and designed OCS infrastructure will result in minimal visual impact on views from the surrounding area.

4.10.11.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

There are no residual visual effects due to OCS installation on adjacent visual receptors along LSW-7 since the entire section is classified as having negligible visual impacts.

GO Stations

Residual visual effects due to OCS installation within the Bronte and Appleby GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

4.10.12 OCS & Bridges: Section LSW-8 – Appleby Station to Burlington (MP 31.5)

4.10.12.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

This section is industrial and classified as negligible impact with two exceptions. Where Fairview Street runs between the railroad and Burlington Mall, this segment is classified as low impact. There is also a several-block-long segment in Glenwood Park where single-family homes back up to the railroad but are more than 20 metres from the railroad. The terminating end of this section includes a nursery on the south side of the tracks and rear yards of homes on the north side which have an area of dense vegetation at the ends of the lots which will not be disturbed by the project clearing.

This segment is also classified as potential low visual impact.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Burlington GO Station is the only station within this section and is classified as potential low visual impact. Platforms and the approaches to platforms provide clear close up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Bridges/Rail Overpasses

There is one bridge in this section. A pedestrian bridge crosses the railroad connecting Drury Land to Orpha Street (see Map B-32 in the Visual Impact Assessment Report) which is recommended for replacement rather than modification as part of this project. Pedestrian bridges will require protective barriers on both sides, and therefore these bridges are classified as potential moderate visual impact. Pedestrian bridges should be designed to allow views to and from people walking across the bridge to avoid a claustrophobic tunnel effect and maintain a safe environment (see **Table 4-48**). Refer to **Figure 4-25** for photographs of typical bridge barriers.

Table 4-48: Summary of Bridges – Section LSW-8

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSW-8	B-32	Drury Lane	Pedestrian Bridge	Yes. Preferred solution to address impacts due to attachment of protective barrier and vertical clearance: Replace pedestrian bridge	Yes Moderate Visual Impact

In addition, there are six rail overpasses in this section, three of which cross over roads and three over creeks (see **Table 4-49**). These are classified as negligible visual impact except Guelph Line which is classified as potential low visual impacts since it ishighly visible from Fairview Street.Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 4-49: Summary of Rail Overpasses – Section LSW-8

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSW-8	B-29	Appleby Line	Rail Overpass	N/A	No Negligible Visual Impact
LSW-8	B-30	Shoreacres Creek	Rail Overpass	N/A	No Negligible Visual Impact
LSW-8	B-30	Walker's Line	Rail Overpass	N/A	No Negligible Visual Impact
LSW-8	B-30	Tuck Creek	Rail Overpass	N/A	No Negligible Visual Impact
LSW-8	B-31	Roseland Creek	Rail Overpass	N/A	No Negligible Visual Impact
LSW-8	B-31	Guelph Line	Rail Overpass	N/A	Yes Low Visual Impact

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on views from the surrounding area. Among these areas, Burlington GO Station is the most important feature requiring careful design consideration.

4.10.12.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSW-8 such as the residential areas and along Fairview Street will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Burlington GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to potentially negligible to moderate.

4.11 Utilities

A Utilities Impact Assessment study was completed as part of the TPAP to carry out preliminary identification of existing utilities within the study area and to identify possible utility conflicts between these utilities and the planned electrification infrastructure. Conflicts were characterized under the following three categories:

1. **Spatial Conflicts**

Spatial conflicts occur where OCS structures and foundations occupy the same physical space as overhead or buried utilities. Spatial conflicts can also occur where utilities attached to bridges occupy the same space as proposed bridge barriers or bridge barrier fixing points. Overhead transmission, distribution, and communication lines are identified as potential spatial conflicts if they are located within the OCS impact zone and have a vertical clearance from top of rail of less than 10.7 metres. Buried utilities running parallel to the rail corridor within the OCS impact zone are identified as potential spatial conflicts, irrespective of depth.

2. **Electrical Zone of Influence Conflicts**

"Influence" describes the unintended effect of electrified OCS wires on adjacent infrastructure and includes the induction of current (counteracted by grounding and bonding) and electromagnetic interference (EMI). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the Overhead Contact Line Zone (OCLZ) (see **Figure 4-37**). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the OCLZ. Because vertical spatial clearance requirements (10.7 metres) are more conservative than those shown in **Figure 4-37**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

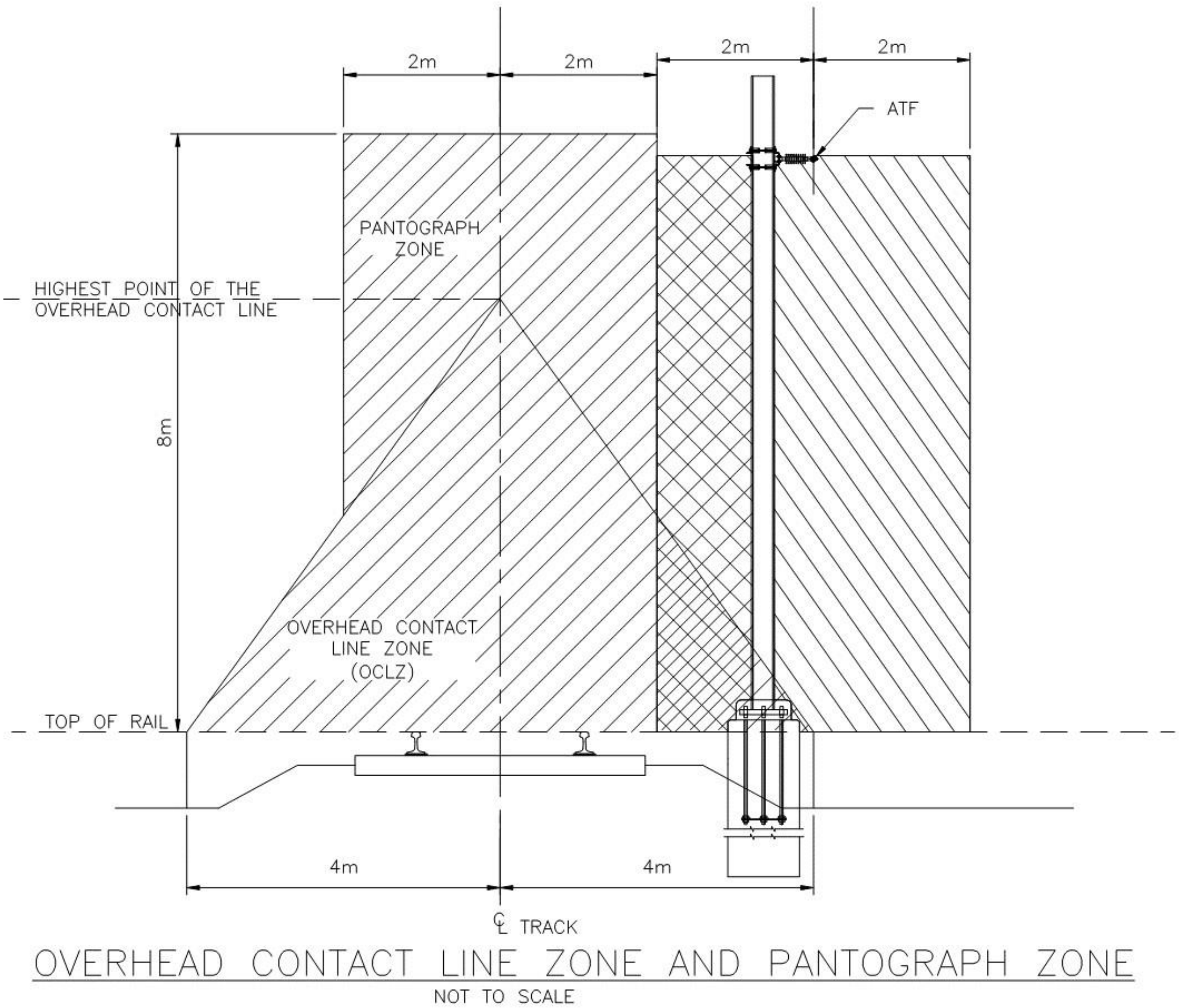
Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements (5.0 metres from centerline of track as captured in the OCS impact zone) are more conservative than the OCLZ clearance requirements (4.0 metres from centerline of track as shown in **Figure 4-37**) those shown in **Figure 4-37**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

Infrastructure that is considered an electrical zone of influence conflict is also a spatial conflict. The resolution for a spatial conflict (usually relocation) will also remove the utility from the electrical zone of influence and thus grounding and bonding will not be required. Existing utilities in the rail corridor outside of the electrical zone of influence may be grounded and bonded at the request of the owner but it is not a requirement for Electrification as the effects of stray current are anticipated to be minimal. Future utilities in the rail corridor outside of the electrical zone of influence should be grounded and bonded at installation.

With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.

Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

Figure 4-37 Overhead Contact Line Zone



3. Electrical Clearance Conflicts

Electrical clearance is defined as the minimum distance between live components and grounded structures or rolling stock. Electrical clearance conflicts occur where the minimum required vertical (see **Table 4-50**) or parallel (see **Table 4-51**) clearances are not met. Electrical clearance does not apply to buried utilities.

Table 4-50: Vertical Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Min. Vertical Clearance Between Wires Crossing Each Other (m)	Min. Distance Above OCS (m) for Max. Wire Sag (Measured From Track)
>0 ≥ 150kV	5.0	15.7
>150kV ≥ 250kV	6.5	17.2

Nominal Phase to Phase Voltage Rating	Min. Vertical Clearance Between Wires Crossing Each Other (m)	Min. Distance Above OCS (m) for Max. Wire Sag (Measured From Track)
250kV	8.0	18.7

Table 4-51: Lateral Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Minimum Distance (m)
>0 ≥ 150kV	5.2
>150kV ≥ 250kV	6.7
250kV	8.2

Additional details on the methodology followed for assessment of utilities impacts can be found in the Utilties Impact Assessment Report contained in **Appendix I2**.

4.11.1 Burlington Tap Location

4.11.1.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-52: Burlington TPS and Tap Location Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Cable	Unknown	Metallic	Cumberland Ave
Bell	Buried	Conduit	Unknown	Metallic	Cumberland Ave
Burlington Hydro	Overhead	Electrical	27600-3PH	Metallic	Cumberland Ave
Burlington Hydro	Overhead	Electrical	27600-3PH	Metallic	Cumberland Ave
Burlington Hydro	Overhead	Electrical	Unknown	Metallic	Cumberland Ave
Cogeco Cable	Buried	Conduit	Unknown	Metallic	Cumberland Ave
Halton Region	Buried	Water	1.37m	Metallic encasing	Fairview St
Halton Region	Buried	Water	300mm	Other	Cumberland Ave
Halton Region	Buried	Sewer	Unknown	Unknown	Cumberland Ave
Hydro One	Overhead	Electrical	230kV	Metallic	Laurentian Dr
Hydro One	Buried	Electrical	Unknown	Metallic	Laurentian Dr
Hydro One	Buried	Electrical	Unknown	Metallic	Fairview St
Rogers	Buried	Cable	Unknown	Plastic	Fairview St
Union Gas	Buried	Gas	Unknown	Unknown	Cumberland Ave
Unknown	Overhead	Electrical	Unknown	Metallic	Cumberland Ave
Unknown	Overhead	Electrical	Unknown	Metallic	Cumberland Ave
Unknown	Overhead	Electrical	Unknown	Metallic	Cumberland Ave
Unknown	Overhead	Electrical	Unknown	Metallic	Cumberland Ave
Unknown	Overhead	Electrical	Unknown	Metallic	Cumberland Ave

Owner	Utility Class	Description	Size	Material	Nearest Street
Unknown	Overhead	Electrical	Unknown	Metallic	Cumberland Ave

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

4.11.1.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.2 Mimico Tap/TPS Location & 25kV Feeder Route

4.11.2.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in the area of the Mimico Tap/TPS are:

Table 4-53: Mimico Tap/TPS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Overhead	Cable	Unknown	Metallic	Rail
Hydro One	Overhead	Electrical	230kV	Metallic	Rail
Level 3	Buried	Conduit	SDR11	Plastic	Rail
Rogers	Buried	Conduit	Unknown	Metallic	Rail
Toronto Hydro	Overhead	Electrical	27.6/16kV	Metallic	Rail

Table 4-54: Mimico 25kV Feeder Route Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Toronto Hydro	Buried – Parallel to ROW	Electrical	27.6/16kV	Metallic	N Queen St
Toronto Hydro	Buried – Parallel to ROW	Electrical	27.6kV/16kV	Metallic	Tracks
Toronto Hydro	OH – Crossing ROW	Electrical	27.6/16kV	Metallic	The Queensway
Toronto Hydro	OH – Parallel to ROW	Electrical	27.6/16kV	Metallic	Tracks
Toronto Hydro	Buried – Parallel to ROW	Electrical	27.6kV/16kV	Metallic	Tracks
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	Tracks
Hydro One	OH – Parallel to ROW	Electrical	230kV	Metallic	Kipling Ave
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	N Queen St
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	N Queen St

Owner	Utility Class	Description	Size	Material	Nearest Street
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	Tracks
Toronto Hydro	Buried – Crossing ROW	Duct Bank	Unknown	Reinforced Concrete	Tracks
Toronto Hydro	Buried – Parallel to ROW	Electrical	Unknown	Reinforced Concrete	Queen St N
Hydro One	OH – Parallel to ROW	Electrical	14kV	Metallic	Queen St N
Rogers	OH – Parallel to ROW	Conduit	Unknown	Plastic	Wickman Rd
Bell	Buried – Parallel to ROW	Cable	Unknown	Plastic	Queen St N
Bell	Buried – Parallel to ROW	Cable	Unknown	Plastic	Queen St N
Bell	Buried – Parallel to ROW	Cable	Unknown	Plastic	Queen St N
Hydro One	OH – Crossing ROW	Electrical	14kV	Metallic	Queen St N
Hydro One	OH – Crossing ROW	Electrical	230kV	Metallic	Queen St N
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	N Queen St
Toronto Hydro	OH – Crossing ROW	Electrical	27.6kV	Metallic	N Queen St
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	N Queen St
Toronto Hydro	OH – Parallel to ROW	Electrical	600/347/250 V	Metallic	N Queen St
City of Toronto	Buried – Crossing ROW	Sewer	250mm	Plastic	Queen St N
City of Toronto	Buried – Parallel to ROW	Storm	450mm	Reinforced Concrete	Queen St N
City of Toronto	Buried – Crossing ROW	Storm	1050mm	Reinforced Concrete	Queen St N
City of Toronto	Buried – Parallel to ROW	Sewer	150mm	Plastic	Queen St N
City of Toronto	Buried – Parallel to ROW	Storm	375mm	Reinforced Concrete	Queen St N
Bell	Buried – Crossing ROW	Cable	Unknown	Plastic	Queen St N
Bell	Buried – Crossing ROW	Conduit	Unknown	Plastic	Queen St N
Rogers	Buried – Crossing ROW	Conduit	Unknown	Plastic	Queen St N
Toronto Hydro	Buried – Crossing ROW	Electrical	120V	Metallic	N Queen St
City of Toronto	Buried – Parallel to ROW	Storm	Unknown	Reinforced Concrete	Queen St N
City of Toronto	Buried – Parallel to ROW	Storm	375mm	Reinforced Concrete	Queen St N
City of Toronto	Buried – Crossing ROW	Storm	450mm	Reinforced Concrete	Queen St N
City of Toronto	Buried – Parallel to ROW	Storm	600mm	Reinforced Concrete	Queen St N

Owner	Utility Class	Description	Size	Material	Nearest Street
City of Toronto	Buried – Parallel to ROW	Storm	600mm	Reinforced Concrete	Queen St N
City of Toronto	Buried – Crossing ROW	Sewer	200mm	Reinforced Concrete	Queen St N
City of Toronto	Buried – Crossing ROW	Water	300mm	Unknown	Queen St N
Bell	Buried – Crossing ROW	Conduit	Unknown	Plastic	Queen St N
Bell	Buried – Parallel to ROW	Conduit	Unknown	Plastic	Queen St N
City of Toronto	Buried – Crossing ROW	Water	300mm	Plastic	Queen St N
Toronto Hydro	Buried – Parallel to ROW	Electrical	120/240V	Metallic	Queen St N
Enbridge Gas	Buried – Crossing ROW	Gas	8''	Metallic	The Queensway
Toronto Hydro	Buried – Parallel to ROW	Electrical	120V	Metallic	Queen St N
Rogers	Buried – Parallel to ROW	Conduit	Unknown	Plastic	Kipling Ave
City of Toronto	Buried – Crossing ROW	Storm	1050mm	Reinforced Concrete	Queen St N
Toronto Hydro	Buried – Parallel to ROW	Electrical	600/347V	Metallic	The Queensway
Toronto Hydro	OH – Parallel to ROW	Electrical	600/347V	Metallic	The Queensway
Toronto Hydro	OH – Crossing ROW	Electrical	600/347V	Metallic	The Queensway
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	3W3H	Reinforced Concrete	The Queensway
Toronto Hydro	OH – Parallel to ROW	Electrical	120V	Metallic	The Queensway
Bell	Buried – Crossing ROW	Conduit	Unknown	Plastic	The Queensway
Bell	Buried – Crossing ROW	Conduit	Unknown	Plastic	The Queensway
Bell	Buried – Crossing ROW	Conduit	Unknown	Plastic	The Queensway
Hydro One	OH – Parallel to ROW	Electrical	230kV	Metallic	The Queensway, Evans Ave
Toronto Hydro	On Bridge	Electrical	120V	Metallic	The Queensway
City of Toronto	Buried – Crossing ROW	Water	300mm	unknown	The Queensway
City of Toronto	Buried – Crossing ROW	Sewer	250mm	Reinforced Concrete	The Queensway
Rogers	Buried – Crossing ROW	Conduit	Unknown	Plastic	The Queensway
Rogers	Buried – Parallel to ROW	Conduit	Unknown	Plastic	The Queensway
City of Toronto	Buried – Parallel to ROW	Storm	375mm	Reinforced Concrete	The Queensway
Toronto Hydro	On Bridge	Electrical	120V	Metallic	The Queensway
City of Toronto	Buried – Crossing ROW	Storm	825mm	Reinforced Concrete	The Queensway
Toronto Hydro	OH – Parallel to ROW	Electrical	27.6/16kV	Metallic	The Queensway to Horner Ave
Toronto Hydro	OH – Crossing ROW	Electrical	27.6/16kV	Metallic	The Queensway
Enbridge Gas	Buried – Crossing ROW	Gas	6''	Metallic	The Queensway

Owner	Utility Class	Description	Size	Material	Nearest Street
Toronto Hydro	OH – Crossing ROW	Electrical	unknown	Metallic	The Queensway
Toronto Hydro	OH – Crossing ROW	Electrical	unknown	Metallic	The Queensway
Enbridge Gas	Buried – Parallel to ROW	Gas	2''	Metallic	Wickman Rd
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	3W3H	Reinforced Concrete	The Queensway
Toronto Hydro	OH – Crossing ROW	Electrical	Unknown	Metallic	The Queensway and Gardiner Expy
City of Toronto	Buried – Parallel to ROW	Storm	525mm	Reinforced Concrete	The Queensway
Toronto Hydro	OH – Crossing ROW	Electrical	unknown	Metallic	The Queensway and Gardiner Expy
Toronto Hydro	OH – Parallel to ROW	Electrical	120V	Metallic	Gardiner Expy
City of Toronto	Buried – Parallel to ROW	Storm	375mm	Reinforced Concrete	The Queensway
City of Toronto	Buried – Crossing ROW	Sewer	700mm	Reinforced Concrete	Gardiner Expy
Toronto Hydro	Buried – Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	Gardiner Expy
Toronto Hydro	On Bridge	Electrical	120V	Metallic	Gardiner Expy
Toronto Hydro	On Bridge	Electrical	120V	Metallic	Gardiner Expy
Toronto Hydro	Buried – Crossing ROW	Duct Bank	Unknown	Reinforced Concrete	Gardiner Expy
Toronto Hydro	On Bridge	Electrical	120V	Metallic	Gardiner Expy
Enbridge Gas	Buried – Crossing ROW	Gas	20''	Metallic	Gardiner Expy
City of Toronto	Buried – Parallel to ROW	Storm	Unknown	Reinforced Concrete	Gardiner Expy
City of Toronto	Buried – Parallel to ROW	Storm	Unknown	Reinforced Concrete	Gardiner Expy
City of Toronto	Buried – Parallel to ROW	Storm	Unknown	Reinforced Concrete	Gardiner Expy
Toronto Hydro	Buried – Crossing ROW	Duct Bank	Unknown	Reinforced Concrete	Gardiner Expy
Toronto Hydro	Buried – Crossing ROW	Electrical	Unknown	Metallic	Gardiner Expy
City of Toronto	Buried – Parallel to ROW	Storm	Unknown	Reinforced Concrete	Gardiner Expy
Toronto Hydro	OH – Parallel to ROW	Electrical	120V	Metallic	Evans Ave
City of Toronto	Buried – Parallel to ROW	Water	Unknown	unknown	Gardiner Expy
Rogers	Buried – Parallel to ROW	Conduit	Unknown	Plastic	Evans Ave
City of Toronto	Buried – Crossing ROW	Storm	Unknown	Reinforced Concrete	Evans Ave

Owner	Utility Class	Description	Size	Material	Nearest Street
Toronto Hydro	OH – Parallel to ROW	Electrical	120V	Metallic	Evans Ave
Toronto Hydro	OH – Parallel to ROW	Electrical	120V	Metallic	Evans Ave
Bell	Buried – Crossing ROW	Conduit	Unknown	Plastic	Evans Ave
Hydro One	Buried – Crossing ROW	Electrical	230kV	Metallic	Evans Ave
City of Toronto	Buried – Crossing ROW	Water	Unknown	unknown	Evans Ave
City of Toronto	Buried – Crossing ROW	Water	Unknown	unknown	Evans Ave
Toronto Hydro	OH – Crossing ROW	Electrical	120V	Metallic	Evans Ave
City of Toronto	Buried – Parallel to ROW	Storm	Unknown	Reinforced Concrete	Evans Ave
Enbridge Gas	Buried – Crossing ROW	Gas	8''	Metallic	Evans Ave
Toronto Hydro	OH – Crossing ROW	Electrical	27.6/16kV	Metallic	Evans Ave
Rogers	Buried – Crossing ROW	Conduit	Unknown	Plastic	Evans Ave
Hydro One	Buried – Crossing ROW	Electrical	230kV	Metallic	Evans Ave
Toronto Hydro	OH – Parallel to ROW	Electrical	27.6/16kV	Metallic	Horner Ave
City of Toronto	Buried – Parallel to ROW	Storm	300mm	Reinforced Concrete	Horner Ave
Toronto Hydro	OH – Crossing ROW	Electrical	Unknown	Metallic	Horner Ave
Rogers	Buried – Crossing ROW	Conduit	Unknown	Plastic	Horner Ave
Toronto Hydro	OH – Crossing ROW	Electrical	27.6/16kV	Metallic	Horner Ave
City of Toronto	Buried – Crossing ROW	Water	200mm	unknown	Horner Ave
City of Toronto	Buried – Crossing ROW	Sewer	375mm	Reinforced Concrete	Horner Ave
City of Toronto	Buried – Crossing ROW	Water	400mm	Reinforced Concrete	Horner Ave
Toronto Hydro	OH – Crossing ROW	Electrical	120V	Metallic	Horner Ave
Enbridge Gas	Buried – Crossing ROW	Gas	8''	Metallic	Horner Ave
City of Toronto	Buried – Crossing ROW	Sewer	675mm	Other	Horner Ave
City of Toronto	Buried – Crossing ROW	Storm	2100mm	Reinforced Concrete	Horner Ave
Rogers	Buried – Parallel to ROW	Conduit	Unknown	Plastic	Queen St N

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

4.11.2.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.3 Burlington TPS

4.11.3.1 Potential Effects and Mitigation Measures

For a discussion on the Potential Effects and Mitigation Measures at the Burlington TPS please see Section **4.11.1.1**.

4.11.3.2 Net Effects

For a discussion on the Net Effects at the Burlington TPS please see Section **4.11.1.2**.

4.11.4 Mimico SWS

4.11.4.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in the area of the Mimico SWS are:

Table 4-55: Mimico SWS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Allstream	Buried	Conduit	Unknown	Metallic	Towns Rd
Bell	Buried	Conduit	Unknown	Metallic	Towns Rd
Bell	Buried	Conduit	Unknown	Metallic	Towns Rd
Bell	Buried	Conduit	Unknown	Metallic	Towns Rd
Bell	Buried	Conduit	Unknown	Metallic	Towns Rd
Bell	Buried	Conduit	Unknown	Metallic	Towns Rd
Bell	Buried	Cable	Unknown	Plastic	Towns Rd
City of Toronto	Buried	Sewer	675mm	Other	Towns Rd
City of Toronto	Buried	Storm	2400mm	Reinforced Concrete	Towns Rd
City of Toronto	Buried	Storm	Unknown	Reinforced Concrete	Towns Rd
City of Toronto	Buried	Water	150mm	Plastic	Towns Rd
City of Toronto	Buried	Water	Unknown	Other	Towns Rd
Enbridge Gas	Buried	Gas	Unknown	Metallic	Towns Rd
Rogers	Buried	Conduit	Unknown	Plastic	Towns Rd
Toronto Hydro	Overhead	Electrical	Unknown	Metallic	Towns Rd

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

4.11.4.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.5 Oakville SWS

4.11.5.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-56: Oakville SWS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Allstream	Buried	Conduit	Unknown	Plastic	Maple Grove Dr
Bell	Buried	Conduit	Unknown	Unknown	Maple Grove Dr
Bell	Buried	Conduit	Unknown	Unknown	Maple Grove Dr
Bell	Buried	Conduit	Unknown	Unknown	Maple Grove Dr
Bell	Buried	Conduit	Unknown	Metallic	Maple Grove Dr
Bell	Buried	Conduit	Unknown	Plastic	Maple Grove Dr
Bell	Buried	Conduit	Unknown	Plastic	Maple Grove Dr
Cogeco	Buried	Conduit	Unknown	Metallic	Lakeshore West corridor
Halton Region	Buried	Water	600mm	Metallic	Cornwall Rd / Maple Grove Dr
Halton Region	Buried	Sewer	375mm	Plastic	Maple Grove Dr
Halton Region	Buried	Storm	1520mm	Unknown	Maple Grove Dr
Oakville Hydro	Overhead	Electrical	Unknown	Metallic	Maple Grove Dt
Oakville Hydro	Overhead	Electrical	27 kV, 4.16 kV	Metallic	Maple Grove Dr
Rogers	Buried	Conduit	Unknown	Metallic	Maple Grove Dr
Rogers	Buried	Conduit	Unknown	Metallic	Maple Grove Dr
Rogers	Overhead	Conduit	Unknown	Metallic	Maple Grove Dr
Rogers	Buried	Conduit	Unknown	Metallic	Maple Grove Dr
Rogers	Hardware	Cell Tower	Unknown	Metallic	Maple Grove Dr
Rogers	Buried	Conduit	unknown	Plastic	Maple Grove Dr
Telus	Buried	Conduit	2 x 50mm	Metallic	Maple Grove Dr
Telus	Buried	Conduit	144F	Plastic	Maple Grove Dr
Town of Oakville	Buried	Storm	200 mm	Plastic	Cornwall Rd
Town of Oakville	Buried	Storm	450mm	Plastic	Cornwall Rd
Town of Oakville	Buried	Storm	250mm	Plastic	Cornwall Rd
Town of Oakville	Buried	Ditch Culvert	300mm	Metallic	Maple Grove Dr

Owner	Utility Class	Description	Size	Material	Nearest Street
Town of Oakville	Buried	Storm	600mm	Concrete (Unreinforced)	Cornwall Rd
Town of Oakville	Buried	Storm	200mm	Plastic	Maple Grove Dr
Trans-Northern	Buried	Oil	406.4mm	Metallic	Maple Grove Dr
Union Gas	Buried	Gas	Unknown	Unknown	Maple Grove Dr / Cornwall Rd
Unknown	Buried	Water	600mm	Metallic	Cornwall Rd / Maple Grove Dr
Unknown	Buried	Storm	Unknown	Reinforced Concrete	Maple Grove Dr
Unknown	Buried	Electrical	Unknown	Metallic	Maple Grove Dr
Unknown	Buried	Electrical	Unknown	Metallic	Maple Grove Dr
Unknown	Buried	Electrical	Unknown	Metallic	Maple Grove Dr

Using the criteria set out in Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

4.11.5.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.6 OCS & Bridges: Section LSW-1 – West of Bathurst Street (Mile 1.20) to Mimico Station

4.11.6.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-57: Section LSW-1 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
1.22		Toronto Hydro	OH - Crossing ROW	Electrical	600V	Metallic	Tecumseth St	Y	Y	Y
1.22		Toronto Hydro	OH - Crossing ROW	Electrical	600V	Metallic	Tecumseth St	Y	Y	Y
1.22		Toronto Hydro	OH - Crossing ROW	Electrical	Secondary Voltage	Metallic	Tecumseth St	Y	Y	Y
1.22		Allstream	Buried - Crossing ROW	Cable	Unknown	Plastic	Bathurst St	Y	N	N
1.22	1.24	Allstream	Buried - Parallel to ROW	Cable	Unknown	Plastic	Bathurst St	Y	N	N
1.22		Telus	Buried - Crossing ROW	Duct Bank	288F	Reinforced Concrete	Tecumseth St	Y	N	N
1.24		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Tecumseth St	Y	N	N
1.24		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Tecumseth St	Y	N	N
1.24		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Tecumseth St	Y	N	N
1.24		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Tecumseth St	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
1.24	30.75	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Dowling Ave to Brant St.	Y	N	N
1.24	1.34	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Tecumseth St	Y	N	N
1.24	1.30	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Bathurst St	Y	N	N
1.24	32.06	Telus	Buried - Parallel to ROW	Duct Bank	144F	Metallic	Tecumseth St to Brant St	Y	N	N
1.24	3.48	Telus	Buried - Parallel to ROW	Duct Bank	288F	Metallic	Tecumseth St to Roncesvalles Ave	Y	N	N
1.28	1.31	Toronto Hydro	OH - Parallel to ROW	Electrical	Unknown	Metallic	Tecumseth St	Y	Y	Y
1.32	9.83	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Tecumseth St to Long Branch GO Station	Y	N	N
1.40	1.53	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Tecumseth St to Exhibition GO Station	N	Y	N
1.45	1.69	Unknown	Buried - Parallel to ROW	Gas	Unknown	Plastic	Strachan Ave	Y	N	N
1.56		City of Toronto	Buried - Crossing ROW	Sewer	680mm	Concrete (Unreinforced)	Strachan Ave	Y	N	N
1.56	1.57	City of Toronto	Buried - Crossing ROW	Sewer	2525 x 3200mm	Reinforced Concrete	Strachan Ave	Y	N	N
1.57		City of Toronto	Buried - Crossing ROW	Water	300mm	Reinforced Concrete	Strachan Ave	Y	N	N
1.57		City of Toronto	Buried - Crossing ROW	Sewer	450mm	Other	Strachan Ave	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
1.57		Rogers	Buried - Crossing ROW	Conduit	Unknown	Plastic	Strachan Ave	Y	N	N
1.58	1.60	Toronto Hydro	OH - Parallel to ROW	Electrical	120/240v	Metallic	Strachan Ave	Y	Y	Y
1.58	1.58	Toronto Hydro	OH - Parallel to ROW	Electrical	Secondary voltage	Metallic	Strachan Ave	Y	Y	Y
1.58		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Strachan Ave	Y	N	N
1.58		Toronto Hydro	Buried - Crossing ROW	Duct Bank	13.8kV (4W6H)	Reinforced Concrete	Strachan Ave	Y	N	N
1.59		Toronto Hydro	Buried - Crossing ROW	Duct Bank	3W6H	Reinforced Concrete	Strachan Ave	Y	N	N
1.59		Toronto Hydro	Buried - Crossing ROW	Duct Bank	3W6H	Reinforced Concrete	Strachan Ave	Y	N	N
1.59		Unknown	OH - Crossing ROW	Electrical	5kV	Metallic	Strachan Ave	Y	Y	Y
1.59	2.06	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Strachan Ave to Atlantic Ave	Y	Y	Y
1.82	2.00	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Pirandello St to Exhibition GO Station	Y	Y	Y
2.23	2.37	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Exhibition GO Station to Dufferin St	N	Y	N
2.30	4.56	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Dufferin St to Ellis Ave	Y	Y	Y
2.37		City of Toronto	Buried - Crossing ROW	Water	400mm	Metallic encasing	Dufferin St	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
2.38	2.39	Bell	Buried - Parallel to ROW	Duct Bank	1 duct	Reinforced Concrete	Dufferin St	Y	N	N
2.38		City of Toronto	Buried - Crossing ROW	Water	300mm	Metallic	Dufferin St	Y	N	N
2.38		Toronto Hydro	On Bridge	Electrical	120/240V	Metallic	Dufferin St	Y	N	N
2.38		City of Toronto	Buried - Crossing ROW	Storm	1875mm	Other	Dufferin St	Y	N	N
2.38		City of Toronto	Buried - Crossing ROW	Sewer	750x1125mm	Reinforced Concrete	Dufferin St	Y	N	N
2.39		Bell	Buried - Crossing ROW	Duct Bank	6 ducts	Reinforced Concrete	Dufferin St	Y	N	N
2.39		Rogers	Buried - Crossing ROW	Conduit	Unknown	Plastic	Dufferin St	Y	N	N
2.39		Toronto Hydro	On Bridge	Electrical	Unknown	Metallic	Dufferin St	Y	Y	N
2.62	2.64	Bell	Buried - Parallel to ROW	Duct Bank	1 duct	Reinforced Concrete	Cowan Ave	Y	N	N
2.70		Bell	On Bridge	Conduit	3 conduits	Plastic	Dunn Ave	Y	N	N
2.87		Toronto Hydro	OH - Crossing ROW	Electrical	13.8kV	Metallic	Close Ave	N	Y	N
2.84		Toronto Hydro	On Bridge	Electrical	120/240V	Metallic	Jameson Ave	Y	Y	Y
2.85		Bell	Buried - Crossing ROW	Duct Bank	1 duct	Reinforced Concrete	Jameson Ave	Y	N	N
2.86		Toronto Hydro	On Bridge	Electrical	120/240V	Metallic	Jameson Ave	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
3.01		Toronto Hydro	Buried - Crossing ROW	Electrical	Unknown	Plastic	Dowling Ave	Y	N	N
3.03		Unknown	Buried - Crossing ROW	Ditch Culvert	300	Other	Dowling Ave	Y	N	N
3.04		Bell	Buried - Crossing ROW	Cable	1 duct	Metallic	Dowling Ave	Y	N	N
3.05		Unknown	Buried - Crossing ROW	Ditch Culvert	300	Other	Dowling Ave	Y	N	N
3.48	6.45	Telus	Buried - Parallel to ROW	Duct Bank	288F	Metallic	Roncesvalles Ave to Audley St	Y	N	N
3.55	3.79	Bell	Buried - Parallel to ROW	Duct Bank	1 - 32 ducts	Reinforced Concrete	Sunnyside Ave	Y	N	N
3.55	3.89	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	13.8kV (4W3H)	Reinforced Concrete	Roncesvalles Ave to Parkside Dr	Y	N	N
4.83	5.35	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Windermere Ave to Humber Loop	Y	Y	N
5.15	5.15	Toronto Hydro	OH - Parallel to ROW	Electrical	27.6/16kV	Metallic	Palace Pier Crt	N	Y	N
5.61		Toronto Hydro	On Bridge	Duct Bank	120V	Plastic	Gardiner Expy	Y	Y	Y
5.64		City of Toronto	On Bridge	Conduit	Unknown	Metallic	Gardiner Expy	Y	N	N
5.66		Toronto Hydro	On Bridge	Duct Bank	120V	Plastic	Gardiner Expy	Y	Y	Y
5.66		Toronto Hydro	On Bridge	Duct Bank	120V	Plastic	Gardiner Expy	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
5.69	5.81	Toronto Hydro	OH - Parallel to ROW	Electrical	Primary voltage	Metallic	Park Lawn Rd	Y	Y	N
5.80		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Park Lawn Rd	Y	Y	N
5.92	5.94	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Park Lawn Rd	Y	Y	Y
6.02		Toronto Hydro	OH - Crossing ROW	Electrical	4.16kV or Secondary voltage	Metallic	Park Lawn Rd	Y	Y	N
6.09	6.16	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Harbourview Cres	Y	Y	Y
6.17	6.73	Toronto Hydro	OH - Parallel to ROW	Electrical	27.6kV, 120/240V	Metallic	Harbourview Cres to Royal York Rd	Y	Y	Y
6.21		Toronto Hydro	OH - Crossing ROW	Electrical	27.6 kV	Metallic	Grand Ave	Y	Y	Y
6.23	6.27	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Burlington St	Y	Y	Y
6.30	6.39	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Burlington St	Y	Y	Y
6.32		Toronto Hydro	OH - Crossing ROW	Electrical	N/A	Metallic	Burlington St	Y	Y	N
6.45	6.48	Toronto Hydro	OH - Parallel to ROW	Electrical	120/240V, 600/347V, 27.6kV	Metallic	Royal York Rd	Y	Y	Y
6.72		Toronto Hydro	OH - Crossing ROW	Electrical	27.6 kV, 120V	Metallic	Royal York Rd	Y	Y	N

<u>Mitigation/Avoidance Measures</u>
The mitigation/avoidance measures included in Section **3.11.1.1** also apply to LSW-1.

4.11.6.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.7 OCS & Bridges: Section LSW-2 – Mimico Station to Long Branch Station

4.11.7.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-58: Section LSW-4 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
7.32		Toronto Hydro	On Bridge	Duct Bank	Unknown	Concrete (Unreinforced)	Islington Ave	Y	Y	Y
7.89		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Kipling Ave	Y	Y	Y
8.07		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV, 120/240V, 120V	Metallic	Kipling Ave	Y	Y	N
8.07		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Kipling Ave	Y	Y	N
8.09		Toronto Hydro	OH - Crossing ROW	Electrical	27.6 kV	Metallic	Kipling Ave	Y	Y	N
8.50	9.36	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Evergreen Ave. to Browns Lane	Y	Y	Y
8.70	8.73	Bell	Buried - Parallel to ROW	Duct Bank	4 ducts	Reinforced Concrete	29th St to 30th St	Y	N	N
8.77		Toronto Hydro	OH - Crossing ROW	Electrical	27.6/16kV, 120/240V, 5kV	Metallic	30th St	Y	Y	N
8.92		Unknown	OH - Crossing ROW	Electrical	N/A	Metallic	30th St	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
9.01		Unknown	OH - Crossing ROW	Electrical	N/A	Metallic	30th St	Y	Y	N
9.28		Toronto Hydro	OH - Crossing ROW	Electrical	27.6/16kV	Metallic	Brown's Line	Y	Y	Y
9.36		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Brown's Line	Y	Y	N
9.37	9.84	Toronto Hydro	OH - Parallel to ROW	Electrical	27.6kV	Metallic	Brown's Line	N	Y	N
9.38		City of Toronto	Buried - Crossing ROW	Water	250mm	Other	Brown's Line	Y	N	N
9.39		City of Toronto	Buried - Crossing ROW	Sewer	680mm	Other	Brown's Line	Y	N	N
9.39		City of Toronto	Buried - Crossing ROW	Water	300mm	Reinforced Concrete	Brown's Line	Y	N	N
9.40	11.32	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Brown's Line	Y	Y	Y
9.41		Enbridge Gas	Buried - Crossing ROW	Gas	10''	Metallic	Brown's Line	Y	N	N
9.41		Enbridge Gas	Buried - Crossing ROW	Gas	8''	Plastic	Brown's Line	Y	N	N
9.44		Toronto Hydro	OH - Crossing ROW	Electrical	N/A	Metallic	Brown's Line	N	Y	N
9.51	9.69	Rogers	OH - Parallel to ROW	Conduit	Unknown	Plastic	Long Branch GO Station	N	Y	N
9.58		Toronto Hydro	OH - Crossing ROW	Electrical	N/A	Metallic	Long Branch GO Station	Y	Y	N
9.69		Toronto Hydro	OH - Crossing ROW	Electrical	N/A	Metallic	Long Branch GO Station	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
9.72	21.26	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Long Branh GO station to Trafalgar Rd	Y	N	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in **3.11.1.1** also apply to LSW-2.

4.11.7.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.8 OCS & Bridges: Section LSW-3 – Long Branch Station to Port Credit Station

4.11.8.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-59: Section LSW-3 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
10.19		Enersource	OH - Crossing ROW	Electrical	Unknown	Metallic	Dixie Rd	Y	Y	N
10.19		Peel Region PSN	OH - Crossing ROW	Conduit	36 strand	Plastic	Dixie Rd	Y	Y	N
10.19		Rogers	OH - Crossing ROW	Conduit	33 strand, 96 ct	Plastic	Dixie Rd	Y	Y	N
10.57		Enersource	OH - Crossing ROW	Electrical	<5kV	Metallic	Haig Blvd	Y	Y	N
10.62		Hydro One	OH - Crossing ROW	Electrical	0kV	Metallic	Haig Blvd	N	Y	N
10.82		Enersource	OH - Crossing ROW	Electrical	Unknown	Metallic	Ogden Ave	Y	Y	N
10.83	10.83	Enersource	OH - Parallel to ROW	Electrical	N/A	Metallic	Ogden Ave	N	Y	N
10.83	10.83	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Ogden Ave	N	Y	N
11.01		Enersource	OH - Crossing ROW	Electrical	<5kV	Metallic	Alexandra Ave	Y	Y	N
11.01	11.02	Unknown	OH - Parallel to ROW	Electrical	N/A	Metallic	Alexandra Ave	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
11.49		Bell	Buried - Crossing ROW	Cable	Unknown	Metallic	Cawthra Rd	Y	N	N
11.49		Enersource	OH - Crossing ROW	Electrical	5kV	Metallic	Cawthra Rd	Y	Y	N
11.49		Peel Region PSN	OH - Crossing ROW	Conduit	Unknown	Plastic	Cawthra Rd	Y	Y	Y
11.49		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Cawthra Rd	Y	Y	Y
11.80	13.00	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Cawthra Rd to Hurontario St	Y	Y	Y
11.88		Bell	Buried - Crossing ROW	Cable	Unknown	Metallic	Revus Ave	Y	N	N
12.03		Enersource	OH - Crossing ROW	Electrical	11 to 33kV	Metallic	Revus Ave	Y	Y	N
12.66		Enersource	OH - Crossing ROW	Electrical	11 to 33kV	Metallic	Rosewood Ave	Y	Y	Y
12.67		Bell	Buried - Crossing ROW	Cable	Unknown	Metallic	Hurontario St	Y	N	N
12.69		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Hurontario St to CN Oakville Yard	Y	N	N
12.76		Unknown	OH - Crossing ROW	Electrical	N/A	Metallic	Hurontario St	Y	Y	Y
13.01		Bell	Buried - Crossing ROW	Cable	Unknown	Metallic	Port Credit GO Station	Y	N	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **3.11.1.1** also apply to LSW-3.

4.11.8.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.9 OCS & Bridges: Section LSW-4 – Port Credit Station to Clarkson Station

4.11.9.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-60: Section LSW-4 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
13.09		Enersource	OH - Crossing ROW	Electrical	11kV	Metallic	Stavebank Rd	Y	Y	N
13.38		Enersource	OH - Crossing ROW	Electrical	Unknown	Metallic	Mississauga Rd	Y	Y	N
13.38		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Mississauga Rd	Y	Y	N
14.03	14.13	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Godfreys Lane to Shawnmarr Rd.	N	Y	N
14.05		Bell	Buried - Crossing ROW	Cable	Unknown	Metallic	Merlot Court	Y	N	N
14.07	14.22	Enbridge Pipelines	Buried - Parallel to ROW	Oil	Unknown	Plastic	Shawnmar Rd	Y	N	N
14.13		Enersource	OH - Crossing ROW	Electrical	11 to 33kV	Metallic	Shawnmar Rd	Y	Y	N
14.99	15.02	Bell	Buried - Parallel to ROW	Conduit	1 conduit	Plastic	Lorne Park Rd	Y	N	N
15.01		Bell	Hardware	Conduit	Unknown	Other	Lorne Park Rd	Y	N	N
15.02		Bell Mobility	Hardware	Signal Broad-cast Tower	Unknown	Other	Lorne Park Rd	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
15.02		Telus Mobility	Hardware	Signal Broad-cast Tower	Unknown	Other	Lorne Park Rd	Y	Y	N
16.07	16.09	Rogers	Buried - Parallel to ROW	Cable	Unknown	Plastic	Clarkson Rd	Y	N	N
16.07	16.07	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Clarkson Rd	Y	N	N
16.08		Enersource	OH - Crossing ROW	Electrical	5-11kV	Metallic	Clarkson Rd	Y	Y	Y
16.08		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Clarkson Rd	Y	Y	Y
16.08		Bell	Buried - Crossing ROW	Cable	Unknown	Metallic	Clarkson Rd	Y	N	N
16.28		Trans-Northern	Buried - Crossing ROW	Oil	406mm	Metallic encasing	Clarkson Rd	Y	N	N
16.29		Enersource	OH - Crossing ROW	Electrical	11kV	Metallic	Clarkson Rd	Y	Y	N
16.30		Enersource	OH - Crossing ROW	Electrical	Unknown	Metallic	Clarkson Rd	Y	Y	N
16.59		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Southdown Rd	Y	Y	N
16.59		Enersource	OH - Crossing ROW	Electrical	5kV	Metallic	Southdown Rd	Y	Y	N
16.59		Peel Region PSN	OH - Crossing ROW	Conduit	Unknown	Plastic	Southdown Rd	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **3.11.1.1** also apply to LSW-4.

4.11.9.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.10 OCS & Bridges: Section LSW-5 – Clarkson Station to Oakville Station

4.11.10.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-61: Section LSW-5 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
17.27	19.40	Trans-Northern	Buried - Parallel to ROW	OIl	254mm, 508mm	Metallic	Wintson Churchill Blvd to Maple Grove Dr	Y	N	N
17.34	18.38	Enersource	OH - Parallel to ROW	Electrical	11-33kV	Metallic	Winston Churchill Blvd to Ford Dr	Y	Y	N
17.79		Enersource	OH - Crossing ROW	Electrical	11kV	Metallic	Winston Churchill Blvd	Y	Y	Y
17.89		Enersource	OH - Crossing ROW	Electrical	11-33kV	Metallic	Winston Churchill Blvd	Y	Y	Y
17.91	33.31	Cogeco Cable	Buried - Parallel to ROW	Conduit	12F, 84F	Plastic	Winston Churchill Blvd to King Rd	Y	N	N
17.93		Oakville Hydro	OH - Crossing ROW	Electrical	27kV	Metallic	Winston Churchill Blvd	Y	Y	N
18.66	19.23	Bell	Buried - Parallel to ROW	Duct Bank	6 ducts	Reinforced Concrete	Royal Windsor Dr to Maple Grove Dr	Y	N	N
18.67		Unknown	OH - Crossing ROW	Electrical	11kV	Metallic	Royal Windsor Dr	Y	Y	N
18.70		Bell Mobility	Hardware	Signal Broad-cast Tower	Unknown	Metallic	Royal Windsor Dr	N	Y	N
18.73		Union Gas	Buried - Crossing ROW	Gas	12"	Metallic	Royal Windsor Dr	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
18.77	18.88	Bell	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Royal Windsor Dr	Y	Y	Y
18.79		Bell	Buried - Crossing ROW	Cable	Unknown	Plastic	Royal Windsor Dr	Y	N	N
18.79		Oakville Hydro	OH - Crossing ROW	Electrical	27kV	Metallic	Royal Windsor Dr	Y	Y	N
18.80	26.20	Oakville Hydro	OH - Parallel to ROW	Electrical	Unknown	Metallic	Royal Windsor Dr	N	Y	N
18.92		Enbridge Pipelines	Buried - Crossing ROW	Oil	508mm	Plastic	Royal Windsor Dr	Y	N	N
19.04		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	Maple Grove Dr	N	Y	N
19.06		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	Maple Grove Dr	N	Y	N
19.21		Oakville Hydro	OH - Crossing ROW	Electrical	27 kV	Metallic	Maple Grove Dr	N	Y	N
19.23		Oakville Hydro	OH - Crossing ROW	Electrical	27 kV, 4.16 kV	Metallic	Maple Grove Dr	Y	Y	N
19.42		Trans-Northern	Buried - Crossing ROW	Oil	508mm	Metallic	Maple Grove Dr	Y	N	N
19.44	20.42	Trans-Northern	Buried - Parallel to ROW	Oil	254mm,406mm	Metallic	Maple Grove Dr to Chartwell Rd	Y	N	N
20.15		Bell	Buried - Crossing ROW	Conduit	Unknown	Plastic	Morrison Rd	Y	N	N
20.41	20.42	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Chartwell Rd	Y	N	N
20.43		Trans-Northern	Buried - Crossing ROW	Oil	406mm, 508mm	Metallic	Chartwell Rd	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
20.43	21.75	Trans-Northern	Buried - Parallel to ROW	Oil	254mm, 406mm	Metallic	Chartwell Rd to Cross Ave	Y	N	N
20.53	20.54	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Chartwell Rd	Y	N	N
20.54		Oakville Hydro	OH - Crossing ROW	Electrical	2x4.16kV	Metallic	Chartwell Rd	Y	Y	Y
20.58		Oakville Hydro	OH - Crossing ROW	Electrical	27kV	Metallic	Chartwell Rd	Y	Y	N
21.03		Oakville Hydro	OH - Crossing ROW	Electrical	27kV	Metallic	Allan St	Y	Y	Y
21.17	21.49	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Trafalgar Rd	Y	N	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **3.11.1.1** also apply to LSW-5.

4.11.10.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.11 OCS & Bridges: Section LSW-6 – Oakville Station to Bronte Station

4.11.11.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-62: Section LSW-6 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
21.40	21.50	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Oakville GO Station to Lyons Lane	Y	N	N
21.46	34.80	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Lyons Lane to Waterdown Rd	Y	N	N
21.49	21.53	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Old Mill Rd.	Y	N	N
21.51	21.54	Oakville Hydro	Hardware	Electrical	Unknown	Metallic	Lyons Lane	Y	Y	N
21.51	23.19	Cogeco Cable	OH - Parallel to ROW	Conduit	Unknown	Metallic	Lyons Lane to 4th Line	N	Y	N
21.53		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Old Mill Rd.	Y	N	N
21.78		Trans-Northern	Buried - Crossing ROW	Oil	406mm, 508mm	Metallic	Cross Ave	Y	N	N
21.79	21.87	Trans-Northern	Buried - Parallel to ROW	Oil	254mm,406mm	Metallic	Cross Ave to Kerr St	Y	N	N
21.88		Trans-Northern	Buried - Crossing ROW	Oil	406mm, 508mm	Metallic	Kerr St	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
21.89	26.04	Trans-Northern	Buried - Parallel to ROW	OIl	254mm,406mm	Metallic	Krr St to McPherson	Y	N	N
21.93		Oakville Hydro	OH - Crossing ROW	Electrical	27kV, 4.16kV	Metallic	Kerr St	Y	Y	N
22.12		Oakville Hydro	OH - Crossing ROW	Electrical	27 kV	Metallic	Kerr St	Y	Y	N
22.12		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Kerr St	Y	Y	N
22.48		Oakville Hydro	OH - Crossing ROW	Electrical	27kV	Metallic	Morden Rd	Y	Y	N
23.00		Oakville Hydro	OH - Crossing ROW	Electrical	27 kV	Metallic	4th Line	Y	Y	N
23.12	23.41	Rogers	OH - Parallel to ROW	Conduit	Unknown	Plastic	4th Line	N	Y	N
23.17	23.17	Oakville Hydro	Buried - Parallel to ROW	Duct Bank	8-100mm	Reinforced Concrete	4th Line	Y	N	N
23.23		Rogers Wireless	Hardware	Signal Broad-cast Tower	Unknown	Metallic	4th Line	N	Y	N
23.41	24.39	Town of Oakville	OH - Parallel to ROW	Conduit	Unknown	Metallic	4th Line to 3rd Line	N	Y	N
24.48		Oakville Hydro	OH - Crossing ROW	Electrical	N/A	Metallic	3rd Line	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **3.11.1.1** also apply to LSW-6.

4.11.11.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.12 OCS & Bridges: Section LSW-7 – Bronte Station to Appleby Station

4.11.12.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-63: Section LSW-7 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
24.22		Oakville Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Bronte GO Station	Y	Y	N
24.82		Oakville Hydro	OH - Crossing ROW	Electrical	N/A	Metallic	Bronte GO Station	Y	Y	N
25.38		Oakville Hydro	OH - Crossing ROW	Electrical	Unknown	Metallic	Bronte Rd	Y	Y	Y
25.67		Oakville Hydro	OH - Crossing ROW	Electrical	2x27kV, 4.16kV	Metallic	Bronte Rd	Y	Y	N
25.96	26.67	Oakville Hydro	OH - Parallel to ROW	Electrical	Unknown	Metallic	Bronte Rd to Burloak Dr	N	Y	N
26.04		Trans-Northern	Buried - Crossing ROW	Oil	406mm	Metallic	McPherson Rd	Y	N	N
26.05		Trans-Northern	Buried - Crossing ROW	Oil	508mm	Metallic	McPherson Rd	Y	N	N
26.06		Oakville Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	McPherson Rd	Y	Y	N
26.07		Oakville Hydro	OH - Crossing ROW	Electrical	4x27kV	Metallic	McPherson Rd	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
26.07		Suncor	Buried - Crossing ROW	Oil	1.8m	Metallic	Bronte Rd	Y	N	N
26.07		Oakville Hydro	OH - Crossing ROW	Electrical	2x27kV	Metallic	Bronte Rd	Y	Y	N
26.08	26.54	Trans-Northern	Buried - Parallel to ROW	Oil	254mm, 406mm	Metallic	Mcpherson Rd	Y	N	N
26.20		Trans-Northern	Buried - Crossing ROW	Oil	508mm	Metallic	McPherson Rd	Y	N	N
26.20		Trans-Northern	Buried - Crossing ROW	Oil	508mm	Metallic	McPherson Rd	Y	N	N
26.55		Enbridge Pipelines	Buried - Crossing ROW	Oil	508mm	Metallic	Burloak Dr	Y	N	N
26.60		Oakville Hydro	OH - Crossing ROW	Electrical	N/A	Metallic	McPherson Rd	Y	Y	N
26.93		Oakville Hydro	OH - Crossing ROW	Electrical	4x27kV	Metallic	Burloak Dr	Y	Y	Y
26.93		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Burloak Dr	Y	Y	Y
26.96		Burlington Hydro	OH - Crossing ROW	Electrical	27600-3PH	Metallic	Burloak Dr	Y	Y	N
26.96	26.97	Burlington Hydro	Buried - Parallel to ROW	Electrical	Secondary voltage	Metallic	Burloak Dr	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
27.57		Cogeco Cable	OH - Crossing ROW	Conduit	36F	Plastic	Fairview St	Y	Y	N
27.58		Burlington Hydro	OH - Crossing ROW	Electrical	13800-3PH	Metallic	Fairview St	Y	Y	N
27.81	27.98	City of Burlington	Buried - Parallel to ROW	Storm	200mm	Reinforced Concrete	Harvester Rd	Y	N	N
27.90		City of Burlington	Buried - Crossing ROW	Storm	300mm	Reinforced Concrete	Oval Ct	Y	N	N
27.93	28.00	Bell	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Appleby GO Station	Y	N	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **3.11.1.1** also apply to LSW-7.

4.11.12.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.11.13 OCS & Bridges: Section LSW-8 – Appleby Station to Burlington (Mi. 31.5)

4.11.13.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 4-64: Section LSW-8 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
28.25		Burlington Hydro	OH - Crossing ROW	Electrical	27600-3PH	Metallic	Appleby Line	Y	Y	Y
28.25		Cogeco Cable	OH - Crossing ROW	Conduit	Unknown	Plastic	Appleby Line	Y	Y	Y
29.46	29.49	Burlington Hydro	Buried - Parallel to ROW	Electrical	13800-3PH	Metallic	Walkers Line	Y	N	N
29.49	30.19	Cogeco Cable	Buried - Parallel to ROW	Conduit	12F, 60F, 60F	Plastic	Walkers Line to Cumberland Ave	Y	N	N
29.49	29.52	Bell	Buried - Parallel to ROW	Conduit	6x90mm	Plastic	Walkers Line	Y	N	N
29.49	29.49	Cogeco Cable	OH - Parallel to ROW	Conduit	36F	Plastic	Walkers Line	Y	Y	Y
29.49	29.63	Burlington Hydro	OH - Parallel to ROW	Electrical	27600-3PH	Metallic	Walkers Line	Y	Y	Y
29.51		Burlington Hydro	OH - Crossing ROW	Electrical	16000-RPH	Metallic	Walkers Line	N	Y	N
29.51	29.51	Cogeco Cable	Buried - Parallel to ROW	Conduit	36F	Plastic	Walkers Line	Y	Y	N
29.53		Cogeco Cable	OH - Crossing ROW	Conduit	36F	Plastic	Walkers Line	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
29.55		Burlington Hydro	OH - Crossing ROW	Electrical	27600-3PH	Metallic	Walkers Line	Y	Y	Y
29.58	29.66	Burlington Hydro	OH - Parallel to ROW	Electrical	27600-3PH	Metallic	Walkers Line	N	Y	N
29.58		Burlington Hydro	OH - Crossing ROW	Electrical	27600-3PH	Metallic	Walkers Line	Y	Y	N
29.66		Burlington Hydro	OH - Crossing ROW	Electrical	27600-3PH	Metallic	Walkers Line	Y	Y	Y
29.66	30.24	Burlington Hydro	OH - Parallel to ROW	Electrical	27600-3PH	Metallic	Walkers Line to Cumberland Ave	Y	Y	Y
30.13		Burlington Hydro	OH - Crossing ROW	Electrical	27600-3PH	Metallic	Cumberland Ave	Y	Y	N
30.13		Cogeco Cable	OH - Crossing ROW	Conduit	715C, 625C	Metallic	Cumberland Ave	Y	Y	N
30.13	30.14	Cogeco Cable	Buried - Parallel to ROW	Conduit	500C	Plastic	Cumberland Ave	Y	N	N
30.13	30.24	Burlington Hydro	OH - Parallel to ROW	Electrical	13800-3PH	Metallic	Cumberland Ave	Y	Y	Y
30.14	30.27	Burlington Hydro	Buried - Parallel to ROW	Electrical	13800-3PH	Metallic	Cumberland Ave	Y	N	N
30.14		Cogeco Cable	Buried - Crossing ROW	Conduit	500C	Plastic	Cumberland Ave	Y	N	N
30.19	30.27	Burlington Hydro	Buried - Parallel to ROW	Conduit	8 Conduits	Metallic	Cumberland Ave	Y	N	N
30.24		Burlington Hydro	OH - Crossing ROW	Electrical	27600-3PH	Metallic	Cumberland Ave	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial Conflict	Electrical Clearance Conflict	Electrical Zone of Influence
30.27		Burlington Hydro	OH - Crossing ROW	Electrical	27600-3PH	Metallic	Cumberland Ave	Y	Y	N
30.34	30.38	Burlington Hydro	Buried - Parallel to ROW	Electrical	Secondary voltage	Metallic	Cumberland Ave	Y	N	N
30.70	30.76	Telus	Buried - Parallel to ROW	Duct Bank	48F	Metallic	Guelph Line	Y	N	N
30.79	30.80	Burlington Hydro	Buried - Parallel to ROW	Electrical	Secondary voltage	Metallic	Guelph Line	Y	N	N
31.22		Burlington Hydro	Buried - Crossing ROW	Conduit	4.16kV	Metallic	Drury Lane	Y	N	N
31.22		Burlington Hydro	Buried - Crossing ROW	Electrical	4.16kV	Metallic	Drury Lane	Y	N	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **3.11.1.1** also apply to LSW-8.

4.11.13.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

4.12 EMI & EMF

This section provides a summary of the key potential EMI/EMF effects, mitigation measures, and (resultant) net effects. The impact assessment was carried out using the baseline conditions data summarized in the EMI/EMF Baseline Conditions Report which entailed a survey of existing EMI/EMF conditions throughout the study area including along the rail corridors, feeder routes and at Taps/TPF locations (see **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report**).

The primary effects assessed with regard to electromagnetic compatibility (EMC) relate to human exposure, i.e., Extremely Low Frequency (ELF) Electromagnetic Fields (EMF).

With regard to Electromagnetic Interference (EMI), the primary concern is adverse effects on electronics.

4.12.1 Conservative 10 mG Reassessment Value

As part of carrying out the EMI/EMF Impact Assessment for the TPAP, a conservative value of 10.0 mG magnetic field strength was established as the threshold for which a measured location along the rail corridors or at Taps/TPFs would trigger the recommendation for re-assessing/confirming baseline EMF and EMI measurements during the next phase of the project and before operation commences. This value was based upon the values summarized in **Table 4-65**, which presents information found in *NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power*. Additional supporting technical information may be found in EN 62233:2008, *Measurement Methods for EMF of Household Appliances and Similar Apparatus with Regard to Human Exposure.*

Table 4-65: Typical Magnetic Field Strengths

Electrical Appliances in Home or Office	Magnetic Field Strength
Dishwasher	30 mG (at 30 cm)
Vacuum Cleaner	200 mG (at 30 cm)
Hair Dryer	70 mG (at 30 cm)
Electric Shaver	100 mG (at 30 cm)
Video Display	6 mG (at 30 cm)
Other Environmental Sources	

Electrical Appliances in Home or Office	Magnetic Field Strength
Electric Power Distribution/Subtransmission Lines[13] (4 to 24 kV)	
Within Right-of-Way	10 to 70 mG
Edge of Right-of-Way	N/A
High-Voltage Transmission Lines[14] (115 kV to 500 kV)	
Within Right-of-Way	30 to 87 mG (at 1 metre height above ground)
Edge of Right-of-Way	7 to 29 mG (at 1 metre height above ground)

4.12.2 Lakeshore West Rail Corridor

4.12.2.1 Potential Effects and Mitigation Measures – General

- Radio Frequency EMI from the control system(s) leading to improper operation of electronics on-board the train or in the surrounding neighbourhood.
- Radiated Magnetic Fields and Time-Varying EMFs leading to damage to belongings, i.e., magnetic media, of passengers.
- Induced Current in metallic wires, rail transit tracks, metallic fences, underground communication cables, gas pipelines, and track circuits in neighbouring rail properties leading to contact burns or shocks, or communication errors.
- ELF EMF from the power system(s) leading to effects on workers, passengers, or residents.

Mitigation Measures - General

- Implementation of an *EMC Control Plan*, the objective of which is to is to facilitate and confirm formal qualification of the electrification system and all its components with respect to the required EMC standards. The components of the *EMC Control Plan* will include but are not limited to:
  - Characterizes potential EMI sources and hazards to transit/rail operations;
  - Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed);
  - Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.);
  - Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B EMF Modeling and Measurement Tools.;

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[13] As per NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power, these values "can vary considerably depending on the current carried by the line."
[14] Ibid. "During peak loads (about 1% of the time), magnetic fields are about twice as strong as the mean levels" quoted here.

  - Includes (or references) a safety analysis and failure analysis of the transit system;
  - Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a key input to the detailed, post-electrification EMI scans taken at each TPF and compared to levels shown in EN 50121.)
  - Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions;
  - Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.);
- Baseline EMF and EMI measurements before and after system construction and operation;
- Use of ATF power systems; and
- Design and installation of the electrification system and all of its components using industry-standard practices, including:
  - Good electrical grounds;
  - Proper shielding;
  - Physical separation, including burial to proper depths; and,
  - The installation of filters, capacitors, and inductors.

4.12.2.2 Net Effects – General

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

4.12.2.3 Potential Effects and Mitigation Measures – Specific Commitments (Lakeshore West Corridor)

- No ELF EMF at higher-than-background levels was found in LSW.
- Areas requiring special attention in relation to re-assessment of background EMI/EMF levels, as summarized in **Table 4-67.**
- No EMI signals measured in LSW emanated from unknown sources.

Table 4-66: EMI Sensitive Site Locations Measurement Coordinates – Lakeshore West

Facility Name	Corridor	Garmin Lat	Garmin Lon	Current ELF Levels	Comments
3 Metres from Center of Track, Burlington	Lakeshore West	43.352272	-79.79153	Background Only	Measured from parking lot near Cogent Power.
Burgess Veterinary Emergency	Lakeshore West	43.356311	-79.784957	0.7, 1.1, 4.3, 4.4	Measured from dead end near Burgess Veterinary Emergency.

Table 4-67: EMI/EMF Commitments – Specific Locations Along Lakeshore West Rail Corridor

Location	Commitment
3 Metres from Center of Track, Burlington Hydro One Cumberland TS near Tap/TPS	Confirmation/Re-Assessment of ELF EMF
Burgess Veterinary Hospital	Confirmation/Re-Assessment of ELF EMF
Burgess Veterinary Hospital	Re-Assessment of Background EMI
Burgess Veterinary Hospital	Full Characterization of Time-Varying EMF and EMI as per EN 61000. (With and Without Rolling Stock)
Burlington, Mimico, and Oakville Traction Power Facilities	Re-Assessment of Background EMI
Burlington, Mimico, and Oakville Traction Power Facilities	Full Characterization of EMI Profile, using Frequencies Identified in EMC Control Plan and Corresponding Harmonics as per EN 50121.
Burlington, Mimico, and Oakville Traction Power Facilities, and Burlington Tap Location	Confirmation/Re-Assessment of ELF EMF

Specific Mitigation Measures – Lakeshore West

As per **Table 4-67**:

- Confirmation/Re-assessment of ELF EMF levels post-electrification, particularly at TPFs, and locations where higher-than-background ELF EMF was measured.
- Re-assessment of EMI levels post-electrification, specifically at TPFs, and a selection of EMI sensitive locations identified during baseline surveys.

4.12.2.4 Net Effects

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

4.13 Stormwater Management

A Preliminary Stormwater Management Assessment (see **Appendix K – Preliminary Stormwater Management Report** for additional detail) was undertaken at each Tap/TPF site as part of the TPAP to: determine existing and proposed drainage features/patterns, carry out a preliminary flow analysis, establish proposed drainage patterns once the Taps/TPFs are implemented, and to carry out a preliminary assessment of the development impact on drainage (including recommendations for mitigation measures as required). As this preliminary assessment was based on conceptual design information, a more detailed review and SWM analysis will need to be carried out as part of the Detailed Design phase once final design is prepared and additional information (e.g., survey results) is available for each Tap/TPF site.

Please refer to Appendix K for a description of the methodology followed for assessment of stormwater management impacts. Additional details can be found in the Preliminary Stormwater Management Report contained in **Appendix K**.

With respect to track lowering, it is noted that no adverse impacts to watercourses are anticipated based on the conceptual design developed as part of the TPAP. Similarly, with respect to drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to track lowering activities (or other electrification infrastructure proposed along the corridors) based on the preliminary analysis undertaken as part of the conceptual design work. Notwithstanding this, if environmental impacts are subsequently identified as part of Detailed Design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction.

4.13.1 Burlington Tap/TPS

The site for the proposed Burlington Tap/TPS is located in the City of Burlington, Ontario between Guelph line and Cumberland Avenue and is to the north west of the Lakeshore West Rail Corridor in the vicinity of an existing Hydro One Transformer Station.

The site is situated at the boundary of the Roseland Creek watershed and the Tuck Creek watershed. Final layout design and grade elevations will determine whether the site will partially drain to both water sheds or to a single watershed.

The site is within the conservation area of Halton Region Conservation Authority (HRCA) but is outside the regulated area.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

4.13.1.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern for the Burlington Tap/TPS is shown on **Figure 4-38**. The site under existing conditions is undeveloped land. A runoff coefficient, 'C' of 0.2 is estimated for the site area of 0.42 ha.

The proposed Burlington Tap/TPS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be asphalt set at lower grades. The approximate footprint for the tentative location of the proposed building and electrical equipment will be approximately 0.38 ha and for the access road it will be approximately 0.04 ha. The runoff coefficient for the granular surface is estimated at 0.8 while for the building and access road it is estimated at 0.9. The composite runoff coefficient for the entire site area of 0.42 ha, after development, will be approximately 0.82.

The proposed development areas and their locations, shown on **Figure 4-39**, are based on conceptual design and may be refined as the design progresses. Therefore if necessary, reassessment of the drainage areas will be required at subsequent Detailed Design phases.

Figure 4-38 – Burlington Tap/TPS Existing Drainage Conditions

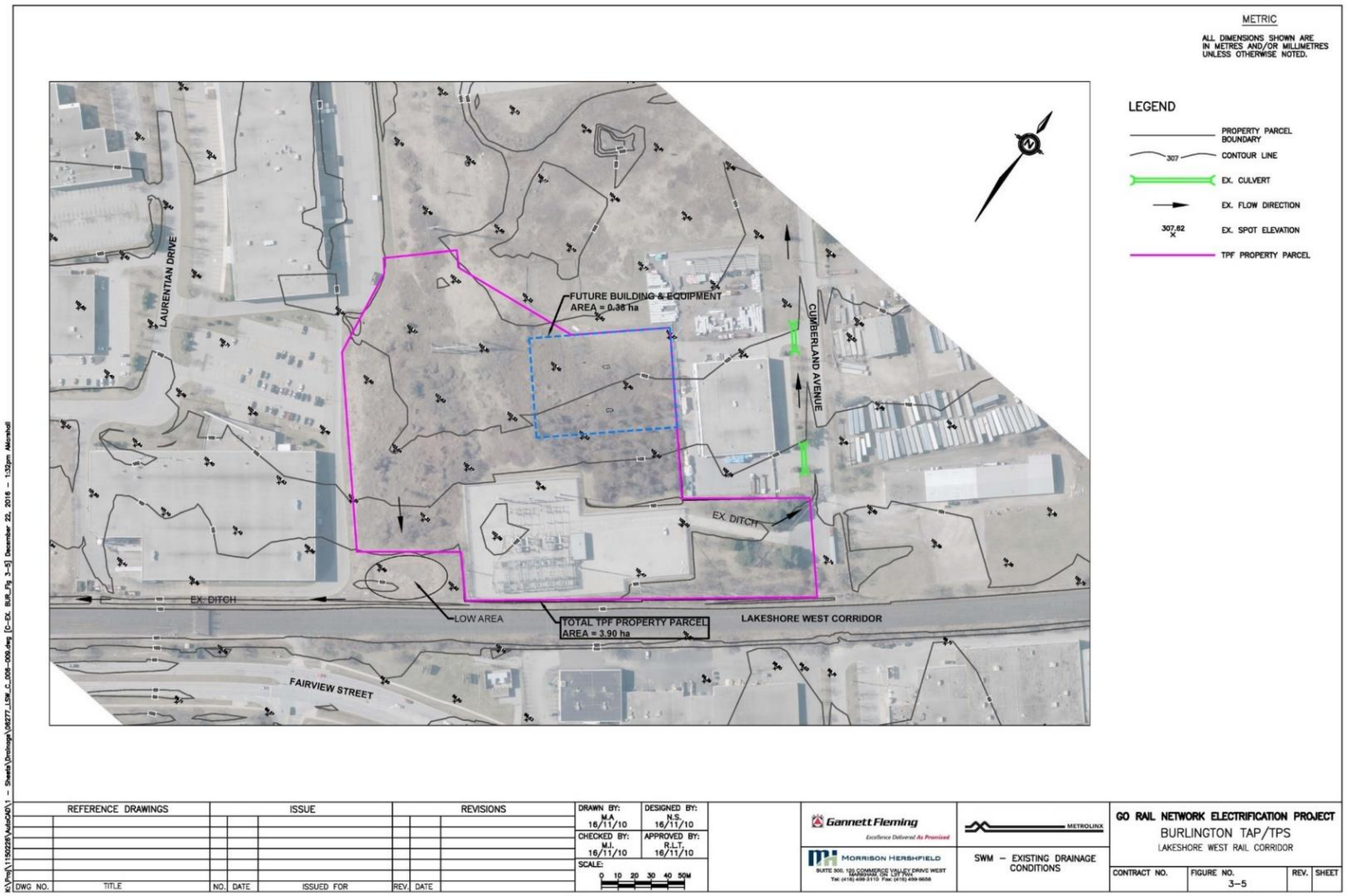
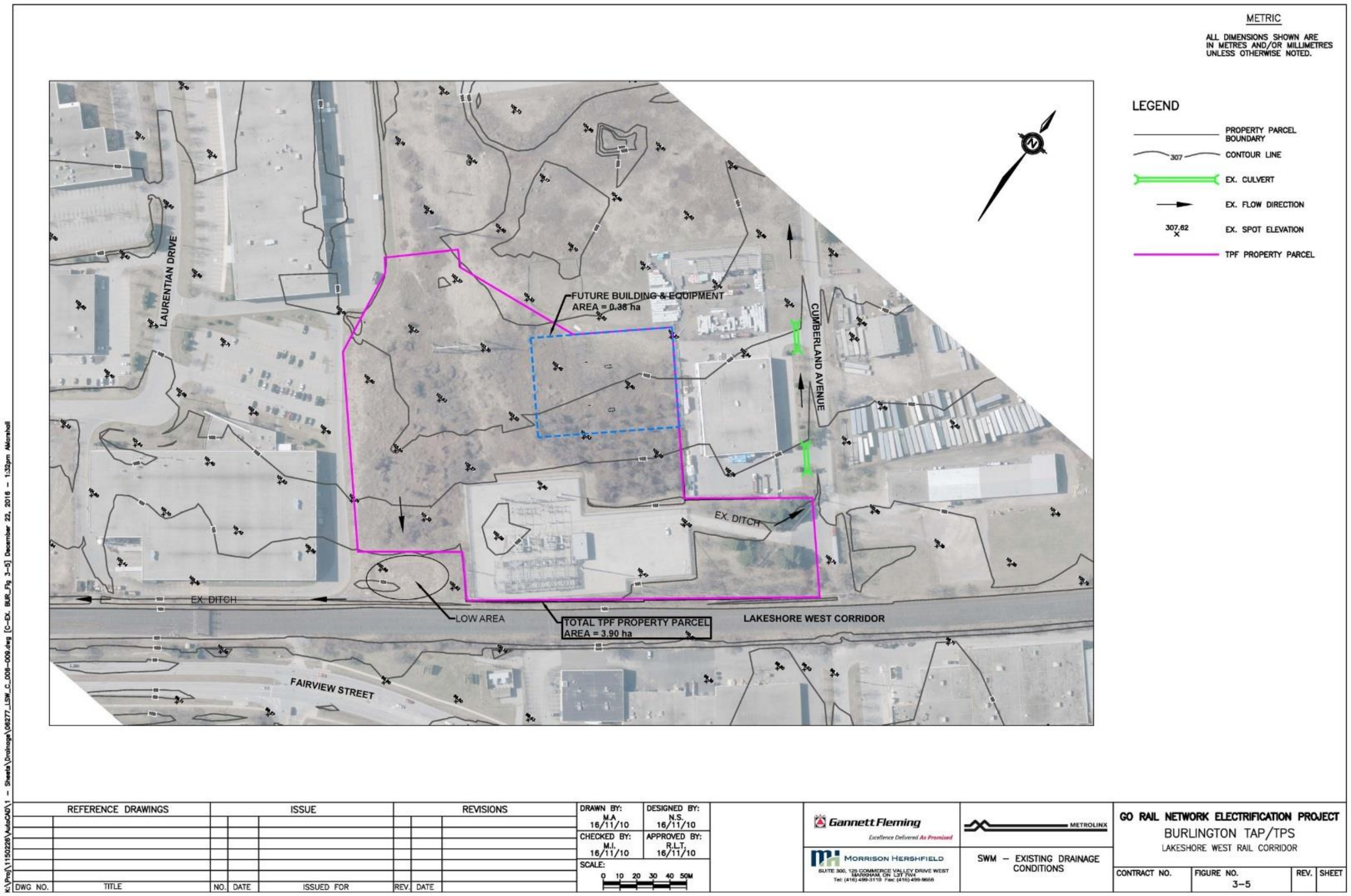


Figure 4-39 – Burlington Tap/TPS Proposed Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 4-68**.

Table 4-68: Burlington Tap/TPS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped	0.42	0.2	Building	0.03	0.9
			*Access Road	0.04	0.9
			Granular Surface	0.35	0.8
Total/Composite	**0.42**	**0.2 or 0 % Impervious**		**0.42**	**0.82 or 88 % Impervious**

** The type of the proposed Access Road is not confirmed. It might be a gravel or asphalt. As a conservative approach, at this stage, it is assumed as asphalt.*

Flow Analysis

A preliminary analysis of runoff from the site area was completed to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. The Rational Formula was used to determine flows for the existing and the proposed development conditions.

There will be an increase of 88% in impervious area and the development will cause an increase in the stormwater runoff. Flows were computed for the 2 year to 100 year storm event using MTO Rainfall IDF curves. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 10 minutes was used in the flow computations.

Runoff computations are presented in **Appendix K – Preliminary Stormwater Management Report**. Parameters used for the computations were determined from the MTO rainfall IDF curves. Results are summarized below in **Table 4-69**.

Table 4-69: Burlington Tap/TPS – Existing and Proposed Development Flows

Storm event	Exis. Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.003	0.039	0.036
2yr	0.018	0.072	0.055
5yr	0.024	0.097	0.073
10yr	0.028	0.113	0.085
25yr	0.036	0.145	0.110
50yr	0.044	0.172	0.129
100yr	0.050	0.190	0.140

4.13.1.2 Development Impact on Drainage & Proposed Mitigation Measures

The proposed construction of the Burlington Tap/TPS will result in 88% increase in impervious area. However the total site area is very small (0.42 ha) and the impervious area is even smaller. As outlined in **Table 4-69**, the increase in flows resulting from the construction of the Burlington Tap/TPS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City / HRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can also be used for quality and quantity control. The proposed perimeter ditch will discharge to the ditch along the proposed access road which will outlet to the existing ditch along the Cumberland Avenue.

It is anticipated that the quantity and quality control design criteria will be met by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be required at Detailed Design phase.

4.13.1.3 Recommendations

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Burlington Tap/TPS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control criteria will be met by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

4.13.2 Mimico Tap/TPS

The proposed Mimico Tap/TPS site is connected to a tributary to the Lake Ontario Waterfront and is located within the jurisdiction of TRCA, but it is outside the regulated area. The site is located on elevated ground (approximately 7 to 8 metres higher than adjacent properties), it is uneven and debris has beend umped on the surface. Debris will be removed and the site will be levelled. There is no defined flow route from the site under existing condition. The runoff either infiltrates to the ground or runs down the slope in all directions. There is no defined ditch, at the toe of the slope, along the rail tracks. Tracks are generally higher than the adjacent grounds and the minor flow either infiltrates to the ground or ponds at low spots beside the tracks. Major flow runs to the south west direction as the ground elevations generally drop in that direction and ultimately discharges to Etobicoke Creek located approximately 2km away from the site towards the west. Major flow from the site is caught by the drainage system of the adjacent properties before discharging to the Creek. More investigations, at Detailed Design phase, would determine the outfall locations for the site runoff.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

4.13.2.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 4-40.** The site under existing condition is elevated, uneven, undeveloped land with no impervious area. A runoff coefficient, 'C' of 0.2 is estimated for the site area of 1.40 ha.

The proposed Mimico Tap/TPS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be asphalt. The approximate footprint for the tentative location of the proposed building and electrical equipment will be 0.37 ha and for the access road it will be 0.10ha at the location shown in Figure 3-3C. The runoff coefficient for the granular surface is estimated 0.8 while for the building and access road it is estimated to be 0.9. The composite runoff coefficient for the entire TPF Assessment Area of 1.40 ha, after development, will be approximately 0.41 or an imperviousness of 30%.

The proposed development areas and their location shown on **Figure 4-41** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 4-70**.

Table 4-70: Mimico Tap/TPS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped	1.40	0.2	Building	0.02	0.9
			*Access Road	0.10	0.9
			Gravel	0.35	0.8
			Undeveloped	0.93	0.2
Total/Composite	**1.40**	**0.2 OR 0% Impervious**		**1.40**	**0.41 OR 30%Impervious**

** The type of the proposed Access Road is not confirmed (i.e., it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. It can be seen that there is 30% increase in impervious area and the development will cause some increase in the stormwater runoff.

Figure 4-40 Existing Drainage Conditions – Mimico Tap/TPS

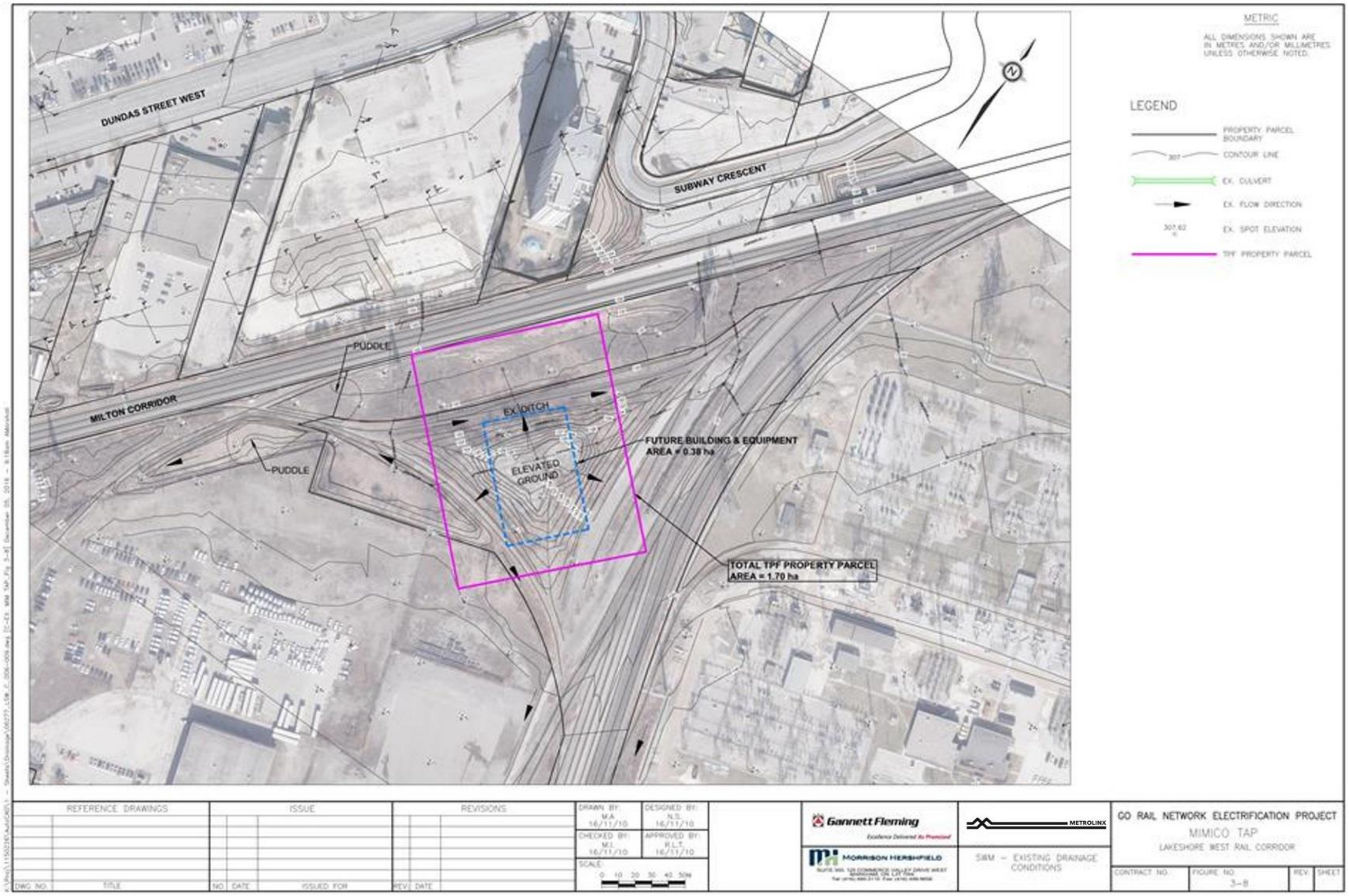
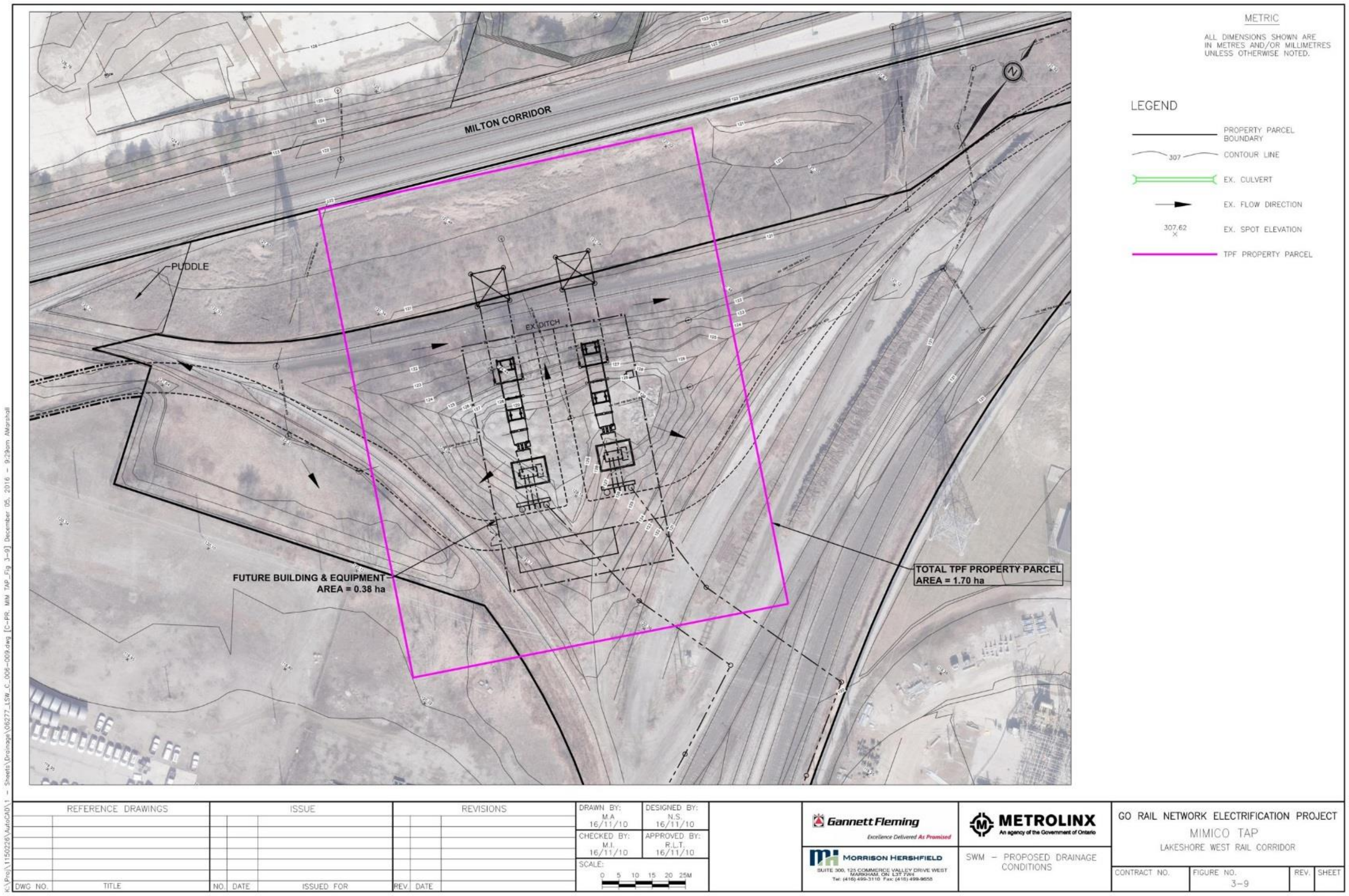


Figure 4-41 Proposed Drainage Conditions - Mimico Tap/TPS



Flows were computed for the 2 year to 100 year storm event using City of Toronto IDF Curves from Wet Weather Guidelines. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 15 minutes was used in the flow computations

A more refined flow analysis for the site drainage would be required at the Detailed Design phase.

Runoff computations and the Parameters used for the computations and City of Toronto IDF curve data are presented in **Appendix K – Preliminary Stormwater Management Report**. Results are summarized below in **Table 4-71**.

Table 4-71: Mimico Tap/TPS - Existing and Proposed Development Flows

Storm event	Area Draining to West		
	Pre Dev Flow m^3/s	Post Dev Flow m^3/s	Flow Increase m^3/s
25mm	0.011	0.038	0.026
2yr	0.050	0.102	0.052
5yr	0.074	0.153	0.078
10yr	0.091	0.187	0.096
25yr	0.117	0.240	0.123
50yr	0.151	0.310	0.159
100yr	0.176	0.361	0.185

4.13.2.2 Development Impact on Drainage & Proposed Mitigation Measures

The proposed construction of the Mimico Tap/TPS will result in 30% increase in impervious area. However the total site area is small (less than 2 ha) and the impervious area is even smaller. Based on this preliminary assessment, the increase in flows resulting from the construction of the Mimico Tap/TPS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City of Toronto / TRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the perimeter ditch can be converted to a bio-swale. The bio-swale can be used for quantity control as well.

It is anticipated that the quantity and quality control targets will be achieved by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be provided at Detailed Design phase.

4.13.2.3 Recommendations

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Mimico Tap/TPS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

4.13.3 Mimico SWS

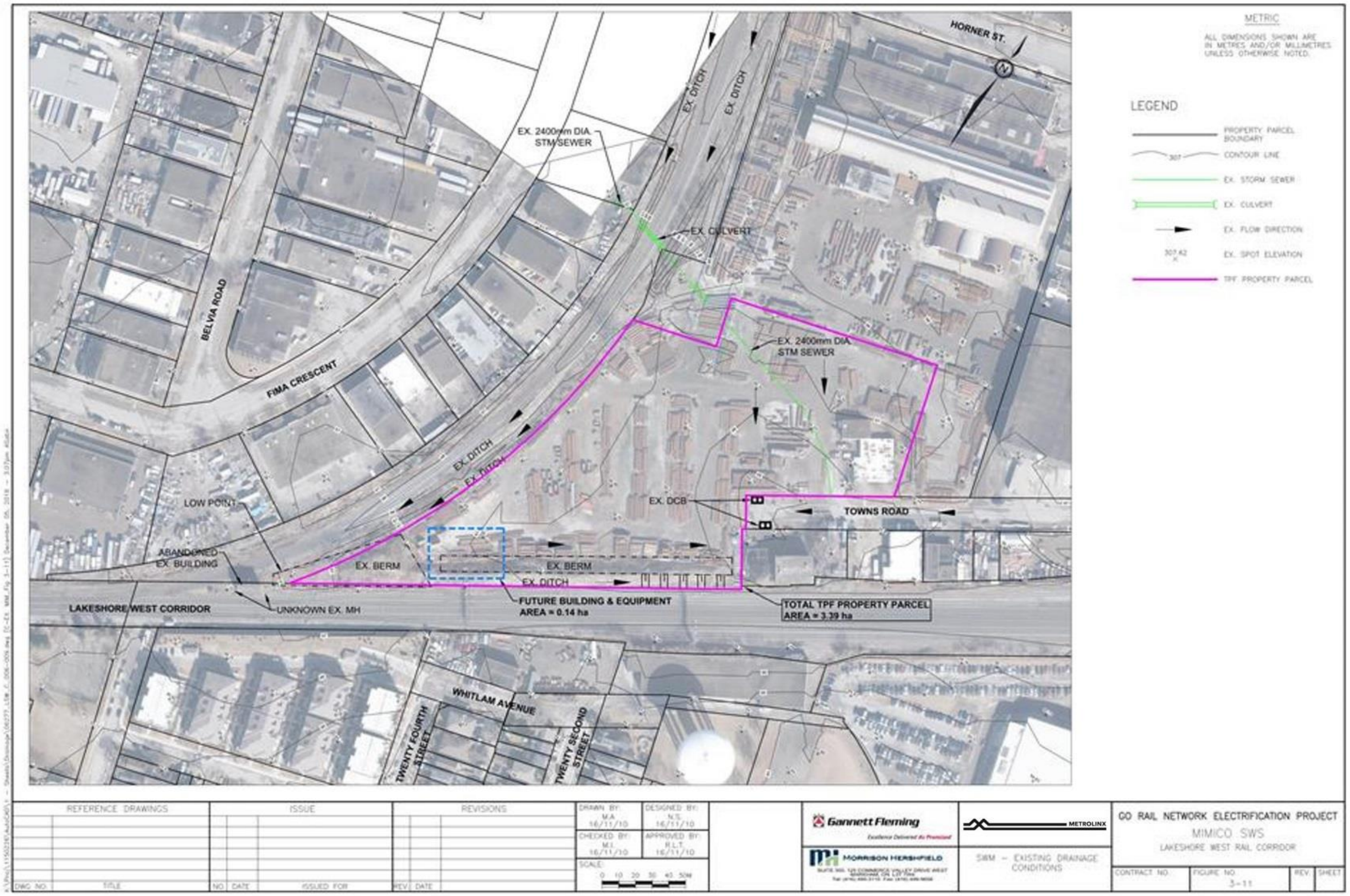
The proposed site is part of the tributary area of Mimico Creek, and as such it is within the jurisdiction of TRCA. However, the site is outside the regulated area of the Mimico Creek.

The existing drainage pattern for the site area is shown on **Figure 4-42**. The total area of the TPF Assessment Area is approximately 3.70 ha with railway tracks to the south and west of the site. The site is used as a storage yard for pipes (large and small) and steel beams. The ground is mostly covered with gravel.

Under existing condition, the runoff from the site sheet flows to the ditch along the Lakeshore Railway Corridor and to a ditch along the west secondary/branch track.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

Figure 4-42 – Mimico SWS Existing Drainage Conditions



4.13.3.1 Hydrologic Analysis

Drainage Areas

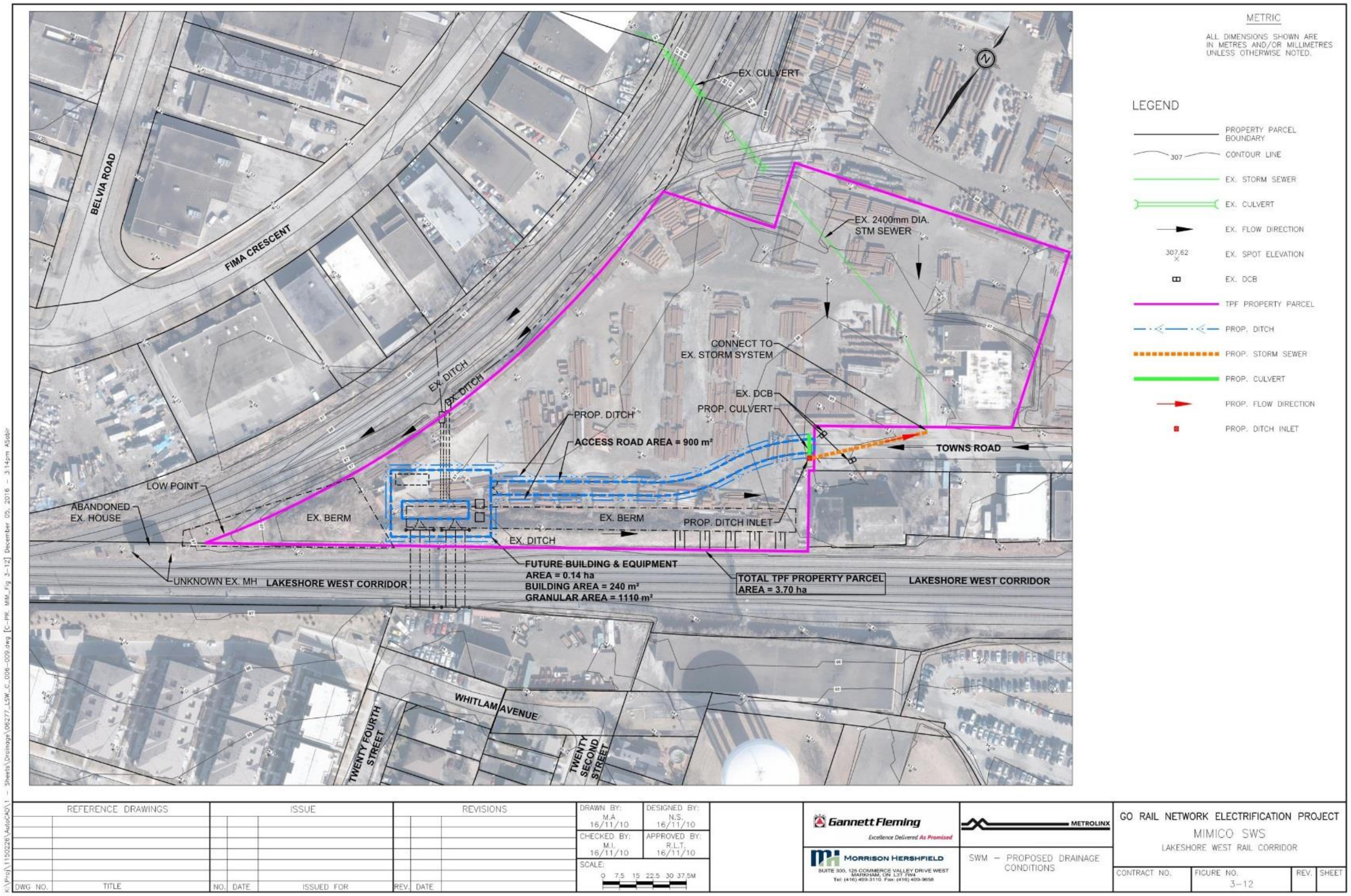
The proposed Mimico SWS development will consist of the following:

- A building area of 0.02 ha with a runoff coefficient of 0.90;
- Granular surface area of 0.11 ha around the SWS and electrical equipment pads with a runoff coefficient of 0.80;
- An asphalted access road of 0.09 ha with ditches on each site to convey the runoff to an acceptable outlet with a runoff coefficient of 0.90;

The composite runoff coefficient for the entire site area of 0.22 ha, after development, will be approximately 0.85.

The proposed development areas and their locations shown on **Figure 4-43** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

Figure 4-43 – Mimico SWS Proposed Drainage Conditions



For the overall site, the following table shows the changes in land use.

Table 4-72 Mimico SWS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Gravel storage area	0.22	0.50	Building	0.02	0.9
			*Access Road	0.09	0.9
			Granular Surface	0.11	0.8
Total/Composite	**0.22**	**0.50 or 43% Impervious**		**0.22**	**0.85 or 93% Impervious**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Flow Analysis

A preliminary analysis of runoff from the site area was completed to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. The Rational Formula was used to determine flows for the existing and the proposed development conditions.

As outlined in **Table 4-72** there is an increase of 50% in impervious area and the development will cause an increase in the stormwater runoff. Flows were computed for the 2 year to 100 year storm events using the City of Toronto rainfall intensities. The rainfall data was extracted from *The Wet Weather Flow Management Guidelines*, November 2006, page 32. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control.

A more refined flow analysis for the site drainage will be required at Detailed Design phase.

The site would drain to the 2400 mm sewer; and will be required to regulate the release rate to the pre-development levels. The 2400 mm storm sewer is assumed to convey the runoff from the 2-year storm event.

Runoff computations and the parameters used for the computations and rainfall intensities for time of concentration (Tc) of 10 minutes, from the City of Toronto IDF curve data, are presented in **Appendix K**. Results are summarized below in **Table 4-73.**

Table 4-73: Mimico SWS - Existing and Proposed Development Flows

Storm event	Exis. Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.008	0.022	0.014
2yr	0.027	0.046	0.019
5yr	0.040	0.068	0.028

Storm event	Exis. Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
10yr	0.050	0.084	0.035
25yr	0.064	0.108	0.045
50yr	0.082	0.130	0.048
100yr	0.096	0.145	0.050

4.13.3.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Mimico SWS will result in 50% increase in impervious area. However the total site area is very small (0.22 ha) and the impervious area is even smaller. As outlined in **Table 4-73**, the increase in flows resulting from the construction of the Mimico SWS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can also be used for quality and quantity control. The proposed perimeter ditch will discharge to the ditch along the proposed access road which will outlet to the existing 2400 sewer via a proposed storm sewer.

It is anticipated that the quantity and quality control design criteria will be met by the runoff infiltration within the ditches and the bio-swale. The minor and major storm runoff outlets will remain the same as under existing condition.

A more detailed analysis for the quantity, quality and water balance will be required at Detailed Design phase.

4.13.3.3 Recommendations

From the hydrological analysis it is concluded that the construction of the Mimico SWS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control criteria will be met by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing storm sewer, ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures, including the existing receiving 2400mm sewer, and the site runoff outfalls.

4.13.4 Oakville SWS

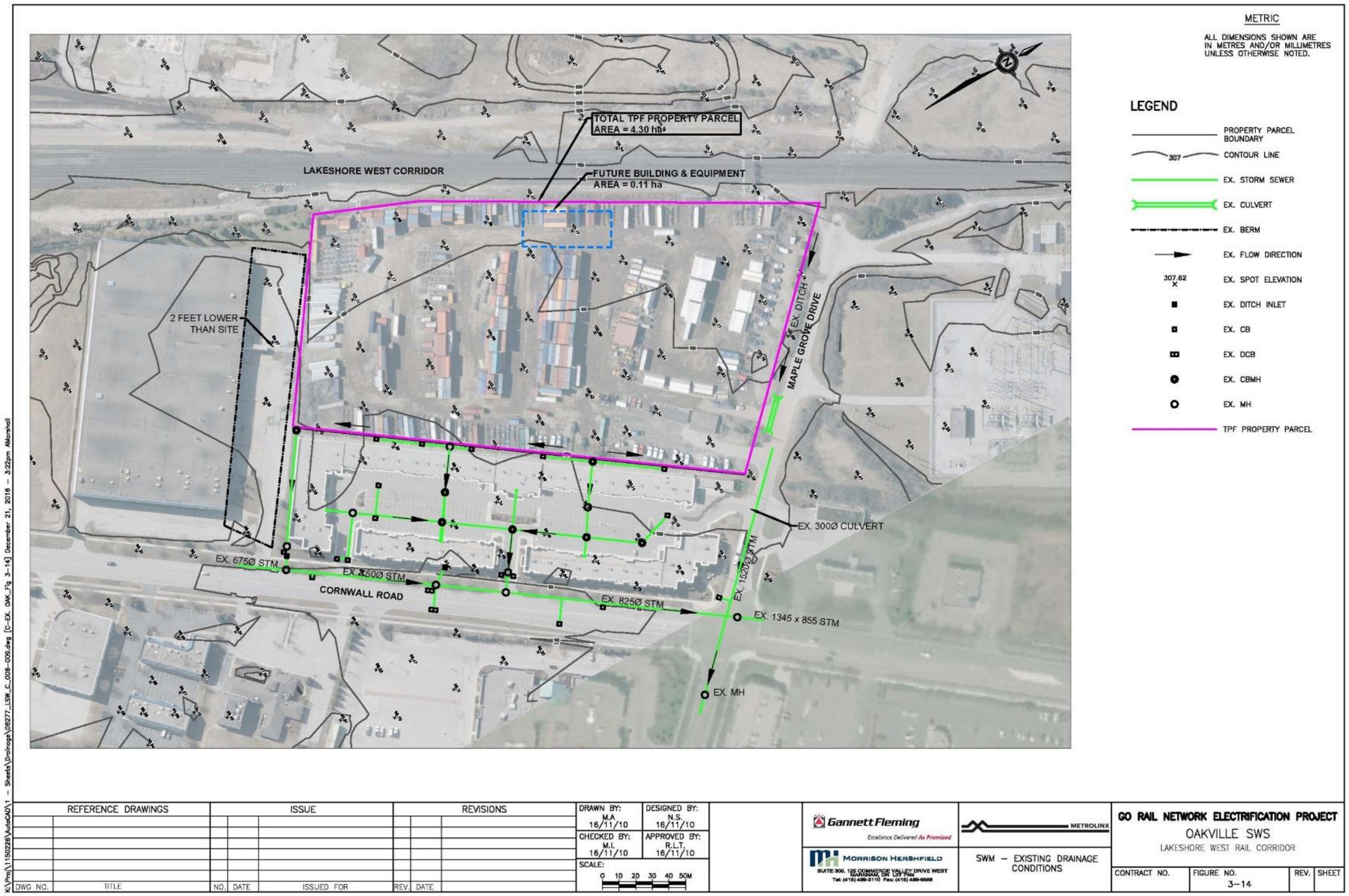
The proposed site is a tributary to the Joshua's Creek and is located within the jurisdiction of HRCA but is outside the regulated area. However, HRCA has noted that the Oakville SWS site may be subject to spill from the adjacent Joshua's Creek.

The existing drainage pattern for the site area is shown on **Figure 4-44**. The total TPF Assessment Area is approximately 4.3 ha consisting of existing trucking facility. The portion of the property parcel affected by the construction of future building and gravel pad, for the placement of electrical equipment will be approximately 0.11 ha as shown on the figure. Future access road outside this area will be approximately 0.06 ha. In the subsequent sections of this report only the area affected by the development, including future access road (total of 0.17 ha), is considered for the analysis.

Under existing condition, there is no defined drainage system for the Assessment Area. The site in general is flat and the storm water runs overland towards south east and south west directions. There is a ditch along the south east limit of the assessment area with no defined outlet. The ditch overflows towards the Maple Grove Drive where the runoff is captured by the road storm sewer system. There is another existing ditch along the north east limit of the property parcel, along the Maple Grove Drive, which ends at the entrance of the assessment area. The runoff at this point enters into the driveway culvert connected to the road storm sewer system which conveys flows downstream.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

Figure 4-44: Oakville SWS Existing Drainage Conditions



4.13.4.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 4-44**. The site under existing condition is flat undeveloped land used as trucking facility. A runoff coefficient, 'C' of 0.3 is estimated for the site area of 0.17 ha.

The proposed Oakville SWS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be asphalt set at lower grades. The approximate foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.11 ha and for the access road it will be approximately 0.06 ha at the location shown on **Figure 4-45**. The runoff coefficient for the granular surface is estimated 0.8 while for the building and access road it is estimated 0.9. The composite runoff coefficient for the whole site area of 0.17 ha, after development, will be approximately 0.85.

The proposed development areas and their location shown on **Figure 4-45** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

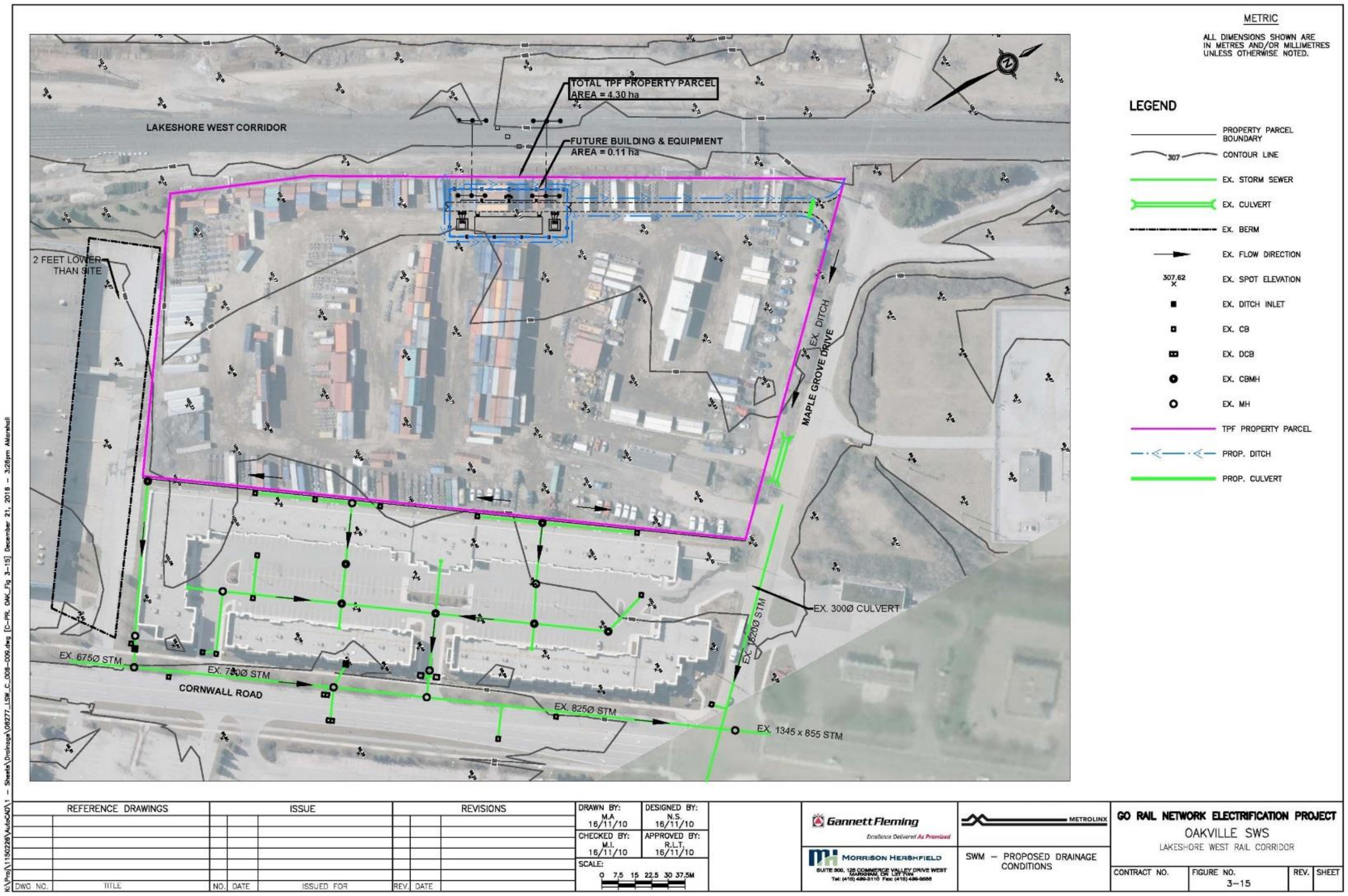
The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 4-74.**

Table 4-74: Oakville SWS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped	0.17	0.3	Building	0.02	0.9
			*Access Road	0.06	0.9
			Granular Surface	0.09	0.8
Total/Composite	**0.17**	**0.3 Or 14% Impervious**		**0.17**	**0.85 Or 92 % Impervious**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Figure 4-45: Oakville SWS Proposed Drainage Conditions



Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage.

It can be seen in **Table 4-74** that there is some increase in impervious area and the development will cause increase in the stormwater runoff. Flows were computed for the 2 year to 100 year storm event using MTO Rainfall IDF curves. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 10 minutes was used in the flow computations.

Runoff computations and the Parameters used for the computations and rainfall intensities for time of concentration (Tc) of 10 minutes, from the MTO Rainfall IDF curves, are presented in Appendix B. Results are summarized below in **Table 4-75**.

Table 4-75: Oakville SWS - Pre and Post Development Flows

Storm event	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.003	0.017	0.014
2yr	0.011	0.030	0.019
5yr	0.014	0.040	0.026
10yr	0.017	0.047	0.030
25yr	0.022	0.061	0.039
50yr	0.026	0.069	0.043
100yr	0.030	0.076	0.046

4.13.4.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Oakville SWS will result in 78% increase in impervious area. However the total site area is very small (0.17 ha) and the impervious area is even smaller. Based on this preliminary assessment, the increase in flows resulting from the construction of the Oakville SWS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City / HRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can be used for quantity control as well. The proposed perimeter ditch will discharge to the existing Maple Grove Drive Roadside ditch which flows towards south east direction to discharge to the existing road drainage system.

It is anticipated that the quantity and quality control targets will be achieved by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be provided at Detailed Design phase.

4.13.4.3 Recommendations

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Oakville SWS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

HRCA will be contacted during Detailed Design to determine the extent and depth of the Joshua Creek's spill so that mitigation measures can be undertaken, if required.

4.14 Groundwater and Wells

Please refer to Appendix V for a description of the methodology followed for assessment of groundwater impacts. Additional details can be found in the Groundwater Impact Assessment Report contained in **Appendix V**.

4.14.1 Burlington Tap & TPS Location

4.14.1.1 Potential Effects and Mitigation Measures

There was one (1) domestic supply well identified within 500 metres of the Burlington Tap/TPS location. The surrounding area is characterized by an urban setting and the use of private water wells in this area is likely negligible. There is one (1) waterbody, Roseland Creek, located within 500 metres of the Tap/TPS location.

The subsurface footprint of the Burlington Tap/traction power station grounding grid, gantry foundations, duct banks and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep, except at the Tap foundations, which will be up to 10 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Roseland Creek. Therefore, no mitigation measures are recommended.

4.14.1.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.2 Mimico Tap & TPS Location

4.14.2.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the Mimico Tap/TPS location. The surrounding area is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are no waterbodies located within 500 metres of the Tap/TPS location.

The subsurface footprint of the Mimico Tap structure foundations, and TPS grounding grid, gantry foundations, and duct banks is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep, except at the Tap foundations, which will be up to 10 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse groundwater impacts are anticipated. Therefore, no mitigation measures are recommended.

4.14.2.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.3 Canpa 25 kV Feeder Route

4.14.3.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the Canpa 25kV Feeder Route. However, this section is characterized by an urban setting and the use of private water wells is likely negligible. There are no waterbodies located within 500 metres of the 25kV Feeder Route.

The Canpa feeder route will commence at the Mimico TPS location and will run south via aerial cables along the Canpa Rail ROW to the Mimico SWS site. The aerial feeder route is not expected to cause any groundwater impacts.

Based on the above, no adverse groundwater impacts are anticipated. Therefore, no mitigation measures are recommended.

4.14.3.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.4 Mimico SWS

4.14.4.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the Mimico switching station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There are no waterbodies located within 500 metres of the SWS location.

The subsurface footprint of the Mimico switching station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse groundwater impacts are anticipated. Therefore, no mitigation measures are recommended.

4.14.4.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.5 Oakville SWS

4.14.5.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the Oakville switching station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There are two (2) waterbodies, Joshua's Creek and Wedgewood Creek, located within 500 metres of the SWS location.

The subsurface footprint of the Oakville switching station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to groundwater or groundwater dependent features including Joshua's Creek and Wedgewood Creek. Therefore, no mitigation measures are recommended.

4.14.5.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.6 OCS & Bridges: Section LSW 1 – Strachan Avenue to Mimico Station

4.14.6.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are four (4) waterbodies, Grenadier Pond, Mimico Creek, Humber River and Lake Ontario, located within 500 metres of the rail corridor in this section.

There are eight (8) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers and/or OCS wires at Strachan Avenue, Sunnyside Pedestrian Bridge, Humber River, and Gardiner Expressway. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.
- Track lowering at Strachan Avenue, Dufferin Street, Dunn Avenue, and Jameson Avenue. No adverse effect on groundwater is anticipated; however, this will be assessed during the Detailed Design phase for the affected structure.
- Bridge replacement at Dufferin Street, Dunn Avenue, Jameson Avenue and pedestrian bridge replacement at Dowling Avenue. A detailed assessment of any potential groundwater/well impacts will be completed as part of a separate EA Addendum process as outlined in the GO Rail Network Electrification EPR.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to groundwater or groundwater dependent features including Grenadier Pond, Mimico Creek, Humber River and Lake Ontario. Therefore, no mitigation measures are recommended.

4.14.6.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.7 OCS & Bridges: Section LSW 2 – Mimico Station to Long Branch Station

4.14.7.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the rail corridor in this section. The section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There is one (1) waterbody, Etobicoke Creek, located within 500 metres of the rail corridor in this section.

There are two (2) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers and OCS wires at Islington Avenue and Brown's Line. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.
- Track lowering at Brown's Line. No adverse effect on groundwater is anticipated; however, this will be assessed during the Detailed Design phase for the affected structure.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to groundwater, or groundwater dependent features including Etobicoke Creek. Therefore, no mitigation measures are recommended.

4.14.7.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.8 OCS & Bridges: Section LSW 3 – Long Branch Station to Port Credit

4.14.8.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the rail corridor in this section. The section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are five (5) waterbodies, Etobicoke Creek, Applewood Creek, Serson Creek, Cooksville Creek, and Mary Fix Creek, located within 500 metres of the rail corridor in this section.

There is one (1) bridge requiring modifications, including the following:

- Installation of OCS wires at Etobicoke Creek. These modifications will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to groundwater or groundwater dependent features including Etobicoke Creek, Applewood Creek, Serson Creek, Cooksville Creek, and Mary Fix Creek. Therefore, no mitigation measures are recommended.

4.14.8.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.9 OCS & Bridges: Section LSW 4 – Port Credit Station to Clarkson Station

4.14.9.1 Potential Effects and Mitigation Measures

There were seven (7) domestic supply wells and two (2) industrial/commercial supply wells identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are seven (7) waterbodies, Credit River Marshes Wetland Complex, Tecumseh Creek, Lornewood Creek, Birchwood Creek, Fudger's Marsh, Turtle Creek, and Sheridan Creek, located within 500 metres of the rail corridor in this section.

There is one (1) bridge requiring modifications, including the following:

- Installation of OCS wires at Credit River. These modifications will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Credit River Marshes Wetland Complex, Tecumseh Creek, Lornewood Creek, Birchwood Creek, Fudger's Marsh, Turtle Creek, and Sheridan Creek. Therefore, no mitigation measures are recommended.

4.14.9.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.10 OCS & Bridges: Section LSW 5 – Clarkson Station to Oakville Station

4.14.10.1 Potential Effects and Mitigation Measures

There were five (5) domestic supply wells, eleven (11) industrial/commercial supply wells, and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are six (6) waterbodies, Sheridan Creek, Avonhead Creek, Joshua's Creek, Wedgewood Creek, Morrison Creek, and Sixteen Mile Creek, located within 500 metres of the rail corridor in this section.

There is one (1) bridge requiring modifications, including the following:

- Installation of bridge barriers and OCS wires at Royal Windsor Drive. These modifications will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Sheridan Creek, Avonhead Creek, Joshua's Creek, Wedgewood Creek, Morrison Creek, and Sixteen Mile Creek. Therefore, no mitigation measures are recommended.

4.14.10.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.11 OCS & Bridges: Section LSW 6 – Oakville Station to Bronte Station

4.14.11.1 Potential Effects and Mitigation Measures

There was one (1) domestic supply well and one (1) industrial/commercial supply well identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are three (3) waterbodies, Sixteen Mile Creek, McCraney Creek, and Fourteen Mile Creek, located within 500 metres of the rail corridor in this section.

There are two (2) bridges requiring modifications, including the following:

- Installation of OCS wires at Cross Avenue and Sixteen Mile Creek. These modifications will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Sixteen Mile Creek, McCraney Creek, and Fourteen Mile Creek. Therefore, no mitigation measures are recommended.

4.14.11.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.12 OCS & Bridges: Section LSW 7 – Bronte Station to Appleby Station

4.14.12.1 Potential Effects and Mitigation Measures

There were eight (8) domestic supply wells, two (2) industrial/commercial supply wells, one (1) agricultural supply well, and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are three (3) waterbodies, Lower Bronte Creek Wetland Complex, Appleby Creek, and Sheldon Creek, located within 500 metres of the rail corridor in this section.

There is one (1) bridge requiring modifications, including the following:

- Installation of bridge barriers and OCS wires at Bronte Creek. These modifications will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Lower Bronte Creek Wetland Complex, Appleby Creek, and Sheldon Creek. Therefore, no mitigation measures are recommended.

4.14.12.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

4.14.13 OCS & Bridges: Section LSW 8 – Appleby Station to Burlington Station (MP 31.5)

4.14.13.1 Potential Effects and Mitigation Measures

There were five (5) domestic supply wells identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are six (6) waterbodies, Appleby Creek, Sheldon Creek, Shoreacres Creek, Tuck Creek, Roseland Creek, and Indian Creek, located within 500 metres of the rail corridor in this section.

There are three (3) bridges requiring modifications, including the following:

- Installation of bridge barriers and/or OCS wires at Guelph Line and Burlington GO Station Pedestrian Bridge. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

- Pedestrian bridge replacement at Drury Lane. A detailed assessment of any potential groundwater/well impacts will be completed as part of a separate EA Addendum process as outlined in the GO Rail Network Electrification EPR.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Appleby Creek, Sheldon Creek, Shoreacres Creek, Tuck Creek, Roseland Creek, and Indian Creek. Therefore, no mitigation measures are recommended.

4.14.13.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

5 Impact Assessment – Kitchener Corridor

5.1 Natural Environment

Vegetation Clearing Zone

As described in Volume 1, a Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the 5m OCS Impact Zone plus an additional 2 metre offset area on either side of the OCS components. As a result, the total clearing area is defined as 7m measured from the centerline of the outermost tracks to be electrified on either side of each rail corridor. The 7 metre zone is considered a maximum removal zone; during Detailed Design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

As part of the TPAP, the following approach was taken to assess potential ecological impacts associated with the required vegetation removal for the Electrification Project. There were two components to the analysis:

1. Identification of ecological impacts related to vegetation removals, and
2. Characterization of the extent of tree removals.

Approach/Methodology for Assessing Ecological Impacts

To classify potential ecological impacts due to vegetation removal, they were categorized as either: ***negligible, low, moderate, or high*** based on the rationale outlined below. Using Geographic Information Systems (GIS) technology, Ecological Land Classification (ELC) communities along the corridors/feeder routes were mapped (via aerial photo interpretation as part of the baseline conditions phase), and the areas (in hectares [ha]) of potential vegetation removal (including trees) were calculated for each type of ELC community within a given corridor segment. It should be noted that the assessment did not entail field surveys or ground truthing to delineate impact areas within the vegetation clearing zone. However field investigations were undertaken along corridor sections identified within the *GO Rail Network Electrification TPAP - Natural Environmental Baseline Conditions Report* (Future/Work & Commitments section) to assess habitat suitability within various ELC communities to be affected.

In order to further characterize tree removals specifically, the extent of tree removals within each ELC community was categorized as ***minor, fair, or extensive*** based on the canopy cover within each respective ELC community (see **Table 5-1** below).

- Where canopy cover is minimal (<10%) or limited (10-20%), the extent of removals is considered ***minor.***
- For areas with intermediate (20-70%) canopy cover, the extent of tree removals is considered ***fair.***

- For communities with high (>70%) canopy cover, tree removals are anticipated to be ***extensive.***

Table 5-1 Extent of Tree Removals

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Agriculture (AG)	AG communities include intensive and non-intensive farming. Intensive practices includes cultivated field producing crops (e.g. corn and wheat) and specialty agricultural crops (e.g. orchards, and nurseries). Non-intensive fields are dominated with herbaceous vegetation and grasses primarily used for pasture and grazing areas. Treed areas may be located along the perimeter of AG communities. AG communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within AG lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Commercial and Institutional (CVC)	CVC communities contain constructed areas, including businesses, light industry, heavy industry, educational and health buildings, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Constructed (CV)	CV communities contain constructed areas, including light and heavy industry, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Transportation and Utility (CVI)	CVI communities include roads, highways, right of ways, railways, airports, and sewage treatment facilities, and are dominated by non-native grasses and herbaceous species common to disturbed habitat. CVI communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVI lands are considered to have negligible ecological impact since the affected areas provide limited to no habitat for wildlife.
Residential (CVR)	CVR communities include low to high residential housing, rural property,	Fair	Vegetation removals with CVR lands are considered to

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	single family homes, and trailer parks, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. Due to the presence of treed areas along the boundary between the CVI and CVR communities, the canopy cover within the impacted areas is considered intermediate (20-70%).		have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Green Land (CGL)	CGL communities are composed of open areas such as parks, golf courses, playing fields, picnic areas, and cemeteries, and are primarily dominated by non-native grass species (Kentucky Blue Grass), as well as herbaceous species common to disturbed habitat. CGL communities contain varying levels of canopy cover from minimal (<10%) to limited (10-20%) dependent on the community.	Minor	Vegetation removals with CGL communities are considered to have a low ecological impact since these communities provide limited to no habitat for wildlife.
Cultural Meadow (CUM)	CUM communities result from, or are maintained by, cultural or anthropogenic-based disturbances and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CUM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CUM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Red Pine Coniferous Plantation (CUP)	CUP communities greater than 75% coniferous tree composition. CUP communities generally contain high (>70%) canopy cover.	N/A	Vegetation removals within CUP communities are considered to have low ecological impact.
Cultural Woodland (CUW)	CUW communities are culturally influenced and contain high (>70%) canopy cover.	Extensive	Vegetation removals within CUW communities have low ecological impacts.
Treed Agriculture (TAG)	TAG communities include coniferous, deciduous and mixed plantations, treed pastures and fencerows. TAG communities contain TAG communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the TAG communities are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Deciduous Thicket (THD)	THD communities contain some shrub and tree cover. The communities are culturally influenced and dominated by non-native and invasive species. THD communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the THD communities are considered to have low ecological impact as the areas affected provide limited wildlife habitat.
Deciduous Forest (FOD)	FOD communities contain are dominated by deciduous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Forest (FOM)	FOM communities contain >60% tree cover and dominated by a mix of deciduous and coniferous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOM communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Marsh (MA)	MA communities are dominated by emergent hydorphytic macrophytes with some tree and shrub cover. MA communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MA communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Meadow Marsh (MAM)	MAM communities represent areas that experience seasonal flooding, and	Minor	Vegetation removals within the MAM communities

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	contain species that are less tolerant of prolonged flooding. MAS communities contain minimal (<10%) canopy cover.		have varying levels of ecological impacts, ranging from low to moderate and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, and wildlife habitat suitability.
Shallow Marsh (MAS)	MAS communities are restricted to facultative and obligate wetland plants. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MAS communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Meadow (MEM)	MEM communities contain a mix of grass-like and broadleaf species and include non-native and invasive species. MEM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with MEM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Open Shoreline (SHO)	SHO communities are associated with and adjacent to permanent or ephemeral water and subject to active shoreline processes. Vegetation cover varies from patchy to barren to more closed and treed. SHO communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within SHO communities result in a moderate ecological impact and as they contain specialized habitat for wildlife.
Open Water (OA)	OA communities include watercourses, rivers, streams, and ponds.	N/A	There are no footprint impacts associated with OA communities as all OCS components will be attached to bridge structures and no vegetation removals are required in these areas.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Swamp (SW)	SW communities contain tree or shrub cover with variable flooding regimes and areas with standing water. SW communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within SW communities have varying levels of ecological impacts, ranging from moderate to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Swamp (SWM)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWM communities contain tree both deciduous and coniferous composition. SWM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals with SWM lands are considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.
Deciduous Swamp (SWD)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWD communities contain deciduous content. SWD communities generally contain high (>70%) canopy cover.	Extensive	There are no anticipated impacts to this community.
Deciduous Woodland (WOD)	WOD communities contain semi-closed tree cover and are dominated by mid-aged deciduous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within WOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Woodland (WOM)	WOM communities contain semi-closed tree cover and are dominated by mid-aged deciduous and coniferous trees. Species located along the forest	Extensive	Vegetation removals within the WOM community is considered to have moderate ecological impact

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOM communities generally contain high (>70%) canopy cover.		since the affected areas provide habitat for wildlife and act as movement corridors.

Additional details can be found in the Natural Environment Impact Assessment Report contained in **Appendix A2.**

5.1.1 Bramalea PS & 25kV Feeder Route

5.1.1.1 Potential Effects and Mitigation Measures

5.1.1.1.1 Terrestrial

The approximate footprint dimension of the PS facility is 22 metres x 47 metres and will contain ancillary components associated with the TPF including gantries, access roads, underground duct banks, and aerial 25kV Feeder Route.

The 25kV Feeder Route includes in the installation of two aerial 2x25kV feeders on top of independent single pole OCS structures (approximately 13 metres in height, and 65 metres apart) along the rail ROW. The 2x25kV Bramalea feeder route will commence at the Bramalea PS location and run east via aerial cables along the GO Kitchener Corridor right-of-way to Bramalea GO Station.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for the Bramalea PS are presented in **Table 5-2. Figure 5-2** and **Figure 5-3** depict that the footprint impacts associated with the PS include the underground duct banks, gantries, and access road are within Cultural Meadow (CUM), Transportation and Utilities (CVI), and Commercial and Institutional (CVC) communities and vegetation removals will be required. The majority of vegetation to be removed is primarily composed of non-native and invasive herbaceous commonly found in anthropogenically disturbed areas, including Bindweed sp. (*Convolvulaceae*),Tall Goldenrod, New England Aster (*Symphyotrichum novae-angliae*), Heath Aster (*Symphyotrichum ericoides*), Common Milkweed, and Trembling Aspen saplings and Staghorn Sumac. The CVI, CUM and CVC communities within the PS do not contain specialized habitat for wildlife and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover in the CVI, CUM and CVC communities, the extent of tree removals is minor and the overall loss of vegetation in this community is negligible.

Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation removal areas for the 25kV Feeder Route is presented in **Table 5-3. Figure 5-3** depict that the footprint impacts associated with the 25kV Feeder Route are entirely outside of the Metrolinx owned ROW and are located within Cultural Meadow (CUM) and Transportation and Utilities (CVI) communities and vegetation removals will be required. The CUM and CVI communities within the 25kV Feeder Route do not contain specialized habitat for wildlife and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover in the CUM and CVI communities, the extent of tree removals is minor and the overall loss of vegetation in this community is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing

identified below. No vegetation clearing within the Commercial and Institutional (CVC) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

Table 5-2: Summary of Vegetation Removal Areas within ELC Communities – Bramalea PS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.109	Minor
Transportation and Utilities (CVI)	0.017	Minor
Cultural Meadow (CUM)	0.222	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Table 5-3: Summary of Vegetation Removal Areas within ELC Communities - Bramalea 25 kV Feeder Route*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0	N/A
Transportation and Utilities (CVI)	1.191	Minor
Cultural Meadow (CUM)	0.089	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 5-1 Existing Conditions - Bramalea PS

Figure 5-2 Footprint Impacts Ecological Land Classification - Bramalea PS

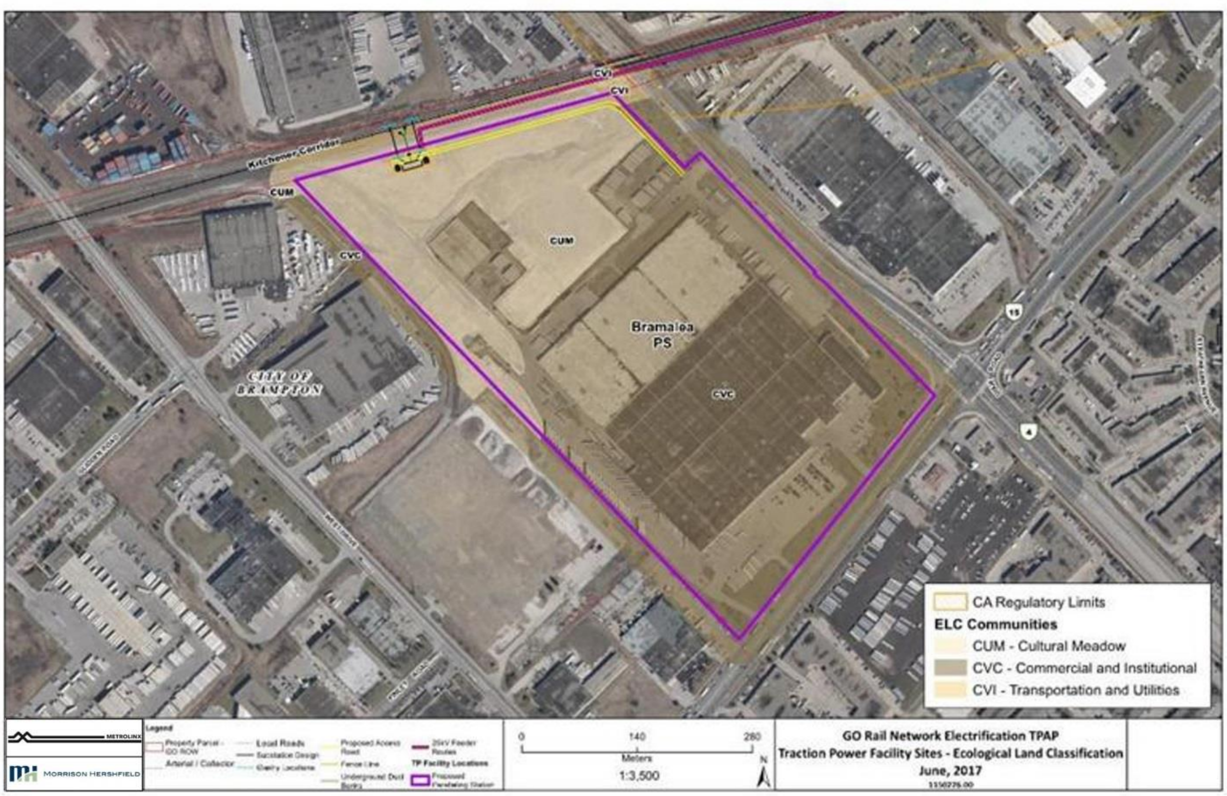
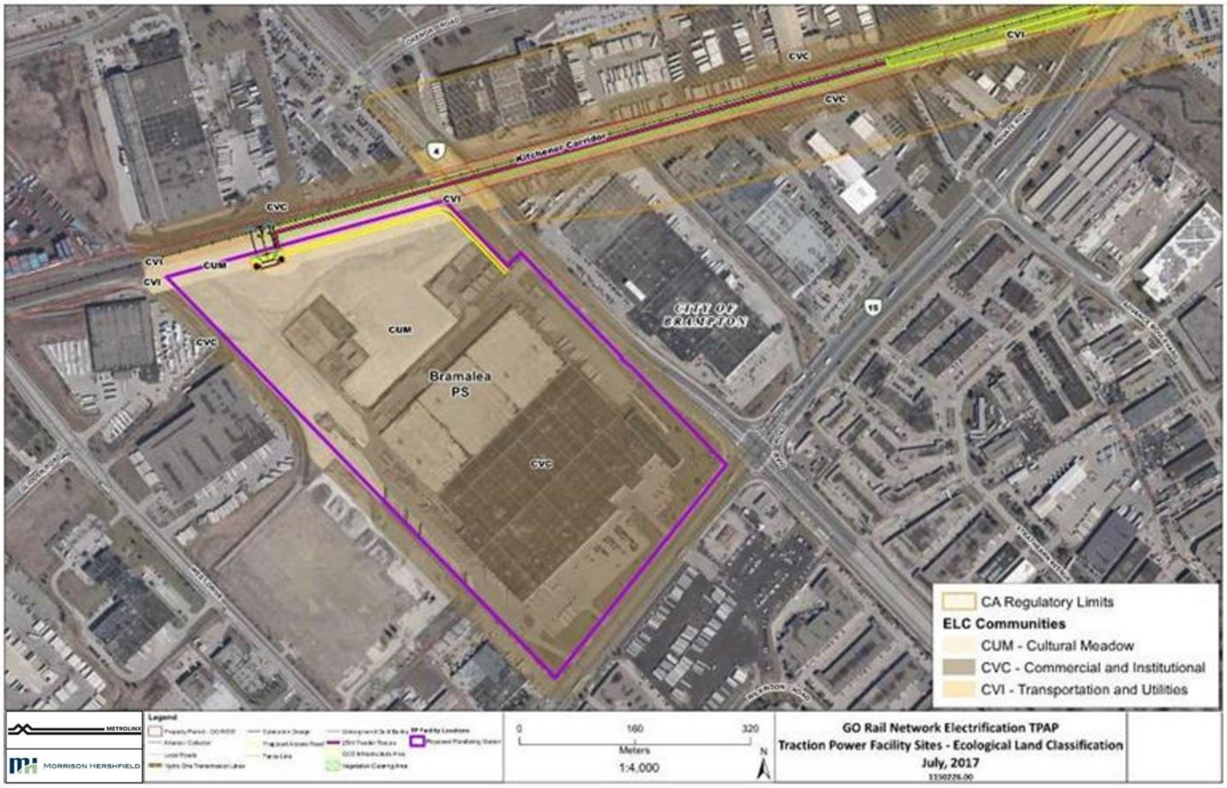


Figure 5-3 Footprint Impacts Ecological Land Classification - Bramalea PS & 25kV Feeder Route



Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing within the PS, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

The following mitigation measures, which are common to all ELC communities, will be implemented within the 25kV Feeder Route to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
    - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
    - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.

- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA)
- Vegetation removals within the Regulation Area for Asian Long-Horn Beetle within the 12 genera identified as host trees must be carried out carried out in a manner in compliant with the Ministerial Order issued by the Federal Government in 2013 which identifies prohibitions and restrictions of movement on trees, leaves, logs, lumber, wood/wood chips from host species of the Asian Long-horned Beetle. Unless authorized by a Movement Certificate issued by the CFIA, moving these products out of the Regulated Area is prohibited.

5.1.1.1.2 Aquatic

There are no aquatic features within the PS property parcel or 25kV Feeder Route, and therefore no aquatic footprint impacts.

5.1.1.1.3 Species at Risk

There are no Species at Risk or Species at Risk habitat identified within the PS property parcel or 25kV Feeder Route and therefore no footprint impacts.

5.1.1.1.4 Designated Areas

There are no footprint impacts within any Designated Areas within the PS property parcel.

Footprint impacts associated with the 25kV Feeder Route to CVI lands within TRCA areas are identified in **Table 5-4**. Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 5-4: Summary of Vegetation Removal Areas within Designated Areas – 25 kV Feeder Route*

ELC Community	Area within TRCA Regulation Limit (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0	N/A
Transportation and Utilities (CVI)	0.875	Minor
Cultural Meadow (CUM)	0	N/A

5.1.1.2 Net Effects

5.1.1.2.1 Terrestrial

There are no net adverse effects to the wildlife habitat associated with the loss of vegetation within the footprint of the PS or 25kV Feeder Route as the CUM, CVC, or CVI communities do not provide any specialized habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

5.1.1.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the PS property parcel or 25kV Feeder Route.

5.1.1.2.3 Species at Risk

There are no net adverse effects to Species at Risk or Species at Risk habitat within the PS property parcel or 25kV Feeder Route as there are no footprint impacts.

5.1.1.2.4 Designated Areas

Net effects relating to the 25kV Feeder Route footprint impacts within TRCA Regulated Areas within CVI lands are identified in **Table 5-4**

5.1.2 OCS & Bridges: Section KT-1 – UP Express Spur (at Highway 427) to Malton Station

5.1.2.1 Potential Effects and Mitigation Measures

5.1.2.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment KT-1 are presented in **Table 5-5**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due to minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including, Commercial and Institutional (CVC), Cultural Meadow (CUM) and a small area of Mixed Meadow (MEM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, the areas are highly urban, and they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM, and MEM communities, the extent of tree removals in these areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) community will result in a loss of vegetation along the edge of this natural vegetation community. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. The WOD community is associated with the Mimico Creek corridor. Due to the natural attributes of the woodland community and its association with the watercourse corridor, ecological impacts to these areas are considered moderate. The high amount of canopy cover in the WOD community will result in extensive tree removals within this community. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 5-5: Summary of Vegetation Removal Areas within ELC Communities KT-1*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.073	0	0.073	Minor
Transportation and Utilities (CVI)	4.544	0.136	4.681	Minor

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Mixed Meadow (MEM)	0.104	0	0.104	Minor
Deciduous Woodland (WOD)	0.063	0	0.063	Extensive
Cultural Meadow (CUM)	0.191	0	0.191	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx’s property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA)
- Vegetation removals within the Regulation Area for Asian Long-Horn Beetle within the 12 genera identified as host trees must be carried out carried out in a manner in compliant with the Ministerial Order issued by the Federal Government in 2013 which identifies prohibitions and restrictions of movement on trees, leaves, logs, lumber, wood/wood chips from host species of the Asian Long-horned Beetle. Unless authorized by a Movement Certificate issued by the CFIA, moving these products out of the Regulated Area is prohibited.

Impacts Related to Bridge Modifications

There are no bridges requiring modifications and therefore, no impacts.

5.1.2.1.2 Aquatic

There is one watercourse within the corridor segment: Mimico Creek. No bridge modifications are required on the Mimico Creek Bridge (Weston Sub Mile 13.7) and therefore there are no footprint impacts to Mimico Creek. Similarly, no adverse effects to this creek are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourse. To mitigate the potential indirect impacts to the watercourse, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

5.1.2.1.3 Species at Risk

Given the low potential of occurrence for Chimney Swift and Snapping Turtle there are no anticipated footprint impacts to these species.

While Monarch has a moderate potential of occurrence in the MEM community and low potential within the CUM community the removal of a small amount of herbaceous vegetation within the MEM and CUM communities are not anticipated to have an impact on this species.

Butternuts have a moderate potential for occurrence within WOD communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Mimico Creek Bridge (Weston Sub Mile 13.7) was surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at this site. As there are no bridge modifications required at this bridge structure and no evidence of Barn Swallow nesting was found, there are no anticipated impacts. Red-headed Woodpecker has a moderate potential of occurrence in WOD communities, however this species is generally tolerant of disturbance and small amounts of woodland edge removal is not anticipated to have an impact on this species. There is high potential for Wood Thrush within Deciduous Woodland (WOD) communities; however, this species is associated with interior forest habitat which will not be impacted.

There is a high potential for Western Chorus Frog (a SAR protected on Federal lands only) within MEM community within the corridor segment. Vegetation clearing with the MEM community will not impact any specialized amphibian habitat as the areas adjacent to the corridor are not conducive to breeding or hibernation areas.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

5.1.2.1.4 Designated Areas

Footprint impacts to CVI, CVC, MEM, CUM, and WOD areas within TRCA areas are identified in **Table 5-6**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 5-6: Summary of Vegetation Removal Areas within Designated Areas KT-1*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.003	0	0.003	Minor
Transportation and Utilities (CVI)	0.600	0	0.600	Minor
Mixed Meadow (MEM)	0.104	0	0.104	Minor
Deciduous Woodland (WOD)	0.011	0	0.011	Extensive
Cultural Meadow (CUM)	0.096	0	0.096	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

5.1.2.2 Net Effects

5.1.2.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CUM, CVC, and MEM lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor within the existing ROW. The WOD is part of the Mimico Creek corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD community including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

5.1.2.2.2 Aquatic

There are no net adverse effects on Mimico Creek as there are no anticipated footprint impacts.

5.1.2.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift, Barn Swallow, orSnapping Turtle. While there are footprint impacts to the WOD community, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. The vegetation removals within the MEM community may result in a net loss of vegetation along the perimeter the MEM. However, this area does not contain suitable amphibian habitat and no adverse effects to Western Chorus Frog are anticipated. Although there are footprint impacts to the MEM and CUM communities, the potential loss of Monarch habitat is considered minor in relation to the amount of adjacent un-impacted habitat. Net effects to Butternut will be determined during Detailed Design.

5.1.2.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVC, MEM, CUM, and WOD communities are depicted in **Table 5-6**. No vegetation clearing within the TRCA Regulated area is required within any of these communities outside of the Metrolinx owned ROW.

5.1.3 OCS & Bridges: Section KT-2 – Malton Station to Bramalea Station

5.1.3.1 Potential Effects and Mitigation Measures

5.1.3.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment KT-2 are presented in **Table 5-7**. As depicted in mapping provided in **Appendix A2**, , the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities, mainly Cultural Meadow (CUM), and small areas of Residential (CVR), Commercial and Institutional (CVC), Deciduous Thicket (THD), and Meadow Marsh (MAM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CUM, MAM, THD and CVC communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 5-7: Summary of Vegetation Removal Areas within ELC Communities KT-2*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.083	0	0.083	Minor
Transportation and Utilities (CVI)	9.357	0.645	10.001	Minor
Residential (CVR)	0.116	0	0.116	Fair
Deciduous Thicket (THD)	0	0	0	N/A
Meadow Marsh (MAM)	0.273	0	0.273	Minor
Cultural Meadow (CUM)	0.747	0.042	0.789	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA)
- Vegetation removals within the Regulation Area for Asian Long-Horn Beetle within the 12 genera identified as host trees must be carried out carried out in a manner in compliant with the Ministerial Order issued by the Federal Government in 2013 which identifies prohibitions and

restrictions of movement on trees, leaves, logs, lumber, wood/wood chips from host species of the Asian Long-horned Beetle. Unless authorized by a Movement Certificate issued by the CFIA, moving these products out of the Regulated Area is prohibited.

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Highway 407 North (Weston Sub Mile 16.9)
- Highway 407 South (Weston Sub Mile 16.94)
- Airport Road (Weston Sub Mile 14.80)
- Derry Road (West Sub Mile 14.87)
- Bramalea Road (Halton Sub Mile 11.39)
- GO Bramalea (Halton Sub Mile 11.60)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

5.1.3.1.2 Aquatic

There are two crossings of Mimico Creek and one crossing of Spring Creek in this corridor segment. These crossings of Mimico Creek and Spring Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

5.1.3.1.3 Species at Risk

Given the low potential of occurrence for Chimney Swift, Monarch, and Snapping Turtle, there are no anticipated footprint impacts to these species.

Butternuts have a low potential for occurrence within the THD communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

5.1.3.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, and CUM areas within TRCA areas are identified in **Table 5-8**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 5-8: Summary of Vegetation Removal Areas within Designated Areas KT-2*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area inside ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.011	0	0.011	Minor
Transportation and Utilities (CVI)	3.930	0.089	4.020	Minor
Residential (CVR)	0.094	0	0.094	Fair
Deciduous Thicket (THD)	0	0	0	N/A
Cultural Meadow (CUM)	0.511	0	0.511	Minor
Meadow Marsh (MAM)	0	0	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

5.1.3.2 Net Effects

5.1.3.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CUM, CVR, CVC, THD, and MAM lands as these communities contain limited habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

5.1.3.2.2 Aquatic

There are no net adverse effects on the two crossings of Mimico Creek and one crossing of Spring Creek as there are no anticipated footprint impacts.

5.1.3.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift, Monarch, or Snapping Turtle. Net effects to Butternut will be determined during Detailed Design.

5.1.3.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVC, CVR, and CUM areas communities are depicted in **Table 5-8**. No vegetation clearing within the TRCA Regulated Area within the CVR, CVC, and CUM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI communities are required outside of the ROW.

5.2 Preliminary Environmental Site Assessment

Please refer to Appendix B for a description of the methodology followed for Environmental Site Assessment work. Additional details can be found in the Preliminary Environmental Site Assessment Report contained in **Appendix B**.

5.2.1 Bramalea PS

5.2.1.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown composition may be present across the Site;
- Industrial on-Site and off-Site land usage, including waste generation of halogenated solvents; and
- Possible on-Site fuel or solvents containing Above-ground Storage Tanks(ASTs).

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Phase I Environmental Site Assessment if the property is to be acquired;
- Complete a Subsurface Investigation to assess the presence and quality of fill and potential impacts resulting from on-Site and adjacent/nearby land uses; and
- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

5.2.1.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

5.2.2 Bramalea 25kV Feeder Route

5.2.2.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Various industrial land uses surrounding the Site, including several USTs and two waste disposal sites.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;

- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Phase I Environmental Site Assessment if the property is to be acquired;
- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

5.2.2.2 Net Effects

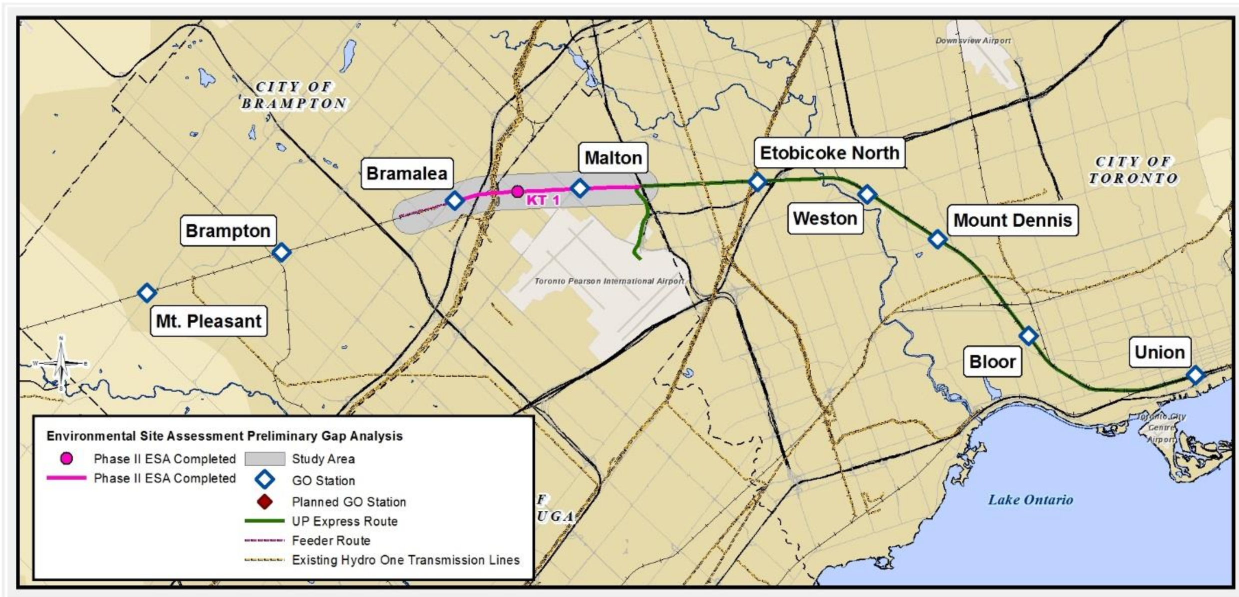
Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

5.2.3 OCS & Bridges: Kitchener Corridor

5.2.3.1 Potential Effects and Mitigation Measures

The scope of the study undertaken as part of the GO Rail Network Electrification TPAP was limited to a gap analysis review of previous Environmental Site Assessment work within the OCS Impact Zones along the corridors. Based on the available background reports reviewed, the Kitchener corridor has been subject of a Phase I Environmental Site Assessment and limited Phase II Environmental Site Assessment from Highway 427 (the eastern boundary of the current study) to Highway 407. The corridor west of this point (to Steeles Ave.) has not been assessed, a length of approximately 2.7 km (see **Figure 5-4**).

Figure 5-4 Kitchener Corridor Gap Analysis Map



Mitigation Measures

Implement the mitigation measures and/or carry out further study as documented in the applicable Kitchener studies listed in **Table 5-9**.

Table 5-9 Phase I/II or Other Contaminated Site Related Documents Reviewed - Kitchener Corridor

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
Ecoplans 2009	Phase I and II ESAs Canadian National Railway Weston Subdivision, Toronto, Mississauga and Brampton, Ontario	Metrolinx	Ecoplans Ltd. Environmental Consultants	Jul-09	550302	Kitchener	Covers off CNR Rail Corridor (Weston Subdivision). The rail corridor study area goes from Strachan Avenue in Toronto to Highway 407 in Brampton. It follows the UPER and then continues into the Kitchener Corridor however stops at Highway 407.	Phase I and II

Further work is recommended along the Kitchener corridor to assess/characterize potential soil and/or groundwater contamination and develop appropriate mitigation measures. As a result, additional Environmental Site Assessment studies including Phase I ESAs, Phase II ESAs, etc. will be carried out by Metrolinx as required along the corridors/OCS Impact Zone during the Detailed Design phase. Should these further assessments confirm the presence of subsurface contamination at these sites, recommendations for mitigation will be developed and implemented as appropriate which may include but are not limited to:

- Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site;
- Undertake remediation and/or implementation of management measures to address contaminated soils and/or groundwater during construction and long term operations and maintenance. Management measures will be carried out in accordance with applicable environmental legislation.

Furthermore, the mitigation measures as outlined in Section 9.2 will be adhered to and implemented during Detailed Design and construction.

5.2.3.2 Net Effects

Based on the implementation of the mitigation measures outlined above, no net adverse effects are anticipated.

5.3 Cultural Heritage

Please refer to Appendix C2 for a description of the methodology followed for assessment of cultural heritage impacts. Additional details can be found in the Cultural Heritage Impact Assessment Report contained in **Appendix C2**.

5.3.1 Bramalea PS & 25kV Feeder Route

The cultural heritage resources within this section include:

- 8000 Dixie Road (KT-2-1)

A summary of impacts and mitigation measures is provided in **Table 5-10** and feature mapping of resources is provided in **Appendix C2**.

5.3.1.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 5-10: Summary of Bramalea PS & 25kV Feeder Route Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
8000 Dixie Road KT-2-1 (Adjacent Heritage Property to the Bramalea PS)	No impacts to the heritage attributes of the adjacent heritage property are anticipated as a result of the installation of the Bramalea PS.	N/A	• A CHER was undertaken (as part of Electrification TPAP) and a portion of the 8000 Dixie Rd. site was determined to be an Adjacent Heritage Property. • The heritage attributes are confined to the southern 2/3 of the 8000 Dixie Rd. property containing the International Style Building, which are not anticipated to be impacted by the installation of the proposed Bramalea PS. • Should the location/configuration of the proposed Bramalea PS facility change during detailed design, potential impacts to the Adjacent Heritage Property (i.e., portion of the 8000 Dixie Rd site that contains CHVI) will be considered and reviewed to ensure no adverse impacts to the Adjacent Heritage Property.

No adverse net effects are anticipated as a result of this undertaking.

5.3.1.2 Net Effects

No net effects will be experienced as a result of this undertaking.OCS & Bridges: Section KT-1 – UP Express Spur (at Highway 427) to Malton Station

There are no heritage properties identified in the Section KT-1 study area. There are no further concerns from a cultural heritage perspective.

5.3.1.3 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

5.3.1.4 Net Effects

No net effects will be experienced as a result of this undertaking.

5.3.2 OCS & Bridges: Section KT-2 – Malton Station to Bramalea Station

There are no heritage properties identified in the Section KT-2 study area. There are no further concerns from a cultural heritage perspective.

5.3.2.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

5.3.2.2 Net Effects

No net effects will be experienced as a result of this undertaking.

5.4 Archaeology

A Stage 1 Archaeological Assessment was undertaken for the GO Rail Network Electrification Project. A summary of the findings and recommendations for the Kitchener Corridor can be found in the sections below. Refer to **Appendix D2** for complete details.

5.4.1 Bramalea PS & 25kV Feeder Route

A property inspection of the proposed facility site for the Bramalea PS was conducted by Robert Pihl (P057), ASI on June 6, 2016 and by Lisa Merritt, ASI on June 22, 2017. Access to the site was provided by Ford Motors on June 22, 2017.

The proposed Bramalea PS site is located within a large industrial complex – a Ford Motors distribution centre- that includes a building, associated landscaped grounds, truck yard and vacant scrub land to the rear; the latter area is where the proposed PS site will be located. The vacant land has been heavily modified by construction of the Dixie Road Grade separation and by construction of two large berms and a drainage channel. Scrubby and level lands to the west of the berms do not appear to be as heavily modified with the exception of a now overgrown railway spur.

5.4.1.1 Potential Effects and Mitigation Measures

The Bramalea PS site appears to have been substantially disturbed due to past building construction, berm construction and from grading/landscaping along the road ROWs and grading and dumping at the rear of the property adjacent to the study corridor. There is also an area that appears to retain archaeological potential in the northwest corner of the property. Mitigation measures include a Stage 2 Archaeological Assessment of the portion of the PS site with archaeological potential.The proposed Bramalea Feeder Route has been severely disturbed by previous railway construction; as such, archaeological potential has been removed. No further archaeological assessment is recommended.

5.4.1.2 Net Effects

Net effects associated with the Bramalea PS site, if any will be determined upon further assessment. No net effects will be experienced as a result of the installation of the Bramalea Feeder Route.

5.4.2 OCS & Bridges: Kitchener Corridor

5.4.2.1 Potential Effects and Mitigation Measures

OCS Footprint

The Stage 1 Archaeological Assessment confirmed that the OCS footprint includes an active GO Railway Corridor on disturbed lands. Archaeological potential has therefore been removed, as such no further Archaeological Assessment is recommended.

Bridge Modifications

There are no bridges that have vertical clearance or design issues requiring alteration/replacement or track lowering. Archaeological potential is therefore not affected. As such, no further Archaeological Assessment is recommended.

5.4.2.2 Net Effects

No net effects will be experienced as a result of this undertaking.

5.5 Land Use

Please refer to Appendix E2 for a description of the methodology followed for assessment of land use impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in **Appendix E2**.

5.5.1 Bramalea PS & 25kV Feeder Route

5.5.1.1 Potential Effects and Mitigation Measures

The proposed Bramalea PS site is located in the City of Brampton on a site which is a combination of open space and commercial/industrial/warehousing buildings, including the Ford Parts and Distribution Centre. The lands of the proposed site are subject to the Bramalea West Industrial Secondary Plan, which encourages the continuing development of Community Structure "Villages", while maintaining the existing commercial and industrial areas. With the commercial/industrial nature of the site already established, the presence of the PS is not anticipated to affect planned land uses for the area.

The proposed site is zoned *Industrial (M2)*, which permits industrial uses such as power generation through fuel combustion. The southwest corner of the site is zoned *Commercial (SC)*, and permitted land uses included a variety of retail, service, industrial, non-industrial, and accessory uses. As stated under Section 6.10 of the City of Brampton Zoning-Bylaw, the provisions of the by-law do not apply to prevent utility uses erected by a public authority, Crown agency or private electricity utility provided the structure meets the following requirements:

- other than an electric power transmission line, the size, height, coverage and yard regulations required for the zone in which such land, building, structure, plant, or equipment is located shall be complied with except for a facility less than 1 square metre in area and 2 metres in height, which may be located not less than 3 metres from a public road right-of-way and 1.5 metres from any other property line;

- no goods, material or equipment may be stored in the open in a Residential Zone or in a lot abutting a Residential Zone;
- any parking and loading regulations prescribed for these uses shall be complied with;
- areas not used for parking, driveways or storage shall be landscaped; and,
- all electric power facilities of Hydro One Inc. and Brampton Hydro Networks Inc. existing on the date of enactment of this by-law shall be deemed to conform with the requirements and restrictions pertaining to the particular zone in which it is located. (City of Brampton, 2004)

Based on this understanding, the PS is not expected to be a conflict in the current zoning given existing land uses in the vicinity of the site. There are no development applications affecting this site.

Mitigation Measures

Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Brampton will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners with regards to this property and will reach an agreement prior to the commencement of construction activities.

Bramalea 25 kV Feeder Route

The 25 kV Feeder route will run within the City of Brampton along the Kitchener Corridor from the Bramalea PS eastward for approximately 800m Land use on either side of this route generally consists of industrial uses, and commercial uses, As this connection is proposed to consist of an above ground feeder line in the existing right of way, there are no expected footprint impacts to adjacent land uses.

Mitigation Measures

No mitigation measures are required.

5.5.1.2 Net Effects

Neither the PS nor the 25kV Feeder is anticipated to negatively affect future development within the present zoning context, and no negative net effects to land use are anticipated.

5.5.2 OCS & Bridges: Section KT1 – UP Express Spur (at Highway 427) to Malton Station

5.5.2.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the two structures within KT-1 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification). They also do not require bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure. A full listing of the bridges within the Kitchener Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

5.5.2.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along KT-1. There are no anticipated net effects associated with bridges within KT-1.

5.5.3 OCS & Bridges: Section KT2 – Malton Station to Bramalea Station

5.5.3.1 Potential Effects and Mitigation Measures

5.5.3.1.1 Encroachment onto Adjacent Land Uses

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the six structures within KT-2 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However all (Derry Road Bridge, Airport Road Bridge, Hwy 407 North Bridge, Highway 407 South Bridge, Bramalea Road Bridge, and GO Bramalea Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure there are no land use effects associated with these modifications. A full listing of the bridges within the Kitchener Corridor is provided in Section 3 of Volume 1 of the EPR.

The City of Brampton is currently undertaking an environmental assessment which includes a proposal to widen the bridge on Bramalea Road that crosses the railway tracksrail ROW in this segment.

Mitigation Measures
Consultation with the City of Brampton will be required during Detailed Design to discuss the progress of the environmental assessment and to finalize design details related to road and bridge projects. OCS attachments may be required in cases where bridges are widened.

5.5.3.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along KT-2. There are no anticipated net effects from the modifications of bridges within KT-2.

5.6 Socio-Economic

Please refer to Appendix E2 for a description of the methodology followed for assessment of socio-economic impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in **Appendix E2**.

5.6.1 Bramalea PS & 25kV Feeder Route

5.6.1.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed Bramalea PS location and therefore there will be no footprint impacts to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Kitchener corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 5.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 5.8 and 5.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 5.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 5.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Kitchener corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

5.6.1.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

5.6.2 OCS & Bridges: Sections KT-1 to KT-2

5.6.2.1 Potential Effects and Mitigation Measures

There are no sensitive facilities adjacent to the OCS impact zone in KT-1 or KT-2, and therefore there will be no footprint effects to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Kitchener corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 5.7 as well as the Air Quality Assessment Report contained in Appendix F*
- *Noise and Vibration – see EPR Volume 3 Section 5.8 and 5.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 5.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 5.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Wildwood Park is the only large park that borders the Kitchener rail corridor. There are no anticipated adverse effects on this recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the City of Mississauga will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Kitchener corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

5.6.2.2 Net Effects

Net effects to sensitive facilities and recreational amenities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF related to the Kitchener Corridor, refer to the respective reports listed above.

5.7 Air Quality

Please refer to Appendix F2 for a description of the methodology followed for assessment of air quality impacts. Additional details can be found in the Air Quality Impact Assessment Report contained in **Appendix F2**.

Electrification of the GO Rail Network will result in the reduction of diesel emissions (due to electric powered trains) which will have a benefit to local air quality near the rail corridors. The increased electricity generation will generate some pollutants through the combustion of fossil fuels, but overall the total air emissions will be lower as a result of the electrification. Similarly, the distribution of electricity via the Traction Power Facilities (and ancillary components such as gantries) and 25kV feeder routes does not produce air pollutants and therefore no impacts are anticipated and no mitigation measures are required. As such, no impacts are anticipated and no mitigation measures are required. As there will be a net benefit to air quality, post-construction monitoring is not necessary.

Further details related to the air quality assessment undertaken as part of the TPAP have been included in **Section 9.7.**

5.8 Noise

Recognizing that electrification of the GO network is a component of the over-arching Regional Express Rail plan, a comprehensive noise study was undertaken to examine the noise effects of the conversion to increased electric service[15] as part of the GO Rail Network Electrification TPAP.

The objective of the noise study was to assess the effects on noise levels due to the conversion from existing/present day (2015) diesel-based GO service levels (referred to as the Future No-Build scenario) to the Electric (2025) GO RER electric-based service levels (referred to as the Future Build Scenario), and to subsequently determine whether mitigation measures may be required to address adverse noise effects. The scope of the study examined noise effects due to electric RER GO service along the rail corridors as well as noise effects related to the proposed Tap locations and Traction Power Facilities.

It is noted that numerous (i.e., thousands of) receptors were included in the noise model and considered as part of the analysis; however in order to present the results in a comprehensible way for purposes of reporting, representative receptors were chosen to demonstrate the general conditions and sound levels modelled in the area.

[15] *The electric RER scenario will entail a mixed diesel and electric fleet.*

In order to carry out this detailed noise modeling exercise, several assumptions were established. Some of the key assumptions were as follows (note - this is not an exhaustive list, please refer to **Appendix G – Noise and Vibration Modelling Reports**):

- Present day 2015 diesel based GO service was modelled as the 'base case'. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Future (2025) electric based GO RER service levels were modelled as the 'future case'. It should be noted that the 2025 scenario includes a mixed GO fleet of diesel and electric trains. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Freight traffic was included/considered in the modelling. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports.**
- Data was gathered on existing noise barriers as well as planned noise barriers along the rail corridors and were included/considered in the modelling. Planned barriers were defined as: noise barriers that were identified/proposed as part of previously completed Metrolinx/GO Transit Environmental Assessment/TPAP studies. While it is recognized that not all of these barriers have been implemented at the time the assessment was completed, they were included/considered in the modelling. It should be noted these 'planned barriers' were not evaluated for technical feasibility.
- The scope of the study did not include a comprehensive analysis of the technical, operational, economical, or administrative feasibility of implementing noise mitigation measures. Rather, a preliminary assessment of technical feasibility was completed.
- Noise sources associated with GO diesel and/or GO electric rail activity include:
    - Moving trains (applicable to all trains);
    - Idling trains at each station (applicable to all trains);
    - Road crossings signals (applicable to all trains);
    - Crossovers and Switches (applicable to all trains);
    - Wheel squeal (applicable to all trains); and
    - Pantograph (applicable to electric trains only).

A complete list of all assumptions applied can be found in the **Appendix G – Noise and Vibration Modelling Reports.**

Future/Commited Land Use

As per the 1995 MOEE / GO Transit Protocol, noise and vibration impacts are evaluated at lands which have been committed for (future) sensitive land uses. Committed uses beyond existing developments include: approved site plans, approved condominium plans or draft approved plans of subdivision. As part of carrying out the noise/vibration modelling work, this data was requested from the municipalities located within the Electrifciation TPAP study area. It should be noted that the only data that was available/provided was from the City of Toronto for approved building permits for new residential uses, therefore this data was reviewed and included in the assessment. Modelling was completed for all receptors identified through review of this data; results are presented for selected representative receptors.

For those sections of the corridor outside of the City of Toronto, a screening level assessment was conducted based on the limited detail provided in the available data on planned developments provided for municipalities other than the City of Toronto. The screening level assessment was designed to flag potential planned areas of development that may experience Adjusted Noise Impacts of greater than 5 dB based on the limited information available. This assessment was completed for the Electric RER scenario only and does not include the investigation of barriers within these areas. Notwithstanding this, the reports contained in **EPR Appendix G** include figures showing flagged potential planned areas of (future) development that were provided by their respective municipalities. Metrolinx will use this information for consideration of noise mitigation for new planned developments (if approved by the relevant municipalities) during the detail design stage as appropriate.

5.8.1 Credible Worst Case Scenario

The credible worst-case scenario is based on established service goals upon which the minimum infrastructure needs were determined. Increase to the service levels would require additional infrastructure due to operational and safety considerations. Current rail regulations are principally governed by Transport Canada and the US Federal Rail Administration; while Metrolinx, CN and CP are the principal sources of operational policies, standards, and rules. Other contributors to rail policy are the American Railway Engineering and Maintenance of Way Association (AREMA) and the American Public Transportation Association (APTA). Collectively, these regulators and associations set limits on how railways are designed, operated and maintained. Therefore the proposed infrastructure and service levels represent a credible worst-case scenario.

5.8.2 Ambient Sound Levels

5.8.2.1 Along the Rail Corridors

According to the MOEE/GO Protocol, ambient noise is the sound existing at a receptor in the absence of all noise from the GO Transit rail project. Ambient noise can be used as a component of the sound level objective, in combination with the sound level from any existing rail activity. The ambient levels are primarily due to noise from local road traffic and surrounding industry.

Ambient noise from road traffic and other background noise sources including industry was assumed to be negligible compared to existing rail traffic noise at most receptors near the rail corridor, and not a significant factor in determining the desirable sound level objective. Therefore, ambient noise was not assessed.

5.8.2.2 At Traction Power Facilities

The sound level objective for traction power facilities is the higher of the exclusion limit values for L_{EQ} (1-hr) in NPC-300 or the minimum background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the traction power facilities. Therefore, the exclusion limits were adopted as the desired sound level objectives.

5.8.3 Rail Activity Sound Levels

5.8.3.1 CADNA/A MODELLING

The MOEE/GO Protocol stipulates the use of a model known as Sound from Trains Environmental Analysis Method (STEAM) for predicting rail traffic noise levels. STEAM was developed by the MOECC (MOECC, 1990). The present study deviated from this guidance in that the rail traffic noise levels were modelled using the “Federal Noise and Vibration Impact Assessment” (FTA Protocol) (FTA, 2006) incorporated in Cadna/A. Cadna/A allows for the modelling of complex railway schemes including curves, parallel and intervening tracks which cannot be easily assessed using STEAM. Cadna/A is software that includes the implementation of the FTA noise propagation algorithms and as well as aspects of ISO 9613 algorithms (ISO 1994, ISO 1996). Refer to **EPR Appendix G** for a copy of the correspondence from Metrolinx to MOECC on the use of CADNA/A.

The existing, Diesel RER and Electric RER noise levels were modelled for the entire Study Area. Results at each discrete receptor were used to establish the adjusted noise impact of the Diesel RER scenario relative to the existing scenario, as well as that of the Electric RER scenario relative to the existing scenario.

As per the FTA Protocol, the diesel trains and electric trains were modelled with a noise source height of 2.4 metres (8 ft) and 0.6 metres (2ft), respectively. The noise from a diesel train is dominated by the engine (located at approximately 2.4 metres above the rail) with a lesser contribution from the wheels (located at approximately 0.6 metres above the rail). The noise from an electric train, on the other hand, is dominated by wheel noise (emitted approximately 0.6 metres above the rail), since the electric engine is relatively quiet.

Topography was included in the Cadna/A model to take into consideration the elevation differences of the railway, receptors and the intervening terrain. The topographical features were assumed to be the same in the existing and future scenarios. High-resolution (i.e., 5 metres) topographical information was obtained from public databases (Ministry of Natural Resources and Forestry, 2016).

“Retained” Noise Barriers

The diesel and electric locomotives were defined using the FTA standards implemented into Cadna/A. At the time of the original noise assessment, the electric locomotive train type was defined mathematically within Cadna/A with a "K" constant[16] that differed from the "K" constant defined in the FTA model. Metrolinx presented the results of the preliminary noise modelling for electric RER service at a series of public consultations throughout the TPAP.

Following the original assessment, an option within Cadna/A to use the "K" constant which corresponds to the FTA model was created by Datakustik, the developers of the Cadna/A software. Re-assessment using this updated Cadna/A option showed that a limited number of areas where mitigation was previously identified using the preliminary noise modelling no longer achieves an increase of 5 dB or more with the updated Cadna/A noise modelling. This was a result of the correction to the noise modelling input that more accurately reflects the quieter nature of electrified locomotives. Metrolinx believes these supplemental areas should still be included for consideration of noise mitigation. As a result, the locations of these particular mitigation barriers are identified as "retained mitigation barriers" throughout **EPR Appendix G**, and in the mapping provided in **EPR Appendix S**. Refer to the orange coloured lines/symbols shown on the Kitchener Corridor EPR Appendix S maps.

5.8.4 Traction Power Facilities – Predicted Noise Impacts

Generally, the traction power substations are comprised of two power transformers and a control / switchgear room and the paralleling stations and switching stations are comprised of two autotransformers and a control / switchgear room.

The sound power level generated by a typical 10 MVA transformer, estimated at approximately 87 dBA (Metrolinx, 2014), was used as an estimate for the power transformers at the traction power substations and the autotransformers at the switching stations. The MOECC requires that a 5 dB tonal penalty be applied to sources exhibiting a humming characteristic. As transformers are known to exhibit tonal characteristics, the 5 dB penalty was applied to all the transformers.

The noise impacts from the traction power facilities were evaluated at nearby receptors and are summarized in **Table 5-11**. The predicted noise impacts from the traction power facilities at nearby receptors were below the MOECC applicable exclusion limits. Therefore, no mitigation measures were investigated for these facilities.

[16] The "K" constant is un unnamed parameter in the FTA calculations, which describes the locomotive type (i.e., passenger diesel, electric, DMU, etc.).

Table 5-11 Noise Impacts –Kitchener Traction Power Facilities

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
R46	Bramalea PS	Façade	Daytime\Evening	31.4	Class 1	50	Yes
			Nighttime	31.4		45	Yes
		Outdoor Area	Daytime\Evening	30.1		50	Yes

Notes:
[1] Daytime occurs from 0700-1900h. Evening occurs from 1900h-2300h. Nighttime occurs from 2300-0700h.
[2] Applicable worst-case NPC-300 Class 1 Area sound level limit.

5.8.5 Kitchener Corridor - Adjusted Noise Impact of the Electric RER Scenario

The following section summarizes the results of the noise modelling analysis for the Kitchener corridor. The Adjusted Noise Impact between Existing and Electric RER noise levels for Kitchener is summarised in **Table 5-12.**

Impact ratings for the 3 representative receptors listed in the table can be summarised as follows:

- daytime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- daytime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB);
- 1 nighttime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB); and
- 2 nighttime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99) dB.

There are no Adjusted Noise Impacts in the Electric RER scenario that were deemed to be Significant (i.e., between 4.99 and 9.99 dB)or Very Significant (i.e. greater than 10 dB increase).

As all Adjusted Noise Impacts for the Electric RER scenario were predicted to be not significant (i.e. there was less than 5 dB increase); investigation of noise mitigation was not required.

5.8.6 Kitchener Corridor – Retained Noise Barriers

he noise barriers that were recommended as a result of the *original assessment* were retained as part of the proposed mitigation. The locations of these barriers are shown as orange coloured lines/symbols shown on the Kitchener Corridor EPR Appendix S maps. The *original assessment* is defined as the previously completed noise assessment reflecting the electric locomotive train type defined mathematically within Cadna/A with a "K" constant that differed from the "K" constant defined in the FTA mode as described above.

Table 5-12: Adjusted Noise Impacts of the Electric RER Scenario in Comparison to Existing GO Service – Kitchener Corridor

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R44	Daytime	59.4	63.5	59.4	4.1	Noticeable	No	No
	Nighttime	57.1	60.5	57.1	3.4	Noticeable	No	
R45	Daytime	56.1	60.3	56.1	4.2	Noticeable	No	No
	Nighttime	53.2	57.5	53.2	4.3	Noticeable	No	
R46	Daytime	20.5	21.5	55.0	-33.5	Insignificant	No	No
	Nighttime	15.6	19.2	50.0	-30.8	Insignificant	No	

Notes:
[1] The LEQ (Day) is evaluated for a 16-hour period (i.e., from 0700h to 2300h) and the LEQ (Night) is evaluated for an 8 hour period (i.e., from 2300h to 0700h).
[2] The objective is the higher of the ambient sound level, combined with the existing rail activity, or 55 dBA (Daytime) / 50 dBA (Night-time).
[3] The potential to mitigate is considered when a significant (or greater) impact is predicted. This is equivalent to an increase of 5dB or greater, relative to the objective level, as per the MOEE / GO Protocol for Noise and Vibration Assessments. An adjusted noise impact greater than 5 dB requires the investigation of mitigation.

5.8.7 Approach to Investigation of Mitigation - Operational Noise

Based on the Adjusted Noise Impacts resulting from a project, an investigation of noise mitigation measures is required. MOEE/GO Protocol includes the following mitigation guidance:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering, economic and administrative feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

For the purposes of this study, it was assumed that noise mitigation would be limited to locations within the GO Transit right-of-way, and to be considered feasible, the mitigation measures should achieve at least a 5 dB reduction in noise at the first row of affected receptors. The ID numbers of the barriers correspond to the ID numbers of the representative first row receptors.

If the Adjusted Noise Impact at a receptor is deemed significant during the daytime period, technical feasibility of a noise barrier was evaluated based on the noise reduction achieved during the daytime period only. Similarly, if the Adjusted Noise Impact at a receptor was deemed significant during nighttime period, technical feasibility of a noise barrier is evaluated based on the noise reduction achieved during the nighttime period only. If the Adjusted Noise Impacts at a receptor were deemed significant during both the daytime and nighttime periods and noise reduction resulting from a noise barrier is at least 5 dB in either the daytime or nighttime period, the noise barrier was deemed technically feasible.

Noise barriers can be formed of earthen berms, engineered noise walls, or some combination of the two. Where earthen berms are used, side slopes of 3:1 should be used for drainage and erosion control and right-of-way maintenance. Where noise walls are to be used, they should be free of gaps and cracks, and have a minimum surface density (mass per unit of face area) of 20 kg/m^2 (4 lb. per sq. ft.). It is preferable that barriers are sound absorptive at least on the railway side, and this is mandatory in situations where parallel barriers (e.g., barriers on both sides of a railway) are proposed.

Metrolinx will use barriers with a height of 5 metres for all new or replacement noise barriers. Higher noise barriers require specially engineered footings, which may not be technically and/or economically feasible to implement. The investigation of mitigation was limited to noise barriers with heights of 5 metres.

During detailed design, each location identified as a technically feasible noise mitigation location along each rail corridor will be further reviewed to determine the administrative, operational, economic and technical feasibility and to further define what type of mitigation will be implemented.

5.8.8 Kitchener Corridor - Investigation of Mitigation

Technically feasible and non-technically feasible noise barriers are shown in **Appendix S.** Of the 2 barriers investigated for the Electric RER scenario, both are considered technically feasible, as they achieve at least a 5 dB reduction in sound levels at nearby receptors. For details regarding length of barrier, side of rail ROW, approximate number of receptors shielded by barrier, etc. please refer to **Appendix G - Noise and Vibration Assessment Report.**

For all locations where there will be a change in noise levels of 5dB or more and where noise barrier locations deemed either technically and non-technically feasible (as part of the study carried out for the TPAP), Metrolinx will undertake more detailed analysis during Detailed Design to assess technical, economic, administrative and operational feasibility as per the MOECC Protocol to finalize the type and locations of noise mitigation along the rail corridors. In addition, Metrolinx will investigate other forms of noise mitigation such as train technology, rail dampeners etc. during Detailed Design to assess feasibility. The MOEE/GO Protocol provides the following mitigation guidance with respect to noise mitigation measures:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering and economic feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

Metrolinx will continue to consult with the public during Detailed Design with respect to further assessment and implementation of noise mitigation along the rail corridors.

5.9 Vibration

The MOEE/GO Protocol outlines desired objectives for vibration levels from GO Transit projects. The requirement to investigate vibration mitigation focuses on the change between the existing vibration levels and the future vibration levels. Change in vibration levels may occur under the following circumstances: change in track alignment, addition of track, and change/addition of special track work (such as switches).

It should be noted that vibration impacts are associated with the characteristics of individual trains (especially the weight of the locomotive) and are not related to the increased rail traffic associated with future RER service.

Vibration effects were predicted in accordance with the methods of the United States Department of Transportation - Federal Transit Administration (FTA, 2006). Vibration levels were expressed in terms of root-mean-square (RMS) velocity in the vertical direction, which is the dominant axis for vibration generated from mobile sources such as trains and most closely correlated with human annoyance and perceptibility. The relative change between existing and future vibration levels is presented as a percentage. For further details ad supporting information please refer to **Appendix G - Noise and Vibration Assessment Report.**

5.9.1 Applicable Criteria

The desirable objective of the MOEE/GO Protocol is that the RMS velocity of vibration produced by the future GO Transit operations at a sensitive receptor should not exceed:

- 0.14 mm/s; or
- The existing vibration levels where existing operations already produce vibration that exceeds 0.14 mm/s.

Furthermore, the MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the RMS velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

The FTA vibration level predictions were calibrated by measuring existing vibration levels at a small selection of locations in the vicinity of the GO network. The measurements informed the selection of appropriate adjustment factors. The adjustment factors in the FTA vibration calculations account for:

- Vehicle speed;
- Track type and track conditions;
- Type of locomotive power; and
- Condition of wheels (i.e., wheel wear).

The intent of the MOEE/GO protocol's impact assessment is to evaluate change in vibration between the pre-project and post-project scenarios. One method (i.e. modelling) was chosen to evaluate both scenarios to ensure consistency. Comparing existing measured vibration levels to future modelled vibration levels inherently introduces an additional source of uncertainty into the impact assessment. For this reason, the assessment evaluates modelled existing vibration levels against modelled future vibration levels, as opposed to measured existing vibration levels against modelled future vibration level. At the detailed design stage, verification measurements of existing conditions at receptors where the greatest effect is expected and a reasonable number of additional receptors will be conducted to validate FTA vibration calculations.

A literature review was conducted to compare the gross weight of a diesel MP40 locomotive and an electric locomotive with a similar horsepower rating. It was determined that the difference in locomotive weight was not significant enough to have an impact on the vibration levels; therefore, a single set of predicted vibration levels applies to both diesel trains and electric trains.

5.9.2 Kitchener Corridor - Vibration Impacts Electric RER Scenario

Within the Kitchener Corridor, It was identified that receptor R13 was the closest receptor to the addition of track; other representative receptors (R30, R36 and R45) were chosen to assess impacts at various distances from the existing and future outer track. The vibration assessment focused on the Adjusted Vibration Impacts at the aforementioned receptors.

The predicted existing and future vibration levels and change in vibration levels for a GO train pass-by, passenger train and a freight train are presented in **Table 5-13.**

Neither, the existing and nor future vibration for GO Train traffic at the nearest receptor near the track upgrade were predicted to exceed the lowest MOEE/GO Protocol objective of 0.14 mm/s; and therefore, mitigation has not been recommended.

The approximate locations of trackwork and switches requiring mitigation are presented in **Appendix S**. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage.

Table 5-13 Vibration Impact Assessment Results of the Electric RER Scenario – Kitchener Rail Corridor

Train Type Assessed	Receptor [1]	Speed Over Track (km/h)	Special Trackwork Present?	Distance to Rail Component		Predicted Vibration Level		Objective (mm/s)	% Above Objective	Mitigation Required? [2]
				Existing (m)	Future (m)	Existing (mm/s)	Future (mm/s)			
Go Train	R13	128	No	30	20	0.093	0.14	0.14	n/a	No
Freight Train		40				0.31	0.52	0.31	66%	Yes
Go Train	R30	129	No	65	60	0.04	0.04	0.14	n/a	No
Freight Train		40				0.13	0.14	0.14	n/a	No
Go Train	R36	128	No	40	35	0.07	0.08	0.14	n/a	No
Freight Train		40				0.22	0.26	0.22	19%	No
Go Train	R45	128	No	50	45	0.05	0.06	0.14	n/a	No
Freight Train		40				0.16	0.19	0.16	13%	No

Notes:
[1] See Figure 2b, 2d and 2h for receptor locations.
[2] The MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the vibration velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels). The future vibration levels do not exceed the objective, therefore no mitigation is required.

5.10 Visual

Please refer to Section **3.10** for a description of the methodology followed for assessment of visual impacts. Additional details can be found in the Visual Impact Assessment Report contained in **Appendix H2.**

5.10.1 Bramalea PS & 25kV Feeder Route

5.10.1.1 Potential Effects and Mitigation Measures

The Bramalea PS is located on an industrial property adjacent to the south side of the railroad next to the Dixie Drive underpass. The site will not be visible from Dixie Drive because of the retaining walls on the approach to the underpass. All the surrounding development is industrial. There are negligible visual impacts and no mitigation measures are required.

The Bramalea 25kV feeder route (see Map G-6 in the Visual Impact Assessment Report) follows the Kitchener Corridor through an industrial area. There are negligible visual impacts and no mitigation measures are required.

Figure 5-5: Typical Paralleling Station (PS)

5.10.1.2 Net Effects

There will be no anticipated net visual effects.

5.10.2 OCS & Bridges: Section KT-1 – UP Express Spur (at Highway 427) to Malton Station

5.10.2.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section KT-1 is entirely industrial, except for Malton GO Station and Malton Greenway. The improved areas of Malton Greenway are distant from the rail corridor, with those areas close to the tracks being natural scrub vegetation with no paths for access. This section is classified as having negligible visual impacts.

Mitigation Recommendations:
No mitigation required.

GO Stations

Malton GO Station is the only station in this section and is classified as potential low visual impact. Platforms and the approaches to platforms provide clear close up views of the rail corridor and any infrastructure placed in it

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there are two rail overpasses, one over Goreway Drive and one over a small creek that runs through Wildwood Park to the north. These bridges are located in undeveloped areas and will have negligible visual impact on the surrounding viewshed (see **Table 5-14**). Refer **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 5-14: Summary of Rail Overpasses – Section KT-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
KT-1	C-1	Goreway Drive	Rail Overpass	N/A	No Negligible Visual Impact
KT-1	C-1	Mimico Creek	Rail Overpass	N/A	No Negligible Visual Impact

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on views from the surrounding area. Among these areas, Malton GO Station is the most important feature requiring careful design consideration.

5.10.2.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along KT-1 will be negligible.

GO Stations

Residual visual effects due to OCS installation within the Malton GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above including placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

5.10.3 OCS & Bridges: Section KT-2 – Malton Station to Bramalea Station

5.10.3.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

West of Malton GO Station, the railroad passes through a residential area where the rear yards of homes back onto the railroad tracks. These homes are located more than 8 metres from the railroad, and are classified as potential moderate visual impact. Otherwise, the remainder of this section is industrial and classified as negligible impact.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of ‘high’ visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Bramalea GO Station is the only station in this section and is classified as having potential low visual impact. Platforms and the approaches to platforms provide clear close up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Bridges/Rail Overpasses

There are three bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

No special treatment is required for the Highway 407 Bridges. However, the Bramalea Road Bridge is a wide roadway in an industrial area. Though there are sidewalks on either side of the bridge, few pedestrians are anticipated to be using this bridge. These bridges are classified as having potential low visual impact (see **Table 5-15**).

Table 5-15: Summary of Bridges – Section KT-2

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
KT-2	C-3	Highway 407 North	Bridge	No	Yes Low Visual Impact
KT-2	C-3	Highway 407 South	Bridge	No	Yes Low Visual Impact
KT-2	C-4	Bramalea Road	Bridge	No	Yes Low Visual Impact

In addition, there are two rail overpasses over Derry Road and Airport Road. These overpasses are located close to residential areas and close to the Malton GO Station, and are classified as having potential low visual impacts due to the installation of new OCS infrastructure (See **Table 5-16**).

Refer **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 5-16: Summary of Rail Overpasses – Section KT-2

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
KT-2	C-2	Derry Road	Rail Overpass	N/A	Yes Low Visual Impact

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
KT-2	C-2	Airport Road	Rail Overpass	N/A	Yes Low Visual Impact

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the views from the surrounding area. Among these areas, Bramalea GO Station is the most important feature requiring careful design consideration.

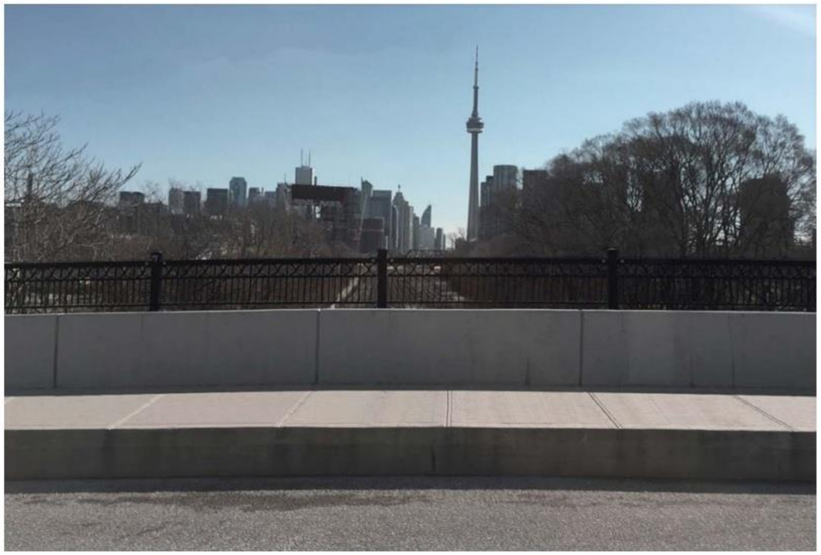
As part of detailed design, Metrolinx's Design Excellence Committee will be engaged to review possible design treatments/option for enhancing the aesthetics of bridge barriers where feasible/required. It is anticipated that the basis of the protection barrier will be a post and panel (solid-faced) design with customizable panels toward suiting visual preferences (in consultation with the applicable bridge owners as appropriate), such as:

- Multilane, restricted access highways and non-visually sensitive locations;
- Visually sensitive locations;
- Structures of heritage value or sensitivity.

An example of a bridge barrier in a visually sensitive location has been provided in **Figure 5-6**. Additional design option examples have been provided in **Figure 5-7** and **Figure 5-8.** It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

Figure 5-6: Example Of Bridge Barrier In A Visually Sensitive Location

Before



After

Figure 5-7: Illustrative Bridge Barrier Design Options (Examples)

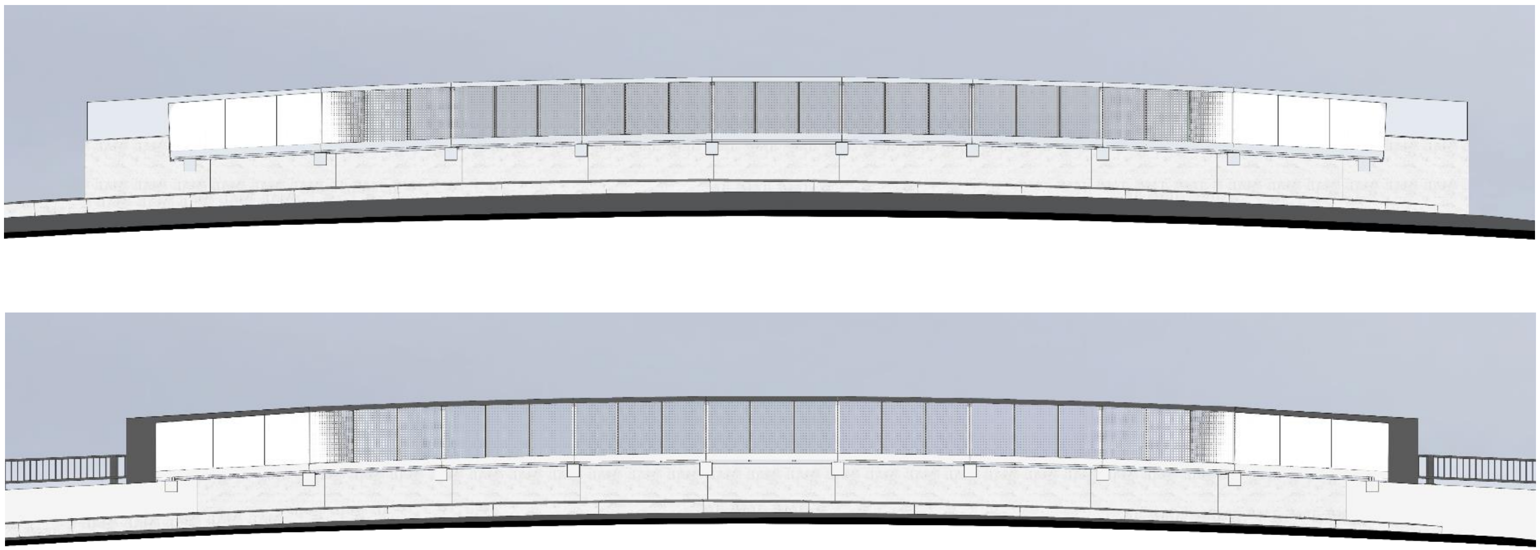


Figure 5-8: Bridge Barrier Design Option Example (Glass Back View)

5.10.3.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along KT-2 such as residential areas with homes more than 8 metres from the railroad will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Bramalea GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered low.

5.11 Utilities

A Utilities Impact Assessment study was completed as part of the TPAP to carry out preliminary identification of existing utilities within the study area and to identify possible utility conflicts between these utilities and the planned electrification infrastructure. Conflicts were characterized under the following three categories:

1. **Spatial Conflicts**

Spatial conflicts occur where OCS structures and foundations occupy the same physical space as overhead or buried utilities. Spatial conflicts can also occur where utilities attached to bridges occupy the same space as proposed bridge barriers or bridge barrier fixing points. Overhead transmission, distribution, and communication lines are identified as potential spatial conflicts if they are located within the OCS impact zone and have a vertical clearance from top of rail of less than 10.7 metres. Buried utilities running parallel to the rail corridor within the OCS impact zone are identified as potential spatial conflicts, irrespective of depth.

2. **Electrical Zone of Influence Conflicts**

"Influence" describes the unintended effect of electrified OCS wires on adjacent infrastructure and includes the induction of current (counteracted by grounding and bonding) and electromagnetic interference (EMI). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the Overhead Contact Line Zone (OCLZ) (see **Figure 5-9**). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the OCLZ. Because vertical spatial clearance requirements (10.7 metres) are more conservative than those shown in **Figure 5-9**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

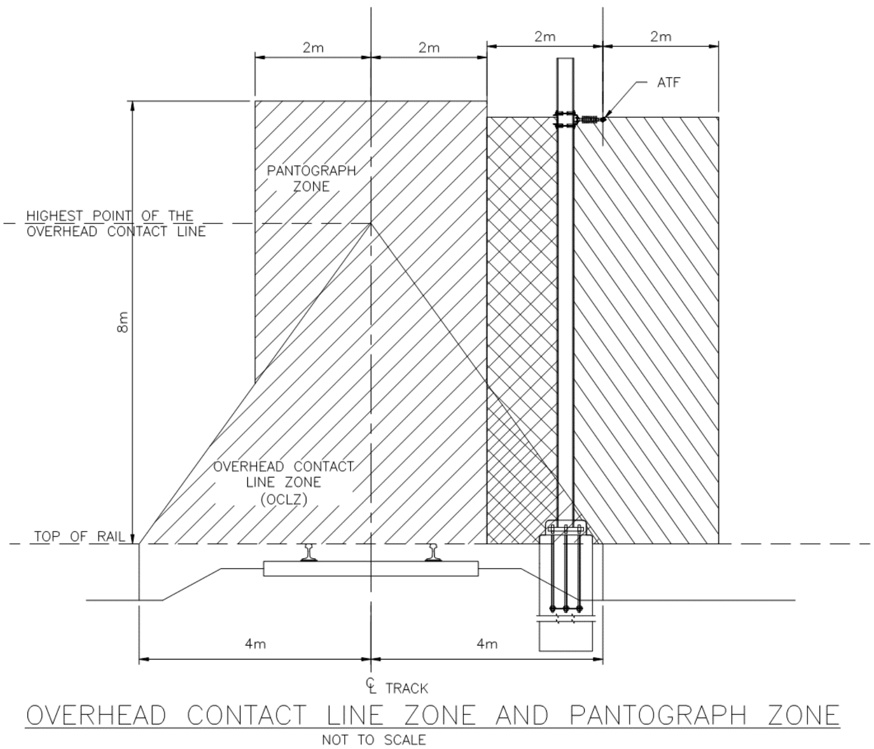
Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements (5.0 metres from centerline of track as captured in the OCS impact zone) are more conservative than the OCLZ clearance requirements (4.0 metres from centerline of track as shown in **Figure 5-9**) those shown in **Figure 5-9**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

Infrastructure that is considered an electrical zone of influence conflict is also a spatial conflict. The resolution for a spatial conflict (usually relocation) will also remove the utility from the electrical zone of influence and thus grounding and bonding will not be required. Existing utilities in the rail corridor outside of the electrical zone of influence may be grounded and bonded at the request of the owner but it is not a requirement for Electrification as the effects of stray current are anticipated to be minimal. Future utilities in the rail corridor outside of the electrical zone of influence should be grounded and bonded at installation.

With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.

Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

Figure 5-9 Overhead Contact Line Zone



3. Electrical Clearance Conflicts

Electrical clearance is defined as the minimum distance between live components and grounded structures or rolling stock. Electrical clearance conflicts occur where the minimum required vertical (see **Table 5-17**) or parallel (see **Table 5-18**) clearances are not met. Electrical clearance does not apply to buried utilities.

Table 5-17 Vertical Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Min. Vertical Clearance Between Wires Crossing Each Other (m)	Min. Distance Above OCS (m) for Max. Wire Sag (Measured From Track)
>0 ≥ 150kV	5.0	15.7
>150kV ≥ 250kV	6.5	17.2
250kV	8.0	18.7

Table 5-18 Lateral Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Minimum Distance (m)
>0 ≥ 150kV	5.2
>150kV ≥ 250kV	6.7
250kV	8.2

Additional details on the methodology followed for assessment of utilities impacts can be found in the Utilties Impact Assessment Report contained in **Appendix I2**.

5.11.1 Bramalea PS & 25kV Feeder Route

5.11.1.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 5-19 Bramalea PS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Conduit	Unknown	Metallic	Steeles Ave E
Enbridge Gas	Buried	Gas	8''	Metallic	Dixie Rd
Enbridge Gas	Buried	Gas	8''	Metallic	Steeles Ave E
Enbridge Gas	Buried	Gas	8''	Metallic	Dixie Rd
Enbridge Gas	Buried	Gas	8''	Metallic	Dixie Rd
Region of Peel	Buried	Water	300mm	Metallic	Steeles Ave E
Region of Peel	Buried	Storm	1350mm	Reinforced Concrete	Steeles Ave E
Region of Peel	Buried	Water	900mm	Reinforced Concrete	Steeles Ave E
Region of Peel	Buried	Sewer	450mm	Other	Steeles Ave E
Region of Peel	Buried	Water	300mm	Plastic	Dixie Rd
Region of Peel	Buried	Storm	300mm	Concrete (Unreinforced)	Dixie Rd
Region of Peel	Buried	Sewer	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Sewer	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Sewer	Unknown	Unknown	Steeles Ave E
Region of Peel	Buried	Storm	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Storm	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Ditch Culvert	600mm	Metallic	Dixie Rd
Region of Peel	Buried	Storm	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Storm	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Storm	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Storm	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Storm	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Storm	Unknown	Unknown	Steeles Ave E
Region of Peel	Buried	Storm	Unknown	Unknown	West Dr
Region of Peel	Buried	Storm	Unknown	Unknown	West Dr
Region of Peel	Buried	Storm	Unknown	Unknown	West Dr
Region of Peel	Buried	Storm	Unknown	Unknown	West Dr
Region of Peel	Buried	Storm	Unknown	Unknown	West Dr

Owner	Utility Class	Description	Size	Material	Nearest Street
Region of Peel	Buried	Storm	300mm	Concrete (Unreinforced)	West Dr
Region of Peel	Buried	Water	100mm	Unknown	Steeles Ave E
Region of Peel	Buried	Water	250mm	Unknown	Dixie Rd
Region of Peel	Buried	Storm	600mm	Unknown	Dixie Rd
Region of Peel	Buried	Sewer	300mm	Unknown	Dixie Rd
Region of Peel	Buried	Water	250mm	Unknown	Steeles Ave E
Region of Peel	Buried	Water	250mm	Unknown	Steeles Ave E
Region of Peel	Buried	Water	300mm	Unknown	Steeles Ave E
Region of Peel	Buried	Water	250mm	Unknown	Steeles Ave E
Region of Peel	Buried	Water	250mm	Unknown	Steeles Ave E
Region of Peel	Buried	Water	250mm	Unknown	Steeles Ave E
Region of Peel	Buried	Water	250mm	Unknown	Steeles Ave E
Region of Peel	Buried	Water	300mm	Unknown	Dixie Rd
Region of Peel	Buried	Water	Unknown	Unknown	Dixie Rd
Region of Peel	Buried	Water	250mm	Unknown	Rail
Region of Peel	Buried	Water	250mm	Unknown	West Dr
Region of Peel	Buried	Water	250mm	Unknown	West Dr
Region of Peel	Buried	Water	250mm	Unknown	West Dr
Region of Peel	Buried	Water	250mm	Unknown	West Dr
Region of Peel	Buried	Water	250mm	Unknown	Dixie Rd
Region of Peel	Buried	Water	250mm	Unknown	Dixie Rd
Region of Peel	Buried	Water	250mm	Unknown	Dixie Rd
Region of Peel	Buried	Water	250mm	Unknown	West Dr
Region of Peel	Buried	Water	300mm	Unknown	Dixie Rd
Region of Peel	Buried	Water	150mm	Unknown	Dixie Rd
Region of Peel	Buried	Ditch Culvert	300mm	Metallic	Rail
Region of Peel	Buried	Storm	Unknown	Unknown	Steeles Ave E
Region of Peel	Buried	Ditch Culvert	300mm	Metallic	West Dr
Region of Peel	Buried	Sewer	250mm	Unknown	Steeles Ave E
Region of Peel	Buried	Sewer	400mm	Other	Steeles Ave E
Rogers	Overhead	Conduit	Unknown	Metallic	Steeles Ave E
Rogers	Overhead	Conduit	Unknown	Metallic	Dixie Rd
Rogers	Buried	Conduit	Unknown	Plastic	CN Rail
Unknown	Buried	Cable	Unknown	Metallic	West Dr
Unknown	Buried	Gas	Unknown	Unknown	West Dr
Unknown	Buried	Electrical	Unknown	Unknown	West Dr
Unknown	Overhead	Electrical	Unknown	Unknown	CN Rail

Table 5-20: Bramalea 25kV Feeder Route Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
17.69		Rogers	Buried – Parallel to ROW	Conduit	Unknown	Plastic	Dixie Rd
17.75	18.70	Bell	Buried – Parallel to ROW	Cable	Unknown	Plastic	Dixie Rd
17.75		Rogers	Buried – Parallel to ROW	Conduit	Unknown	Plastic	Dixie Rd
17.75	18.53	Allstream	Buried	Cable	Unknown	Plastic	Dixie Rd
17.83		Rogers	Buried – Parallel to ROW	Conduit	Unknown	Plastic	Dixie Rd
18.09	18.23	Peel Region	Buried – Parallel to ROW	Storm	1120x1830		Dixie Rd
18.09		Peel Region	Buried – Crossing ROW	Ditch Culvert	Unknown		Dixie Rd
18.21		Rogers	Overhead	Conduit	Unknown	Unknown	Dixie Rd
18.21		Rogers	Buried	Conduit	75mm	Plastic	Dixie Rd
18.23		Peel Region	Buried – Crossing ROW	Water	Unknown		Dixie Rd
18.23		Peel Region	Buried – Crossing ROW	Storm	Unknown		Dixie Rd
18.23		Enbridge Gas	Buried – Crossing ROW	Gas	8''	Metallic	Dixie Rd
18.24		Rogers	OH – Crossing ROW	Conduit	Unknown	Plastic	Dixie Rd

Using the criteria set out in Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

5.11.1.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

5.11.2 OCS & Bridges: Section KT-1 – UP Express Spur (at Highway 427) to Malton Station

5.11.2.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 5-21: Section KT-1 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
13.52	11.08	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Hwy 427 to Steeles Ave W	Y	N	N
13.53	13.61	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Hwy 427 to Goreway Dr	N	Y	N
13.53	13.61	Unknown	OH - Parallel to ROW	Conduit	Unknown	Plastic	Hwy 427 to Goreway Dr	N	Y	N
13.54	13.62	Unknown	OH - Parallel to ROW	Conduit	Unknown	Plastic	Hwy 427 to Goreway Dr	N	Y	N
13.61		Peel Region PSN	OH - Crossing ROW	Conduit	24ct	Plastic	Goreway Dr	Y	Y	Y
13.61		Enersource	OH - Crossing ROW	Electrical	11kV	Metallic	Goreway Dr	Y	Y	N
13.64		Allstream	Buried - Crossing ROW	Conduit	0.1016m	Metallic	Goreway Dr	Y	N	N
14.22	14.23	Unknown	Buried - Parallel to ROW	Ditch Culvert	Unknown	Other	Caravelle Dr	Y	N	N
14.22	14.23	Unknown	Buried - Parallel to ROW	Ditch Culvert	Unknown	Other	Caravelle Dr	Y	N	N
14.42	15.02	Unknown	OH - Parallel to ROW	Conduit	Unknown	Plastic	Malton GO Station	N	Y	N
14.44	15.03	Enersource	OH - Parallel to ROW	Electrical	11 to 33kV	Metallic	Derry Rd E to Airport Rd	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
14.55	15.04	Enersource	OH - Parallel to ROW	Electrical	11 to 33kV	Metallic	Airport Rd/Derry Rd	N	Y	N
14.55	14.73	Unknown	OH - Parallel to ROW	Conduit	Unknown	Plastic	Malton GO Station	N	Y	N
14.56		Enersource	OH - Crossing ROW	Electrical	11 to 33kV	Metallic	Derry Rd E	N	Y	N
14.71		Enersource	OH - Crossing ROW	Electrical	Unknown	Metallic	Malton GO Station	N	Y	N
14.88		Enersource	OH - Crossing ROW	Electrical	27.6/44kV	Metallic	Derry Rd E	Y	Y	N
14.89	14.97	Unknown	OH - Parallel to ROW	Conduit	Unknown	Plastic	Malton GO Station	N	Y	N

Mitigation/Avoidance Measures

- Further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Spatial and electrical conflicts will be mitigated by the removal, relocation, reconfiguration or burial of overhead utilities. Further consultation and coordination with affected utility companies will need to be undertaken during Detailed Design to confirm conflicts and to establish the preferred mitigation approach. In some cases, primarily relating to those utilities attached to bridges, further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Electrical zone of influence conflicts will be resolved by installing appropriate grounding and bonding measures to counteract electromagnetic interference (EMI). Because vertical spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- With regard to existing buried utilities, notification shall be provided to the third party of the anticipated AC electrification of the rail ROW.
- With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.
- Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

5.11.2.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

5.11.3 OCS & Bridges: Section KT-2 – Malton Station to Bramalea Station

5.11.3.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 5-22: Section KT-2 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
11.23		Unknown	OH - Crossing ROW	Electrical	Unknown	Other	Bramalea Rd	Y	Y	Y
11.35		Peel Region	Buried - Crossing ROW	Water	400mm	Reinforced Concrete	Bramalea Rd	Y	N	N
11.35		Bell	On Bridge	Conduit	1D	Plastic	Bramalea Rd	Y	N	Y
11.36		Bell	On Bridge	Cable	Unknown	Plastic	Bramalea Rd	Y	N	Y
11.38		Enbridge Gas	Buried - Crossing ROW	Gas	150mm	Metallic	Bramalea Rd	Y	N	N
11.38		Unknown	OH - Crossing ROW	Electrical	Unknown	Other	Bramalea Rd	Y	Y	N
11.38		Unknown	OH - Crossing ROW	Conduit	Unknown	Plastic	Bramalea Rd	Y	Y	N
11.73		Peel Region	Buried - Crossing ROW	Water	48"	Metallic	Steeles Ave E	Y	N	N
11.75		Bell	On Bridge	Duct Bank	8D	Reinforced Concrete	Steeles Ave E	Y	N	Y
11.77		Peel Region	Buried - Crossing ROW	Sewer	600mm	Other	Steeles Ave E	Y	N	N
11.78		Bell	On Bridge	Duct Bank	5D/9D	Reinforced Concrete	Steeles Ave E	Y	N	Y
11.78		Peel Region PSN	OH - Crossing ROW	Conduit	96/12ct	Plastic	Steeles Ave E	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
11.95	16.57	Bell	Buried - Parallel to ROW	Cable	Unknown	Plastic	Hwy 407 to Steeles Ave E	Y	N	N
14.96		Enersource	OH - Crossing ROW	Electrical	11 to 33kV	Metallic	Derry Rd E	Y	Y	N
14.96		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Derry Rd E	Y	Y	Y
14.96		Peel Region PSN	OH - Crossing ROW	Conduit	12ct	Plastic	Derry Rd E	Y	Y	Y
14.96	15.03	Peel Region PSN	OH - Parallel to ROW	Conduit	96ct	Plastic	Airport Rd	Y	Y	N
15.04		Enersource	OH - Crossing ROW	Electrical	11kV	Metallic	Airport Rd	Y	Y	N
15.04		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Airport Rd	Y	Y	Y
15.09	11.95	Rogers	Buried - Parallel to ROW	Conduit	36F	Plastic	Airport Rd to Steeles Ave E	Y	N	N
15.53		Enersource	OH - Crossing ROW	Electrical	13.8kV	Metallic	Hull St	Y	Y	N
15.62	16.21	Enersource	OH - Parallel to ROW	Electrical	44kV	Metallic	Drew Rd	N	Y	N
16.16		Enersource	OH - Crossing ROW	Electrical	Unknown	Metallic	Torbram Rd	N	Y	N
16.55		Hydro One	OH - Crossing ROW	Electrical	500kV	Metallic	Hwy 407	N	Y	N
16.57		Hydro One	OH - Crossing ROW	Electrical	500kV	Metallic	Hwy 407	N	Y	N
16.60		Hydro One	OH - Crossing ROW	Electrical	500kV	Metallic	Hwy 407	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
16.63		Hydro One	OH - Crossing ROW	Electrical	500kV	Metallic	Hwy 407	N	Y	N
16.65		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	Hwy 407	N	Y	N
16.66		Enersource	OH - Crossing ROW	Electrical	Unknown	Metallic	Hwy 407	Y	Y	N
16.85	12.35	Telus	Buried - Parallel to ROW	Conduit	144F	Plastic	Hwy 407	Y	N	N
16.97		Peel Region	Buried - Crossing ROW	Sewer	900mm	Metallic	Hwy 407	Y	N	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **5.11.2.1** also apply to KT-2.

5.11.3.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

5.12 EMI & EMF

This section provides a summary of the key potential EMI/EMF effects, mitigation measures, and (resultant) net effects. The impact assessment was carried out using the baseline conditions data summarized in the EMI/EMF Baseline Conditions Report which entailed a survey of existing EMI/EMF conditions throughout the study area including along the rail corridors, feeder routes and at Taps/TPF locations (see **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report**).

Please refer to Appendix J2 for a description of the methodology followed for assessment of EMI/EMF impacts. Additional details can be found in the Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Impact Assessment Report contained in **Appendix J2**.

The primary effects assessed with regard to electromagnetic compatibility (EMC) relate to human exposure, i.e., Extremely Low Frequency (ELF) Electromagnetic Fields (EMF).

With regard to Electromagnetic Interference (EMI), the primary concern is adverse effects on electronics.

5.12.1 Conservative 10 mG Reassessment Value

As part of carrying out the EMI/EMF Impact Assessment for the TPAP, a conservative value of 10.0 mG magnetic field strength was established as the threshold for which a measured location along the rail corridors or at Taps/TPFs would trigger the recommendation for re-assessing/confirming baseline EMF and EMI measurements during the next phase of the project and before operation commences. This value was based upon the values summarized in **Table 5-23**, which presents information found in *NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power*. Additional supporting technical information may be found in EN 62233:2008, *Measurement Methods for EMF of Household Appliances and Similar Apparatus with Regard to Human Exposure.*

Table 5-23. Typical Magnetic Field Strengths

Electrical Appliances in Home or Office	Magnetic Field Strength
Dishwasher	30 mG (at 30 cm)
Vacuum Cleaner	200 mG (at 30 cm)
Hair Dryer	70 mG (at 30 cm)
Electric Shaver	100 mG (at 30 cm)
Video Display	6 mG (at 30 cm)

Electrical Appliances in Home or Office	Magnetic Field Strength
Other Environmental Sources	
Electric Power Distribution/Subtransmission Lines[17] (4 to 24 kV)	
Within Right-of-Way	10 to 70 mG
Edge of Right-of-Way	N/A
High-Voltage Transmission Lines[18] (115 kV to 500 kV)	
Within Right-of-Way	30 to 87 mG (at 1metreheight above ground)
Edge of Right-of-Way	7 to 29 mG (at 1 metre height above ground)

5.12.2 Kitchener Rail Corridor

5.12.2.1 Potential Effects and Mitigation Measures – General

- Radio Frequency EMI from the control system(s) leading to improper operation of electronics on-board the train or in the surrounding neighbourhood.
- Radiated Magnetic Fields and Time-Varying EMFs leading to damage to belongings, i.e., magnetic media, of passengers.
- Induced Current in metallic wires, rail transit tracks, metallic fences, underground communication cables, gas pipelines, and track circuits in neighbouring rail properties leading to contact burns or shocks, or communication errors.
- ELF EMF from the power system(s) leading to effects on workers, passengers, or residents.

Mitigation Measures - General

- Implementation of an EMC Control Plan, the objective of which is to is to facilitate and confirm formal qualification of the electrification system and all its components with respect to the required EMC standards. The components of the EMC Control Plan will include but are not limited to:
  - Characterizes potential EMI sources and hazards to transit/rail operations;
  - Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed);
  - Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.);

[17] As per NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power, these values “can vary considerably depending on the current carried by the line.”
[18] Ibid. “During peak loads (about 1% of the time), magnetic fields are about twice as strong as the mean levels” quoted here.

  - Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B *EMF Modeling and Measurement Tools*.;
  - Includes (or references) a safety analysis and failure analysis of the transit system;
  - Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a key input to the detailed, post-electrification EMI scans taken at each TPF and compared to levels shown in EN 50121.)
  - Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions;
  - Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.);
- Baseline EMF and EMI measurements before and after system construction and operation;
- Use of ATF power systems; and
- Design and installation of the electrification system and all of its components using industry-standard practices, including:
  - Good electrical grounds;
  - Proper shielding;
  - Physical separation, including burial to proper depths; and,
  - The installation of filters, capacitors, and inductors.

<u>Mitigation Measures – NAVCanada & Greater Toronto Airports Authority</u>

As the Kitchener corridor is situated nearby Toronto Lester B. Pearson International Airport consultation with NAVCanada and the Greater Toronto Airports Authority (GTAA) was undertaken as part of the TPAP to discuss the EMI/EMF study results and requirements for detailed design and future project phases.

The following commitments will be adhered to during Detailed Design related to satisfying NAVCanada requirements:

- Consultation with NavCan will continue as part of Detailed Design phase to ensure that any required agreements, approvals or authorizations are obtained prior to project implementation;
- The contract documents will contain relevant requirements relating to the design of the Metrolinx electrification system in accordance with applicable legislation, codes, etc. including a requirement to demonstrate compliance through field measurements and testing under actual operating conditions, as well as remediation measures if allowable thresholds are exceeded; and

- Further discussions will be held with GTAA and NavCanada to confirm expansion plans and potential areas of interference during Detailed Design.

The following commitments will be adhered to during Detailed Design related to satisfying Greater Toronto Airports Authority (GTAA) requirements:

- As part of Detailed Design, an agreement will need to be established between Metrolinx and Greater Toronto Airports Authority (GTAA) in relation to how the electrification project will be designed and implemented, and 2) final design will be prepared based on the agreement.
- The contract document requirements will reflect that that the results of the Electromagnetic Compatibility/Electromagnetic Interference (EMC/EMI) testing shall be provided to the GTAA.
- Metrolinx will inform the GTAA of the proposed changes to the areas that are jointly supported with the GTAA's Emergency Services prior to finalizing the design. The denoted areas of interest will be reviewed jointly. This will be reflected in the contract document requirements; and
- Further discussions will be held with GTAA and NavCanada to confirm expansion plans and potential areas of interference during detailed design.

5.12.2.2 Net Effects – General

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project. Further consultation will be undertaken with NAVCanada and GTAA during Detailed Design, no net adverse effects related to EMI/EMF are anticipated.

5.12.2.3 Potential Effects and Mitigation Measures – Specific Commitments (Kitchener)

- ELF EMF at higher-than-background levels was found in areas along the Kitchener corridor.
- No EMI signals measured along the Kitchener corridor emanated from unknown sources.
- Areas requiring special attention in relation to re-assessment of background EMI/EMF levels, as summarized in **Table 5-24**.

Table 5-24 EMI/EMF Commitments – Specific Locations Along Kitchener Rail Corridor

Location	Commitment
Under High-Voltage Lines in KT-2 and Bramalea Traction Power Facility	Confirmation/Re-Assessment of ELF EMF
Bramalea Traction Power Facility	Re-Assessment of Background EMI

Location	Commitment
Bramalea Traction Power Facility	Full Characterization of EMI Profile, using Frequencies Identified in EMC Control Plan and Corresponding Harmonics as per EN 50121.

Specific Mitigation Measures – Kitchener

As per **Table 5-24:**

- Confirmation/Re-assessment of ELF EMF levels post-electrification, particularly at TPFs, and locations where higher-than-background ELF EMF was measured.
- Re-assessment of EMI levels post-electrification, specifically at TPFs.

5.12.2.4 Net Effects

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

5.13 Stormwater Management

A Preliminary Stormwater Management Assessment (see **Appendix K – Preliminary Stormwater Management Report** for additional detail) was undertaken at each Tap/TPF site as part of the TPAP to: determine existing and proposed drainage features/patterns, carry out a preliminary flow analysis, establish proposed drainage patterns once the Taps/TPFs are implemented, and to carry out a preliminary assessment of the development impact on drainage (including recommendations for mitigation measures as required). As this preliminary assessment was based on conceptual design information, a more detailed review and SWM analysis will need to be carried out as part of the Detailed Design phase once final design is prepared and additional information (e.g., survey results) is available for each Tap/TPF site.

Please refer to Appendix K for a description of the methodology followed for assessment of stormwater management impacts. Additional details can be found in the Preliminary Stormwater Management Report contained in **Appendix K.**

With respect to track lowering, it is noted that no adverse impacts to watercourses are anticipated based on the conceptual design developed as part of the TPAP. Similarly, with respect to drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to track lowering activities (or other electrification infrastructure proposed along the corridors) based on the preliminary analysis undertaken as part of the conceptual design work. Notwithstanding this, if environmental impacts are subsequently identified as part of Detailed Design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction.

5.13.1 Bramalea PS

The proposed site is part of the tributary area of Etobicoke Creek, and as such it is within the jurisdiction of TRCA. The site should be investigated further, for flood elevations, floodproofing and cut and fill balance within the floodplain, during the Detailed Design phase.

The existing drainage pattern for the site area is shown on **Figure 5-10.** The total area of the TPF Property is approximately 7.48 ha. Except for the branch railway track, the building and parking lot, the site is largely undeveloped.

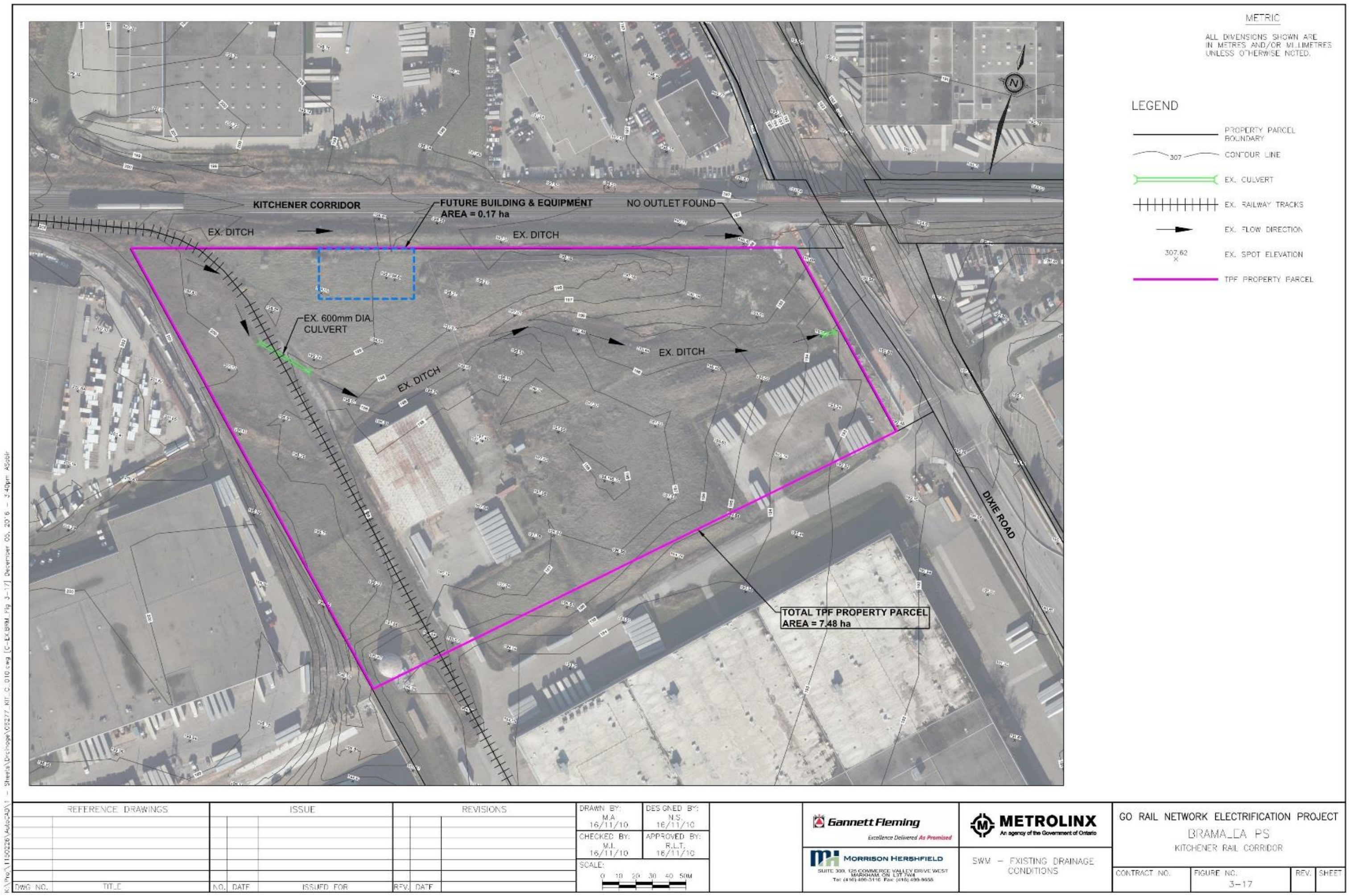
Based on the available contour plans, aerial photographs and judgement from survey outside the fence line, it was understood that a ditch runs from north west of the branching track, crosses the track via a culvert and runs through the site towards a 675mm outlet culvert at Dixie Road. Under existing condition, the runoff from the site flows to the ditch discharging to the Dixie Road culvert.

Based on the existing land use, the runoff coefficient, (C) is estimated at 0.30.

Based on the information extracted from Ontario Geological Survey, Preliminary Map P.2204, by Ministry of Natural Resources, Ontario, the soil type for the TPF Assessment Area is generally Clay (see **Appendix K)**. Detailed geotechnical investigations will be done at Detailed Design phase to precisely determine the soil type.

For Further details regarding existing conditions refer to **Appendix K – Preliminary Stormwater Management Report.**

Figure 5-10 – Bramalea PS Existing Drainage Conditions



5.13.1.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 5-10.** For the existing condition, the estimated runoff coefficient is 0.30.

The approximate footprint for a tentative location of the above development is shown on **Figure 5-11**.

Portion of the property parcel affected by the construction of future building and gravel pad, for the placement of electrical equipment, and access Road will be approximately 0.32 ha. Areas for different segments of development are as follows:

- A building and equipment area of 0.02 ha with a runoff coefficient of 0.90;
- A granular surface area of 0.15 ha around the PS and electrical equipment pads with a runoff coefficient of 0.80;
- An asphalted access road of 0.15 ha with ditches on each site to convey the runoff to an acceptable outlet with a runoff coefficient of 0.90.

The composite runoff coefficient for the entire site area of 0.32 ha, after development, will be approximately 0.85.

The proposed development areas and their locations, shown on **Figure 5-11,** are based on available conceptual design and may be refined as the design progresses. Therefore if necessary, reassessment of the drainage areas will be required at subsequent Detailed Design phases.

The existing and the proposed drainage areas and runoff coefficients are summarized in **Table 5-25**.

Figure 5-11 – Bramalea PS Proposed Drainage Conditions

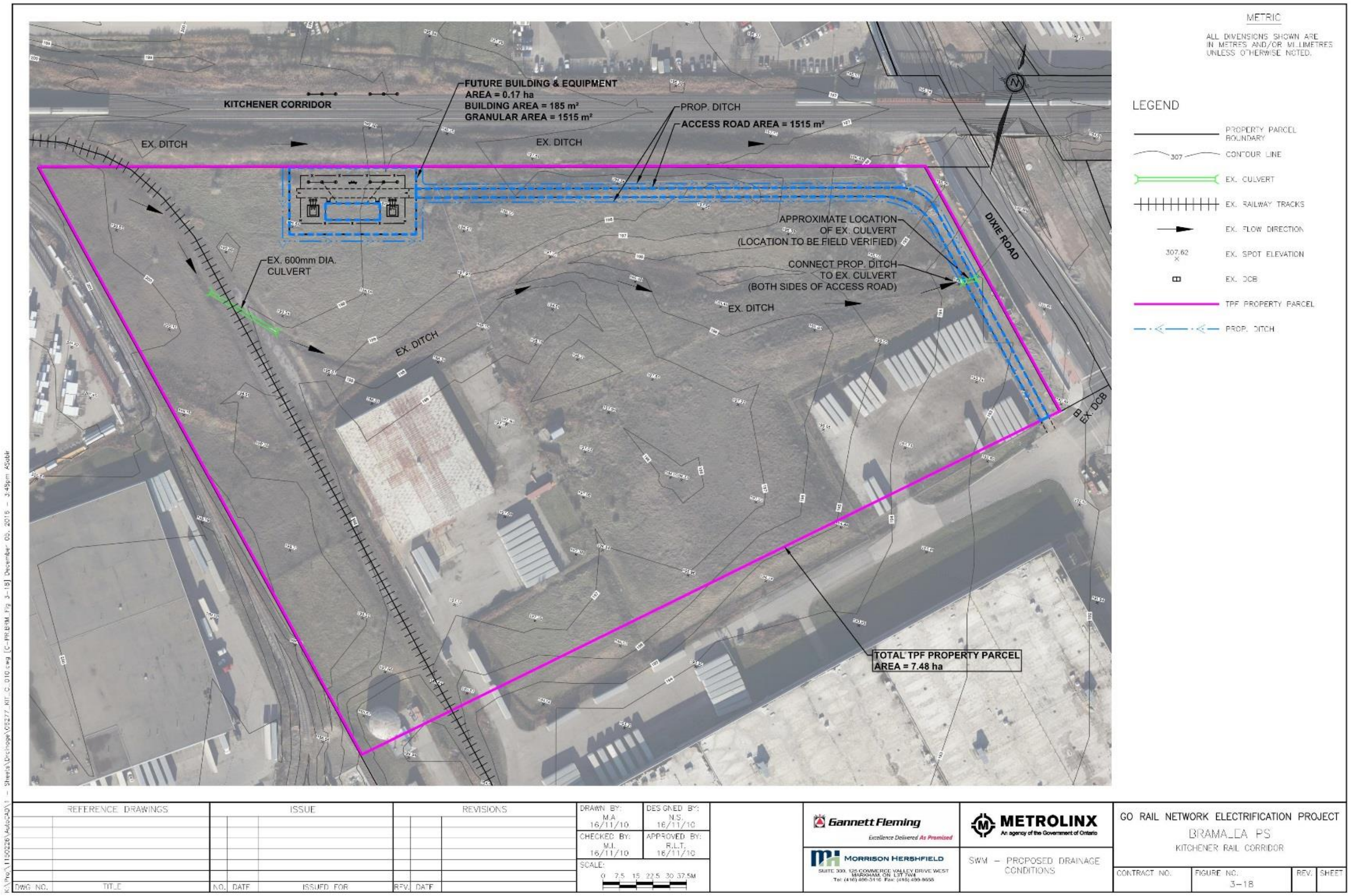


Table 5-25 Bramalea PS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Total site	0.32	0.30	Building	0.02	0.90
			*Access Road	0.15	0.90
			Granular Surface	0.15	0.80
Total/Composite	**0.32**	**0.30 or 14% Impervious**	**Total**	**0.32**	**0.85 or 93% Impervious**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

The proposed condition shows that for the whole site, the runoff coefficient increased by 21%, which is indicative that the runoff will also similarly be increased. Hence, stormwater management flood control mitigation is required for the site.

Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development for stormwater drainage. It can be seen in **Table 5-25** that there is an increase of 79% in impervious area and the development will cause an increase in the stormwater runoff. Flows were computed for the 2 year to 100 year storm events. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control.

A more refined flow analysis for the site drainage will be required at Detailed Design phase.

TRCA has adopted a restricted release rate for flows within the Etobicoke Creek watershed. To prevent flooding within the Etobicoke Creek, the City and TRCA have adopted a unit flow discharge (maximum of Litres/hectare) for the development of all lands within the Etobicoke Creek watershed. At the time of the analysis for stormwater management, the unit rate for the Bramalea PS location is not known. The allowable unit flow area per hectare will be required at the Detailed Design phase.

Runoff computations and the parameters used for the computations and rainfall intensities for time of concentration (Tc) of 10 minutes, from the City of Brampton IDF curve data, are presented in **Appendix A**. Results are summarized below in **Table 5-26**.

Table 5-26 Bramalea PS - Pre and Post Development Flows for development area

Storm event	Exis. Flow m^3/s	Post Dev Flow m^3/s	Flow Increase m^3/s
25mm	0.005	0.032	0.027

Storm event	Exis. Flow m^3/s	Post Dev Flow m^3/s	Flow Increase m^3/s
2yr	0.021	0.060	0.039
5yr	0.028	0.080	0.052
10yr	0.033	0.092	0.060
25yr	0.042	0.120	0.078
50yr	0.051	0.135	0.084
100yr	0.058	0.148	0.090

5.13.1.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Bramalea PS will result in 79% increase in impervious area. However the total site area is very small (0.32 ha) and the impervious area is even smaller. From **Table 3-11**, it can be seen that the increase in flows resulting from the construction of the Bramalea PS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can also be used for quality and quantity control. The proposed perimeter ditch will discharge to the ditch along the proposed access road which will outlet to the existing Dixie road culvert.

It is anticipated that the quantity and quality control design criteria will be met by the runoff infiltration within the ditches and the bio-swale. The minor and major storm runoff outlets will remain the same as under existing condition.

A more detailed analysis for the quantity, quality and water balance will be required at Detailed Design phase.

5.13.1.3 Recommendations

For flood-proofing of sites, the facilities will be built 0.3m above the floodplain. Fill below the flood line will need to be compensated with a cut volume for the cut-fill balance. Whether the site can accommodate compensating cut or not is to be finalized during the Detailed Design phase.

External drainage onto and off the site require determination at Detailed Design phase. A site visit is needed to assess the existing site condition and land use for better estimation of the runoff coefficient.

From the hydrological analysis and the consequent discussion presented in this section of the report, it is concluded that the construction of the Bramalea PS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control criteria will be met by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures, including the existing 675mm culvert under Dixie Road, and the site runoff outfalls.

5.14 Groundwater and Wells

Please refer to Appendix V for a description of the methodology followed for assessment of groundwater impacts. Additional details can be found in the Groundwater Impact Assessment Report contained in **Appendix V**.

5.14.1 Bramalea PS

5.14.1.1 Potential Effects and Mitigation Measures

There is one (1) domestic well and one (1) industrial/commercial well within 500 metres of the Bramalea paralleling station. The surrounding area is characterized by an urban setting and the use of private water wells in this area is likely negligible. There is one (1) waterbody, Spring Creek, located within 500 metres of the paralleling station.

The subsurface footprint of the Bramalea paralleling station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Spring Creek. Therefore, no mitigation measures are recommended.

5.14.1.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

5.14.2 Bramalea 25kV Feeder Route

5.14.2.1 Potential Effects and Mitigation Measures

There was one (1) domestic supply well and one (1) industrial/commercial supply well identified within 500 metres of the Bramalea Feeder Route. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There is one (1) waterbody, Spring Creek, located within 500 metres of the feeder route.

The Bramalea feeder route will commence at the Bramalea PS location and will run east along the Kitchener Railway ROW to the termination limit of electrification near Bramalea GO Station. The aerial feed route is not expected to cause any groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Spring Creek. Therefore, no mitigation measures are recommended.

5.14.2.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

5.14.3 OCS & Bridges: Section KT-1 – UP Express Spur (at Highway 427) to Malton Station

5.14.3.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the rail corridor in this section. The section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There is one (1) waterbody, Mimico Creek, located within 500 metres of the rail corridor.

There are no bridge modifications in this section of the rail corridor.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Mimico Creek. Therefore, no mitigation measures are recommended.

5.14.3.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

5.14.4 OCS & Bridges: Section KT-2 – Malton Station to Bramalea Station

5.14.4.1 Potential Effects and Mitigation Measures

There were eight (8) domestic supply wells, one (1) agricultural supply well, four (4) commercial/ industrial supply wells and two (2) supply wells of unknown type identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are two (2) waterbodies, Mimico Creek and Spring Creek, located within 500 metres of the rail corridor.

There are six (6) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers and/or OCS wires at Highway 407 North, Highway 407 South, Derry Road, Airport Road and Bramalea Road. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.
- New pedestrian bridge construction at GO Bramalea. A detailed assessment of any potential groundwater/well impacts will be completed as part of a separate EA Addendum process as outlined in the GO Rail Network Electrification EPR.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Mimico Creek and Spring Creek. Therefore, no mitigation measures are recommended.

5.14.4.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6 Impact Assessment - Barrie Corridor

6.1 Natural Environment

Vegetation Clearing Zone

As described in Volume 1, a Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the 5 metre OCS Impact Zone plus an additional 2 metre offset area on either side of the OCS components. As a result, the total clearing area is defined as 7 metres measured from the centerline of the outermost tracks to be electrified on either side of each rail corridor. The 7 metre zone is considered a maximum removal zone; during Detailed Design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

As part of the TPAP, the following approach was taken to assess potential ecological impacts associated with the required vegetation removal for the Electrification Project. There were two components to the analysis:

1. Identification of ecological impacts related to vegetation removals, and
2. Characterization of the extent of tree removals.

Approach/Methodology for Assessing Ecological Impacts

To classify potential ecological impacts due to vegetation removal, they were categorized as either: ***negligible, low, moderate, or high*** based on the rationale outlined below. Using Geographic Information Systems (GIS) technology, Ecological Land Classification (ELC) communities along the corridors/feeder routes were mapped (via aerial photo interpretation as part of the baseline conditions phase), and the areas (in hectares [ha]) of potential vegetation removal (including trees) were calculated for each type of ELC community within a given corridor segment. It should be noted that the assessment did not entail field surveys or ground truthing to delineate impact areas within the vegetation clearing zone. However field investigations were undertaken along corridor sections identified within the *GO Rail Network Electrification TPAP - Natural Environmental Baseline Conditions Report* (Future/Work & Commitments section) to assess habitat suitability within various ELC communities to be affected.

In order to further characterize tree removals specifically, the extent of tree removals within each ELC community was categorized as ***minor, fair, or extensive*** based on the canopy cover within each respective ELC community (see **Table 6-1** below).

- Where canopy cover is minimal (<10%) or limited (10-20%), the extent of removals is considered ***minor.***
- For areas with intermediate (20-70%) canopy cover, the extent of tree removals is considered ***fair.***

- For communities with high (>70%) canopy cover, tree removals are anticipated to be ***extensive.***

Table 6-1 Extent of Tree Removals

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Agriculture (AG)	AG communities include intensive and non-intensive farming. Intensive practices includes cultivated field producing crops (e.g. corn and wheat) and specialty agricultural crops (e.g. orchards, and nurseries). Non-intensive fields are dominated with herbaceous vegetation and grasses primarily used for pasture and grazing areas. Treed areas may be located along the perimeter of AG communities. AG communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within AG lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Commercial and Institutional (CVC)	CVC communities contain constructed areas, including businesses, light industry, heavy industry, educational and health buildings, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Constructed (CV)	CV communities contain constructed areas, including light and heavy industry, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Transportation and Utility (CVI)	CVI communities include roads, highways, right of ways, railways, airports, and sewage treatment facilities, and are dominated by non-native grasses and herbaceous species common to disturbed habitat. CVI communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVI lands are considered to have negligible ecological impact since the affected areas provide limited to no habitat for wildlife.
Residential (CVR)	CVR communities include low to high residential housing, rural property,	Fair	Vegetation removals with CVR lands are considered to have

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	single family homes, and trailer parks, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. Due to the presence of treed areas along the boundary between the CVI and CVR communities, the canopy cover within the impacted areas is considered intermediate (20-70%).		low ecological impact since the affected areas provide limited to no habitat for wildlife.
Green Land (CGL)	CGL communities are composed of open areas such as parks, golf courses, playing fields, picnic areas, and cemeteries, and are primarily dominated by non-native grass species (Kentucky Blue Grass), as well as herbaceous species common to disturbed habitat. CGL communities contain varying levels of canopy cover from minimal (<10%) to limited (10-20%) dependent on the community.	Minor	Vegetation removals with CGL communities are considered to have a low ecological impact since these communities provide limited to no habitat for wildlife.
Cultural Meadow (CUM)	CUM communities result from, or are maintained by, cultural or anthropogenic-based disturbances and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CUM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CUM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Red Pine Coniferous Plantation (CUP)	CUP communities greater than 75% coniferous tree composition. CUP communities generally contain high (>70%) canopy cover.	N/A	Vegetation removals within CUP communities are considered to have low ecological impact.
Cultural Woodland (CUW)	CUW communities are culturally influenced and contain high (>70%) canopy cover.	Extensive	Vegetation removals within CUW communities have low ecological impacts.
Treed Agriculture (TAG)	TAG communities include coniferous, deciduous and mixed plantations, treed pastures and fencerows. TAG communities contain TAG communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the TAG communities are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Deciduous Thicket (THD)	THD communities contain some shrub and tree cover. The communities are culturally influenced and dominated by non-native and invasive species. THD communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the THD communities are considered to have low ecological impact as the areas affected provide limited wildlife habitat.
Deciduous Forest (FOD)	FOD communities contain are dominated by deciduous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Forest (FOM)	FOM communities contain >60% tree cover and dominated by a mix of deciduous and coniferous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOM communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Marsh (MA)	MA communities are dominated by emergent hydorphytic macrophytes with some tree and shrub cover. MA communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MA communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Meadow Marsh (MAM)	MAM communities represent areas that experience seasonal flooding, and contain species that are less tolerant of prolonged flooding. MAS	Minor	Vegetation removals within the MAM communities have varying levels of ecological impacts, ranging from low to moderate and are dependent

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	communities contain minimal (<10%) canopy cover.		on several factors including: composition and structure, size, connection with wildlife corridors, and wildlife habitat suitability.
Shallow Marsh (MAS)	MAS communities are restricted to facultative and obligate wetland plants. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MAS communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Meadow (MEM)	MEM communities contain a mix of grass-like and broadleaf species and include non-native and invasive species. MEM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with MEM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Open Shoreline (SHO)	SHO communities are associated with and adjacent to permanent or ephemeral water and subject to active shoreline processes. Vegetation cover varies from patchy to barren to more closed and treed. SHO communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within SHO communities result in a moderate ecological impact and as they contain specialized habitat for wildlife.
Open Water (OA)	OA communities include watercourses, rivers, streams, and ponds.	N/A	There are no footprint impacts associated with OA communities as all OCS components will be attached to bridge structures and no vegetation removals are required in these areas.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Swamp (SW)	SW communities contain tree or shrub cover with variable flooding regimes and areas with standing water. SW communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within SW communities have varying levels of ecological impacts, ranging from moderate to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Swamp (SWM)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWM communities contain tree both deciduous and coniferous composition. SWM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals with SWM lands are considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.
Deciduous Swamp (SWD)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWD communities contain deciduous content. SWD communities generally contain high (>70%) canopy cover.	Extensive	There are no anticipated impacts to this community.
Deciduous Woodland (WOD)	WOD communities contain semi-closed tree cover and are dominated by mid-aged deciduous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within WOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Woodland (WOM)	WOM communities contain semi-closed tree cover and are dominated by mid-aged deciduous and coniferous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative	Extensive	Vegetation removals within the WOM community is considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	and non-native species. WOM communities generally contain high (>70%) canopy cover.		

Additional details can be found in the Natural Environment Impact Assessment Report contained in **Appendix A2**.

6.1.1 Preferred and Alternative Allandale Tap Location

6.1.1.1 Potential Effects and Mitigation Measures

6.1.1.1.1 Terrestrial

The proposed Tap Location will include two structures with an approximate footprint of $10m^2$ and up to 30m tall.

Impacts Related to Tap Vegetation Clearing

The Preferred Allandale Tap Area is included as part of Hydro One's Environmental Assessment (Class EA) study area. A natural environment inventory was undertaken by Arcadis Canada Inc. (*Barrie TS to Essa TS Corridor Assessment – Natural Environment* [2016]) in 2016. The complete Memorandum has been included in the Natural Environment Impact Assessment report (**Appendix A2** of the EPR). The findings and mapping documented in the memo have been reviewed in order to determine and discuss potential impacts to the ELC communities within the Allandale Tap Area.

Vegetation removal areas for the Preferred Allandale Tap Location are presented in **Table 6-2. Figure 6-2** depicts the footprint impacts associated with Preferred Tap Area which are largely located within Commercial and Institutional Lands (CVC) and Cultural Meadow (CUM) lands. Small portions of the Tap Area is located within Transportation and Utilities (CVI), Red Pine Coniferous Plantation (CUP), Deciduous Forest (FOD), and Mixed Forest (FOM) communities. A majority of the vegetation removals will likely occur within the CVC and CUM communities. As identified in the Arcadis Canada Inc. (2016) memo, vegetation within these areas consists of a mix of non-native and native species, including Staghorn Sumac, Willow (Salix spp.), Cottonwood saplings (Populus deltoides), Gray Dogwood (Cornus racemosa), Goldenrod sp., Bird's Foot Trefoil (Lotus corniculatus), Riverbank Grape (Vitis riparia), Butter and Eggs (Linaria vulgaris), and Curly Dock (Rumex crispus). There is limited habitat for wildlife within the CUM and CVC communities. Due to the minimal/limited canopy cover in the CVC and CUM, the extent of tree removals is minor and the overall loss of vegetation in this community is negligible. The impacts associated with the Tap Area are considered low from an ecological perspective. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. Footprint and vegetation removals have been identified for the CUP, FOM, and FOD communities; however, impacts to these communities are not anticipated.

Table 6-2: Summary of Vegettion Removal Ara within ELC Communities - Preferred Allandale Tap*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	2.017	Minor
Transportation and Utilities (CVI)	0.088	Minor
Cultural Meadow (CUM)	0.413	Minor
Red Pine Coniferous Plantation (CUP)	0.048	Extensive
Deciduous Forest (FOD)	0.118	Extensive
Mixed Forest (FOM)	0.051	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

Vegetation removal areas for the Alternative Allandale Tap Location are presented in **Table 6-3**. **Figure 6-1** depicts the footprint impacts associated with the Allandale Tap Point are located within Cultural Meadow (CUM) and Commercial and Institutional Lands (CVC) lands and vegetation removals will be required. The majority of the vegetation to be removed is composed of non-native and invasive species common to disturbed areas, including Trembling Aspen, Buckthorn, Tall Goldenrod, Wild Carrot, and White Sweet Clover. There is limited habitat for wildlife within the CUM and CVC communities. Due to the minimal/limited canopy cover in the CUM and CVC, the extent of tree removals is minor and the overall loss of vegetation in this community is negligible. The impacts associated with the Tap location are considered low from an ecological perspective. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. No vegetation clearing within the Transportation and Utilities (CVI) or Residential (CVR) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

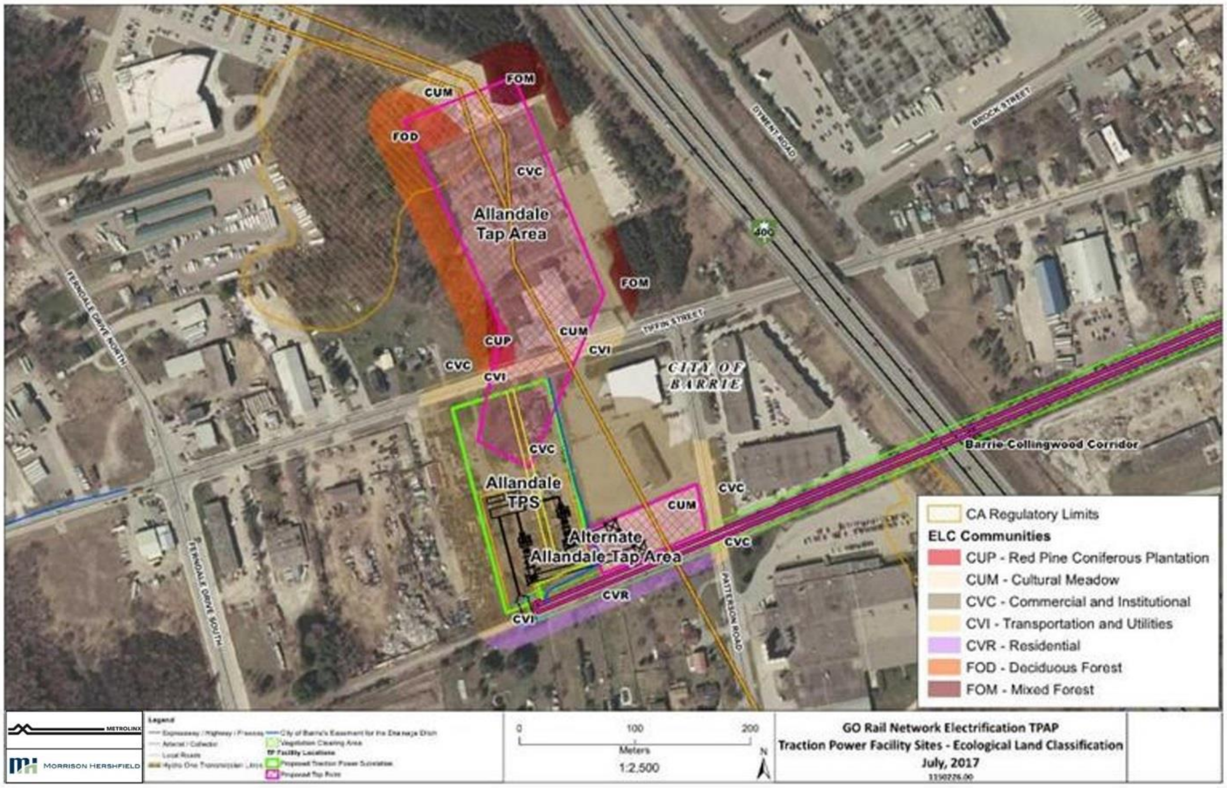
Table 6-3: Summary of Vegetation Removal Area within ELC Communities – Alternative Allandale Tap*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0.373	Minor
Commercial and Institutional (CVC)	0.012	Minor
Transportation and Utilities (CVI)	0	N/A
Residential (CVR)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 6-1 Existing Conditions – Alternative Allandale Tap/TPS

Figure 6-2 Footprint Impacts Ecological Land Classification – Preferred and Alternative Allandale Tap



Mitigation Measures

Hydro One must maintain specific clearances between lines and trees/vegetation to prevent tree caused outages and electrocutions and therefore any trees removed from the TAP location will not be replaced. However, considerations for plantings that are compatible with transmission lines may be considered. The following mitigation measures will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removal within the Tap Location:

- Compliance with the Migratory Birds Convention Act (MBCA).

6.1.1.1.2 Aquatic

A drainage ditch is located within the south portion of the Preferred Tap and along the west corner of the Alternative Tap. A desktop review of LIO data and Lake Simcoe Region Conservation Authority Regulated Area mapping did not identify the drainage ditch as a watercourse or within CA regulated area. Lake Simcoe Region Conservation Authority conducted a field visit and confirmed that the drainage ditch does not connect to any watercourse features.

6.1.1.1.3 Species at Risk

With regards to the Preferred Tap, no Butternuts were observed during Arcadis Canada Inc. 2016 field investigations and therefore there are no footprint impacts. While the Red-headed Woodpecker has a moderate potential of occurrence in the FOD, FOM, and CUP communities, this species is generally tolerant of disturbance and small amount of woodland edge within the FOD, FOM, and CUP is not anticipated to have an impact on this species.

Given the low potential of occurrence for Monarch, there are no anticipated footprint impacts to this species in either of the Tap areas.

6.1.1.1.4 Designated Areas

The Preferred Tap is within the CVC, CUM, and FOD communities within the LSRCA Regulated Areas and will require vegetation clearing. There will also be impacts to the CVC, CUM, CVI, CUP, FOM and FOD lands within Lake Simcoe Protection Plan areas. Footprint impacts within the CUM and CVC communities within the Alternative Allandale Tap will require vegetation clearing within the Lake Simcoe Protection Plan area.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-4: Summary of Vegetation Removal Areas within Designated Areas - Preferred Allandale Tap*

ELC Community	Area within LSRCA Regulation Limit (ha)	Area within Lake Simcoe Protection Plan Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.153	2.017	Minor
Cultural Meadow (CUM)	0.118	0.413	Minor
Deciduous Forest (FOD)	0.089	0.118	Extensive
Red Pine Coniferous Plantation (CUP)	0	0.049	N/A
Mixed Forest (FOM)	0	0.051	N/A
Transportation and Utilities (CVI)	0	0.088	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Table 6-5: Summary of Vegetation Removal Areas within Designated Areas - Alternative Allandale Tap*

ELC Community	Area within Lake Simcoe Protection Plan Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0.373	Minor
Commercial and Institutional (CVC)	0.012	Minor
Transportation and Utilities (CVI)	0	N/A
Residential (CVR)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.1.2 Net Effects

6.1.1.2.1 Terrestrial

There are no net adverse effects to the CUP, FOM, and FOD communities within the Preferred Tap as there are no anticipated impacts to these areas. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the Tap Area as the CVC, CVI and CUM communities provide only limited habitat for wildlife.

There are no net adverse effects to the CVI or CVR communities within the Alternative Tap as there are no anticipated impacts to these areas. There are no net adverse effects to the wildlife habitat associated with the loss of vegetation within the footprint of Alternative Tap as the CUM and CVC communities provides only limited habitat for wildlife.

6.1.1.2.2 Aquatic

There are no net adverse effects on the drainage ditch as there are no anticipated footprint impacts to either Tap Locations.

6.1.1.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat within Preferred or Alternative Tap Area. There are no footprint impacts to Monarch and therefore no net adverse effects. While there are footprint impacts to the FOD, FOM, and CUP communities associated with the Preferred Tap, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated.

6.1.1.2.4 Designated Areas

Net effects relating to footprint impacts of the Preferred Tap within CVI, CUM, CVC, CUP, FOD and FOM lands within the Lake Simcoe Protection Plan areas are identified in **Table 6-4**. Net effects relating to footprint impacts of the Alternative Tap within CVC, CVI, CUM and CVR lands within the Lake Simcoe Protection Plan areas are discussed within **Table 6-5**. Allandale TPS and 25kV Feeder Route

6.1.1.3 Potential Effects and Mitigation Measures

The proposed Tap Location will include two structures with an approximate footprint of $10m^2$ and up to 30m tall under/adjacent to the Hydro One 230kV transmission lines to facilitate tapping to the 230kV transmission circuits and connection to the aerial 25kV Feeder Route.

The Allandale feeder route will commence at the Allandale Tap location and will run east along the Barrie-Collingwood Railway (BCRY) ROW under Highway 400 to the termination limit of electrification on the Barrie Corridor (i.e. Allendale Waterfront GO Station). For purposes of the TPAP, it was assumed that the feeder route along the BCRY ROW will be underground as this represents the worst-case scenario from a potential impact perspective. During Detailed Design, either the aerial or underground design option will be confirmed.

6.1.1.3.1 Terrestrial

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Allandale TPS are presented in **Table 6-6**. **Figure 6-3** depicts the footprint impacts associated with the footprint impacts associated with the TPS facility, gantries, and access road are within the Commercial and Institutional (CVC) land and will require minor vegetation removals. The majority of the vegetation to be removed is composed of non-native and invasive vegetation associated with disturbed areas, including Trembling Aspen, Manitoba Maple, Norway Maple, Common Buckthorn and non-native and invasive forbs and herbaceous plants. The CVC land do not contain any specialized habitat for wildlife and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the CVC community, the extent of tree removals in these areas is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. No vegetation clearing within the Transportation and Utilities (CVI), Cultural Meadow (CUM) or Residential (CVR) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

Table 6-6: Summary of Vegetation Removal Areas within ELC Communities – Allandale TPS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.684	Minor
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0	N/A
Residential (CVR)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 6-3 Footprint Impacts Ecological Land Classification - Allandale Tap/TPS & Barrie-Collingwood 25kV Feeder Route

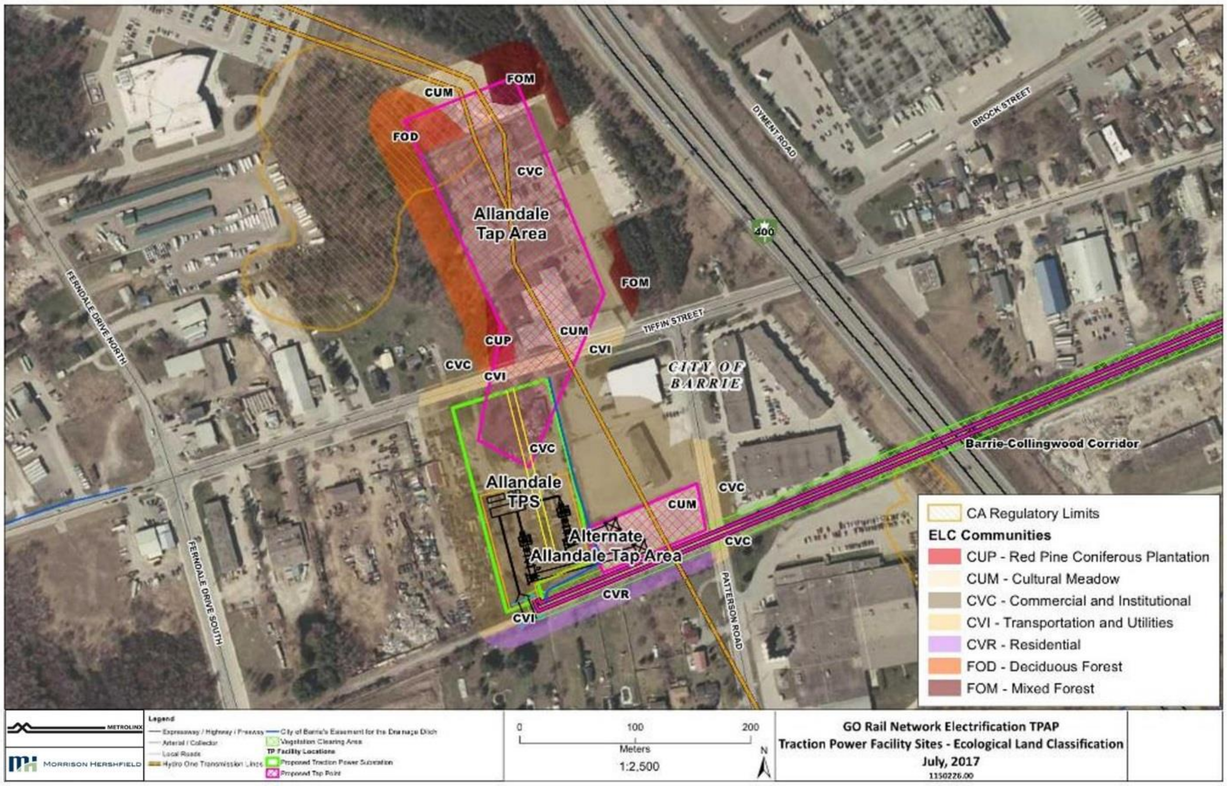
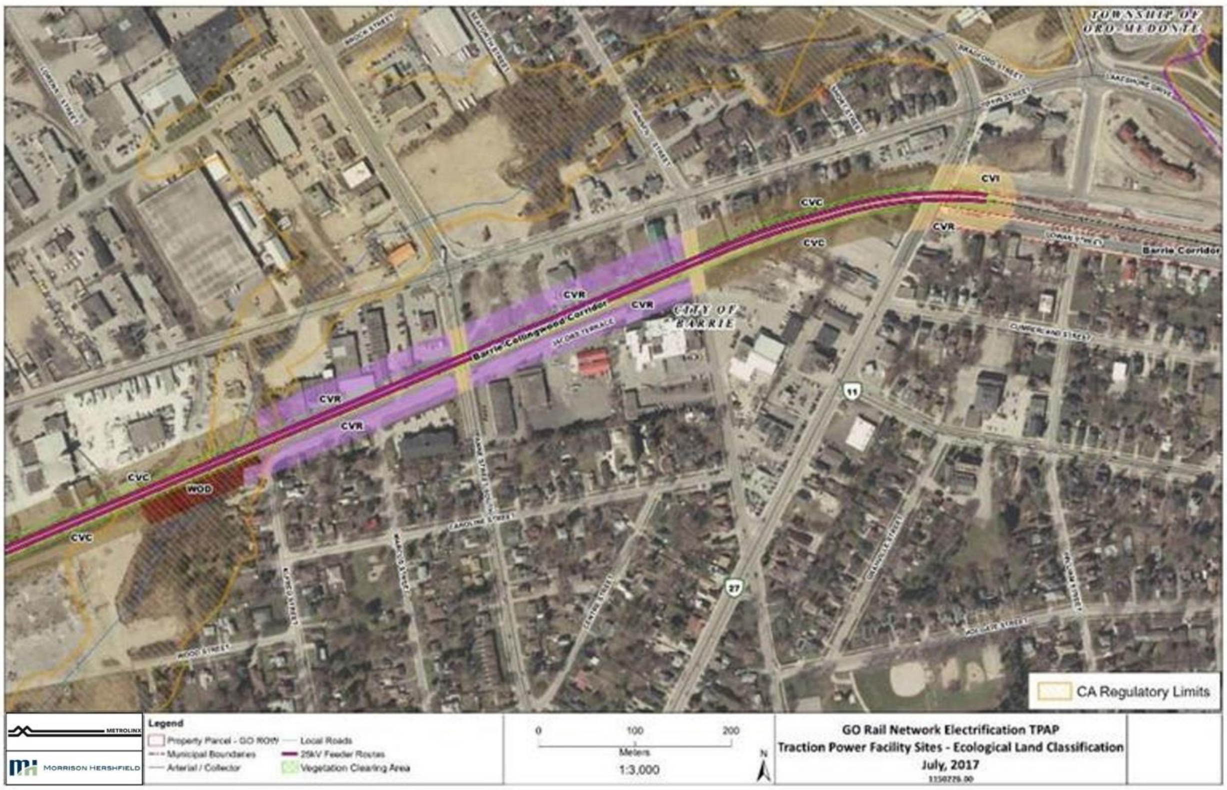


Figure 6-4 Footprint Impacts Ecological Land Classification - Barrie-Collingwood 25kV Feeder Route



Vegetation removal areas for the25kV Feeder Route are presented in **Table 6-7**. All impacts are outside of the Metrolinx ROW as the Feeder Route runs through the Barrie-Collingwood Railway ROW, which is owned by the City of Barrie. **Figure 6-3** and **Figure 6-4** depict the footprint impacts associated with the Feeder Route are mainly within Transportation and Utility (CVI), Commercial and Institutional (CVC), Residential (CVR), and a small portion within a Deciduous Woodland (WOD). Vegetation removals will be required. The majority of the vegetation to be removed is composed of non-native and invasive vegetation associated with edge habitats including Trembling Aspen, Manitoba Maple, Norway Maple, Black Walnut, Common Buckthorn, and Silver Maple. There is limited habitat for wildlife within the CVI, CVC, and CVR communities and no specialized habitat is present within the WOD community due to its isolation from other natural areas and small size. Impacts associated with the Feeder Route are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the CVI, CVC, and CVR communities, the extent of tree removals in these areas is minor and the overall loss of vegetation in these communities is negligible. The intermediate canopy cover within the CVR community results in a fair extent of tree removals; however, the overall loss of vegetation in these communities is negligible. The canopy cover in the WOD community is high and therefore will result in extensive tree removals. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 6-7: Summary of Vegetation Removal Areas within ELC Communities – 25kV Feeder Route*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.769	Minor
Transportation and Utilities (CVI)	1.443	Minor
Cultural Meadow (CUM)	0	Minor
Residential (CVR)	0.534	Fair
Deciduous Woodland (WOD)	0.035	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

Due to the negligible impacts at the TPS associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

The following mitigation measures, which are common to all ELC communities, will be implemented within the 25kV Feeder Route to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.

- **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
- **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
- **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the *Migratory Birds Convention Act* (MBCA)

6.1.1.3.2 Aquatic

There is one watercourse within this corridor segment, Hotchkiss Creek. No footprint effects to Hotchkiss Creek are anticipated to result from the installation of the 25kV Feeder Route. A drainage ditch is located east of the TPS facility. A desktop review of LIO data and Lake Simcoe Region Conservation Authority Regulated Area mapping did not identify the drainage ditch as a watercourse or within CA regulated area. Lake Simcoe Region Conservation Authority conducted a field visit and confirmed that the drainage ditch does not connect to any watercourse features.

6.1.1.3.3 Species at Risk

No Butternuts were observed during field investigations there are no anticipated footprint impacts associated with the TPS.

Within the footprint of the 25kV Feeder Route, there is moderate potential for Butternut and Red-headed Woodpecker within the WOD community and low potential within the CVR communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD community and low potential in the CVR, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD and individual tree removals in the CVR are not anticipated to have an impact on this species.

6.1.1.3.4 Designated Areas

Footprint impacts within the CVC communities within the TPS will require vegetation clearing within the Lake Simcoe Protection Plan area and are identified within **Table 6-8**.

Footprint impacts to the CVC, CVI, CVR, and WOD communities within the 25kV Feeder Route are within LSRCA and Lake Simcoe Protection Plan area and will require vegetation clearing identified areas have been discussed within **Table 6-9.**

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-8: Summary of Vegetation Removal Areas within Designated Areas - Allandale TPS*

ELC Community	Area within Lake Simcoe Protection Plan Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.684	Minor
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0	N/A
Residential (CVR)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Table 6-9: Summary of Vegetation Removal Areas within Designated Areas – 25kV Feeder Route*

ELC Community	Area within LSRCA Regulation Limit (ha)	Area within Lake Simcoe Protection Plan Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0	0	N/A
Commercial and Institutional (CVC)	0.109	0.769	Minor
Transportation and Utilities (CVI)	0.164	1.443	Minor
Residential (CVR)	0.029	0.534	Minor
Deciduous Woodland (WOD)	0.035	0.035	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.1.4 Net Effects

6.1.1.4.1 Terrestrial

There are no net adverse effects in association to the TPS to the CVI, CUM or CVR communities as there are no anticipated impacts to these areas. There are no net adverse effects to the wildlife habitat associated with the loss of vegetation within the footprint of the TPS, as the CVC community does not provide any specialized habitat for wildlife.

There are no net adverse effects to the wildlife habitat associated with the loss of vegetation within the footprint of the TPS facility or 25kV Feeder Route as the CVI, CVC, CVR, or WOD communities do not provide any specialized habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

6.1.1.4.2 Aquatic

There are no net adverse effects on the drainage ditch as there are no anticipated footprint impacts to the TPS Location.

There are no net adverse effects on Hotchkiss Creek as there are no anticipated footprint impacts associated with the 25kV Feeder Route.

6.1.1.4.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat as there are no footprint impacts for Butternut within the TPS.

There are no net adverse effects on Species at Risk or their habitat within the 25kV Feeder Route. There are no footprint impacts to Monarch and therefore no net adverse effects. While there are footprint impacts to the WOD and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Net effects to Butternut will be determined during Detail Design.

6.1.1.4.4 Designated Areas

Net effects relating to the TPS footprint impacts to CVC lands within the Lake Simcoe Protection Plan areas are identified in **Table 6-8**.

Net effects relating to footprint impacts within CVI, CVC, and CVR lands within LSRCA Regulated Areas; and, CVC, CVI, CUM, CVR, and WOD for the Feeder Route within the Lake Simcoe Protection Plan areas are identified in **Table 6-9**.

6.1.2 Newmarket SWS

6.1.2.1 Potential Effects and Mitigation Measures

6.1.2.1.1 Terrestrial

The approximate footprint dimension of the SWS facility is 22 metres x 55 metres and will contain ancillary components associated with the TPF including gantries, access road and underground duct banks.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Newmarket SWS are presented in **Table 6-10**. **Figure 6-5** depicts the footprint impacts associated with the SWS facility, underground duct banks, and access road are mainly within the Cultural Meadow (CUM), Commercial and Institutional (CVC), Deciduous Thicket (THD) communities and vegetation removals will be required. The majority of the vegetation to be removed is composed of non-native and invasive vegetation associated with edge habitats and disturbed areas including, Manitoba Maple, Russian Olive, Common Buckthorn and Dog Strangling Vine. The CUM and THD communities do not contain any specialized habitat for wildlife and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the CUM and THD communities, the extent of tree removals in these areas is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. No vegetation clearing within the Transportation and Utilities (CVI) or Deciduous Woodland (WOD) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

The gantries and a small portion of the underground duct banks are located within the Transportation and Utilities (CVI) lands and have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

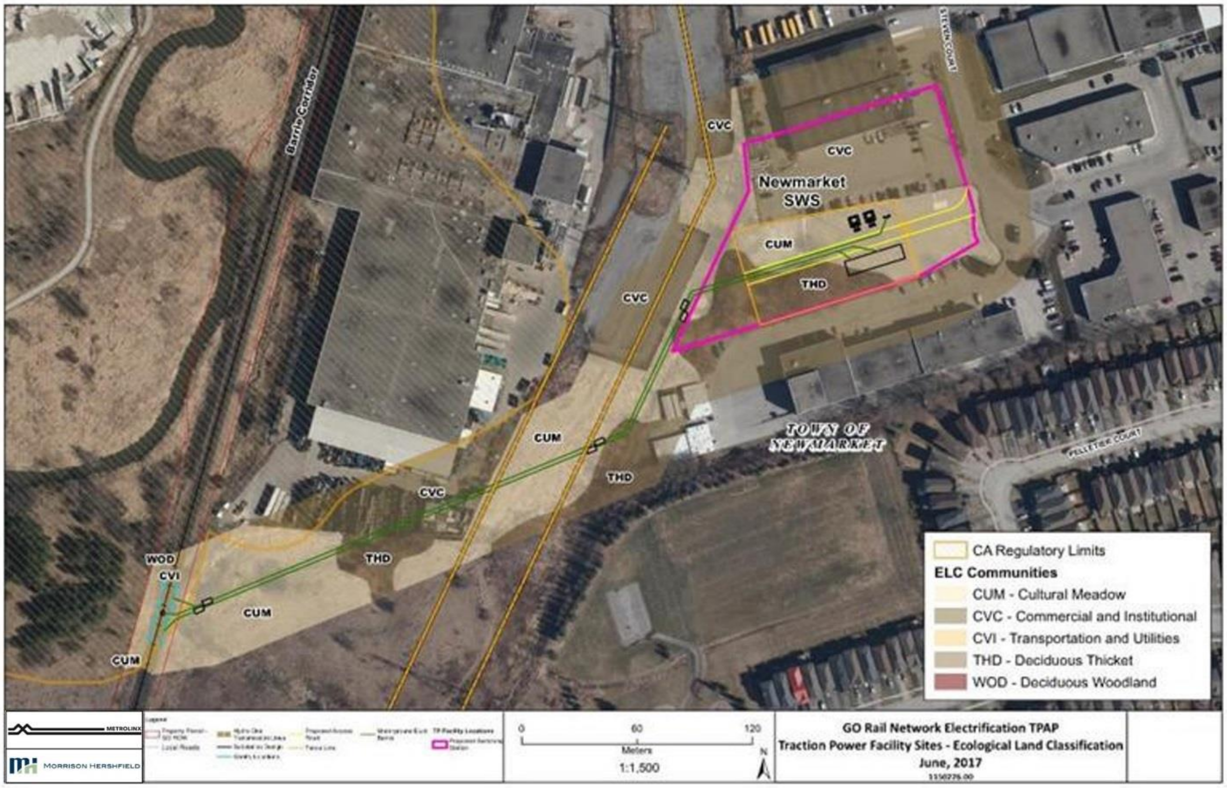
Table 6-10: Summary of Vegetation Removal Areas within ELC Communities – Newmarket SWS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.013	Minor
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0.361	Minor
Deciduous Thicket (THD)	0.164	Minor
Deciduous Woodland (WOD)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 6-5 Existing Conditions - Newmarket SWS

Figure 6-6 Footprint Impacts Ecological Land Classification - Newmarket SWS



Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

6.1.2.1.2 Aquatic

There are no aquatic features within the SWS property parcel, and therefore no aquatic footprint impacts.

6.1.2.1.3 Species at Risk

No Butternuts were observed during field investigations and there are no footprint impacts.

6.1.2.1.4 Designated Areas

Footprint impacts from the underground duct banks to the CUM community are within a small portion of the Lake Simcoe Region Conservation Authority (LSRCA) Regulated Areas and will require vegetation clearing and identified in **Table 6-11.**

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Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-11: Summary of Vegetation Removal Areas within Designated Areas – Newmarket SWS*

ELC Community	Area within LSRCA Regulation Limit (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0.009	Minor
Transportation and Utilities (CVI)	0	N/A
Deciduous Thicket (THD)	0	N/A
Commercial and Institutional (CVC)	0	N/A
Deciduous Woodland (WOD)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.2.2 Net Effects

6.1.2.2.1 Terrestrial

There are no net adverse effects to the WOD or CVI communities as there are no anticipated impacts to these areas. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the SWS facility as the CUM, CVC and THD communities do not provide any specialized habitat for wildlife.

6.1.2.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the SWS property parcel.

6.1.2.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat as there are no footprint impacts for Butternut.

6.1.2.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with the CUM community are discussed in identified in **Table 6-11.**

6.1.3 Gilford PS

6.1.3.1 Potential Effects and Mitigation Measures

6.1.3.1.1 Terrestrial

The approximate footprint dimension of the PS facility is 22 metres x 47 metres and will contain ancillary components associated with the TPF including gantries, access road and underground duct banks.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Gilford PS are presented in **Table 6-12**. As depicted in **Figure 6-8,** the footprint impacts associated with the PS facility, access road, and gantries are mainly within Cultural Meadow (CUM) lands. Vegetation removals will be required within the footprint for the PS facility and associated components. The access road within the Transportation and Utilities (CVI) land does not contain any natural features or habitat for wildlife. The majority of vegetation to be removed within the CUM community is primarily composed of non-native and invasive herbaceous vegetation commonly found in anthropogenically disturbed areas, including White Sweet Clover, Common Milkweed, Dog Strangling Vine, Large Tooth Aspen, and Manitoba Maple. The CUM community provides limited habitat for wildlife, and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the CUM community, the extent of tree removals in these areas is minor and the overall loss of vegetation is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. No vegetation clearing within the Residential (CVR) and Deciduous Woodland (WOD) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

The gantries and a small portion of the underground duct banks are located within the Transportation and Utilities (CVI) lands have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

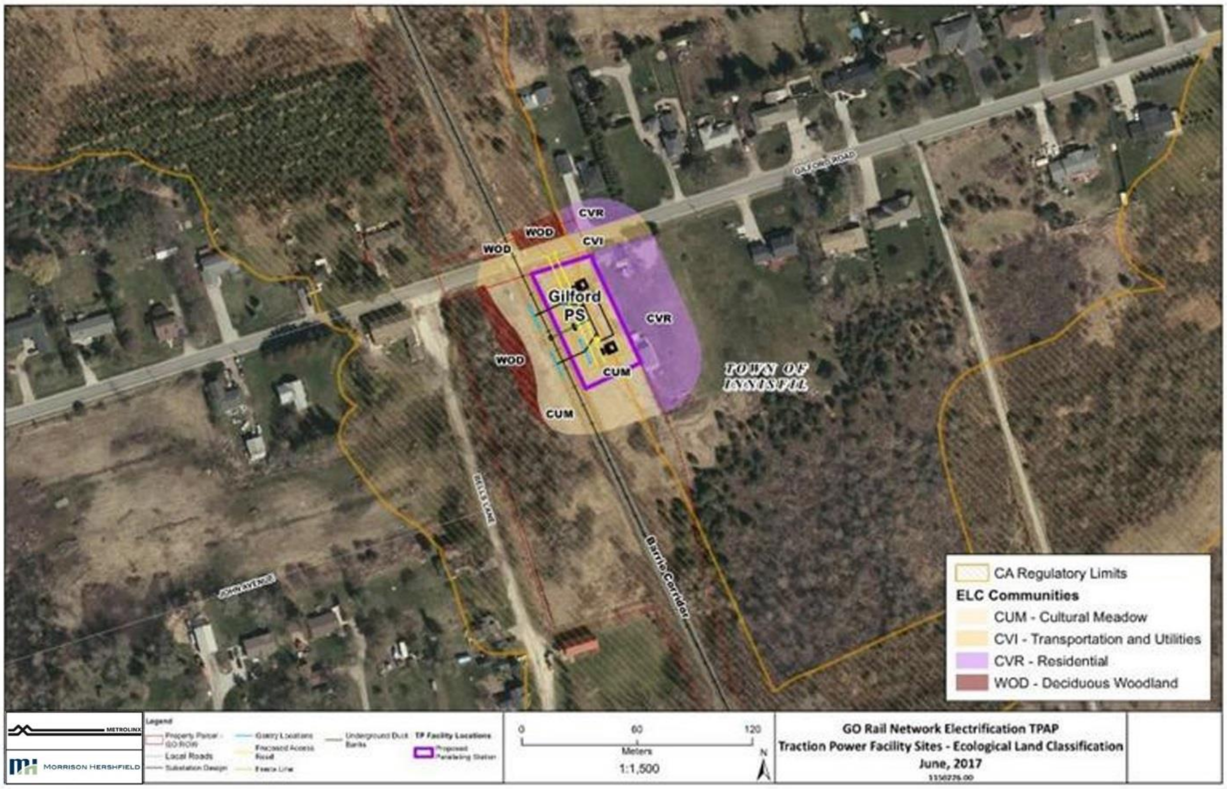
Table 6-12: Summary of Vegetation Removal Areas within ELC Communities – Gilford PS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0.105	Minor
Transportation and Utilities (CVI)	0.002	Minor
Residential (CVR)	0	N/A
Deciduous Woodland (WOD)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 6-7 Existing Conditions - Gilford PS

Figure 6-8 Footprint Impacts Ecological Land Classification - Gilford PS



Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

6.1.3.1.2 Aquatic

There are no aquatic features within the PS property parcel, and therefore no aquatic footprint impacts.

6.1.3.1.3 Species at Risk

No Butternuts were observed during field investigations and there are no footprint impacts.

6.1.3.1.4 Designated Areas

Footprint impacts from the underground duct banks to the CUM community are within a small portion of the Lake Simcoe Region Conservation Authority (LSRCA) Regulated Areas and will require vegetation clearing and identified in **Table 6-13.**

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-13: Summary of Vegetation Removal Areas within Designated Areas – Gilford PS*

ELC Community	Area within LSRCA Regulation Limit (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0.071	Minor
Transportation and Utilities (CVI)	0	N/A
Residential (CVR)	0	N/A
Deciduous Woodland (WOD)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.3.2 Net Effects

6.1.3.2.1 Terrestrial

There are no net adverse effects to the WOD or CVR communities as there are no anticipated impacts to these areas. Net adverse effects to the CVI community are discussed under OCS Corridor BR-10. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the PS location as the CUM community provides only limited habitat for wildlife.

6.1.3.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the PS property parcel.

6.1.3.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat as there are no footprint impacts for Butternut.

6.1.3.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with the CUM community are discussed in .

6.1.4 Maple PS

6.1.4.1 Potential Effects and Mitigation Measures

6.1.4.1.1 Terrestrial

The approximate footprint dimension of the PS facility is 22 metres x 47 metres and will contain ancillary components associated with the TPF including gantries, access road and underground duct banks.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Maple PS are presented in **Table 6-14**. As depicted **Figure 6-10**, the footprint impacts associated with the PS facility, access road, and gantries are mainly within Agricultural (AG), Cultural Meadow (CUM), and Treed Agriculture (TAG) lands with one gantry located within Transportation and Utility (CVI) lands. The access road located within the CVI land does not contain any natural features and will not result in any footprint impacts to the natural environment. Vegetation removals will be required within the footprint for the PS facility and associated components. The majority of vegetation to be removed within the TAG, and CUM community is primarily composed of non-native and invasive herbaceous vegetation commonly found in anthropogenically disturbed and edge habitat areas, including Common Buckthorn, White Sweet Clover, Tall Goldenrod, Orchard Grass (*Dactylis glomerata*), and Common Tansy (*Tanacetum vulgare*). The AG lands are primarily composed of soybeans, an annual crop cover. The AG, TAG and CUM communities provide limited habitat for wildlife, and the impacts are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the AG, TAG, CUM and CVI communities, the extent of tree removals in these areas is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. No vegetation clearing within the Meadow Marsh (MAM) are anticipated, and therefore there are no footprint impacts within this ELC community.

The gantries and a small portion of the underground duct banks are located within the Transportation and Utilities (CVI) lands have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

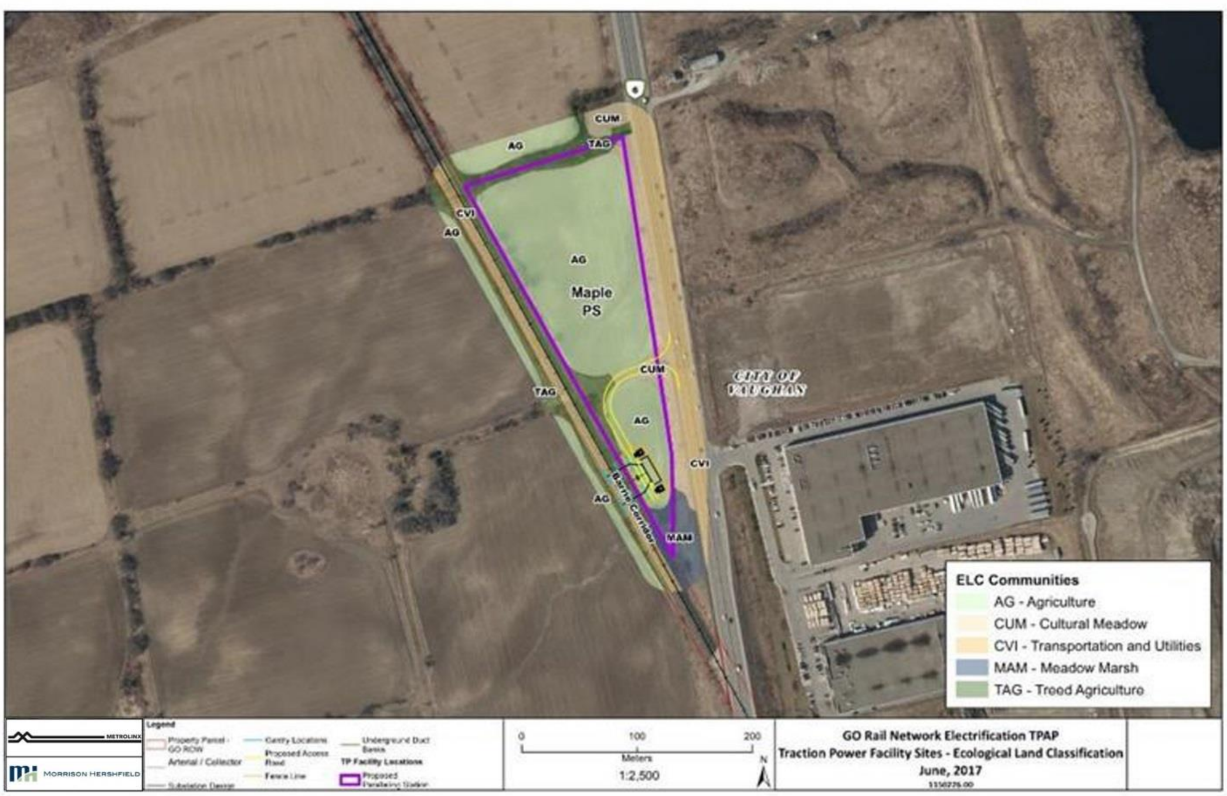
Table 6-14: Summary of Vegetation Removal Areas within ELC Communities – Maple PS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Agriculture (AG)	0.134	Minor
Transportation and Utilities (CVI)	0.008	Minor
Treed Agriculture (TAG)	0.010	Minor
Cultural Meadow (CUM)	0.035	Minor
Meadow Marsh (MAM)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 6-9 Existing Conditions - Maple PS

Figure 6-10 Footprint Impacts Ecological Land Classification - Maple PS



Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

6.1.4.1.2 Aquatic

There are no aquatic features within the PS property parcel, and therefore no aquatic footprint impacts.

6.1.4.1.3 Species at Risk

There is low potential for Eastern Meadowlark and Bobolink within the Agriculture (AG) communities. Due to the site location change of the proposed PS facility, no targeted SAR breeding bird surveys were conducted within the Maple PS. A SAR breeding bird surveys was completed along the highway ROW adjacent to the AG communities of the previous study area, located immediately north of the current Maple PS study area (refer to **Appendix A** for complete survey). No SAR were observed and the AG communities were not conducive to SAR habitat.

During the December 1st, 2016 field investigation, the AG community contained soybeans, an annual crop cover. Although this type of cover does not support breeding habitat conditions for Eastern Meadowlark or Bobolink, suitable crop cover could be planted in future rotations, which could support SAR breeding habitat. As such, crop over should be reviewed again prior to the commencement of construction. In the event suitable crop cover is planted supporting breeding habitat conditions for Eastern Meadowlark or Bobolink, a specialized SAR breeding bird survey will need to be undertaken to determine the presence/absence of Eastern Meadowlark and Bobolink within the AG communities.

Due to the low potential of occurrence of Rusty-patched Bumblebee, there are no anticipated footprint impacts.

6.1.4.1.4 Designated Areas

There are no Designated Areas within the PS property parcel, and therefore no footprint impacts.

6.1.4.2 Net Effects

6.1.4.2.1 Terrestrial

There are no net adverse effects to the MAM community as there are no anticipated impacts to this area. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the PS location as the AG, TAG, and CUM communities provide only limited habitat for wildlife.

6.1.4.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the PS property parcel.

6.1.4.2.3 Species at Risk

There is low potential for Eastern Meadowlark and Bobolink within the AG communities. No net adverse effects are anticipated based on current crop cover. The site should be reviewed again prior to construction to confirm suitable crop cover was not planted.There are no net adverse effects to Rusty-patched Bumblebee as there are no footprint impacts.

6.1.4.2.4 Designated Areas

There are no Designated Areas within the PS property parcel, and therefore no footprint impacts.

6.1.5 OCS & Bridges: Section BR-1 – Parkdale Junction to Caledonia Station

6.1.5.1 Potential Effects and Mitigation Measures

6.1.5.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-1 are presented in **Table 6-15**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities mainly Residential (CVR) and Commercial and Institutional (CVC) with some Green Lands (CGL) will be required within the vegetation-clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore, the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 6-15: Summary of Vegetation Removal Areas within ELC Communities BR-1*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	2.514	0.272	2.786	Minor
Transportation and Utilities (CVI)	4.920	0.085	5.004	Minor
Residential (CVR)	1.759	0.211	1.970	Fair

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Green Land (CGL)	0.535	0.109	0.644	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and

- Compliance with the *Migratory Birds Convention Act* (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Dundas Street (Newmarket Sub Mile 3.37)
- St. Clair Avenue West (Newmarket Sub Mile 5.24)
- Eglinton Avenue (Newmarket Sub Mile 6.50)

Bridges where the preferred alternative to address issues related to attachment of protective barriers is bridge modifications include:

- Innes Avenue Pedestrian Bridge (Newmarket Sub Mile 5.65) – modify pedestrian bridge

Bridges below the Absolute Minimum vertical clearance (6937 mm) will require additional modifications and/or solutions, to accommodate electrification, including unique engineering designs, lowering tracks, raising the bridge, bridge replacement, or improving the quality of maintenance to reduce the track maintenance allowance (TMA). Bridges under the Absolute Minimum vertical clearance include:

- Dundas Street (Newmarket Sub Mile 3.37) – lower tracks

Due to possible issues related to lowering the tracks at Dundas Street (Newmarket Sub Mile 3.37), potential impacts to Lansdowne Avenue (Newmarket Sub Mile 3.12) may include using a ballast mat, changing from a ballasted deck to direct fixation, possible replacement with a shallower superstructure or lowering the roadway.

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.5.1.2 Aquatic

There are no aquatic features within this corridor segment, and therefore no aquatic footprint impacts.

6.1.5.1.3 Species at Risk

Given the low potential of occurrence of Barn Swallows, Monarch, and Rusty-patched Bumblebee there are no anticipated footprint impacts to these species or their habitat. Butternuts have a low potential for occurrence within the CGL and CVR communities. The presence/absence of Butternuts will be confirmed during detailed tree inventories of impacted areas during Detailed Design. A health assessment will be undertaken at that time for any pure butternuts. Should any Butternuts be found during detail design, appropriate approval under the ESA, 2007 will be required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed shall be implemented.

The Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to this species or its habitat.

6.1.5.1.4 Designated Areas

There are no footprint impacts to CVI, CVC, CVR, or CGL lands within Toronto and Region Conservation Authority Regulated Areas as identified in **Table 6-16.**

Table 6-16: Summary of Vegetation Removal Areas within Designated Areas BR-1*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area within TRCA Regulation Limit (ha)	
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	0	0	0	N/A
Residential (CVR)	0	0	0	N/A
Green Land (CGL)	0	0	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.5.2 Net Effects

6.1.5.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVR, CVC and CGL lands as these communities contain limited habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.5.2.2 Aquatic

There are no net adverse effects as there are no watercourses within this corridor segment.

6.1.5.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Monarch, Rusty-patched Bumblebee, Barn Swallow, or Chimney Swift. Net effects to Butternut will be determined during Detail Design.

6.1.5.2.4 Designated Areas

There are no net adverse effects as there are no footprint impacts within TRCA Regulated areas.

6.1.6 OCS & Bridges: Section BR-2 – Caledonia Station to Downsview Park Station

6.1.6.1 Potential Effects and Mitigation Measures

6.1.6.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-21 are presented in **Table 6-17**. As depicted in mapping provided in **Appendix A2**, the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities, mainly Commercial and Institutional (CVC) and Residential (CVR) with a small area of Green Lands (CGL) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore, the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) communities will result in a loss of vegetation along the edge of these natural vegetation communities. WOD communities within the corridor segment are located mainly adjacent to the rail corridor, CGL and CVR communities. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. These areas provide only non-specialized habitat for wildlife, which result in low potential ecological impacts. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities.

Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 6-17: Summary of Vegetation Removal Areas within ELC Communities BR-2*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	5.697	0.191	5.888	Minor
Transportation and Utilities (CVI)	6.170	0.014	6.184	Minor
Residential (CVR)	0.597	0.006	0.603	Fair
Green Land (CGL)	0.309	0	0.309	Minor
Deciduous Woodland (WOD)	0.150	0	0.150	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

<u>*Mitigation Measures*</u>

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx’s property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.

  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Hwy 401 (Newmarket Sub Mile 8.80)

Bridges below the Absolute Minimum vertical clearance (6937 mm) will require additional modifications and/or solutions, to accommodate electrification, including unique engineering designs, lowering tracks, raising the bridge, or bridge replacement. Bridges under the Absolute Minimum vertical clearance include:

- Hwy 401 (Newmarket Sub Mile 8.80) – lower tracks

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.6.1.2 Aquatic

There is one watercourse within the corridor segment: Maple Leaf Creek. Maple Leaf Creek is conveyed under the corridor by a culvert therefore no footprint impacts to the culvert or watercourse is anticipated to result from the installation of OCS within the existing corridor above the culvert. To mitigate the potential indirect impacts to the watercourse, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

6.1.6.1.3 Species at Risk

Given the low potential of occurrence of Barn Swallow, Monarch, Rusty-patched Bumblebee, Eastern Small-footed Myotis, Tri-coloured Bat, Little Brown Myotis, and Northern Myotis there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL and CVR communities, but moderate potential in the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design.

Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed shall be implemented.

The Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to the species or its habitat. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

6.1.6.1.4 Designated Areas

Footprint impacts to CVI, CVC, CGL and WOD lands within Toronto and Region Conservation Authority Regulated Areas are identified in **Table 6-18**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-18: Summary of Vegetation Removal Areas within Designated Areas BR-2*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area within TRCA Regulation Limit (ha)	
Commercial and Institutional (CVC)	0.265	0	0.265	Minor
Transportation and Utilities (CVI)	0.297	0	0.297	Minor
Residential (CVR)	0	0	0	N/A
Green Land (CGL)	0.090	0	0.090	Minor
Deciduous Woodland (WOD)	0.048	0	0.048	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.6.2 Net Effects

6.1.6.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, and CGL lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.6.2.2 Aquatic

There are no net adverse effects on Maple Leaf Creek as there are no anticipated footprint impacts.

6.1.6.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Barn Swallow Chimney Swift, Monarch, Rusty-patched Bumblebee, Easter Small-footed Myotis, Tri-coloured Bat, Little Brown Myotis, or Northern Myotis. While there are footprint impacts to the WOD and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Net effects to Butternut will be determined during Detailed Design.

6.1.6.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVC, CGL and WOD communities are depicted in **Table 6-18.** No vegetation clearing within the TRCA Regulated area is required within any of these communities outside of the Metrolinx owned ROW.

6.1.7 OCS & Bridges: Section BR-3 – Downsview Park Station to Rutherford Station

6.1.7.1 Potential Effects and Mitigation Measures

6.1.7.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-3 are presented in **Table 6-19**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including, Commercial and Institutional (CVC) Residential (CVR), Green Lands (CGL), and Cultural Meadow (CUM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore, the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL, and CUM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The Deciduous Woodland (WOD) communities associated with Don River West Branch and Westminster Creek provide habitat for wildlife and acts as movement corridors. Due to the natural attributes of these woodlands communities, ecological impacts to these areas are considered moderate. Other Deciduous Woodland (WOD) communities, located mainly adjacent to the rail corridor, CGL, and CUM communities provide only non-specialized habitat for wildlife, which result in low potential ecological impacts. Vegetation clearing within the WOD communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

No vegetation clearing within the Marsh (MA) community is anticipated, and therefore there are no footprint impacts within this ELC community.

Table 6-19: Summary of Vegetation Removal Areas within ELC Communities BR-3*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	4.205	0.389	4.594	Minor
Transportation and Utilities (CVI)	11.757	0.363	12.120	Minor
Residential (CVR)	0.262	0.087	0.349	Fair
Green Land (CGL)	0.230	0.001	0.231	Minor
Marsh (MA)	0	0	0	N/A
Deciduous Woodland (WOD)	0.290	0.075	0.365	Extensive
Cultural Meadow (CUM)	0.280	0.004	0.284	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

<u>*Mitigation Measures*</u>

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:

- **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
- **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Hwy 407 (Newmarket Sub Mile 13.81)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.7.1.2 Aquatic

There are two watercourses within this corridor segment: Don River West Branch (three crossings) and Westminster Creek. All three crossings of the Don River West Branch and Westminster Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses and appropriate sediment and erosion controls will be implemented.

6.1.7.1.3 Species at Risk

Given the low potential of occurrence of Snapping Turtle, Eastern Ribbonsnake, Monarch, Rusty-patched Bumblebee, Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL and CVR communities and moderate potential in the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to the species or its habitat. While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

6.1.7.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CGL, and WOD lands within Toronto and Region Conservation Authority Regulated Areas are identified in **Table 6-20.**

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-20: Summary of Vegetation Removal Areas within Designated Areas BR-3*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area within TRCA Regulation Limit (ha)	
Commercial and Institutional (CVC)	0.704	0	0.704	Minor
Transportation and Utilities (CVI)	2.158	0.018	2.176	Minor
Residential (CVR)	0.002	0	0.002	Fair
Green Land (CGL)	0.015	0	0.015	Minor
Marsh (MA)	0	0	0	N/A
Deciduous Woodland (WOD)	0.211	0.024	0.235	Extensive
Cultural Meadow (CUM)	0	0	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.7.2 Net Effects

6.1.7.2.1 Terrestrial

There are no net adverse effects to the MA community as there are no footprint impacts. There are no net adverse effects to the natural environment associated with vegetation clearing within the CVI, CVC, CVR, CGL, and CUM lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.7.2.2 Aquatic

There are no net adverse effects on Don River West Branch and Westminster Creek as there are no anticipated footprint impacts.

6.1.7.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Barn Swallow, Chimney Swift, Snapping Turtle, Eastern Ribbonsnake, Monarch, Rusty-patched Bumblebee, Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, or Tri-coloured Bat. While there are footprint impacts to the WOD and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Net effects to Butternut will be determined during Detail Design.

6.1.7.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVC, CVR, CGL, and WOD communities are depicted in **Table 6-20.** No vegetation clearing within the TRCA Regulated Area within the CVC, CVR, or CGL communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI and WOD communities are required outside of the ROW.

6.1.8 OCS & Bridges: Section BR-4 – Rutherford Station to King City Station

6.1.8.1 Potential Effects and Mitigation Measures

6.1.8.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-4 are presented in **Table 6-21**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Commercial and Institutional (CVC) and Residential (CVR), with small areas of Green Lands (CGL), Cultural Meadow (CUM), and Meadow Marsh (MAM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL, CUM, and MAM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The Deciduous Woodland (WOD) communities associated with, but not considered part of the Provincially Significant King-Vaughn Wetland Complex, provide habitat for wildlife and act as movement corridors. Due to the natural attributes of these woodlands communities, ecological impacts to these areas are considered moderate. Other Deciduous Woodland (WOD) communities, located mainly adjacent to the rail corridor, AG, and CUM communities provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the WOD communities will result in a loss of vegetation along the edge of these natural vegetation communities within the existing Metrolinx ROW only. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing is required along the edge of the Marsh (MA) community within the Provincially Significant King-Vaughn Wetland Complex. An amphibian survey was conducted during the 2016 field season to determine potential for amphibian breeding habitat. No Species at Risk were observed; however, two species, American Toad and Spring Peeper, were recorded within the MA community outside of the vegetation removal zone. Therefore, no specialized amphibian habitat will be impacted as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. However, ecological impacts to this area are considered high as the MA community within the PSW is considered environmentally significant. Due to the minimal canopy cover in the MA community, the extent of tree removals in this areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the MA areas should occur to buffer the adjacent wetland.

Vegetation clearing within the Agriculture (AG) and Treed Agriculture (TAG) communities will result in a loss of vegetation/trees within these anthropogenically modified vegetation communities which provide limited habitat for wildlife, therefore the ecological impacts in these areas are considered low. Due to the minimal canopy cover in the AG and TAG communities, the extent of tree removals is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

No vegetation clearing within the Swamp (SW) community is anticipated, and therefore there are no footprint impacts within this ELC community.

Table 6-21: Summary of Vegetation Removal Areas within ELC Communities BR-4*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.935	0.124	1.059	Minor
Transportation and Utilities (CVI)	9.717	0.039	9.756	Minor
Residential (CVR)	1.786	0.269	2.054	Fair
Green Land (CGL)	0.357	0.192	0.549	Minor
Deciduous Woodland (WOD)	0.799	0	0.799	Extensive
Cultural Meadow (CUM)	0.103	0	0.103	Minor
Marsh (MA)	0.690	0.055	0.744	Minor
Swamp (SW)	0	0	0	N/A
Meadow Marsh (MAM)	0.093	0	0.093	Minor

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Agriculture (AG)	0.010	0.019	0.029	Minor
Treed Agriculture (TAG)	2.602	0.122	2.724	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
    - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
    - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
    - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
        - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
        - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
        - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
        - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
        - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and

- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Keele Street (Newmarket Sub Mile 19.60)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.8.1.2 Aquatic

There are two crossings of the Don River West Branch and three crossings of East Humber River within this corridor segment. The crossings of Don River West Branch and East Humber River are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses and appropriate sediment and erosion controls will be implemented.

6.1.8.1.3 Species at Risk

Given the low potential of occurrence of Least Bittern, Common Nighthawk, and Short-eared Owl, Monarch, and Rusty-patched Bumblebee there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL, CVC, TAG and CVR communities and moderate potential within the WOD and SW. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. Bobolink and Eastern Meadowlark have a moderate potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD, SW and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD and SW or individual tree removals within the CGL is not anticipated to have an impact on this species.

Snapping Turtle have a moderate potential of occurrence within the Open Water (OA) and Marsh (MA) communities while Eastern Ribbonsnake have a moderate potential of occurrence in the MA. There are no footprint impacts to OA areas. While vegetation removals within the MA are anticipated, the MA areas are directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

6.1.8.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CGL, CUM, WOD, MA, and TAG lands within Toronto and Region Conservation Authority Regulated Areas are identified in **Table 6-22.** There are footprint impacts to the CVI and MA lands within the King-Vaughan Wetland Complex Provincially Significant Wetland (PSW) as identified in **Table 6-22**.

There are footprint impacts to CVI, CVR, WOD and MA lands within the Maple Uplands and Kettles Candidate Life Science Area of Natural and Scientific Interest (ANSI) as identified in **Table 6-22**. Most of these areas of impact occur adjacent to anthropogenically influenced land uses associated with the rail corridor. However, vegetation clearing within areas that are part of the King-Vaughan Wetland Complex Provincially Significant Wetland (PSW) and Maple Uplands and Kettles Candidate ANSI should be minimized to the extent possible, particularly within natural vegetation communities such as MA.

Footprint impacts will occur within several different sub-designations under the Oak Ridges Moraine Conservation Plan. Within Natural Linkage Areas, CVC, CVI, WOD, AG, and TAG communities will be impacted. Impacts to the CVI and MA communities will occur within Natural Core Areas. Natural Linkage Areas and Natural Core Areas are areas that contain key natural environmental features. Within the Countryside Areas, CVC, CVI, CVR, WOD, and MA communities will be impacted. Countryside Areas provide a rural transition and buffer between Natural Core Areas and Natural Linkage Areas. Impacts to the CVI, CVC, CVR, CGL, and MA communities will occur within the Settlement Areas. Settlement areas contain previously developed lands. The majority of these areas of impact occur adjacent to the rail corridor within lands that have been previously modified and anthropogenically influenced. However, vegetation clearing within all lands protected by the Oak Ridge Moraines Conservation Plan should be minimized to the extent possible, especially within natural vegetation communities including WOD and MA.

There are footprint impacts associated with CVI, MA and TAG communities which are within lands identified as Protected Countryside under the Greenbelt Plan. The Greenbelt Plan acknowledges that lands within Protected Countryside have been culturally modified; however, within these areas vegetation removals should be minimized to the extent possible , particularly within the MA. However, no vegetation removals within these communities are required outside of the Metrolinx owned ROW.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol

Table 6-22: Summary of Vegetation Removal Areas within Designated Areas BR-4*

ELC Community	TRCA Regulation Limit			Maple Uplands and Kettles ANSI			King-Vaughn Wetland Complex PSW			Oak Ridges Moraine Natural Core Area			Oak Ridges Moraine Countryside			Oak Ridges Moraine Settlement			Oak Ridges Moraine Natural Linkage			Greenbelt Protected Countryside			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.029	0	0.029	0	0	0	0	0	0	0	0	0	0.029	0	0.029	0.396	0.124	0.568	0.066	0	0.066	0	0	0	Minor
Transportation and Utilities (CVI)	1.362	0	1.362	0.223	0	0.223	0.039	0	0.039	0.445	0	0.445	0.310	0	0.310	2.776	0.035	2.811	1.028	0	1.028	0.154	0	0.154	Minor
Residential (CVR)	0.308	0	0.308	0.001	0	0.001	0	0	0	0	0	0	0.151	0	0.151	1.147	0.269	1.416	0	0	0	0	0	0	Fair
Green Land (CGL)	0.037	0	0.037	0	0	0	0	0	0	0	0	0	0	0	0	0.050	0	0.050	0	0	0	0	0	0	Minor
Deciduous Woodland (WOD)	0.336	0	0.336	0.116	0	0.116	0	0	0	0	0	0	0.253	0	0.253	0	0	0	0.383	0	0.383	0	0	0	Extensive
Cultural Meadow (CUM)	0.013	0	0.013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Minor
Marsh(MA)	0.690	0.055	1.379	0.427	0.054	0.458	0.237	0.043	0.280	0.584	0.055	0.639	0.014	0	0.014	0.089	0	0.089	0	0	0	0.003	0	0.003	Minor
Swamp (SW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Meadow Marsh (MAM)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Agriculture (AG)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.005	0	0.005	0	0	0	Minor
Treed Agriculture (TAG)	0.204	0	0.204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.726	0	0.726	0.152	0	0.152	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.8.2 Net Effects

6.1.8.2.1 Terrestrial

No net adverse effects are anticipated in the SW community as there are no footprint impacts. There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CGL, CUM, MAM, AG, and TAG lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. The vegetation removals within the MA community may result in a net loss of vegetation within the PSW complex. However, the perimeter of this area has previously been culturally modified, and a small amount of vegetation edge removal is not anticipated to have any significant effects on specialized habitat within the wetland and the current ecological function of the wetland area will be maintained. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.8.2.2 Aquatic

There are no net adverse effects on the crossings of Don River West Branch and East Humber River as there are no anticipated footprint impacts.

6.1.8.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Barn Swallow, Bobolink, Eastern Meadowlark, Least Bittern, Common Nighthawk, Short-eared Owl, Monarch, or Rusty-patched Bumblebee. While there are footprint impacts to the WOD, SW and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. No net adverse effects are expected to result to Snapping Turtles or Eastern Ribbonsnake or their habitat as the MA areas to be impacted do not contain specialized habitat. Net effects to Butternut will be determined during Detail Design.

6.1.8.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVC, CVR, CGL, CUM, WOD, MA, and TAG communities are depicted in **Table 6-22**. No vegetation clearing within the TRCA Regulated Area within the CVC, CVI, CVR, CGL, WOD, CUM, or TAG communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the MA communities are required outside of the ROW.

Footprint impacts for CVI communities within the King-Vaughan Wetland Complex PSW occur within a culturally influenced non-natural community. Areas of MA will also be impacted. No vegetation removals within the CVI will occur outside of the Metrolinx owned ROW, and only minor removals outside the ROW are required in the MA. However, the impacted area within the MA outside of the Metrolinx owned ROW represents 0.043 ha of 27.18 ha of the total area of King-Vaughan Wetland Complex PSW. The footprint impacts associated with CVI and CVR communities in the Maple Uplands and Kettles Candidate ANSI also occur within culturally influenced non-natural communities. No vegetation removals within the CVI, CVR, or WOD will occur outside of the Metrolinx owned ROW, and only minor removals outside the ROW are required in the MA. The impacted areas within the MA outside of the Metrolinx owned ROW represents approximately 0.054ha of 57.82ha of the total area of the Maple Uplands and Kettles Candidate ANSI.

Net effects within the Oak Ridges Moraine Conservation Plan Natural Linkage Areas, (CVC, CVI, WOD, AG, and TAG), Natural Core Areas (CVI and MA), Countryside Areas (CVC, CVI, CVR, WOD, and MA), and Settlement Areas (CVI, CVC, CVR, CGL, and MA), in addition to the Protected Countryside Areas under the Greenbelt Plan (CVI, MA and TAG) are discussed in identified in **Table 6-22.** No vegetation clearing within the Natural Linkage Areas, Protected Countryside Areas (Greenbelt Plan) or Countryside Areas (ORM) are required outside of the Metrolinx owned ROW. Within the Natural Core Areas, no vegetation removals within the CVI will occur outside of the Metrolinx owned ROW, and only minor removals outside the ROW are required in the MA. No vegetation removals in Settlement areas within the CGL or MA communities will occur outside of the Metrolinx owned ROW, and only minor removals outside the ROW are required in the CVC, CVI, and CVR.

6.1.9 OCS & Bridges: Section BR-5 – King City Station to Bathurst Street

6.1.9.1 Potential Effects and Mitigation Measures

6.1.9.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-5 are presented in **Table 6-23**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including mainly Residential (CVR), Commercial and Institutional (CVC), Cultural Meadow (CUM), and small areas of Green Lands (CGL) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Deciduous Woodland (WOD) communities, located mainly adjacent to the rail corridor, CVR and CUM communities will also require vegetation clearing. These WOD communities provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the WOD communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing with the Marsh (MA) community within the Provincially Significant King-Vaughn Wetland Complex results in high ecological impacts as this area is considered environmentally significant. However, the vegetation clearing within the MA is only required within the existing Metrolinx ROW. A Meadow Marsh (MAM) south of King Road will also require vegetation clearing. An amphibian survey was conducted during the 2016 field season to identify species present within the MAM community adjacent to the MA area associated with the King-Vaughan Wetland Complex. No amphibians were recorded during the survey and therefore the ecological impact within the MAM is considered low. Several Swamp (SW) areas will also require vegetation clearing. Vegetation clearing in the MA, MAM, and SW areas will not impact any specialized amphibian habitat as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. Due to the minimal canopy cover in the MA and MAM communities, the extent of tree removals in these areas is minor, while the extent of tree removals in the SW areas are extensive due to the high canopy cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required along the edges of the Mixed Forest (FOM) communities associated with the East Humber River, which provide habitat for wildlife and act as movement corridors. Due to the natural attributes of these forest communities, ecological impacts to these areas are considered moderate. Additional FOM and one Deciduous Forest (FOD) communities, located mainly adjacent to the rail corridor and AG communities provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the FOM and FOD communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the FOM and FOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Agriculture (AG) and Treed Agriculture (TAG) communities will result in a loss of vegetation/trees along the edge of these anthropogenically modified vegetation communities which provide limited habitat for wildlife, therefore the ecological impacts in these areas are considered low. Due to the minimal canopy cover in the AG and TAG communities, the extent of tree removals is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 6-23: Summary of Vegetation Removal Areas within ELC Communities BR-5*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.372	0	0.372	Minor
Transportation and Utilities (CVI)	5.235	0.050	5.285	Minor
Residential (CVR)	1.134	0	1.134	Fair
Green Land (CGL)	0.035	0	0.035	Minor
Deciduous Forest (FOD)	0.379	0	0.379	Extensive
Mixed Forest (FOM)	0.231	0	0.231	Extensive
Cultural Meadow (CUM)	0.772	0.003	0.775	Minor
Meadow Marsh (MAM)	0.632	0.001	0.633	Minor
Marsh (MA)	0.046	0	0.046	Minor
Swamp (SW)	0.600	0	0.600	Extensive
Agriculture (AG)	0.237	0	0.237	Minor
Treed Agriculture (TAG)	1.635	0	1.635	Minor
Deciduous Woodland (WOD)	0.067	0	0.067	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

- **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
- **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
- **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
- **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
- **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- King Road (Newmarket Sub Mile 23.26)
- Keele Street (Newmarket Sub Mile 23.30)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.9.1.2 Aquatic

There are four crossings of the East Humber River (and its tributaries) within this corridor segment. The crossings of the East Humber River are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

6.1.9.1.3 Species at Risk

Given the low potential of occurrence of American Ginseng, Acadian Flycatcher, Bank Swallow, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Short-eared Owl, Yellow Rail, Monarch, Rusty-patched Bumblebee, Eastern Ribbonsnake, and Blanding's Turtle there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL, CVC, TAG and CVR communities and moderate potential within the WOD, FOD and FOM communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. Bobolink and Eastern Meadowlark have a moderate potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species. There is moderate potential for Wood Thrush within FOM and FOD communities; however, this species is associated with interior forest habitat which will not be impacted. While the Red-headed Woodpecker has a moderate potential of occurrence in the FOD, WOD, SW and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the FOD, WOD and SW or individual tree removals within the CGL is not anticipated to have an impact on this species.

While Snapping Turtle have a moderate potential of occurrence within the Open Water (OA), there are no footprint impacts to these areas. Within Marsh (MA) communities, Snapping Turtle have a moderate potential for occurrence and footprint impacts within the MA are anticipated. However, the MA areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the FOD and FOM communities and a low potential in the WOD and SW communities. While several bat species were recorded during the SAR bat presence/absence surveys completed in July 2016 no SAR bats were identified. See **Appendix A2** for Bat Survey results. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

Regulated habitat for Redside Dace was identified within East Humber River. No footprint impacts to these watercourses will occur. The regulation for Redside Dace under the ESA, 2007 includes the meander belt width plus thirty (30) metres, therefore further consultation with the MNRF during Detailed Design will be required for any work that occurs within the regulated area, especially as it relates to sediment and erosion control measures associated with construction or site disturbance activities. Footprint impacts within Redside Dace regulated areas should be minimized to the greatest extent possible.

6.1.9.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CGL, FOM, CUM, MA, MAM, SW, and TAG lands within Toronto and Region Conservation Authority Regulated Areas are identified in **Table 6-24**.

There are footprint impacts to MA lands within the King-Vaughan Wetland Complex Provincially Significant Wetland (PSW) as identified in **Table 6-24**. Most of these areas of impact occur adjacent to anthropogenically influenced land uses associated with the rail corridor. However, vegetation clearing within areas that are part of the King-Vaughan Wetland Complex Provincially Significant Wetland (PSW) should be minimized to the extent possible.

Footprint impacts will occur within several different sub-designations under the Oak Ridges Moraine Conservation Plan. Within Natural Linkage Areas, CVC, CVI, CVR, FOD, FOM, CUM, SW, AG, and TAG communities will be impacted. Impacts to the CVI and MA communities will occur within Natural Core Areas. Natural Linkage Areas and Natural Core Areas are areas that contain key natural environmental features. Impacts to the CVI, CVC, CVR, CGL, FOM, CUM, MAM, MA and WOD communities will occur within the Settlement Areas. Settlement areas contain previously developed lands. The majority of these areas of impact occur adjacent to the rail corridor within lands that have been previously modified and anthropogenically influenced. However, vegetation clearing within all lands protected by the Oak Ridge Moraines Conservation Plan should be minimized to the extent possible, especially within natural vegetation communities including WOD and MA.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-24: Summary of Vegetation Removal Areas within Designated Areas BR-5*

ELC Community	TCRA Regulation Limit			King-Vaughan Wetland Complex PSW			Oak Ridges Moraine Natural Core Areas			Oak Ridges Moraine Settlement Areas			Oak Ridges Moraine Natural Linkage Areas			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.001	0	0.001	0	0	0	0	0	0	0.112	0	0.112	0.261	0	0.261	Minor
Transportation and Utilities (CVI)	1.302	0.040	1.342	0	0	0	0.067	0	0.067	2.956	0.050	3.006	2.212	0	2.212	Minor
Residential (CVR)	0.090	0	0.090	0	0	0	0	0	0	1.104	0	1.104	0.030	0	0.030	Fair
Green Land (CGL)	0.018	0	0.018	0	0	0	0	0	0	0.035	0	0.035	0	0	0	Minor
Deciduous Forest (FOD)	0	0	0	0	0	0	0	0	0	0	0	0	0.379	0	0.379	Extensive
Mixed Forest (FOM)	0.153	0	0.153	0	0	0	0	0	0	0.172	0	0.172	0.059	0	0.059	Extensive
Cultural Meadow (CUM)	0.013	0	0.013	0	0	0	0	0	0	0.717	0	0.717	0.055	0.003	0.058	Minor
Meadow Marsh (MAM)	0.308	0	0.308	0	0	0	0	0	0	0.632	0.001	0.633	0	0	0	Minor
Marsh (MA)	0.046	0	0.046	0.001	0	0.001	0.044	0	0.044	0.002	0	0.002	0	0	0	Minor
Swamp (SW)	0.213	0	0.213	0	0	0	0	0	0	0	0	0	0.600	0	0.600	Minor
Agriculture (AG)	0	0	0	0	0	0	0	0	0	0	0	0	0.237	0	0.237	Minor
Treed Agriculture (TAG)	0.571	0	0.571	0	0	0	0	0	0	0	0	0	1.635	0	1.635	Minor
Deciduous Woodland (WOD)	0	0	0	0	0	0	0	0	0	0.067	0	0.067	0	0	0	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.9.2 Net Effects

6.1.9.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CGL, CUM, TAG, and AG lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the FOD, WOD and FOM communities within a watercourse corridor adjacent to the existing rail corridor within the existing ROW. However, a small amount of edge removal in the FOD, FOM and WOD is not anticipated to have any significant effects to the ecological features or function associated with these communities including wildlife or wildlife habitat. The vegetation removals within the MA, MAM and SW communities may result in a net loss of vegetation along the perimeter the MA, MAM and SW within the Metrolinx ROW only. However, these areas do not contain suitable amphibian habitat. Since specialized habitat within the wetlands will not be impacted and the current ecological function of the wetlands areas will be maintained, there are no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.9.2.2 Aquatic

There are no net adverse effects on the crossings of East Humber River as there are no anticipated footprint impacts.

6.1.9.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for American Ginseng, Acadian Flycatcher, Bank Swallow, Barn Swallow, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Short-eared Owl, Yellow Rail, Monarch, Rusty-patched Bumblebee, Eastern Ribbonsnake, and Blanding's Turtle. No net adverse effects are expected to result to Bobolink and Eastern Meadowlark or their habitat as the AG areas to be impacted do not contain specialized habitat for these species. While there are impacts to the FOM communities, there are no impacts to the preferred interior habitat for Wood Thrush and therefore no net adverse effects. While there are footprint impacts to the FOD, WOD, SW and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects on habitat for Redside Dace, as defined under the ESA, 2007 will be addressed in consultation with the MNRF during Detailed Design. No net adverse effects are expected to result to Snapping Turtles or their habitat as the MA areas to be impacted do not contain specialized habitat. Net effects to Butternut will be determined during Detailed Design.

6.1.9.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CVI, CVC, CVR, CGL, FOM, CUM, MA, MAM, SW, and TAG communities are identified in **Table 6-24**. No vegetation clearing within the TRCA Regulated Area within the CVC, CVR, CGL, FOM, CUM, MA, MAM, SW, and TAG communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI communities are required outside of the ROW.

Within the King-Vaughan Wetland Complex PSW areas of MA will be impacted. No vegetation clearing within the King-Vaughan Wetland Complex PSW is required within the MA communities outside of the Metrolinx owned ROW. The net effects to the community are identified in **Table 6-24**.

Net effects within the Oak Ridges Moraine Conservation Plan Natural Linkage Areas, (CVC, CVI, CVR, FOD, FOM, CUM, SW, AG, and TAG), Natural Core Areas (CVI and MA), and Settlement Areas (CVI, CVC, CVR, CGL, FOM, CUM, MAM, WOD and MA) are identified in **Table 6-24.** No vegetation clearing within the Natural Core Areas are required outside of the Metrolinx owned ROW. Within the Settlement Areas, no vegetation removals within the CVC, CVR, CGL, FOM, CUM, MA, and WOD will occur outside of the Metrolinx owned ROW, and only minor removals outside the ROW are required in the MAM and CVI communities. No vegetation removals in Natural Linkage Areas within the CVC, CVI, CVR, FOD, FOM, SW, AG, or TAG communities will occur outside of the Metrolinx owned ROW, and only minor removals outside the ROW are required in the CUM.

6.1.10 OCS & Bridges: Section BR-6 – Bathurst Street to Aurora Station

6.1.10.1 Potential Effects and Mitigation Measures

6.1.10.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-6 are presented in **Table 6-25**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Cultural Meadow (CUM), and Deciduous Thicket (THD) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC CUM, and THD communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The Mixed Forest (FOM), Mixed Woodland (WOM) and Mixed Swamp (SWM) communities provide habitat for wildlife and act as movement corridors. Due to the natural attributes of these communities, ecological impacts to these areas are considered moderate. Vegetation clearing within the FOM, WOM and SWM communities will result in a loss of vegetation along the edge of these natural vegetation communities. Thre are no vegetation removals within the SWM and WOM communities outside of the Metrolinx ROW, and only minor vegetation removals outside the ROW in the FOM communities. The high amount of canopy cover in the FOM, WOM and SWM communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The Deciduous Woodland (WOD) community located adjacent to the rail corridor and surrounded by CVR communities provides only non-specialized habitat for wildlife which results in low potential ecological impacts. Vegetation clearing within the WOD communities will result in a loss of vegetation along the edge of these natural vegetation communities within the existing Metrolinx ROW only. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

A small portion of Marsh (MA) within the existing Metrolinx ROW is within the vegetation clearing zone. Vegetation clearing with the MA community will not impact any specialized amphibian habitat as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. As such, ecological impacts to these areas are low. Due to the minimal canopy cover in the MA community, the extent of tree removals in these areas is minor. No additional mitigation measures are proposed, aside from adherence to the general mitigation measures for vegetation/tree clearing identified below.

No vegetation clearing within the Green Lands (CGL) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

Table 6-25: Summary of Vegetation Removal Areas within ELC Communities BR-6*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	1.481	0.244	1.725	Minor
Transportation and Utilities (CVI)	5.580	0.404	5.984	Minor
Residential (CVR)	1.420	0.017	1.437	Fair
Green Land (CGL)	0	0	0	N/A

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Mixed Forest (FOM)	0.975	0.009	0.984	Extensive
Cultural Meadow (CUM)	0.518	0.001	0.519	Minor
Marsh (MA)	0.008	0	0.008	Minor
Mixed Swamp (SWM)	0.072	0	0.072	Extensive
Deciduous Thicket (THD)	0.002	0	0.002	Minor
Deciduous Woodland (WOD)	0.168	0	0.168	Extensive
Mixed Woodland (WOM)	0.095	0	0.095	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.

  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and

- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Bathurst Street (Newmarket Sub Mile 26.50)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.10.1.2 Aquatic

There are three crossings of the Holland River East Branch (and its tributaries) within this corridor segment. The crossings of the East Humber River are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

6.1.10.1.3 Species at Risk

Given the low potential of occurrence of Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Monarch, Rust-patched Bumblebee and Blanding's Turtle there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL, CVC, THD and CVR communities and moderate potential within the FOM, WOM and WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. There is moderate potential for Wood Thrush within FOM and SWM communities; however, this species is associated with interior forest habitat which will not be impacted. While the Red-headed Woodpecker has a moderate potential of occurrence in the FOM, SWM, WOM, WOD and CGL communities. This species is generally tolerant of disturbance and a small amount of woodland edge removal within the FOM, SWM, WOM and WOD communities or individual tree removals in CGL are not anticipated to have an impact on this species.

While Snapping Turtle have a moderate potential of occurrence within the Open Water (OA), there are no footprint impacts to these areas.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the FOM, WOM, and SWM and a low potential to occur within WOD communities. While several bat species were recorded during the SAR bat presence/absence surveys completed in July 2016 no SAR bats were identified. See **Appendix A2** for Bat Survey results. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified. See **Appendix A2** for Bat Survey results.

6.1.10.1.4 Designated Areas

Footprint impacts to CVI, CVC, WOD and SWM lands within Lake Simcoe Region Conservation Authority Regulated Areas are identified in **Table 6-26**.

There are no footprint impacts to Sheppard's Bush Conservation Area. Footprint impacts will occur within several different sub-designations under the Oak Ridges Moraine Conservation Plan. Within Natural Linkage Areas CVR, CVI, and CUM communities will be impacted. Natural Linkage Areas are areas that contain key natural environmental features. Impacts to the CVI, CVC, CVR, CUM, SWM, WOD, MA, THD, WOM and FOM communities will occur within the Settlement Areas. Settlement areas contain previously developed lands. The majority of these areas of impact occur adjacent to the rail corridor within lands that have been previously modified and anthropogenically influenced. However, vegetation clearing within all lands protected by the Oak Ridge Moraines Conservation Plan should be minimized to the extent possible, especially within natural vegetation communities including WOD and MA.

Footprint impacts will also occur within CVC, CVI, CVR, FOM, SWM, WOD, CUM, MA, and THD communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been identified in **Table 6-26**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-26: Summary of Vegetation Removal Areas within Designated Areas BR-6*

ELC Community	LSRCA Regulation Limit			Oak Ridges Moraine Settlement Areas			Oak Ridges Moraine Natural Linkage Areas			Lake Simcoe Protection Plan Area			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.124	0	0.124	0.583	0.052	0.635	0	0	0	1.476	0.244	1.719	Minor
Transportation and Utilities (CVI)	0.437	0	0.437	3.706	0.006	3.712	0.053	0.002	0.055	5.580	0.404	5.984	Minor
Residential (CVR)	0	0	0	1.420	0.017	1.437	0.001	0	0.001	1.421	0.017	1.438	Fair
Green Land (CGL)	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Mixed Forest (FOM)	0	0	0	0.975	0.009	0.984	0	0	0	0.975	0.009	0.984	Extensive
Cultural Meadow (CUM)	0	0	0	0.509	0	0.509	0.009	0.001	0.010	0	0.509	0.509	Minor
Mixed Swamp (SWM)	0.017	0	0.017	0.072	0	0.072	0	0	0	0.072	0	0.072	Extensive
Deciduous Woodland (WOD)	0.143	0	0.143	0.168	0	0.168	0	0	0	0.168	0	0.168	Extensive
Marsh (MA)	0	0	0	0.008	0	0.008	0	0	0	0.008	0	0.008	Minor
Deciduous Thicket (THD)	0	0	0	0.002	0	0.002	0	0	0	0.002	0	0.002	Minor
Mixed Woodland (WOM)	0	0	0	0.095	0	0.095	0	0	0	0	0	0	Extensive

**areas are approximations for discussion purposes only and not based on surveyed data*

6.1.10.2 Net Effects

6.1.10.2.1 Terrestrial

There are no net adverse effects to the CGL and FOD communities as there are no anticipated impacts to these communities. There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CGL, THD, and CUM lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the FOM, SWM, WOD and WOM communities adjacent to the existing rail corridor. However, a small amount of tree removal from the edge of these communities is not anticipated to have any significant effects to the ecological features or function associated with the communities including wildlife or wildlife habitat. The vegetation removals within the MA community may result in a net loss of vegetation along the perimeter the MA within the existing ROW. However, this area does not contain suitable amphibian habitat. Since specialized habitat within the wetland will not be impacted and the current ecological function of the wetland area will be maintained, there are no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net adverse effects.

6.1.10.2.2 Aquatic

There are no net adverse effects on the crossings of East Humber River as there are no anticipated footprint impacts.

6.1.10.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Acadian Flycatcher, Barn Swallow, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Monarch, Rusty-patched Bumblebee, Blanding's Turtle or Snapping Turtle. While there are impacts to the FOM and SWM communities, there are no impacts to the preferred interior habitat for Wood Thrush and therefore no net adverse effects. While there are footprint impacts to the FOM, CGL, SWM, WOD and WOM communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detailed Design.

6.1.10.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with CVI, CVC, SWM and WOD communities are identified in **Table 6-26.** No vegetation clearing within the LSRCA Regulated area is required within any of these communities outside of the Metrolinx owned ROW.

There are no net adverse effects to Sheppard's Bush Conservation Area, as there are no footprint impacts.

Net effects within the Oak Ridges Moraine Conservation Plan Natural Linkage Areas (CVR, CVI, and CUM), and Settlement Areas (CVI, CVC, CVR, FOM, CUM, SW, WOD, MA, THD, and WOM) are identified in discussed in **Table 6-26.** No vegetation clearing within the Natural Linkage Areas within the CVR communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CUM and CVI communities are required outside of the ROW. Within the Settlement Areas, no vegetation removals outside the Metrolinx owned ROW will be required within the CUM, SWM, WOD, MA, THD or WOM communities and only minor removals are required within the CVC, CVI, CVR, and FOM communities.

Net effects relating to footprint impacts within Lake Simcoe Protection Plan Areas associated with CVI, CVC, CVR, FOM, SWM, CUM, WOD, MA, and THD communities are discussed in **Table 6-26.** No vegetation clearing within the Lake Simcoe Protection Plan Area within the SWM, WOD, MA and THD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVR, CVC, FOM and CUM communities are required outside of the ROW.

6.1.11 OCS & Bridges: Section BR-7 – Aurora Station to East Gwillimbury Station

6.1.11.1 Potential Effects and Mitigation Measures

6.1.11.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-7 are presented in **Table 6-27**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including mainly Residential (CVR), Commercial and Institutional (CVC), Green Lands (CGL), Cultural Meadow (CUM) and Agriculture (AG) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL, CUM, and AG communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) and Deciduous Forest (FOD) communities connected to the Clubinis Creek corridor, Holland River East Branch corridor or Wesley Brooks Conservation Area, will result in a loss of vegetation along the edge of these natural vegetation communities which provide habitat for wildlife and act as movement corridors. However, the vegetation clearing within the WOD and FOD is only required within the existing Metrolinx ROW. Due to the natural attributes of the woodlands communities, ecological impacts to these areas are considered moderate. The high amount of canopy cover in the WOD and FOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Swamp (SW) community within the Provincially Significant Aurora (McKenzie) Marsh Wetland Complex results in high ecological impacts as this area is considered environmentally significant. Vegetation clearing will also be required within Shallow Marsh (MAS) and Marsh (MA) communities. However, the vegetation clearing within the MAS, MA, and SW communities is only required within the existing Metrolinx ROW. An amphibian survey was conducted during the 2016 field season to identify species present within the SW and MAS areas. No amphibians were recorded during the surveys and therefore the ecological impact within the MAS is considered low. However, the vegetation removals in the SW and MAS will not impact any specialized amphibian habitat as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. Due to the minimal canopy cover in the MAS and MA areas, the extent of tree removals is minor, while the extent of tree removals in the SW areas are extensive due to the high canopy cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the SW and MAS areas should occur to buffer the adjacent wetlands.

Table 6-27: Summary of Vegetation Removal Areas within ELC Communities BR-7*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	1.552	0.093	1.645	Minor
Transportation and Utilities (CVI)	8.938	0.022	8.960	Minor
Residential (CVR)	2.740	0.046	2.786	Fair
Green Land (CGL)	1.316	0.368	1.684	Minor
Deciduous Woodland (WOD)	0.137	0	0.137	Extensive
Cultural Meadow (CUM)	0.660	0	0.660	Minor
Marsh (MA)	0.013	0	0.013	Minor
Shallow Marsh (MAS)	0.163	0	0.163	Minor
Swamp (SW)	0.407	0	0.407	Extensive

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Agriculture (AG)	0.007	0	0.007	Minor
Deciduous Forest (FOD)	0.301	0	0.301	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx’s property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and

- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers include:

- Queen Street (Newmarket Sub Mile 33.95)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.11.1.2 Aquatic

There are six crossings of the Holland River East Branch (and its tributaries) within the corridor segment. One tributary of Holland River East Branch is identified as Clubinis Creek. No bridge modifications are required on the Clubinis Creek Bridge (Newmarket Sub Mile 32.00) or the Holland River East Branch Bridge (Newmarket Sub Mile 33.70) and therefore there are no footprint impacts to Clubinis Creek or the Holland River East Branch. Similarly, no adverse effects to these watercourses are anticipated to result from the installation of OCS structures are they are located within the existing corridor ROW away from the watercourses. The remaining four watercourse crossings are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses and appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials.

6.1.11.1.3 Species at Risk

Given the low potential of occurrence of American Ginseng, Bank Swallow, Acadian Flycatcher, Cerulean Warbler, Eastern Wood Peewee, Canada Warbler, Monarch, Rusty-patched Bumblebee, and Northern Map Turtle there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL, CVC and CVR communities and moderate potential within the WOD and FOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Clubinis Creek Bridge (Newmarket Sub Mile 32.0) and Holland River Bridge

(Newmarket Sub Mile 33.70) were surveyed for active nests and individuals. No Barn Swallows nests or individuals at these sites. As there are no bridge modifications are required at these bridge structures and no evidence of Barn Swallow nesting was found, there are no anticipated impacts. There is moderate potential for Wood Thrush within FOD communities, however this species is associated with interior forest habitat which will not be impacted. Bobolink and Eastern Meadowlark have a moderate potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD, SW, FOD and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD, SW, FOM and FOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

While Snapping Turtle and Blanding's Turtle have a moderate potential of occurrence within the Open Water (OA), there are no footprint impacts to these areas. Within Shallow Marsh (MAS) communities, Snapping Turtle and Blanding's Turtle have a moderate potential for occurrence and footprint impacts within the MAS are anticipated. However, the MAS areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD, FOD, and FOM communities but a low potential to occur in the SW communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

6.1.11.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CGL, CUM, WOD, SW, MA, MAS, FOD and AG lands within Lake Simcoe Region Conservation Authority Regulated Areas are identified in **Table 6-28**.

There are no footprint impacts to Mabel Davis Conservation Area or Bailey Ecological Park. There are footprint impacts to SW lands within the Aurora McKenzie Marsh Wetland PSW as identified in **Table 6-28**. There are footprint impacts to the CGL, CVI and WOD lands within the Wesley Brooks Conservation Area as identified in **Table 6-28**. Most of these areas of impact occur adjacent to anthropogenically influenced land uses associated with the rail corridor. However, vegetation clearing within areas that are part of the Aurora McKenzie Marsh Wetland PSW and Wesley Brooks Conservation Area should be minimized to the extent possible, particularly within natural vegetation communities such as WOD and SW.

Footprint impacts will also occur within CVC, CVI, CVR, SW, WOD, CUM, MA, MAS, AG, FOD, and THD communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been discussed within **Table 6-28**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-28: Summary of Vegetation Removal Areas within Designated Areas BR-7*

ELC Community	LSRCA Regulation Limit			Wesley Brooks Conservation Area			Aurora McKenzie Marsh Wetland PSW			Lake Simcoe Protection Plan Area			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.791	0.006	0.797	0	0	0	0	0	0	1.552	0.093	1.644	Minor
Transportation and Utilities (CVI)	0.015	6.014	6.029	8.937	0.022	8.959	0	0	0	8.938	0.022	8.959	Minor
Residential (CVR)	1.384	0.024	1.408	0	0	0	0	0	0	2.740	0.046	2.786	Fair
Green Land (CGL)	0.902	0.368	1.270	0.417	0.017	0.435	0	0	0	1.316	0.368	1.684	Minor
Deciduous Woodland (WOD)	0.137	0	0.137	0	0	0	0	0	0	0.137	0	0.137	Extensive
Cultural Meadow (CUM)	0.535	0	0.535	0	0	0	0	0	0	0.660	0	0.660	Minor
Marsh (MA)	0.013	0	0.013	0	0	0	0	0	0	0.013	0	0.013	Minor
Shallow Marsh (MAS)	0.163	0	0.163	0	0	0	0	0	0	0.163	0	0.163	Minor
Swamp (SW)	0.407	0	0.407	0	0	0	0.001	0	0.001	0.407	0	0.407	Extensive
Agriculture (AG)	0.007	0	0.007	0	0	0	0	0	0	0.007	0	0.007	Minor
Deciduous Forest (FOD)	0.221	0	0.221	0.301	0	0.301	0	0	0	0.301	0	0.301	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

6.1.11.2 Net Effects

6.1.11.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CGL, CUM and AG lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD, SW and FOD communities. Vegetation clearing areas within WOD, SW and FOD are adjacent to the existing rail corridor. However, a small amount of tree removal from the edge of these communities is not anticipated to have any significant effects to the ecological features or function associated with the communities including wildlife or wildlife habitat. The vegetation removals within the MA and MAS communities may result in a net loss of vegetation along the perimeter the MA and MAS within the existing ROW. However, these areas do not contain suitable amphibian habitat. Since specialized habitat within the wetland areas will not be impacted and the current ecological function of the wetland areas will be maintained, there are no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net adverse effects.

6.1.11.2.2 Aquatic

There are no net adverse effects on the Holland River East Branch, Clubinis Creek, or the remaining five watercourse crossings as there are no anticipated footprint impacts.

6.1.11.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for American Ginseng, Barn Swallow, Bank Swallow, Acadian Flycatcher, Cerulean Warbler, Eastern Wood Peewee, Canada Warbler, Monarch, Rusty-patched Bumblebee, and Northern Map Turtle. No net adverse effects are expected to result to Bobolink and Eastern Meadowlark or their habitat as the AG areas to be impacted do not contained specialized habitat. While there are footprint impacts to the WOD, FOD, SW and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. While there are impacts to the FOD communities, there are no impacts to the preferred interior habitat for Wood Thrush and therefore no net adverse effects. No net adverse effects are expected to result to Snapping Turtle and Blanding's Turtle or their habitat as the MAS areas to be impacted do not contained specialized habitat. Net effects to Butternut will be determined during Detailed Design.

6.1.11.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with CVI, CVC, CVR, CGL, CUM, FOD, SW, AG, MA, MAS and WOD communities are identified in **Table 6-28.** No vegetation clearing within the LSRCA Regulated Area within the WOD, CUM, MA, MAS, SW, AG, or FOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, CGL and CVR communities are required outside of the ROW.

There are no net adverse effects to Mabel Davis Conservation Area or Bailey Ecological Park, as there are no footprint impacts. Within the Aurora McKenzie Marsh Wetland PSW areas of SW will be impacted. No vegetation clearing within the Aurora McKenzie Marsh Wetland PSW is required outside of the Metrolinx owned ROW. The majority of footprint impacts within Wesley Brooks Conservation Area are culturally influenced non-natural communities (CVC and CGL). A small area of FOD will also be impacted. However, no vegetation clearing within the Wesley Brooks Conservation Area is required within the FOD community outside of the Metrolinx owned ROW and only minor removals outside the ROW are necessary within the CVI and CGL communities. The net effects to the communities are identified in **Table 6-28.**

Net effects relating to footprint impacts within Lake Simcoe Protection Plan Areas associated with CVI, CVC, CVR, CGL, WOD, CUM, MA, MAS, SW, AG, and FOD communities are discussed in **Table 6-28.** No vegetation clearing within the Lake Simcoe Protection Plan Area within the, WOD, CUM, MA, MAS, SW, AG, or FOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVR, CVC, and CGL communities are required outside of the ROW.

6.1.12 OCS & Bridges: Section BR-8 – East Gwillimbury Station to Bradford Station

6.1.12.1 Potential Effects and Mitigation Measures

6.1.12.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-8 are presented in **Table 6-29**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within other ELC communities including mainly Residential (CVR), Commercial and Institutional (CVC), Green Lands (CGL), Cultural Meadow (CUM), Treed Agriculture (TAG), and Agriculture (AG) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL, CUM, TAG, and AG communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The Deciduous Woodland (WOD), Deciduous Forest (FOD), Mixed Forest (FOM) communities connected to the Holland River East Branch corridor and Rogers Reservoir Conservation Area provide habitat for wildlife and act as movement corridors. Furthermore, the FOD community within Rogers Reservoir Conservation Area has been identified as a deer wintering area by MNRF. Due to the natural attributes of the woodlands and forest communities, ecological impacts to these areas are considered moderate. Vegetation clearing within the WOD, FOD, and FOM communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the WOD, FOD, and FOM communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing is required within the Swamp (SW) community within the Provincially Significant Holland Marsh Wetland Complex (PSW) An amphibian survey was conducted during the 2016 field season to identify species present within the SW. No amphibians were recorded during the survey. However, ecological impacts to this areas are considered high as the community has been identified as significant. The SW community associated with Rogers Reservoir Conservation Area and an MNRF identified deer wintering area will result in moderate ecological impacts. The extent of tree removals in the SW communities is considered extensive due to the high canopy cover present. Mitigation for the SW communities includes compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the SW areas should occur to buffer the adjacent wetland.

Vegetation clearing within the Shallow Marsh (MAS) communities connected to Holland River East Branch corridor and Rogers Reservoir Conservation Area will not impact any specialized amphibian habitat. The vegetation clearing within the MAS is only required within the existing Metrolinx ROW and the areas adjacent to the corridor are not conducive to breeding or hibernation areas. As such, ecological impacts to these areas are low. Minimal canopy cover within the MAS communities results in minor tree removals within the MAS communities. Mitigation for the MAS communities includes compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the MAS areas should occur to buffer the adjacent wetland.

Table 6-29: Summary of Vegetation Removal Areas within ELC Communities BR-8*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.606	0.294	0.900	Minor
Transportation and Utilities (CVI)	11.098	0.046	11.143	Minor
Residential (CVR)	0.563	0.252	0.815	Fair
Green Land (CGL)	0.018	0.073	0.090	Minor
Deciduous Woodland (WOD)	0.506	0.051	0.557	Extensive
Cultural Meadow (CUM)	0.568	0.014	0.582	Minor
Shallow Marsh (MAS)	0.053	0	0.053	Minor
Swamp (SW)	0.356	0.544	0.899	Extensive
Agriculture (AG)	0.433	0.368	0.801	Minor
Deciduous Forest (FOD)	0.5849	0.037	0.622	Extensive
Mixed Forest (FOM)	0.055	0	0.055	Extensive
Treed Agriculture (TAG)	0.878	0.179	1.057	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

<u>*Mitigation Measures*</u>

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing

trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.

- **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
- **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
- **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Holland River (Newmarket Sub Mile 41.00)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.12.1.2 Aquatic

There are five crossings of the Holland River East Branch area and one crossing of the Holland River West Branch. The Open Water (OA) areas of the Holland River West Branch are considered Significant Wetlands by the County of Simcoe. Bridge modifications will occur within the existing Barrie route/corridor on the existing Holland River West Branch Bridge (Newmarket Sub Mile 41.00). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to the Holland River West Branch Bridge or fish/fish habitat. Similarly, no adverse effects to the Holland River West Branch are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. The remaining five watercourse crossings are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

6.1.12.1.3 Species at Risk

Given the low potential of occurrence of American Ginseng, Short-eared Owl, Eastern Ribbonsnake, Northern Map Turtle, Monarch, and Rusty-patched Bumblebee there are no anticipated footprint impacts to the species or its habitat.

Butternuts have a low potential for occurrence within the CGL, CVC, TAG and CVR communities and moderate potential within the FOD, WOD and FOM. The presence/absence of Butternuts will be confirmed during detailed tree inventories of impacted areas during Detailed Design. A health assessment will be undertaken at that time for any pure butternuts. Should any Butternuts be found during Detailed Design, appropriate approval under the ESA, 2007 will be required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Holland River Bridge (Newmarket Sub Mile 41.00) was surveyed for active nests and individuals. While access, made it difficult to observe the underside of the bridge for nests, Barn Swallows were observed flying under the structure and nesting on the structure is likely. Modifications to this bridge (OCS wire attachments) are anticipated. A follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. Bobolink, Eastern Meadowlark and Grasshopper Sparrow have a moderate potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species. There is moderate potential for Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler and Wood Thrush within FOD communities, however, these species are associated with interior forest habitat which will not be impacted. While the Red-headed Woodpecker has a moderate potential of occurrence in the FOD, FOM, SW, WOD and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the FOD, FOM, SW and WOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

Snapping Turtle and Blanding's Turtle have a moderate potential of occurrence within the Open Water (OA) and MAS communities. There are no footprint impacts to the OA areas and the MAS areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD, FOD, and FOM communities but a low potential to occur in the SW communities. While several bat species were recorded during the SAR bat presence/absence surveys completed in July 2016no SAR bats were identified. See **Appendix A2** for Bat Survey results. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified. While American Eel have been identified within the Holland River West Branch, there are no anticipated impacts to the watercourse and therefore no impacts to American Eel.

6.1.12.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CGL, CUM, FOD, FOM, WOD, MAS, SW, TAG and AG lands within Lake Simcoe Region Conservation Authority Regulated Areas are identified in **Table 6-30**.

There are no footprint impacts to Holland Landing Fen and Wetlands Candidate Life Science ANSI. There are footprint impacts to AG lands within the Holland River Marsh (BW5) PSW and footprint impacts to the CVI CVC, and SW lands within the Holland Marsh Wetland Complex PSW as identified in **Table 6-30**. There are footprint impacts to the CGL, FOD, FOM and WOD lands within the Rogers Reservoir Conservation Area as identified in **Table 6-30**. Footprint impacts will also occur within the CVC and CVI communities within the Holland Marsh Lowlands ESA (County of Simcoe). Most of these areas of impact occur adjacent to anthropogenically influenced land uses associated with the rail corridor. However, vegetation clearing within areas that are part of the Holland River Marsh (BW5) PSW, and Holland Marsh Wetland Complex PSW, and Rogers Reservoir should be minimized to the extent possible, particularly within natural vegetation communities such as SW, FOD, FOM WOD, and MAS.

There are footprint impacts associated with CVC, CVI, CVR, AG and SW communities which are within lands identified as Protected Countryside under the Greenbelt Plan. The Greenbelt Plan acknowledges that lands within Protected Countryside have been culturally modified; however, within these areas vegetation removals should be minimized to the extent possible.

Footprint impacts will also occur within CVI, CVC, CVR, CGL, CUM, FOD, FOM, WOD, MAS, SW, TAG and AG communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been identified in **Table 6-30**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-30: Summary of Vegetation Removal Areas within Designated Areas BR-8*

ELC Community	LSRCA Regulation Limit			Rogers Reservoir Conservation Area			Holland River Marsh (BW5) PSW			Holland Marsh Wetland Complex PSW			Holland Marsh Lowlands ESA (Simcoe County)			Greenbelt Plan Protected Countryside			Lake Simcoe Protection Plan Area			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.533	0.133	0.665	0	0	0	0	0	0	0.003	0.002	0.005	0.004	0.004	0.008	0.195	0.095	0.290	0.606	0.294	0.900	Minor
Transportation and Utilities (CVI)	7.081	0.022	7.103	0	0	0	0	0	0	0.048	0	0.048	0.033	0	0.033	3.508	0.020	3.527	11.10	0.046	11.14	Minor
Residential (CVR)	0.427	0.140	0.567	0	0	0	0	0	0	0	0	0	0	0	0	0.090	0.090	0.180	0.563	0.252	0.815	Fair
Green Land (CGL)	0.018	0.073	0.090	0.012	0.053	0.066	0	0	0	0	0	0	0	0	0	0	0	0	0.018	0.073	0.090	Minor
Deciduous Woodland (WOD)	0.383	0.051	0.434	0.191	0.023	0.213	0	0	0	0	0	0	0	0	0	0	0	0	0.506	0.051	0.557	Extensive
Cultural Meadow (CUM)	0.381	0.014	0.394	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.569	0.014	0.582	Minor
Shallow Marsh (MAS)	0.034	0	0.034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.053	0	0.053	Minor
Swamp (SW)	0.344	0.529	0.872	0	0	0	0	0	0	0	0.070	0.070	0	0	0	0.058	0.303	0.361	0.356	0.544	0.899	Minor
Agriculture (AG)	0.407	0.315	0.722	0	0	0	0.018	0.002	0.020	0	0	0	0	0	0	0.165	0.324	0.490	0.433	0.368	0.8005	Minor
Deciduous Forest (FOD)	0.210	0.013	0.223	0.232	0	0.232	0	0	0	0	0	0	0	0	0	0	0	0	0.585	0.037	0.623	Extensive
Mixed Forest (FOM)	0.022	0	0.022	0.055	0	0.055	0	0	0	0	0	0	0	0	0	0	0	0	0.056	0	0.056	Extensive
Treed Agriculture (TAG)	0.217	0.008	0.224	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.878	0.179	1.06	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

6.1.12.2 Net Effects

6.1.12.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CGL, CUM, TAG and AG lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD, FOM, FOD and SW communities adjacent to the existing rail corridor. However, a small amount of woodland or forest edge removal is not anticipated to have any significant effects to the ecological features or function associated with these communities including wildlife or wildlife habitat. The vegetation removals within the SW and MAS communities may result in a net loss of vegetation along the perimeter the MAS. However, these areas do not contain suitable amphibian habitat. Since specialized habitat within the wetlands will not be impacted and the current ecological function of the wetland areas will be maintained, there are no net adverse effects. The function of the deer wintering area will not be impacted as the removals will occur along the edge of the wintering area where deer activity is lowest away from the core cover and feeding areas. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net adverse effects.

6.1.12.2.2 Aquatic

There are no net adverse effects on the Holland River West Branch and the remaining watercourse crossings as there are no anticipated footprint impacts.

6.1.12.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for American Ginseng, Short-eared Owl, Eastern Ribbonsnake, Northern Map Turtle, Monarch, Rusty-patched Bumblebee, and American Eel.. Should Barn Swallow nests be found prior to construction on the Holland River Bridge (Newmarket Sub Mile 41.00), registration and mitigation under the ESA will ensure no net adverse effects to Barn Swallows. No net adverse effects are expected to result to Bobolink, Eastern Meadowlark, and Grasshopper Sparrow or their habitat as the AG areas to be impacted do not contained specialized habitat. While there are impacts to the FOD communities, there are no impacts to the preferred interior habitat for Acadian Flycatcher, Cerulean Warbler, Eastern Peewee, Canada Warbler or Wood Thrush.

While there are footprint impacts to the FOD, WOD, FOM, SW and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. No net adverse effects are expected to result to Snapping Turtle and

Blanding's Turtle or their habitat as the OA and MAS areas to be impacted do not contained specialized habitat. Net effects to Butternut will be determined during Detailed Design.

6.1.12.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with CVI, CVC, CVR, CGL, CUM, FOD, FOM, WOD, MAS, SW, TAG and AG communities are identified in **Table 6-30.** No vegetation clearing within the LSRCA Regulated Area within the MAS and FOM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, CVR, CGL, CUM, FOD, WOD, SW, TAG and AG communities are required outside of the ROW.

There are no net adverse effects to Holland Landing Fen and Wetlands Candidate Life Science ANSI, as there are no footprint impacts. Within the Holland Marsh Wetland Complex PSW areas of CVI, CVC, and SW will be impacted. No vegetation clearing within the Holland Marsh Wetland Complex PSW within the CVI communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVC and SW communities are required outside of the ROW. Footprint impacts for CVI and CVC communities within the Holland Marsh Wetland Complex PSW occur within culturally influenced non-natural communities. The impacted area within the SW outside of the Metrolinx owned ROW represents 0.07ha of 206.77ha of the total area of Holland Marsh Wetland Complex PSW.

The AG communities to be impacted within the Holland River Marsh PSW are considered previously disturbed. Within Rogers Reservoir the CGL, WOD, FOM and FOD communities will be impacted. No vegetation clearing within the FOD and FOM communities will occur outside of the existing Metrolinx owned ROW. Small areas of CGL and WOD within Rogers Reservoir Conservation Area outside of the Metrolinx owned ROW represent 0.053ha and 0.023ha of 52.34ha of the total area of the conservation area. The net effects to the communities are identified in **Table 6-30.** Net effects relating to footprint impacts within Holland Marsh Lowlands ESA (Simcoe County) associated with CVI and CVC communities are discussed in **Table 6-30.** No vegetation clearing within the Holland Marsh Lowlands ESA is required within the CVC communities and only minor vegetation removals are required within the CVI outside of the ROW.

Net effects relating to footprint impacts within CVI, CVC, CVR, SW and AG communities considered Protected Countryside under the Greenbelt Plan are identified in **Table 6-30.** Minor vegetation removals within the CVI, CVC, CVR, SW and AG communities are required outside of the ROW. Within the Lake Simcoe Protection Plan Areas, CVI, CVC, CVR, CGL, CUM, FOD, FOM, WOD, MAS, SW, TAG and AG communities will be impacted. No vegetation clearing within the Lake Simcoe Protection Plan Area within the MAS and FOM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, CVR, CGL, CUM, FOD, WOD, SW, TAG and AG communities are required outside of the ROW.

6.1.13 OCS & Bridges: Section BR-9 – Bradford Station to 13th Line

6.1.13.1 Potential Effects and Mitigation Measures

6.1.13.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-9 are presented in **Table 6-31**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including mainly Residential (CVR), Commercial and Institutional (CVC), Cultural Meadow (CUM), Agriculture (AG) and a small area of Meadow Marsh (MAM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM, AG, and MAM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The Mixed Forest (FOM) and Swamp (SW) communities associated with, but not considered part of the Provincially Significant King-Vaughn Wetland Complex and Scanlon Creek Conservation Area provide habitat for wildlife and act as movement corridors. The FOM and Deciduous Forest (FOD) community within MNRF identified deer wintering areas provide specialized habitat. Due to the natural attributes of these forest communities, ecological impacts to these areas are considered moderate. Other Mixed Forest (FOM) communities, located mainly west of the rail corridor provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the FOM communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the FOM, FOD and SW communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required within the Shallow Marsh (MAS) located mainly adjacent to watercourses. An amphibian survey was conducted within the MAS south of Line 10 during the 2016 field season to identify species present within the MAS. No Species at Risk were observed; however, two species, American Toad and Spring Peeper, were recorded within the MAS community outside of the vegetation removal zone. Vegetation clearing is also required within a Marsh (MA) community adjacent to CVC. Vegetation removals will not impact any specialized amphibian habitat within the MAS or MA as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. As such, ecological impacts to these areas are low. Due to minimal canopy cover within the MAS and MA communities, the extent of tree removals is considered minor, while the extent of tree removals in the SW areas are extensive due to the high canopy cover. Mitigation for the MA and MAS communities include compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the MAS and SW areas should occur to buffer the adjacent wetland.

Table 6-31: Summary of Vegetation Removal Areas within ELC Communities BR-9*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.853	1.326	2.179	Minor
Transportation and Utilities (CVI)	9.294	0.047	9.341	Minor
Residential (CVR)	0.146	0.006	0.152	Fair
Mixed Forest (FOM)	1.035	0.034	1.069	Extensive
Deciduous Forest (FOD)	0.093	0	0.093	Extensive
Cultural Meadow (CUM)	2.131	0.370	2.501	Minor
Marsh (MA)	0	0.518	0.518	Minor
Shallow Marsh (MAS)	0.131	0.057	0.188	Minor
Meadow Marsh (MAM)	0.071	0	0.071	Minor
Agriculture (AG)	0.683	0.176	0.859	Minor
Swamp (SW)	1.330	1.910	3.240	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.

- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

There are no bridges requiring modifications and therefore, no impacts.

6.1.13.1.2 Aquatic

There are approximately thirteen crossings of the Holland River West Branch (and tributaries) within the corridor segment. All of these watercourse crossings are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses and appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials.

6.1.13.1.3 Species at Risk

Given the low potential of occurrence of American Ginseng, Monarch and Chimney Swift there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CVC and CVR communities and moderate potential within the FOM and FOD. The presence/absence of Butternuts will be confirmed during Detailed

Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. Bobolink, Eastern Meadowlark and Grasshopper Sparrow have a moderate potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species. There is moderate potential for Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Whip-poor-will, and Wood Thrush within the FOM and FOD communities; however, these species are associated with interior forest habitat which will not be impacted. While the Red-headed Woodpecker has a moderate potential of occurrence in the FOM, FOD and SW communities, this species is generally tolerant of disturbance and small amount of woodland edge within the FOM, FOD and SW lands is not anticipated to have an impact on this species. There is moderate potential for Golden-winged Warbler and Olive-sided Flycatcher to occur within the SW and FOM communities; however, given the limited amount of removal within these communities and species tolerance and preference to open habitat adjacent to woodlands, there are no anticipated impacts to these species.

Snapping Turtle, Blanding's Turtle and Northern Map Turtle have a moderate potential of occurrence within the Open Water (OA) and MAS communities. There are no footprint impacts to the OA areas. The MAS areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Little Brown Myotis and Northern Myotis have a moderate potential to occur within the FOM, SW, and FOD communities. While several bat species were recorded during the SAR bat presence/absence surveys completed in July 2016 no SAR bats were identified. See **Appendix A2** for Bat Survey results. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

6.1.13.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CUM, FOD, FOM, MAS, SW, MAM, MA and AG lands within Lake Simcoe Region Conservation Authority Regulated Areas are identified in **Table 6-32.**

There are footprint impacts to the FOM lands within Scanlon Creek Conservation Area as identified in **Table 6-32**. Vegetation clearing within areas that are part of Scanlon Creek Conservation Area should be minimized to the extent possible.

There are footprint impacts associated with CVC, CVI, CVR, FOM, CUM, MAS, AG and SW communities which are within lands identified as Protected Countryside under the Greenbelt Plan. The Greenbelt Plan acknowledges that lands within Protected Countryside have been culturally modified; however, within these areas vegetation removals should be minimized to the extent possible.

Footprint impacts will also occur within CVI, CVC, CVR, CUM, FOD, MAS, SW, MAM, and AG communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been discussed within **Table 6-32**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-32: Summary of Vegetation Removal Areas within Designated Areas BR-9*

ELC Community	LSRCA Regulation Limit			Scanlon Creek Conservation Area			Greenbelt Plan Protected Countryside			Lake Simcoe Protection Plan Area			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.215	0.961	1.176	0	0	0	0.409	0.267	0.676	0.853	1.326	2.179	Minor
Transportation and Utilities (CVI)	5.209	5.231	10.439	0	0	0	0.008	0.004	0.011	9.295	9.325	18.620	Minor
Residential (CVR)	0.043	0	0.043	0	0	0	0.024	0.006	0.030	0.146	0.006	0.152	Fair
Mixed Forest (FOM)	0.694	0.034	0.728	0.317	0	0.317	0.162	0.034	0.197	0	0	0	Extensive
Deciduous Forest (FOD)	0.086	0	0.086	0	0	0	0	0	0	1.035	0.034	1.069	Extensive
Cultural Meadow (CUM)	0.986	0.145	1.131	0	0	0	1.255	0.370	1.625	2.130	0.670	2.800	Minor
Marsh (MA)	0	0.121	0.121	0	0	0	0	0	0	0	0.518	0.518	Minor
Shallow Marsh (MAS)	0.114	0.041	0.155	0	0	0	0.112	0.057	0.169	0.131	0.057	0.187	Minor
Meadow Marsh (MAM)	0.065	0	0.065	0	0	0	0	0	0	0.071	0	0.071	Minor
Agriculture (AG)	0.464	0.119	0.583	0	0	0	0.585	0.176	0.761	0.684	0.176	0.860	Minor
Swamp (SW)	0.819	0.946	1.765	0	0	0	0.997	0.712	1.709	1.330	1.910	3.240	Minor

areas are approximate for discussion purposes only and not based on surveyed data

6.1.13.2 Net Effects

6.1.13.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CUM, AG, and MAM lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the FOM, FOD, and SW communities adjacent to the existing rail corridor. However, the perimeter of this area has been previously modified, and a small amount of removal of edge vegetation is not anticipated to have any significant effects to the ecological features or function associated with these areas including wildlife or wildlife habitat. There will be a loss of vegetation along the perimeter of the MAS and MA communities. However, these areas have been previously culturally modified and the removals will not have any impacts on the specialized habitat within these areas the current ecological function will be maintained, resulting in no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.13.2.2 Aquatic

There are no net adverse effects on the watercourse crossings within this corridor segment as there are no anticipated footprint impacts.

6.1.13.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for American Ginseng, Monarch, Chimney Swift, and Barn Swallows. No net adverse effects are expected to result to Bobolink, Eastern Meadowlark, and Grasshopper Sparrow or their habitat as the AG areas to be impacted do not contain specialized habitat. While there are impacts to the FOM and FOD communities, there are no impacts to the preferred interior habitat for Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Whip-poor-will, and Wood Thrush. While there are footprint impacts to the FOM, FOD and SW communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, the potential loss of habitat for Golden-winged Warbler and Olive-sided Flycatcher associated with tree removals within the FOM and SW communities is considered minor in relation to the species tolerance and preference to open habitat adjacent to woodlands. There are no net adverse effects expected to occur to these species. Due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. No net adverse effects are expected to result to Snapping Turtle, Blanding's Turtle and Northern Map Turtle or their habitat as the OA and MAS areas to be impacted do not contained specialized habitat. Net effects to Butternut will be determined during Detail Design.

6.1.13.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with CVI, CVC, CVR, CUM, FOD, FOM, MAS, SW, MAM, and AG communities are identified in **Table 6-32**. No vegetation clearing within the LSRCA Regulated Area within the CVR, FOD and MAM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, FOM, CUM, MA, MAS, AG, and SW communities are required outside of the ROW.

Within Scanlon Creek Conservation Area, small areas of FOM will be impacted. The net effects to this community are identified in **Table 6-32**. No vegetation clearing within the Scanlon Creek Conservation Area is required outside of the Metrolinx owned ROW.

Net effects within the CVC, CVI, CVR, FOM, CUM, MAS, AG and SW communities within Protected Countryside Areas under the Greenbelt Plan are identified in **Table 6-32**. Minor removals within the CVC, CVI, CVR, FOM, CUM, MAS, AG and SW communities are required outside of the ROW.

Net effects within the CVC, CVI, CVR, FOD, CUM, MAS, MA, MAM, AG and SW communities within Lake Simcoe Protection Plan are identified in **Table 6-32.** No vegetation clearing within the Lake Simcoe Protection Plan within the MAM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, CVR, FOD, CUM, MA, MAS, AG, and SW communities are required outside of the ROW.

6.1.14 OCS & Bridges: Section BR-10 – 13th Line to 6th Line Section

6.1.14.1 Potential Effects and Mitigation Measures

6.1.14.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-10 are presented in **Table 6-33**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including mainly Residential (CVR), Commercial and Institutional (CVC), Cultural Meadow (CUM), Green Land (CGL) Treed Agriculture (TAG), and Agriculture (AG) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM, CGL, TAG and AG communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below

Vegetation clearing will be required along the edges of the Mixed Forest (FOM), Deciduous Woodland (WOD) and Swamp (SW) communities within and associated with the Holland Marsh ANSI, Holland Marsh PSW, Wilson Creek Marsh PSW, and Little Cedar Point PSW. Several SW communities are also directly adjacent to the corresponding Holland Marsh BW5, Wilson Creek Marsh and Little Cedar Point Significant Wetlands identified by the Country of Simcoe. These areas provide habitat for wildlife and act as movement corridors. Impacts to these communities within the designated areas (PSWs, ANSI) are considered high as these areas are considered environmentally significant. For portions of these communities associated with, but not within the boundaries of the designated areas, the ecological impacts are considered moderate. There will also be vegetation clearing required within SW and FOM communities that have been designated by the MNRF as deer wintering areas. Ecological impacts to these areas are also considered moderate due to the specialized habitat within these communities. Deciduous Woodland (WOD), Deciduous Forest (FOD), and Mixed Woodland (WOM) communities associated with watercourse corridors provide movement corridors and ecological impacts to these communities are moderate. The high amount of canopy cover in the FOM, SW, FOD, WOD, and WOM communities will result in extensive tree removals within these communities. All vegetation clearing within FOD and WOM communities is within the existing Metrolinx ROW. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The Shallow Marsh (MAS) communities that are within the boundaries of the Wilson Creek Marsh PSW, and Holland River ANSI will require vegetation clearing. The MAS areas are also within the corresponding Wilson Creek Marsh Significant Wetland (County of Simcoe). An amphibian survey was conducted during the 2016 field season to determine potential for amphibian breeding habitat within the MAS community within the boundaries of Wilson Creek Marsh PSW. No Species at Risk were observed; however, two species, American Bullfrog and Spring Peeper, were recorded within the MAS community outside of the vegetation removal zone. No specialized amphibian habitat will be impacted as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. However, ecological impacts to the MAS areas that are within the boundaries of designated areas are considered high as these areas are considered environmentally significant. Ecological impacts to MAS communities associated with, but not within the boundaries of these environmentally significant areas are considered moderate. Due to minimal canopy cover within the MAS communities, the extent of tree removals is considered minor. Mitigation for the MAS communities include compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the MAS areas should occur to buffer the adjacent wetland.

No vegetation clearing within the Marsh (MA) community is anticipated, and therefore there are no footprint impacts within this ELC community.

Table 6-33: Summary of Vegetation Removal Areas within ELC Communities BR-10*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.166	0.028	0.195	Minor
Transportation and Utilities (CVI)	9.954	0.015	9.969	Minor
Residential (CVR)	0.210	0.008	0.218	Fair
Green Land (CGL)	0.068	0	0.068	Minor
Deciduous Woodland (WOD)	0.808	0.180	0.988	Extensive
Cultural Meadow CUM)	1.585	0.268	1.852	Minor
Shallow Marsh (MAS)	0.234	0.076	0.309	Minor
Marsh (MA)	0	0	0	N/A
Swamp (SW)	0.606	0.3366	0.972	Extensive
Agriculture (AG)	0.658	0.202	0.860	Minor
Treed Agriculture (TAG)	1.187	0.177	1.364	Minor
Mixed Forest (FOM)	1.320	0.382	1.702	Extensive
Deciduous Forest (FOD)	0.243	0	0.243	Extensive
Mixed Woodland (WOM)	0.039	0	0.039	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

- **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
- **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
- **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
- **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
- **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications
Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- 6th Line (Newmarket Sub Mile 53.70)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.14.1.2 Aquatic

There are six watercourses within this corridor segment: Holland River West Branch, Gilford Creek, White Birch Cree (two crossings), Wilson Creek (four crossings), Carson Creek, and Belle Aire Creek. These watercourse crossings are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourse are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

6.1.14.1.3 Species at Risk

Given the low potential of occurrence of American Ginseng, Monarch and Common Nighthawk there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL, CVC and CVR communities and moderate potential within the FOM, FOD, WOD, WOM and TAG. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. There is moderate potential for Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Whip-poor-will, and Wood Thrush within the FOM and FOD communities; however, these species are associated with interior forest habitat which will not be impacted. Bobolink, Eastern Meadowlark, and Grasshopper Sparrow have a moderate potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species. While the Red-headed Woodpecker has a moderate potential of occurrence in the CGL, FOM, WOD, SW and FOD communities, this species is generally tolerant of disturbance and small amount of woodland edge within the FOM, WOD, SW and FOD is not anticipated to have an impact on this species. There is moderate potential of occurrence within MAS communities of Yellow Rail. However, this species is highly sensitive and the MAS areas directly adjacent to the rail corridor provide low quality habitat, and it is unlikely this species would be present within the impacted areas. There is a moderate potential for Golden-winged Warbler within the SW, FOM, WOD, and FOD communities and a moderate potential for Olive-sided Flycatcher within the SW and FOM communities; however, given the limited amount of removal within these communities and species tolerance and preference to open habitat adjacent to woodlands, there are no anticipated impacts to these species.

Snapping Turtle, Blanding's Turtle and Northern Map Turtle have a moderate potential of occurrence within the Open Water (OA), MAS and SW communities. There are no footprint impacts to the OA areas. The MAS and SW areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Little Brown Myotis and Northern Myotis have a moderate potential to occur within the FOM, SW, WOD, WOM and FOD communities. While several bat species were recorded during the SAR bat presence/absence surveys completed in July 2016 no SAR bats were identified. See **Appendix A2** for Bat Survey results. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

6.1.14.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CGL, CUM, FOD, FOM, WOD, WOM, MAS, SW, TAG and AG lands within Lake Simcoe Region Conservation Authority Regulated Areas are identified in **Table 6-34**.

There are footprint impacts to the CVI, MAS, SW, and FOM communities within the Holland River ANSI. Impacts to the Wilson Creek PSW are within the CVI, MAS, and SW communities. Within the Little Cedar Point PSW, impacted communities include SW and FOM. Footprint impacts to the Holland River Marsh PSW are within the SW communities. Vegetation clearing within areas that are part of these designated areas should be minimized to the extent possible, particularly within natural vegetation communities including MAS, SW, and FOM.

There are footprint impacts associated with CVI, WOD, CUM, SW, MAS, AG, TAG, and FOM communities which are within lands identified as Protected Countryside under the Greenbelt Plan. The Greenbelt Plan acknowledges that lands within Protected Countryside have been culturally modified; however, within these areas vegetation removals should be minimized to the extent possible, particularly within the WOD, SW, MAS and FOM communities.

Footprint impacts will also occur within CVI, CVC, CVR, CGL, WOD, CUM, FOD, FOM, MAS, SW, WOM, TAG, and AG communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been identified in **Table 6-34**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-34: Summary of Vegetation Removal Areas within Designated Areas BR-10*

ELC Community	LSRCA Regulation Limit			Holland River ANSI			Holland River Marsh (BW5) PSW			Little Cedar Point PSW			Wilson Creek Marsh PSW			Greenbelt Protected Countryside			Lake Simcoe Protection Plan Area			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.129	0.010	0.140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.166	0.028	0.195	Minor
Transportation and Utilities (CVI)	6.990	0.014	7.004	0.322	0.003	0.325	0	0	0	0	0	0	0.003	0	0.003	1.716	0.004	1.720	9.954	0.015	9.969	Minor
Residential (CVR)	0.095	0.008	0.104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.210	0.008	0.218	Fair
Green Land (CGL)	0.049	0	0.049	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.068	0	0.068	Minor
Deciduous Woodland (WOD)	0.693	0.117	0.809	0	0	0	0	0	0	0	0	0	0	0	0	0.023	0.011	0.035	0.808	0.180	0.988	Extensive
Cultural Meadow (CUM)	0.796	0.122	0.918	0	0	0	0	0	0	0	0	0	0	0	0	0.094	0.094	0.189	1.585	0.268	1.853	Minor
Shallow Marsh (MAS)	0.234	0.076	0.309	0.041	0.019	0.061	0	0	0	0	0	0	0.014	0.017	0.031	0.045	0.021	0.066	0.234	0.076	0.309	Minor
Marsh (MA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Swamp (SW)	0.606	0.366	0.972	0.176	0.164	0.339	0.021	0.046	0.063	0	0.002	0.002	0	0.002	0.002	0.180	0.165	0.345	0.606	0.366	0.972	Minor
Agriculture (AG)	0.273	0.064	0.337	0	0	0	0	0	0	0	0	0	0	0	0	0.056	0.176	0.073	0.658	0.202	0.859	Minor
Treed Agriculture (TAG)	0.724	0.174	0.897	0	0	0	0	0	0	0	0	0	0	0	0	0.011	0	0.011	1.187	0.177	1.364	Minor
Mixed Forest (FOM)	1.034	0.276	1.309	0.075	0.044	0.119	0	0	0	0	0.008	0.008	0	0	0	0.199	0.078	0.277	1.320	0.382	1.702	Extensive
Deciduous Forest (FOD)	0.171	0	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.243	0	0.243	Extensive
Mixed Woodland (WOM)	0.039	0	0.039	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.039	0	0.039	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

6.1.14.2 Net Effects

6.1.14.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CGL, CUM, TAG and AG lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the SW, FOM, FOD, WOM and WOD communities adjacent to the existing rail corridor. However, the perimeter of these areas have been previously modified, and a small amount of removal of edge vegetation is not anticipated to have any significant effects to the ecological features or function associated with these areas including wildlife or wildlife habitat. There will be a loss of vegetation along the perimeter of the MAS communities. However, these areas do not contain suitable amphibian habitat. Since specialized habitat within these areas will not be impacted and the current ecological functions will be maintained, there are no net adverse effects. The function of the deer wintering area will not be impacted as the removals will occur along the edge of the wintering area where deer activity is lowest away from the core cover and feeding areas. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.14.2.2 Aquatic

There are no net adverse effects on the Holland River West Branch, Gilford Creek, White Birch Creek (two crossings), Wilson Creek (4 crossings), Carson Creek, and Belle Aire Creek within this corridor segment as there are no anticipated footprint impacts.

6.1.14.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for American Ginseng, Monarch, Barn Swallows and Common Nighthawk. No net adverse effects are expected to result to Bobolink, Eastern Meadowlark and Grasshopper Sparrow or their habitat as the AG areas to be impacted do not contain specialized habitat. While there are impacts to the FOM and FOD communities, there are no impacts to the preferred interior habitat for Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Whip-poor-will, and Wood Thrush. While there are footprint impacts to the CGL, WOD, FOD, SW and FOM communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Footprint impacts to Yellow Rail habitat within MAS communities are considered negligible as no habitat will be affected and impacts will have no net adverse effects. No net adverse effects are expected to result to Snapping Turtle, Blanding's Turtle and Northern Map Turtle or their habitat as the OA, MAS and SW areas to be impacted do not contain specialized habitat. Net effects to Butternut will be determined during Detailed Design. The potential loss of habitat for Golden-winged Warbler and Olive-sided Flycatcher associated with tree removals within the SW, FOM, WOD, and FOD communities is considered minor in relation to the species tolerance and preference to open habitat adjacent to woodlands. There are no net adverse effects expected to occur to these species.

6.1.14.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with CVI, CVC, CVR, CGL, CUM, FOD, FOM, WOD, WOM, SW, MAS, TAG and AG communities are identified in **Table 6-34**. No vegetation clearing within the LSRCA Regulated Area within the FOD, WOM, and CGL communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, CVR, WOD, CUM, MAS, SW, AG, TAG, and FOM communities are required outside of the ROW.

Within the Holland River Marsh (BW5) PSW areas of SW will be impacted. Minor vegetation clearing within the SW communities is required outside the Metrolinx owned ROW. However, the impacted area within the SW represents 0.046ha of 1250.67ha of the total area of Holland River Marsh (BW5) PSW. The CVI, MAS, SW, and FOM communities within the Holland River ANSI will be impacted. Minor vegetation clearing within the CVI, MAS, SW and FOM communities is required outside the Metrolinx ROW. Footprint impacts within CVI communities within the Holland River ANSI occur within culturally influenced non-natural communities. The impacted areas within the MAS, SW and FOM communities outside of the Metrolinx owned ROW represent 0.019ha, 0.164ha, and 0.044 ha, respectively, of the 1021.88ha of the total area of the ANSI. Within Wilson Creek Marsh PSW, small areas of MAS, SW and CVI will be impacted. Footprint impacts within CVI communities within the Wilson Creek Marsh PSW occur within culturally influenced non-natural communities. No vegetation clearing within the CVI communities is required outside of the Metrolinx owned ROW. Minor vegetation clearing within the MAS and SW communities is required outside the Metrolinx ROW. The impacted areas within the MAS and SW communities represent 0.017ha and 0.002ha, respectively, of the total area of the PSW. Within Little Cedar Point PSW, minor vegetation clearing within the FOM and SW communities is required outside the Metrolinx ROW However, the impacted area within the SW and FOM represents 0.002ha and 0.008ha, respectively, of 38.42ha of the total area of Little Cedar Point PSW. The net effects to these communities are identified in **Table 6-34**.

Net effects relating to footprint impacts within CVI, CUM, WOD, FOM, SW, MAS, TAG and AG communities considered Protected Countryside under the Greenbelt Plan are identified in **Table 6-34.** No vegetation clearing within the Protected Countryside areas within the TAG communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CUM, WOD, FOM, SW, MAS and AG communities are required outside of the ROW.

Footprint impacts will also occur within CVI, CVC, CVR, CGL, WOD, CUM, MAS, SW, AG, TAG, FOM, FOD, and WOM communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been identified in **Table 6-34**. No vegetation clearing within the Lake Simcoe Protection Plan area within the CGL, FOD, and WOM communities will occur outside of the existing Metrolinx owned

ROW and only minor removals within the CVI, CVC, CVR, WOD, CUM, MAS, SW, AG, TAG, and FOM communities are required outside of the ROW.

6.1.15 OCS & Bridges: Section BR-11 – 6th Line to Barrie South Station

6.1.15.1 Potential Effects and Mitigation Measures

6.1.15.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-11 are presented in **Table 6-35**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including mainly Commercial and Institutional (CVC) and Residential (CVR), Cultural Meadow (CUM), Agriculture (AG) and Treed Agriculture (TAG) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM, AG, and TAG communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The Mixed Forest (FOM), Deciduous Woodland (WOD), Deciduous Forest (FOD), and Swamp (SW) communities associated with watercourse corridors and the FOM adjacent to, but not considered part of the St. Paul's Swamp Evaluated Wetland, provide habitat for wildlife and act as movement corridors. Due to the natural attributes of these communities, ecological impacts to these areas are considered moderate. Deciduous Woodland (WOD) communities, which are isolated and located mainly adjacent to the rail corridor, or surrounded by CVR provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the FOM, WOD, FOD, and SW communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the FOM, FOD, SW and WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing with the Shallow Marsh (MAS) communities connected to Hewitt's Creek will not impact any specialized amphibian habitat as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. Vegetation clearing within the MAS is only required within the existing Metrolinx ROW. As such, ecological impacts to these areas are low. Due to the minimal canopy cover in the MAS communities, the extent of tree removals in these areas is minor. Mitigation for the MAS communities includes compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 6-35: Summary of Vegetation Removal Areas within ELC Communities BR-11*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.433	0.192	0.625	Minor
Transportation and Utilities (CVI)	8.639	0.021	8.660	Minor
Residential (CVR)	0.434	0.157	0.591	Fair
Mixed Forest (FOM)	0.434	0.201	0.635	Extensive
Deciduous Woodland (WOD)	1.013	0.180	1.193	Extensive
Cultural Meadow (CUM)	0.875	0.151	1.026	Minor
Swamp (SW)	0.199	0.112	0.311	Minor
Shallow Marsh (MAS)	0.075	0	0.075	Minor
Agriculture (AG)	0.056	0.103	0.159	Minor
Treed Agriculture (TAG)	2.494	0.464	2.959	Minor
Deciduous Forest (FOD)	0.305	0	0.305	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
    - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
    - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.

- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

There are no bridges requiring modifications and therefore, no impacts.

6.1.15.1.2 Aquatic

There are two watercourses within this corridor segment, Banks Creek (four crossings) and Hewitt's Creek (two crossings). Banks Creek and Hewitt's Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourse and appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials.

6.1.15.1.3 Species at Risk

Given the low potential of occurrence of American Ginseng, Common Nighthawk and Monarch there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL and CVC communities and moderate potential within the FOM, FOD, WOD and TAG. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. Bobolink, Eastern Meadowlark and Grasshopper Sparrow have a moderate potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species. There is moderate potential for Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Whip-poor-will, Wood Thrush and Golden-winged Warbler within the FOM and FOD communities; however, these species are associated with interior forest habitat which will not be impacted. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD, FOD and FOM communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD FOM and FOD is not anticipated to have an impact on this species. There is moderate potential of occurrence within MAS communities of Least Bittern. However, this species is highly sensitive and the MAS areas directly adjacent to the rail corridor provide low quality habitat, and it is unlikely this species would be present within the impacted areas. There is moderate potential for Olive-sided Flycatcher to occur within the SW and FOM communities; however, given the limited amount of removal within these communities and species tolerance and preference to open habitat adjacent to woodlands, there are no anticipated impacts to this species.

Within MAS communities, Snapping Turtle and Blanding's Turtle have a moderate potential for occurrence and footprint impacts within the MAS are anticipated. However, the MAS areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Little Brown Myotis and Northern Myotis have a moderate potential to occur within the FOM, FOD, WOD, and SW communities. While several bat species were recorded during the SAR bat presence/absence surveys completed in July 2016 no SAR bats were identified. See **Appendix A2** for Bat Survey results. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

6.1.15.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CUM, FOM, FOD WOD, MAS, SW, TAG and AG lands within Lake Simcoe Region Conservation Authority Regulated Areas are identified in **Table 6-36**. There are no footprint impacts within St. Paul's Swamp Evaluated Wetland.

Footprint impacts will also occur within CVI, CVC, CVR, FOM, WOD, CUM, SW, MAS, FOD, TAG, and AG communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been identified in **Table 6-36.**

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-36: Summary of Vegetation Removal Areas within Designated Areas BR-11*

ELC Community	LSRCA Regulation Limit			Lake Simcoe Protection Plan Area			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.305	0.072	0.377	0.437	0.192	0.629	Minor
Transportation and Utilities (CVI)	2.791	0.003	2.794	8.639	0.021	8.660	Minor
Residential (CVR)	0.095	0.029	0.124	0.434	0.157	0.591	Fair
Mixed Forest (FOM)	0.125	0.014	0.140	0.434	0.201	0.635	Extensive
Deciduous Woodland (WOD)	0.600	0.095	0.695	1.01	0.180	1.193	Extensive
Cultural Meadow (CUM)	0.063	0.008	0.071	0.875	0.151	1.026	Minor
Swamp (SW)	0.005	0.098	0.103	0.199	0.112	0.311	Extensive
Shallow Marsh (MAS)	0.075	0	0.075	0.075	0	0.075	Minor
Agriculture (AG)	0	0.023	0.023	0.056	0.103	0.159	Minor
Treed Agriculture (TAG)	0.469	0.091	0.560	2.494	0.464	2.959	Minor
Deciduous Forest (FOD)	0.195	0	0.195	0.305	0	0.305	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

6.1.15.2 Net Effects

6.1.15.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVR, CVC, CUM, AG and TAG lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the FOM, FOD, SW and WOD communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with these communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

There will be a loss of vegetation along the perimeter of the MAS communities. However, these areas have been previously culturally modified and the removals will not have any impacts on the specialized habitat within these areas the current ecological function will be maintained, resulting in no net adverse effects. Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.15.2.2 Aquatic

There are no net adverse effects on Banks Creek and Hewitt's Creek as there are no anticipated footprint impacts.

6.1.15.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for American Ginseng, Barn Swallows, Monarch or Common Nighthawk. No net adverse effects are expected to result to Bobolink, Eastern Meadowlark and Grasshopper Sparrow or their habitat as the AG areas to be impacted do not contain specialized habitat. While there are impacts to the FOM and FOD communities, there are no impacts to the preferred interior habitat for Wood Thrush, Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Whip-poor-will, and Golden-winged Warbler. While there are footprint impacts to the FOM, FOD, SW and WOD communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Footprint impacts to Least Bittern habitat within MAS communities are considered negligible as no habitat will be affected and impacts will have no net adverse effect. The potential loss of habitat for Olive-sided Flycatcher associated with tree removals within the FOM and SW communities is considered minor in relation to the species tolerance and preference to open habitat adjacent to woodlands. There are no net adverse effects expected to occur to these species. No net adverse effects are expected to result to Snapping Turtle and Blanding's Turtle or their habitat as the MAS areas to be impacted do not contain specialized habitat. Net effects to Butternut will be determined during Detailed Design.

6.1.15.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with CVI, CVC, CVR, CUM, FOM, FOD, WOD, MAS, SW, TAG and AG communities are identified in **Table 6-36.** No vegetation clearing within the LSRCA Regulated Area within the FOD and MAS communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, CVR, FOM, WOD, CUM, SW, AG, and TAG communities are required outside of the ROW.

There are no net adverse effects to the St. Paul's Swamp Evaluated Wetland, as there are no footprint impacts.

Footprint impacts will also occur within CVI, CVC, CVR, FOM, WOD, CUM, MAS, SW, AG, TAG, and FOD communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been identified in **Table 6-36**. No vegetation clearing within the Lake Simcoe Protection Plan area within the FOD and MAS communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC, CVR, FOM, WOD, CUM, SW, AG, TAG, and FOD communities are required outside of the ROW.

6.1.16 OCS & Bridges: Section BR-12 – Barrie South Station to Allandale Waterfront Station

6.1.16.1 Potential Effects and Mitigation Measures

6.1.16.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment BR-12 are presented in **Table 6-37**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including mainly Residential (CVR), Commercial and Institutional (CVC), Cultural Meadow (CUM), Treed Agriculture (TAG), and Green Lands (CGL) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM, TAG and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required along the edges of the Mixed Forest (FOM) community associated with Hewitt's Creek, and the Deciduous Woodland (WOD) community associated with Lovers Creek, which provides habitat for wildlife and acts as a movement corridors. Due to the natural attributes of these communities, ecological impacts to this area are considered moderate. Deciduous Woodland (WOD) communities, which are isolated and located mainly adjacent to the rail corridor, or surrounded by CVR provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the FOM and WOD communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the FOM and WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

No vegetation clearing within the Agriculture (AG) communities is anticipated, therefore there are no footprint impacts.

Table 6-37: Summary of Vegetation Removal Areas within ELC Communities BR-12*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.332	0.034	0.366	Minor
Transportation and Utilities (CVI)	8.246	0.536	8.782	Minor
Residential (CVR)	1.264	0.518	1.782	Fair
Green Land (CGL)	0.146	0.089	0.235	Minor
Deciduous Woodland (WOD)	0.169	0	0.169	Extensive
Cultural Meadow (CUM)	0.401	0.009	410	Minor
Mixed Forest (FOM)	0.140	0.142	0.282	Extensive
Agriculture (AG)	0	0	0	N/A
Treed Agriculture (TAG)	0.512	0.025	0.537	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:

- **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
- **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Big Bay Point Road (Newmarket Sub Mile 60.30)
- Cox Mill Road (Newmarket Sub Mile 61.14)
- Tollendale Creek (Newmarket Sub Mile 61.20)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

6.1.16.1.2 Aquatic

There are two watercourses within the corridor segment: Lovers Creek (Tollendale Creek) and Whiskey Creek**.** Bridge modifications will occur within the existing Barrie route/corridor on the existing Lovers Creek (Tollendale Creek) Bridge (Newmarket Sub Mile 61.20). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to the Holland River West Branch Bridge or fish/fish habitat. Similarly, no adverse effects to this watercourse are anticipated to result from the installation of OCS structures are they are located within the existing corridor ROW away from the watercourse. Whiskey Creek is conveyed under the corridor by a culvert therefore no footprint impacts to the culvert or watercourse are anticipated to result from the installation of OCS within the existing corridor above the culvert. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

6.1.16.1.3 Species at Risk

Given the low potential of occurrence of American Ginseng, Monarch and Common Nighthawk there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL, CVR and CVC communities and moderate potential within the FOM, WOD and TAG. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Lover's Creek (Tollendale Creek) Bridge (Newmarket Sub Mile 61.20) was surveyed for active nests and individuals. No Barn Swallows nests or individuals at these sites. Due to bridge modifications (OCS wires) required at the Lovers (Tollendale) Creek Bridge, a follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. Within Agriculture (AG) communities there is moderate potential for Bobolink and Eastern Meadowlark, however no vegetation removals are required within the AG lands. There is moderate potential for Acadian Flycatcher, Cerulean Warbler, Eastern Wood Pewee, Canada Warbler, Whip-poor-will and Wood Thrush within Mixed Forest (FOM) communities; however, these species are associated with interior forest habitat which will not be impacted. Similarly there is a moderate potential for Olive-sided Flycatcher within the FOM communities; however, given the limited amount of removal within these communities and species tolerance and preference to open habitat adjacent to woodlands, there are no anticipated impacts to this species. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD, FOM, TAG and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge removal within the WOD and FOM, and individual tree removals in the TAG and CGL is not anticipated to have an impact on this species.

While Snapping Turtle and Northern Map Turtle have a moderate potential of occurrence within the Open Water (OA) community, there are no footprint impacts to these areas.

Little Brown Myotis and Northern Myotis have a moderate potential to occur within the FOM and WOD communities. While several bat species were recorded during the SAR bat presence/absence surveys completed in July 2016 no SAR bats were identified. See **Appendix A2** for Bat Survey results. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

6.1.16.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR WOD and TAG lands within Lake Simcoe Region Conservation Authority Regulated Areas are identified in **Table 6-38**.

Footprint impacts will also occur within CVI, CVC, CVR, CGL, WOD, CUM, FOM, and TAG communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been identified in **Table 6-38.**

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 6-38: Summary of Vegetation Removal Areas within Designated Areas BR-12*

ELC Community	LSRCA Regulation Limit			Lake Simcoe Protection Plan Area			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.042	0.005	0.047	0.332	0.034	0.366	Minor
Transportation and Utilities (CVI)	0.891	0.069	0.959	8.246	0.536	8.782	Minor
Residential (CVR)	0.013	0.071	0.084	1.264	0.518	1.782	Minor
Green Land (CGL)	0	0	0	0.146	0.089	0.235	Minor
Deciduous Woodland (WOD)	0.014	0	0.014	0.169	0	0.169	Minor
Cultural Meadow (CUM)	0	0	0	0.401	0.009	0.410	Minor
Mixed Forest (FOM)	0	0	0	0.140	0.142	0.282	Minor
Agriculture (AG)	0	0	0	0	0	0	N/A
Treed Agriculture (TAG)	0.188	0.019	0.207	0.512	0.025	0.537	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

6.1.16.2 Net Effects

6.1.16.2.1 Terrestrial

There are no net adverse effects to the AG communities as there are no footprint impacts. There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CGL, and CUM, and TAG lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the FOM and WOD communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the FOM and WOD communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

6.1.16.2.2 Aquatic

There are no net adverse effects on Lovers (Tollendale) Creek or Whiskey Creek as there are no anticipated footprint impacts.

6.1.16.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for American Ginseng, Barn Swallows, Monarch or Common Nighthawk. No net adverse effects are expected to result to Bobolink and Eastern Meadowlark as there are no footprint impacts within the AG communities. While there are impacts to the FOM communities, there are no impacts to the preferred interior habitat for Acadian Flycatcher, Cerulean Warbler, Eastern Peewee, Canada Warbler, Whip-poor-will and Wood Thrush. While there are footprint impacts to the FOM, WOD, CGL and TAG communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, the potential loss of habitat for Olive-sided Flycatcher associated with tree removals within the FOM communities is considered minor in relation to the species tolerance and preference to open habitat adjacent to woodlands. There are no net adverse effects expected to occur to these species. Due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. No net adverse effects are expected to result to Snapping Turtle and Northern Map Turtle or their habitat as the OA areas will not be impacted. Net effects to Butternut will be determined during Detailed Design.

6.1.16.2.4 Designated Areas

Net effects relating to footprint impacts within LSRCA Regulated Areas associated with CVI, CVC, CVR, TAG and WOD communities are identified in **Table 6-38**. No vegetation clearing within the LSRCA Regulated Area within the WOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC CVR and TAG communities are required outside of the ROW.

Footprint impacts will also occur within CVI, CVC, CVR, CGL, WOD, CUM, FOM, and TAG communities within the Lake Simcoe Protection Plan area. Impacts to these vegetation communities have been identified in **Table 6-38.** No vegetation clearing within the Lake Simcoe Protection Plan Area within the WOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVC CVR, CGL, CUM, FOM and TAG communities are required outside of the ROW.

6.2 Preliminary Environmental Site Assessment

Please refer to Appendix B for a description of the methodology followed for Environmental Site Assessment work. Additional details can be found in the Preliminary Environmental Site Assessment Report contained in Appendix B.

6.2.1 Preferred and Alternative Allandale Tap Location

6.2.1.1 Potential Effects and Mitigation Measures

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

6.2.1.2 Net Effects

No net adverse effects are anticipated.

6.2.2 Allandale TPS

6.2.2.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill of unknown quality across the Site; and,
- Industrial Land uses including Romeo's Trucking located immediately adjacent to the north of the Site at 10 Patterson Road; and, an auto junkyard located adjacent to the west of the Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Phase I Environmental Site Assessment if the property is to be acquired.
- Complete a Limited Subsurface Investigation to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses.

- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

6.2.2.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

6.2.3 Barrie Collingwood 25kV Feeder Route

6.2.3.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Various industrial land uses surrounding the Site; and,
- A rail yard present adjacent to the southeast portion of the Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Characterize the quality of excess soil generated at the time of installation to determine management options. A subsurface investigation prior to construction is not considered necessary since the installation of the connection is not anticipated to required property acquisition or large scale excavation activities that have the potential to disturb subsurface contamination, if present.

6.2.3.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

6.2.4 Newmarket SWS

6.2.4.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown composition may be present across the Site;
- Industrial on-Site and off-Site land usage, including hazardous waste generation; and,
- On-Site AST on the northwest corner of the Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Phase I Environmental Site Assessment if the property is to be acquired;
- Complete a Subsurface Investigation to assess the presence and quality of fill and potential impacts resulting from on-site and adjacent/nearby land uses; and,
- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

6.2.4.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

6.2.5 Gilford PS

6.2.5.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown quality.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;

- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment as required to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses.

6.2.5.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

6.2.6 Maple PS

6.2.6.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Auto wrecking facility immediately adjacent to the north of Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,

- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Phase I Environmental Site Assessment if the property is to be acquired;
- Complete a Limited Subsurface Investigation along the northern property boundary to assess for potential subsurface impacts resulting from the auto-wrecking facility located to the north of the Site; and,
- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

6.2.6.2 Net Effects

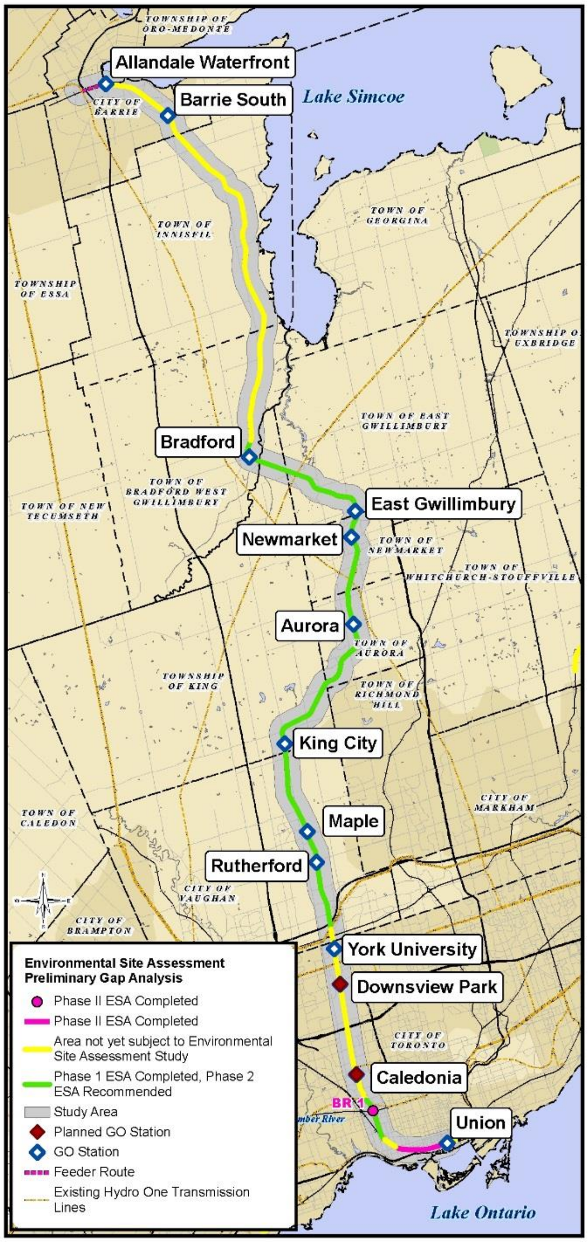
Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

6.2.7 OCS & Bridges: Barrie Corridor

6.2.7.1 Potential Effects and Mitigation Measures

The scope of the study undertaken as part of the GO Rail Network Electrification TPAP was limited to a gap analysis review of previous Environmental Site Assessment work within the OCS Impact Zones along the corridors. Based on the available background reports reviewed, the Barrie corridor has been subject to very limited assessment work (see **Figure 6-11**), consisting only of a Phase I Environmental Site Assessment that extends from just north of Steeles Ave. up to Bradford, where the 9th Line crosses the corridor. The corridor both south and north of this segment has not been assessed, comprising approximately 48 km of corridor.

Figure 6-11 Barrie Corridor Gap Analysis Map



Mitigation Measures

Implement the mitigation measures and/or carry out further study as documented in the applicable Barrie studies listed in **Table 6-39**.

Table 6-39 Phase I/II or Other Contaminated Site Related Documents Reviewed - Barrie Corridor

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
AMEC 2014d	Letter Report Phase I Environmental Site Assessment Recommendations Letter Commercial Property 12620 Keele Street, King City, Ontario	Metrolinx	AMEC Environmental and Infrastructure a Division of AMEC Americas Limited	7-Feb-14	TO130041	Barrie	12620 Keele Street, King City, ON	Phase I
AMEC 2014a	Phase I Environmental Site Assessment Commercial Property, 12588 Keele Street, King City, Ontario, L7B 1H5	Metrolinx	AMEC Environmental and Infrastructure a Division of AMEC Americas Limited	5-Feb-14	TO130041a	Barrie	12588 Keele Street, King City, ON	Phase I
AMEC 2014b	Letter Report Phase I Environmental Site Assessment Recommendations Letter Commercial Property 12588 Keele Street, King City, Ontario	Metrolinx	AMEC Environmental and Infrastructure a Division of AMEC Americas Limited	5-Feb-14	TO130041	Barrie	12588 Keele Street, King City, ON	Phase I
AMEC 2014c	Phase I Environmental Site Assessment Commercial Property, 12620 Keele Street, King City, Ontario, L7B 1H5	Metrolinx	AMEC Environmental and Infrastructure a Division of AMEC Americas Limited	7-Feb-14	TO130041b	Barrie	12620 Keele Street, King City, ON	Phase I

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
AMEC 2014e	Subsurface Environmental Investigation 12588 Keele Street, King City, Ontario, L7B 1H5	Metrolinx	AMEC Environmental and Infrastructure a Division of AMEC Americas Limited	17-Apr-14	TO140007	Barrie	12588 Keele Street, King City, ON	SEI
AMEC 2014f	Letter Report - Subsurface Environmental Investigation Recommendations Letter Commercial Property 12588 Keele Street, King City, Ontario	Metrolinx	AMEC Environmental and Infrastructure a Division of AMEC Americas Limited	17-Apr-14	TO140007	Barrie	12588 Keele Street, King City, ON	SEI Recommendations
AMEC 2014g	Subsurface Environmental Investigation 12620 Keele Street, King City, Ontario, L7B 1H5	Metrolinx	AMEC Environmental and Infrastructure a Division of AMEC Americas Limited	17-Apr-14	TO140007	Barrie	12620 Keele Street, King City, ON	SEI
AMEC 2014h	Letter Report - Subsurface Environmental Investigation Recommendations Letter Undeveloped Commercial Property 12620 Keele Street, King City, Ontario	Metrolinx	AMEC Environmental and Infrastructure a Division of AMEC Americas Limited	17-Apr-14	TO140007	Barrie	12620 Keele Street, King City, ON	SEI Recommendations

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
Arcadis 2015a	Phase One Environmental Site Assessment of the GO Newmarket Subdivision from Dundas Street West to St. Clair Avenue West in Support of the Davenport Community Rail Overpass, Toronto, Ontario	GO Transit, a Division of Metrolinx	ARCADIS Canada Inc.	1-May-15	3011-1401	Barrie	Newmarket Subdivision from Dundas Street West to St. Clair Avenue West	Phase I
Arcadis 2015b	Phase Two Environmental Site Assessment, Davenport Community Rail Overpass, Lappin Avenue to Davenport Road Toronto, Ontario	GO Transit, a Division of Metrolinx	ARCADIS Canada Inc.	29-Sept-15	3011-1402	Barrie	Lappin Avenue to Davenport Road	Phase II
Geotasco 2001	Site Sensitivity Assessment for Comport Communications Int. Inc. In the Town of Aurora. Phase I Environmental Site Assessment Sensitivity Assessment for No. 3 and 11 Ross Street in Aurora, Ont.	Details Design Inc.	Geotasco Inc.	5-Mar-01	Aurora 1-0	Barrie	3 and 11 Ross Street, Aurora	Phase I
JWEL 2000	Canadian National Final Phase I Environmental Site Assessment,	Canadian National	Jacques Whitford Environment Limited	28-Jan-00	33454	Barrie	Newmarket Subdivision Mile 12.90 to 42.30	Phase I

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
	Newmarket Subdivision, Mile 12.90 to 42.30, Vaughan to Bradford, Ontario						Vaughan to Bradford, Ontario	
SNC 2012	55 Station Road King City, ON, Phase I - Environmental Site Assessment	Metrolinx	SNC-Lavalin Environment	25-May-12	12524	Barrie	55 Station Road	Phase I
Terrapex 2009	Greater Toronto Transit Authority Phase I/II Environmental Site Assessment and Designated Substance Survey, 3 Ross Street, Aurora, Ontario	Go Transit	Terrapex Environmental Ltd.	21-Aug-09	CT1719.00	Barrie	3 Ross Street, Aurora	Phase I & II

Further work is recommended along the Barrie corridor to assess/characterize potential soil and/or groundwater contamination and develop appropriate mitigation measures. As a result, additional Environmental Site Assessment studies including Phase I ESAs, Phase II ESAs, etc. will be carried out by Metrolinx as required along the corridors/OCS Impact Zone during the Detailed Design phase. Should these further assessments confirm the presence of subsurface contamination at these sites, recommendations for mitigation will be developed and implemented as appropriate which may include but are not limited to:

- Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site;
- Undertake remediation and/or implementation of management measures to address contaminated soils and/or groundwater during construction and long term operations and maintenance. Management measures will be carried out in accordance with applicable environmental legislation.

Furthermore, the mitigation measures as outlined in **Section 9.2** will be adhered to and implemented during Detailed Design and construction.

6.2.7.2 Net Effects

Based on the implementation of the mitigation measures outlined above, no net adverse effects are anticipated.

6.3 Cultural Heritage

Please refer to Appendix C2 for a description of the methodology followed for assessment of cultural heritage impacts. Additional details can be found in the Cultural Heritage Impact Assessment Report contained in **Appendix C2**.

6.3.1 Preferred and Alternative Allandale Tap Location

There are no heritage properties identified at the Preferred Allandale Tap Location, as determined by a cultural heritage assessment conducted as part of a separate EA (AECOM 2016, see **Appendix C2** of the EPR). There are no further concerns from a cultural heritage perspective.

There are no heritage properties identified at the Alternative Allandale Tap Point Location. There are no further concerns from a cultural heritage perspective.

6.3.1.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at the Preferred or Alternative Allandale Tap locations, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

6.3.1.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.2 Allandale TPS and 25kV Feeder Route

There are no heritage properties identified at the Allandale TPS or along the Feeder Route. There are no further concerns from a cultural heritage perspective.

6.3.2.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

6.3.2.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.3 Newmarket SWS

There are no heritage properties identified at the Newmarket SWS. There are no further concerns from a cultural heritage perspective.

6.3.3.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

6.3.3.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.4 Gilford PS

There are no heritage properties identified at the Gilford PS. There are no further concerns from a cultural heritage perspective.

6.3.4.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

6.3.4.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.5 Maple PS

There are no heritage properties identified at the Maple PS. There are no further concerns from a cultural heritage perspective.

6.3.5.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

6.3.5.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.6 OCS & Bridges: Section BR-1 – Parkdale Junction to Caledonia Station

The cultural heritage resources within this section include:

- National Cash Register Company (BR-1-1)
- Former St. Clair Rail Station (BR-1-2)
- St. Clair Avenue West Bridge (BR-1-3)
- York Beltline Trail (BR-1-4)

A summary of impacts and mitigation measures is provided in **Table 6-40** and feature mapping of resources is provided in **Appendix C2**.

6.3.6.1 Potential Effects

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 6-40: Summary of BR-1 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
National Cash Register Company BR-1-1 (Adjacent Protected Property to the Dundas Street Bridge [BR-1-1])	No impacts to the heritage attributes associated with 222 Lansdowne Road were identified as a result of alterations to the Dundas Street Bridge or	N/A	N/A

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
	as a result of OCS infrastructure.		
Former St. Clair Rail Station BR-1-2 (Former adjacent protected property to the rail corridor)	No impacts to the heritage attributes associated with the former St. Clair Ave. Train Station (now demolished) were identified as a result of OCS infrastructure.	N/A	N/A
St. Clair Avenue West Bridge BR-1-3 (PHP)	Installation of OCS attachments	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was undertaken (as part of separate Metrolinx undertaking) and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the City of Toronto
York Beltline Trail BR-1-4 (PHP) (Adjacent protected property to the rail corridor)	No impacts to the property are expected as a result of OCS infrastructure.	N/A	N/A

6.3.6.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the St. Clair Avenue West Bridge will be minimized by carrying out a HIA. The HIA will identify potential impacts and appropriate mitigation measures for heritage attributes to be incorporated into final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the City of Toronto.

6.3.7 OCS & Bridges: Section BR-2 – Caledonia Station to Downsview Park Station

There are no heritage properties identified in the Section BR-2 study area. There are no further concerns from a cultural heritage perspective.

6.3.7.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

6.3.7.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.8 OCS & Bridges: Section BR-3 – Downsview Park Station to Rutherford Station

The cultural heritage resources within this section include:

- Don River Culvert (BR-3-1)

A summary of impacts and mitigation measures is provided in **Table 6-41** and feature mapping of resources is provided in **Appendix C2**.

6.3.8.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 6-41: Summary of BR-3 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Don River Culvert BR-3-1 (PHP)	No impacts to the Don River Culvert are expected as a result of alterations to the Metrolinx-owned rail ROW	N/A	N/A

6.3.8.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.9 OCS & Bridges: Section BR-4 – Rutherford Station to King City Station

The cultural heritage resources within this section include:

- Maple GO Station (BR-4-1)
- Village of Maple Heritage Conservation District (BR-4-2)

A summary of impacts and mitigation measures is provided in **Table 6-42** and feature mapping of resources is provided in **Appendix C2**.

6.3.9.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 6-42: Summary of BR-4 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Maple GO Station BR-4-1 (PPHP)	Installation of OCS attachments	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was undertaken (as part of Electrification TPAP) and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the City of Vaughan
Village of Maple HCD BR-4-2 (Adjacent Protected Property to the Maple GO Station)	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan. In particular, policies on streetscape and infrastructure. Impacts to Maple Train Station are previously discussed, see BR-4-1.	Potential disruption of setting	• Consultation with heritage staff at the City of Vaughan to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW and to determine if a heritage permit is required (see **Appendix C2**).

See **Figure 6-12** for a visual representation of this CHR.

Figure 6-12: Maple GO Station

6.3.9.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Maple GO Station will be minimized by carrying out a HIA. The HIA will identify potential impacts and appropriate mitigation measures for heritage attributes to be incorporated into final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the City of Vaughan.

Potential disruption to the Maple HCD would be minimized through consultation with heritage staff at the City of Vaughan to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW and to determine if a heritage permit is required.

6.3.10 OCS & Bridges: Section BR-5 – King City Station to Bathurst Street

The cultural heritage resources within this section include:

- Crawford and Maud Wells House (BR-5-1)

A summary of impacts and mitigation measures is provided in **Table 6-43** and feature mapping of resources is provided in **Appendix C2**.

6.3.10.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 6-43 Summary of BR-5 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Crawford and Maud Wells House BR-5-1 (Protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the Crawford and Maud Wells House were identified as a result of OCS infrastructure.	N/A	N/A

6.3.10.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.11 OCS & Bridges: Section BR-6 – Bathurst Street to Aurora Station

The cultural heritage resources within this section include:

- Aurora GO Station (BR-6-1)
- Radial Railway Bridge Abutment (BR-6-2)

A summary of impacts and mitigation measures is provided in **Table 6-44** and feature mapping of resources is provided in **Appendix C2**.

6.3.11.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 6-44 Summary of BR-6 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Aurora GO Station BR-6-1 (PHPPS)	Installation of OCS attachments	Alteration: displacement of heritage attributes and/or disruption of setting	• Conduct a HIA during the TPAP to identify potential impacts and appropriate mitigation measures • During Detailed Design, the HIA should be updated, if necessary in consultation with the MTCS, and the Town of Aurora
Radial Railway Bridge Abutment BR-6-2 (Protected	No impacts to the heritage attributes associated with the Radial Railway Bridge Abutment	N/A	N/A

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
property adjacent to the rail corridor)	were identified as a result of OCS infrastructure.		

6.3.11.1.1 Aurora GO Station

The Aurora GO Station was identified by Metrolinx as a provincial heritage property of provincial significance (2014) and a HIA was conducted. The HIA for the Aurora GO Station was completed July 2017 by Taylor Hazell Architects Ltd. The purpose of the HIA was to consider the potential impacts of proposed interventions. The Aurora GO Station requires modifications to allow for the installation of the OCS. The four main Electrification undertakings at the Aurora GO Station are as follows:

- Installation of support structures for the OCS (cantilever or portal structures);
- Installation of foundations for OCS poles;
- Wiring of the OCS; and,
- Grounding and bonding of the OCS

Introduction of the OCS infrastructure is not expected to result in significantly adverse impacts on the Aurora GO Station's identified heritage attributes. By following the mitigation measures and recommended alternatives, the severity of the impacts of the proposed activities on the attributes of the Aurora GO Station are reduced to 'low' or 'none'. The following mitigation measures should be undertaken:

- Support structures should be positioned to avoid interfering with views of the station building.
- A comprehensive protection plan should be established for the station building to mitigate any impact from excavation during construction. It should reflect an understanding of machine operations around the building and, if possible, include a protective zone around the building.

Refer to **Appendix M** for a copy of the HIA prepared for the Aurora GO Station, as well as a copy of the Statement of Cultural Heritage Value.

6.3.11.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Aurora GO Station has been minimized by carrying out a HIA during the TPAP. The HIA identifies potential impacts and recommend appropriate mitigation measures for heritage attributes to be incorporated into the final design. During Detailed Design, the HIA should be updated, if necessary based on final design in consultation with MTCS and the Town of Aurora.

6.3.12 OCS & Bridges: Section BR-7 – Aurora Station to East Gwillimbury Station

The Screening Report identified two cultural heritage resources within the Section BR-7 study area. Both of these resources will be impacted by the proposed undertaking. The cultural heritage resources within this section include:

- Newmarket GO Station (BR-7-1)
- Robinson House (BR-7-2)
- Former Newmarket Train Station (BR-7-3)

A summary of impacts and mitigation measures is provided in **Table 6-45** and feature mapping of resources is provided in **Appendix C2**.

6.3.12.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 6-45 Summary of BR-7 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Newmarket GO Station BR-7-1 (PPHP)	Installation of OCS attachments	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was undertaken (as part of Electrification TPAP) and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the Town of Newmarket
Robinson House BR-7-2 (Adjacent protected property to rail corridor)	No impacts to the heritage attributes associated with the Robinson House were identified as a result of OCS infrastructure.	N/A	N/A
Former Newmarket Train Station BR-7-3 (Adjacent protected property to rail corridor)	No impacts to the heritage attributes associated with the former Newmarket Train Station were identified as a result of OCS infrastructure.	N/A	N/A

See **Figure 6-13** for a visual representation of this CHR.

Figure 6-13: Newmarket GO Station

6.3.12.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Newmarket GO Station will be minimized by carrying out a HIA. The HIA will identify potential impacts and recommend appropriate mitigation measures for heritage attributes to be incorporated into the final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the Town of Newmarket.

6.3.13 OCS & Bridges: Section BR-8 – East Gwillimbury Station to Bradford Station

There are no heritage properties identified in the Section BR-8 study area. There are no further concerns from a cultural heritage perspective.

6.3.13.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

6.3.13.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.14 OCS & Bridges: Section BR-9 – Bradford Station to 13th Line

The cultural heritage resources within this section include:

- Bradford GO Station (BR-9-1)

A summary of anticipated impacts and net effects is provided in **Table 6-46** and feature mapping of these resources is provided in **Appendix C2**.

6.3.14.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 6-46 Summary of BR-9 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Bradford GO Station BR-9-1 (PHP)	Installation of OCS attachments	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was previously completed (as part of a separate project) and it was determined to be Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be developed during Detailed Design in consultation with MTCS and the Town of Bradford West Gwillimbury

6.3.14.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Bradford GO Station will be minimized by carrying out a HIA during Detailed Design. The HIA will identify potential impacts and recommend appropriate mitigation measures for heritage attributes to be incorporated into the final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the Town of Bradford West Gwillimbury.

6.3.15 OCS & Bridges: Section BR-10 – 13th Line to 6th Line Section

There are no heritage properties identified in this section. There are no further concerns from a cultural heritage perspective.

6.3.15.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

6.3.15.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.16 OCS & Bridges: Section BR-11 – 6th Line to Barrie South Station

The cultural heritage resources within this section include:

- Cotellucci Property (BR-11-1)

A summary of anticipated impacts and net effects is provided in **Table 6-47** and feature mapping of these resources is provided in **Appendix C2**.

6.3.16.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 6-47 Summary of BR-11 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Cotellucci Property BR-11-1 (Protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the Cotellucci Property were identified as a result of OCS infrastructure.	N/A	N/A

6.3.16.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.3.17 OCS & Bridges: Section BR-12 – Barrie South Station to Allandale Waterfront Station

The cultural heritage resources within this section include:

- Former Allandale Train Station (BR-12-1)[19]

A summary of impacts and mitigation measures is provided in **Table 6-48** and feature mapping of resources is provided in **Appendix C2**.

6.3.17.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

[19] The Former Allandale Train Station was identified as a CHP in the GO Rail Network Electrification TPAP CHSR (May 2016). However, based on new information that became available following submission of the CHSR, it was determined that Allandale Station is an Adjacent Protect Property.

Table 6-48 Summary of BR-12 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Former Allandale Train Station BR-12-1 (Protected Property adjacent to the rail corridor and to Allandale GO Station)	No impacts to the heritage attributes associated with the Former Allandale Train Station were identified as a result of OCS infrastructure.	N/A	N/A

6.3.17.2 Net Effects

No net effects will be experienced as a result of this undertaking.

6.4 Archaeology

A Stage 1 Archaeological Assessment was undertaken for the GO Rail Network Electrification Project. A summary of the findings and recommendations for the Barrie Corridor can be found in the sections below. Refer to **Appendix D2** for complete details.

6.4.1 Preferred and Alternative Allandale Tap Location and Allandale TPS

The Preferred Allandale Tap location has been subject of a recent Stage 1 as part of the ongoing Hydro One Barrie Area Transmission Upgrade Class EA which overlaps with the Preferred Allandale Tap site, north of Tiffin Street. The Stage 1 identifies that the Preferred Tap site location retains archaeological potential and that a Stage 2 test pit survey must be conducted. Hydro One will be undertaking the recommended Stage 2 assessment work as part of the Hydro One Barrie Area Transmission Upgrade Class EA.

A field inspection for the Alternative Allandale Tap Location determined that the site consists of mostly grass-covered vacant land, although it may have been disturbed by past land modification.

The following criteria indicate the potential for Indigenous and Euro-Canadian archaeological sites within the Alternative Allandale Tap Location site:

- Proximity to historic transportation route (Northern Railway)
- Well-drained sandy soils (Tioga sandy loam)
- Proximity to Euro-Canadian transportation routes (Tiffin Street; Northern Railway)
- Proximity to historic Euro-Canadian settlement (Allandale village)

Accordingly, a Stage 2 archaeological assessment will be necessary to confirm the presence of undisturbed (or minimally disturbed) archaeological contexts and/or to locate any cultural resources that may be present.

The proposed TPS site is located between Tiffin Street and the Barrie –Collingwood Rail Corridor and consists of industrial lands, truck yard and parking lot. Evidence of previous disturbance is pervasive and extends to the entire property.

The Feeder Route corridor includes an active railway line and an existing bridge, and corridor lands have been previously disturbed by past railway construction.

6.4.1.1 Potential Effects and Mitigation Measures

Both the Preferred and Alternative Allandale Tap sites have the potential to create disturbances to potential Indigenous and Euro-Canadian archaeological resources. Mitigation Measures include conducting a Stage 2 Archaeological Assessment of the portion of the Tap facility site with archaeological potential .

The Allandale TPS has been severely disturbed by grading and construction activities related to its use as a soil and truck storage facility and parking lot. Archaeological potential has been removed. As such, no further archaeological assessment is recommended.

The proposed Allandale Feeder Route has been severely disturbed by previous railway construction. Archaeological potential has been removed. No further archaeological assessment is recommended.

6.4.1.2 Net Effects

Net effects associated with the Preferred and Alternative Allandale Tap will be determined upon further assessment. No net effects will be experienced as a result of the installation of the Allandale TPS/Feeder Route.

6.4.2 Newmarket SWS

A property inspection of the proposed facility site for the Newmarket SWS was conducted by Robert Pihl (P057), ASI on June 9, 2016.

The proposed Newmarket SWS site is located on land with apparently two separate land uses: one consists of commercial buildings and a truck yard, while the second is vacant land that is mostly open and grass-covered with scrub vegetation and some trees to the rear. It appears that part of the latter area may have been used by the adjoining business, as access to it is restricted, and it has been graded and used for dumping debris. The grass-covered parcel appears to have been graded in the past, and this disturbance will have to be confirmed.

6.4.2.1 Potential Effects and Mitigation Measures

Portions of the Newmarket SWS site have the potential to create disturbance to potential Indigenous and Euro-Canadian archaeological resources. As such, a Stage 2 Archaeological Assessment is recommended.

6.4.2.2 Net Effects

Net effects associated with the Newmarket SWS will be determined upon further assessment.

6.4.3 Gilford PS

A property inspection of the proposed facility site for the Gilford PS was conducted by Robert Pihl (P057), ASI on November23, 2016.

The proposed Gilford PS consists of scrub or grass-covered lands that are relatively flat and may have

been previously disturbed by grading.

6.4.3.1 Potential Effects and Mitigation Measures

Portions of the Gilford PS site have the potential to create disturbance to potential Indigenous and Euro-Canadian archaeological resources. Mitigation Measures include conducting a Stage 2 Archaeological Assessment of the PS site to confirm previous disturbance/lack of archaeological potential or locate any cultural resources that may be present.

6.4.3.2 Net Effects

Net effects associated with the Gilford site will be determined upon further assessment.

6.4.4 Maple PS

A Stage 2 Archaeological Assessment was previously conducted by Archaeological Assessments Ltd. (2008) on a much larger parcel of land that includes the Maple PS facility site (See **Appendix D2** for further details). Although three sites were located during the survey, none are within the facility study limits. Two sites—Site P1, a pre-contact Meadowood projectile point dating to the Early Woodland period, ca. 800 - 0 BC, and Site H2, a late Euro-Canadian domestic site dating to the late 19th century—were determined have no CHVI and were recommended for no further archaeological assessment. The Dennis site (AlGv-306), however, was considered to have CHVI, and a Stage 4 mitigative excavation was recommended and subsequently completed (Archeoworks 2010b). The site has now been completely removed in advance of future development.

6.4.4.1 Potential Effects and Mitigation Measures

Previous archaeological assessments encompassing the Maple PS site has been completed and archaeological potential has therefore been removed. As such, no further Stage 2 archaeological assessment is recommended. However, the property is adjacent to the historic Hope Primitive Methodist

Cemetery. The Maple PS may require a Stage 3 cemetery investigation if there are any planned impacts within 10 metres of the cemetery limits.Net Effects

No net effects will be experienced as a result of the installation of the Maple PS.

6.4.5 OCS & Bridges: Barrie Corridor

The OCS footprint for the Barrie study corridor includes active GO Railway lines and existing bridges. A property inspection of the study corridor was conducted by Robert Pihl (P057), ASI on May 5, 2016. Access points for the property inspection consisted of road crossings at grade or bridges, or at one of the many GO station platforms along the way. Each location was photo-documented in one or both directions as deemed appropriate (refer to **Appendix D2** for further details).

6.4.5.1 Potential Effects and Mitigation Measures

OCS Footprint Section BR-1 to BR-11 – Parkdale Junction to Barrie South

The Stage 1 Archaeological Assessment determined that the entire OCS footprint consists of an active GO Rail corridor that has been severely disturbed by previous rail construction, often by filling or down-cutting the landscape to produce an appropriate grade for the train and then by installing a raised bed for the steel rail. As such, no further archaeological assessment is required in this portion of the corridor.

Bridge Modifications Section BR-1 to BR-11 – Parkdale Junction to Barrie South

For overhead and pedestrian bridges along the Barrie corridor that will require modifications (e.g., lower tracks) to achieve required vertical clearances and/or to accommodate the addition of a protective bridge barrier, the Stage 1 Archaeological Assessment confirmed that the existing footprint of these bridges within the GO rail ROW/7 metre zone is within an active railway line on disturbed lands, therefore no further Archaeological Assessment is recommended.

If during detailed, potential impacts to areas that extend outside the 7 metre OCS/Vegetation Removal zone are identified, a review will be undertaken of potential disturbance to Indigenous and Euro-Canadian archaeological resources for these areas. As part of this review, further archaeological assessment work will be identified and undertaken for any areas anticipated to be impacted outside the 7 metre OCS/Vegetation Removal zone, such as Stage 1 Archaeological Assessment.

OCS Footprint Section BR-12– Barrie South Station to Allandale Waterfront Station

The Stage 1 Archaeological Assessment determined that the OCS footprint may retain archaeological potential west of Minet’s Point Road (between Essa Road and Allandale Waterfront GO Station) and requires a Stage 2 Archaeological Assessment by test pit survey to confirm potential Indigenous and Euro-Canadian archaeological resources. East of Minet’s Point Road, the balance of the OCS footprint does not retain archaeological potential. As such, no further archaeological assessment is recommended east of Minet’s Point Road.

In addition, a registered or known archaeological site within 1 km, the Allandale site (BcGw-69) is considered to possess CHVI and is situated adjacent and outside of the OCS footprint near the Historic Allandale Station and the new Allandale Waterfront GO Station. Any work near this highly significant site initially requires a Stage 2 archaeological assessment (preferably with the engagement of interested Indigenous communities) to better define the archaeological integrity and limits of the site. Previous archaeological assessments of the site have been of limited scope and have not fully characterized the nature and extent of the archaeological deposits. Accordingly, depending on the results of the Stage 2 assessment, there is a strong possibility that further Stage 3 archaeological assessment (again with Indigenous engagement) and, ultimately, Stage 4 mitigation—protection/ avoidance of the Allandale site will be recommended. As with all such significant archaeological sites, it is preferable that impacts to the site are mitigated through the development of a Stage 4 protection and avoidance strategy. This would require that a licensed archaeologist monitor the construction activities to ensure that no impacts to the site occur during construction. If the site cannot be fully protected and avoided, then some archaeological mitigation through salvage excavation, with Indigenous engagement, may also be required. Finally, due to the previously documented evidence of disturbed human remains on the historic Allandale Station site, archaeological monitoring of any proposed impacts to the historic station as well as to any crawl spaces or soils beneath existing structures without basements is recommended.

Bridge Modifications Section BR-12– Barrie South Station to Allandale Waterfront Station

There are no bridges with vertical clearance issues within this section of the Barrie Corridor. It is anticipated that any bridge modifications will be contained within the MX ROW/OCS Impact zone. As such, no further archaeological assessment is recommended.

6.4.5.2 Net Effects

OCS & Bridges Section BR-1 to BR-11 – Parkdale Junction to Barrie South

No net effects will be experienced as a result of the installation of the OCS. If during detailed, potential impacts to areas that extend outside the 7 metre OCS/Vegetation Removal zone are identified, a review will be undertaken of potential disturbance to Indigenous and Euro-Canadian archaeological resources for these areas. As part of this review, further archaeological assessment work will be identified and undertaken for any areas anticipated to be impacted outside the 7 metre OCS/Vegetation Removal zone, such as Stage 1 Archaeological Assessment.

OCS & Bridges Section BR-12– Barrie South Station to Allandale Waterfront Station

Net effects associated with the OCS footprint west of Minet's Point Road and Allandale site (BcGw-69) will be determined upon further assessment.

No net effects will be experienced as a result of the installation of the OCS east of Minet's Point Road or in association with bridge modifications.

6.5 Land Use

Please refer to Appendix E2 for a description of the methodology followed for assessment of land use impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in Appendix E2.

6.5.1 Preferred and Alternative Allandale Tap and TPS Location

6.5.1.1 Potential Effects and Mitigation Measures

Tap and TPS Site

The proposed Allandale Tap (Preferred and Alternative) and TPS sites are located in the City of Barrie. The proposed Preferred Tap Area is predominately located on the north side of Tiffin Street. The area is composed of small areas of vegetation/open space, and electrical transmission and distribution infrastructure including a hydro corridor, as well as some office, commercial/industrial buildings and parking areas.

A small portion of the Preferred Tap Area extends south of Tiffin Street and meets the proposed TPS Area. South of Tiffin Street, existing land use is primarily a mixture of commercial and industrial buildings. However, based on desktop review, there is one residential property (south of Tiffin Street), currently located within the proposed TPS Area/southern portion of the Preferred Tap Area. Metrolinx is currently in discussions/consultation with the land owner of this property regarding potential impacts of the proposed Allandale Tap/TPS site development. If required, Metrolinx will proceed with easement/property acquisition in accordance with Metrolinx's approved property acquisition process.

There are three additional residential properties approximately 50m from the proposed Preferred Tap Area on the north side of Tiffin Street. The Preferred Tap Area is zoned Light Industrial, General Commercial and Highway Industrial (LI, C4 and HI respectively) none of these locations permits nor prohibits public utilities in these areas. There is a special provision attached to the Light Industrial property located at 306 Tiffin Street limiting its available use:

> *LI (SP-245) 306 Tiffin Street shall be used for no other purpose than the following: offices, conference centres, electronics and software manufacturing in wholly enclosed buildings, pharmaceutical manufacturing in wholly enclosed buildings, printing and publishing, research and development facilities, restaurants as part of a multi-tenanted building, service stores, transmission and distribution operating centre, veterinary clinic, accessory retail, helicopter landing facility. (By-law 2005-275) (By-law 2015-068)(Barrie Zoning Bylaw 13.3.13).*

This special provision is not anticipated to affect the proposed Preferred Tap area.

The proposed TPS and Alternative Tap Areas are located on the south side of Tiffin Street. There is a mixture of commercial and industrial buildings and outdoor storage/parking for industrial purposes within the proposed TPS and Alternative Tap Areas. The TPS Area is located approximately 65 metres away from a single low-rise residential building on the north side of Tiffin Street. The TPS and Alternative Tap sites are otherwise surrounded by warehouses, commercial buildings and parking lots on three sides and the rail corridor to the south. Across the rail corridor are the backyards of residential properties on Phillips Street and Patterson Road. These residential properties are 12 metres from the TPS and Alternative Tap sites and separated by the existing rail corridor so they will not be impacted by the footprint of the TPS and Tap location. The TPS and Alternative Tap location sites are zoned Light Industrial (LI), which neither permits nor prohibits public utilities in these areas.

The presence of the Preferred and Alternative Tap locations and TPS is not expected to be a conflict with the current zoning given the existing land uses in the vicinity of the sites.

Mitigation Measures
The Preferred and Alternative Tap Areas and TPS are compatible with the existing land use and zoning of the properties.

Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Barrie will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. A portion of these properties are owned or controlled by Hydro One, however Metrolinx is currently in discussions with the landowners for the remaining properties and will reach an agreement prior to the commencement of construction activities.

6.5.1.2 Net Effects

The Preferred and Alternative Tap Areas and TPS are not anticipated to negatively affect future development within this zoning context, therefore no net effects are anticipated at this location.

6.5.2 Allandale 25 kV Feeder Route

6.5.2.1 Potential Effects and Mitigation Measures

The 25 kV Feeder route will run along the Barrie Collingwood Railway (BCRY) from the Allandale TPS to the Allandale GO Station in the City of Barrie. The feeder route passes through areas which generally consist of open space, treed areas, industrial uses, commercial uses, and small section of low-rise residential uses. As this route is proposed to consist of an above ground feeder line in the existing right of way, there are no expected footprint impacts to adjacent land uses. The Feeder route passes through areas zoned as Light Industrial (LI), Highway Industrial (HI SP-135), General Industrial (GI), General Commercial (C4 SP-278), Central Area 1 Commercial (C1-1, C1-1 SP366), and Open Space which neither permits nor prohibits electrical infrastructure in these areas.

Mitigation Measures
No mitigation measures are required.

6.5.2.2 Net Effects

The 25 kV feeder route is not anticipated to negatively affect future development within this zoning context and therefore no net effects are expected.

6.5.3 Newmarket SWS

6.5.3.1 Potential Effects and Mitigation Measures

The proposed Newmarket SWS site is located in the Town of Newmarket on property which includes the Newmarket Hydro building and parking lot, as well as open space with some trees and manicured grass. It is surrounded by hydro corridor / open space and other commercial / warehouse buildings and parking lots. The site is zoned Heavy Employment (EH). Permitted uses within EH areas include a variety of commercial, service, manufacturing, and storage uses, and permitted uses includes public uses by a public authority, subject to various conditions as outlined in section 4.1.3 of the Town of Newmarket Zoning By-law 2010-40. Mitigation Measures

The SWS is located in an area of compatible land use within the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the Town of Newmarket will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. It is assumed that following this discussion and a review of the Detailed Design of the facility the SWS will be deemed consistent with adjacent uses given the site's current use as a parking lot/commercial building and adjacent utility / commercial / warehouse areas. Metrolinx is currently in discussion with the landowners with regarding the use of this property and will reach an agreement prior to commencement of construction activities.

6.5.3.2 Net Effects

The SWS location is not anticipated to negatively affect future development within this zoning context, and therefore no negative net effects to land use are expected.

6.5.4 Gilford PS

6.5.4.1 Potential Effects and Mitigation Measures

The proposed Gilford PS is located in the Town of Innisfil on a property which in a fenced off area that is currently designated open space covered with vegetation including a few trees. It is surrounded by the rail corridor and further open space to the west and south. Residential properties are located to the immediate east of the site. The site does not have active zoning, being indicated as "Rail" in the Town of Innisfil's Zoning By-law 080-13 (similar to the rail corridor itself). Permitted uses within this designation include only those uses directly associated with the rail line, so the presence of the PS is not expected to conflict with this designation. There are no sensitive receptors within 500 metres of the proposed Gilford PS location and therefore there will be no footprint impacts to sensitive receptors.

Mitigation Measures
The PS is located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the Town of Innisfill will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners regarding the use of this property and will reach an agreement prior to the commencement of construction activities.

When finalizing the PS location, special attention should be paid to the placement of the facility with respect to the residential properties to the immediate east, to minimize any effects with these properties.

6.5.4.2 Net Effects

Since there is no planned development for this area, the PS is not anticipated to negatively affect future development within this zoning context, and therefore no net effects are expected.

6.5.5 Maple PS

6.5.5.1 Potential Effects and Mitigation Measures

The proposed Maple PS site is located in the City of Vaughan, in an area designated as agricultural/rural land, adjacent to park/open space/recreational area and employment and industrial area. The site is zoned Agricultural (A), which neither permits nor precludes public utilities.

The proposed PS is situated on lands that are being studied for the future Block 27 Secondary Plan. Specifically, the proposed PS is located on lands designated for a future GO Station/Local Centre Precinct and will be surrounded by a mix of commercial and residential uses.

As part of the TPAP, Metrolinx met with the City of Vaughan to present possible siting options for the Maple PS; these discussions resulted in the Maple PS being re-located to the location presented in this EPR. Consultation with the City of Vaughan will continue throughout Detailed Design to ensure that there are no conflicts with the proposed SWM pond on this site and that the PS facility is integrated as much as possible into the Secondary Plan lands which include proposed mid-rise, mixed used residential area being developed in support of a proposed new Kirby GO Station.

The proposed approximate footprint of the PS is 47 metres x 22 metres, abuts the existing railway corridor, and is anticipated to have minimal noise impacts. Given the nature and function of a PS, it is likely to have a similar impact on adjacent land uses as other types of critical infrastructure (i.e., sewage pumping station, well houses, and electrical distribution stations) and is therefore not anticipated to conflict with this type of development. The property is south west of the proposed North Maple Regional Park, however the placement of the proposed facility is across from an industrial area and not the proposed park and therefore impacts on the viewshed of the park are not anticipated. Visual impacts of the proposed PS are described further in the Visual Impact Assessment Report prepared by Gannett Fleming under separate cover.

Mitigation Measures

The PS is located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Vaughan will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners regarding the use of this property and will reach an agreement prior to the commencement of construction activities.

Additional consultation will be undertaken with the City of Vaughan with regards to the placement of the Storm Water Management Facility within the Block 27 Plan area.

6.5.5.2 Net Effects

Potential land use conflicts will be mitigated through ongoing consultation between Metrolinx and the City of Vaughan during Detailed Design with respect to siting of the Maple PS facility.

6.5.6 Bradford Layover

6.5.6.1 Potential Effects and Mitigation Measures

The Bradford Layover will be located on the western side of the Barrie Corridor, just north of 8th Line in the Town of Bradford West Gwillimbury. These lands are currently open space and are adjacent to industrial/commercial uses. The lands are designated Industrial in Bradford West Gwillimbury's Official Plan 2002, and are zoned General Employment (M1*13) in the Town's Zoning By-law 2010-050. This designation neither permits nor precludes public utilities. Given the existing industrial/commercial nature of the area and existing zoning, there are no expected footprint effects from the electrification of the layover at this location.

Mitigation Measures

The layover is located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the Town of Bradford West Gwillimbury will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners regarding the use of this property and will reach an agreement prior to the commencement of construction activities.

It should be noted that a proposed road link between Highways 400 and 404 (the “Bradford Bypass”) is proposed for the area between 8th Line and 9th Line, and would cross the rail corridor near the south end of the proposed Bradford Layover site. While this project will not necessarily be built, ongoing communication with the Town of Bradford West Gwillimbury should be undertaken to ensure that updated information about the Project is sent to the Town and conflicts with the proposed roadway are minimized.

6.5.6.2 Net Effects

The facility is compatible with existing and adjacent land uses and therefore no net effects are expected.

6.5.7 OCS & Bridges: Section BR-1 –Parkdale Junction to Caledonia Station

6.5.7.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

Of the eleven structures in BR-1, one bridge (Dundas Street Bridge) has a vertical clearance issue (i.e., does not meet the minimum clearance requirement for electrification) which may require track lowering in order to accommodate electrification infrastructure. Based on the conceptual design for this modification it has been assumed that impacts are likely to be contained within the Metrolinx Right of Way (ROW), and no land use effects are anticipated.

In addition, bridge barriers and/or OCS attachments are also required on three structures (Dundas Street Bridge, Innes Avenue Pedestrian Bridge and Eglinton Avenue Bridge), though there are no land use effects associated with these modifications. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

6.5.7.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-1. There are no anticipated net effects from the track lowering or modifications of bridges within BR-1.

6.5.8 OCS & Bridges: Section BR-2 – Caledonia Station to Downsview Park Station

6.5.8.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

Of the four structures in BR-2, one bridge (HWY 401 Bridge) has a vertical clearance issue (i.e., does not meet the minimum clearance requirement for electrification) which may require track lowering in order to accommodate electrification infrastructure. Based on the conceptual design for this modification it has been assumed that impacts are likely to be contained within the Metrolinx Right of Way (ROW), and no land use effects are anticipated.

No other structures in BR-2 require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

6.5.8.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-2. There are no anticipated net effects from the track lowering of the Hwy 401 Bridge.

6.5.9 OCS & Bridges: Section BR-3 – Downsview Park Station to Rutherford Station

6.5.9.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the five structures within BR-3 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However, one bridge will require wire attachments (Hwy 407 Bridge). There are no land use effects associated with this modification. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures
No mitigation measures are required.

6.5.9.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-3. There are no anticipated net effects from the modification of the Hwy 407 Rail Overpass.

6.5.10 OCS & Bridges: Section BR-4 – Rutherford Station to King City Station

6.5.10.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges
Neither of the two structures within BR-4 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However, one bridge (Keele Street Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with this modification. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures
No mitigation measures are required.

6.5.10.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-4. There are no anticipated net effects from the modifications to the Keele St. Bridge.

6.5.11 OCS & Bridges: Section BR-5 – King City Station to Bathurst Street

6.5.11.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this corridor, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the three structures (King Rd Bridge, Keele St. Bridge, Bathurst St. Vaughan Bridge) within BR-5 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification). However, they all will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with these modifications. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

6.5.11.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-5. There are no anticipated net effects from the modifications of bridges within BR-5.

6.5.12 OCS & Bridges: Section BR-6 – Bathurst Street to Aurora Station

6.5.12.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

There is only one structure within BR-6 and it is not expected to have a vertical clearance issue (i.e., do not meet the minimum clearance requirement for electrification. It also does not require bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

6.5.12.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-6. There are no anticipated net effects associated with bridges within BR-6.

6.5.13 OCS & Bridges: Section BR-7 – Aurora Station to East Gwillimbury Station

6.5.13.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the three structures within BR-7 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification). However, one bridge (Queen Street Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with this modification. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

6.5.13.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-7. There are no anticipated net effects from the modifications to the Queen St. Bridge.

6.5.14 OCS & Bridges: Section BR-8 – East Gwillimbury Station to Bradford Station

6.5.14.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

There is only one structure within BR-8 (Holland River Bridge) and it is not expected to have a vertical clearance issue (i.e., do not meet the minimum clearance requirement for electrification). However, it will require wire attachments, there are no land use effects associated with this modification. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

6.5.14.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-8. There are no anticipated net effects from the modification of the Holland River Bridge.

6.5.15 OCS & Bridges: Section BR-9 – Bradford Station to 13th Line

6.5.15.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

There are no structures within this section

Mitigation Measures

No mitigation measures are required.

6.5.15.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-9. There are no anticipated net effects associated with bridges within BR-9.

6.5.16 OCS & Bridges: Section BR-10 – 13th Line to 6th Line Section

6.5.16.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this corridor, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

There is only one structure within BR-10 and it is not expected to have a vertical clearance issue (i.e., do not meet the minimum clearance requirement for electrification). This structure (6th Line Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with this modification. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

6.5.16.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-10. There are no anticipated net effects from the modification of the 6th Line Bridge.

6.5.17 OCS & Bridges: Section BR-11 – 6th Line to Barrie South Station

6.5.17.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

There are no structures within this section.

Mitigation Measures

No mitigation measures are required.

6.5.17.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-11. There are no anticipated net effects associated with bridges within BR-11.

6.5.18 OCS & Bridges: Section BR-12 – Barrie South Station to Allandale Waterfront Station

6.5.18.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW and existing Allandale Layover Facility in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the three structures within BR-12 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification). However, all (Big Bay Pointe Bridge, Cox Mill Road Bridge and Tollendale Creek Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure there are no land use effects associated with this modification. A full listing of the bridges within the Barrie Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

6.5.18.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along BR-12. There are no anticipated net effects from modifications of bridges within BR-12.

6.6 Socio-Economic

Please refer to Appendix E2 for a description of the methodology followed for assessment of socio-economic impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in **Appendix E2**.

6.6.1 Allandale Tap, TPS & 25kv Feeder Route

6.6.1.1 Potential Effects and Mitigation Measures

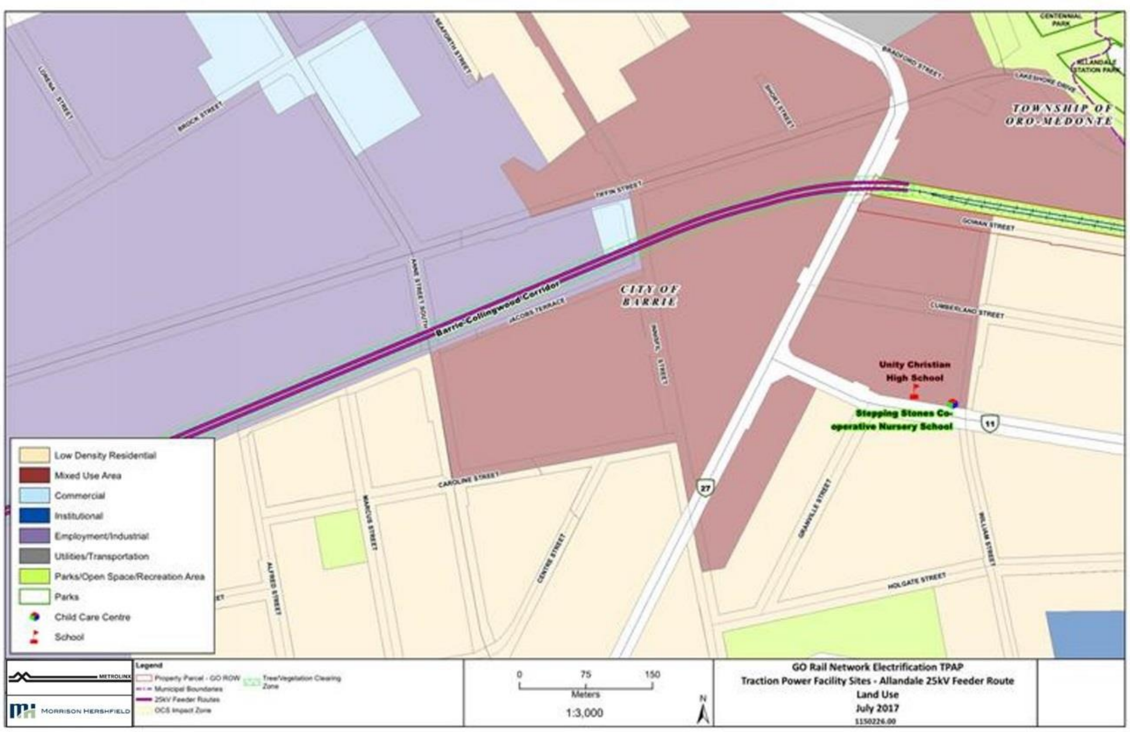
Tap and TPS Site

There are no sensitive facilities within 500 metres of the proposed Preferred or Alternative Allandale Tap or TPS site locations and therefore there will be no footprint effects to sensitive facilities.

25 kV Feeder Route

There are no sensitive facilities within 150 metres of the proposed feeder route, as shown in **Figure 6-14**

Figure 6-14 - Sensitive Facilities in the vicinity of Allandale Feeder Route



Other potential effects on the socio-economic environment associated with the Barrie corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 6.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 6.8 and 6.9 as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 6.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 6.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Barrie corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

6.6.1.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

6.6.2 Newmarket SWS

6.6.2.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed Newmarket SWS location and therefore there will be no footprint impacts to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Barrie corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 6.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 6.8 and 6.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 6.10 as well as the Visual Assessment Report contained in Appendix H*

- *EMI/EMF – see EPR Volume 3 Section 6.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the BR corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

6.6.2.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

6.6.3 Gilford PS

6.6.3.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed Gilford PS location and therefore there will be no footprint impacts to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Barrie corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 6.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 6.8 and 6.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 6.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 6.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Barrie corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

6.6.3.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

6.6.4 Maple PS

6.6.4.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed Maple PS location and therefore there will be no footprint impacts to sensitive facilities.

Potential effects on the socio-economic environment associated with the Barrie corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 6.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 6.8 and 6.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 6.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 6.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Barrie corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

6.6.4.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

6.6.5 Bradford Layover

6.6.5.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within the vicinity of the proposed Bradford Layover location and therefore there will be no footprint impacts to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Barrie corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 6.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 6.8 and 6.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 6.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 6.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Barrie corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

6.6.5.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

6.6.6 OCS & Bridges: Sections BR-1 to BR-12

6.6.6.1 Potential Effects and Mitigation Measures

There are three sensitive facility (two schools and a child care centre) in the vicinity of BR-1, BR-5 and BR-7, as shown in **Table 6-49**. The closest facility is approximately 15 metres from the OCS impact zone, and therefore there will be no footprint effects to the sensitive facility.

Table 6-49 Sensitive Facilities within the vicinity of BR-1 – BR-12

Corridor Segment	Type	Name	Address	Distance from 5 metre OCS Impact Zone
BR-1	School	St. Nicholas Of Bari Catholic Elementary School	363 Rogers Rd, Toronto	15 metre
BR-5	Child Care Centre	Kidz World Child Care Centre	13097 Keele St, King City	35 metre
BR-7	School	Aurora Montessori School	330 Industrial Pkwy N, Aurora	30 metre

Other potential effects on the socio-economic environment associated with the Barrie Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 6.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 6.8 and 6.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 6.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 6.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

There are a number of existing and proposed recreational amenities (parks and trails) within the vicinity of the Barrie rail corridor. There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the relevant municipalities will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities. For more information on recreational amenities please see the Land Use and Socio-Economic Report contained in Appendix E.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Barrie corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

6.6.6.2 Net Effects

Net effects to sensitive facilities and recreational amenities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

6.7 Air Quality

Please refer to Appendix F2 for a description of the methodology followed for assessment of air quality impacts. Additional details can be found in the Air Quality Impact Assessment Report contained in Appendix F2.

Electrification of the GO Rail Network will result in the reduction of diesel emissions (due to electric powered trains) which will have a benefit to local air quality near the rail corridors. The increased electricity generation will generate some pollutants through the combustion of fossil fuels, but overall the total air emissions will be lower as a result of the electrification. Similarly, the distribution of electricity via the Traction Power Facilities (and ancillary components such as gantries) and 25kV feeder routes does not produce air pollutants and therefore no impacts are anticipated and no mitigation measures are required. As such, no impacts are anticipated and no mitigation measures are required. As there will be a net benefit to air quality, post-construction monitoring is not necessary.

Further details related to the air quality assessment undertaken as part of the TPAP have been included in **Section 9.7.**

6.8 Noise

Recognizing that electrification of the GO network is a component of the over-arching Regional Express Rail plan, a comprehensive noise study was undertaken to examine the noise effects of the conversion to increased electric service[20] as part of the GO Rail Network Electrification TPAP.

The objective of the Noise study was to assess the effects on noise levels due to the conversion from existing/present day (2015) diesel-based GO service levels (referred to as the Future No-Build scenario) to the Electric (2025) GO RER electric-based service levels (referred to as the Future Build Scenario), and to subsequently determine whether mitigation measures may be required to address adverse noise effects. The scope of the study examined noise effects due to electric RER GO service along the rail corridors as well as noise effects related to the proposed Tap locations and Traction Power Facilities.

It is noted that numerous (i.e., thousands of) receptors were included in the noise model and considered as part of the analysis; however in order to present the results in a comprehensible way for purposes of reporting, representative receptors were chosen to demonstrate the general conditions and sound levels modelled in the area.In order to carry out this detailed noise modeling exercise, several assumptions were established. Some of the key assumptions were as follows (note - this is not an exhaustive list, please refer to **Appendix G – Noise and Vibration Modelling Reports**):

- Present day 2015 diesel based GO service was modelled as the 'base case'. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Future (2025) electric based GO RER service levels were modelled as the 'future case'. It should be noted that the 2025 scenario includes a mixed GO fleet of diesel and electric trains. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Freight traffic was included/considered in the modelling. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports.**
- Data was gathered on existing noise barriers as well as planned noise barriers along the rail corridors and were included/considered in the modelling. Planned barriers were defined as: noise barriers that were identified/proposed as part of previously completed Metrolinx/GO Transit

[20] *The electric RER scenario will entail a mixed diesel and electric fleet.*

Environmental Assessment/TPAP studies. While it is recognized that not all of these barriers have been implemented at the time the assessment was completed, they were included/considered in the modelling. It should be noted these 'planned barriers' were not evaluated for technical feasibility.

- The scope of the study did not include a comprehensive analysis of the technical, operational, economical, or administrative feasibility of implementing noise mitigation measures. Rather, a preliminary assessment of technical feasibility was completed.
- Noise sources associated with GO diesel and/or GO electric rail activity include:
  - Moving trains (applicable to all trains);
  - Idling trains at each station (applicable to all trains);
  - Road crossings signals (applicable to all trains);
  - Crossovers and Switches (applicable to all trains);
  - Wheel squeal (applicable to all trains); and
  - Pantograph (applicable to electric trains only).

A complete list of all assumptions applied can be found in the **Appendix G – Noise and Vibration Modelling Reports.**

Future/Committed Land Use

As per the 1995 MOEE / GO Transit Protocol, noise and vibration impacts are evaluated at lands which have been committed for (future) sensitive land uses. Committed uses beyond existing developments include: approved site plans, approved condominium plans or draft approved plans of subdivision. As part of carrying out the noise/vibration modelling work, this data was requested from the municipalities located within the Electrifciation TPAP study area. It should be noted that the only data that was available/provided was from the City of Toronto for approved building permits for new residential uses, therefore this data was reviewed and included in the assessment. Modelling was completed for all receptors identified through review of this data; results are presented for selected representative receptors.

For those sections of the corridor outside of the City of Toronto, a screening level assessment was conducted based on the limited detail provided in the available data on planned developments provided for municipalities other than the City of Toronto. The screening level assessment was designed to flag potential planned areas of development that may experience Adjusted Noise Impacts of greater than 5 dB based on the limited information available. This assessment was completed for the Electric RER scenario only and does not include the investigation of barriers within these areas. Notwithstanding this, the reports contained in EPR Appendix G include figures showing flagged potential planned areas of (future) development that were provided by their respective municipalities. Metrolinx will use this information for consideration of noise mitigation for new planned developments (if approved by the relevant municipalities) during the detail design stage as appropriate.

6.8.1 Credible Worst Case Scenario

The credible worst-case scenario is based on established service goals upon which the minimum infrastructure needs were determined. Increase to the service levels would require additional infrastructure due to operational and safety considerations. Current rail regulations are principally governed by Transport Canada and the US Federal Rail Administration; while Metrolinx, CN and CP are the principal sources of operational policies, standards, and rules. Other contributors to rail policy are the American Railway Engineering and Maintenance of Way Association (AREMA) and the American Public Transportation Association (APTA). Collectively, these regulators and associations set limits on how railways are designed, operated and maintained. Therefore the proposed infrastructure and service levels represent a credible worst-case scenario.

6.8.2 Ambient Sound Levels

6.8.2.1 Along the Rail Corridors

According to the MOEE/GO Protocol, ambient noise is the sound existing at a receptor in the absence of all noise from the GO Transit rail project. Ambient noise can be used as a component of the sound level objective, in combination with the sound level from any existing rail activity. The ambient levels are primarily due to noise from local road traffic and surrounding industry.

Ambient noise from road traffic and other background noise sources including industry was assumed to be negligible compared to existing rail traffic noise at most receptors near the rail corridor, and not a significant factor in determining the desirable sound level objective. Therefore, ambient noise was not assessed.

6.8.2.2 At Traction Power Facilities

The sound level objective for traction power facilities is the higher of the exclusion limit values for L_{EQ} (1-hr) in NPC-300 or the minimum background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the traction power facilities. Therefore, the exclusion limits were adopted as the desired sound level objectives.

6.8.2.3 At Layover Sites

The sound level objectives for layover sites are the higher of the exclusion limits for L_{EQ} (1-hr) in the MOEE/GO Protocol or the minimum 1-hr L_{EQ} background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the layover sites. Therefore, the exclusion limits were adopted as the desired sound level objectives.

6.8.3 Rail Activity Sound Levels

6.8.3.1 CADNA/A MODELLING

The MOEE/GO Protocol stipulates the use of a model known as Sound from Trains Environmental Analysis Method (STEAM) for predicting rail traffic noise levels. STEAM was developed by the MOECC (MOECC, 1990). The present study deviated from this guidance in that the rail traffic noise levels were modelled using the "Federal Noise and Vibration Impact Assessment" (FTA Protocol) (FTA, 2006) incorporated in Cadna/A. Cadna/A allows for the modelling of complex railway schemes including curves, parallel and intervening tracks which cannot be easily assessed using STEAM. Cadna/A is software that includes the implementation of the FTA noise propagation algorithms and as well as aspects of ISO 9613 algorithms (ISO 1994, ISO 1996).

The existing, Diesel RER and Electric RER noise levels were modelled for the entire Study Area. Results at each discrete receptor were used to establish the adjusted noise impact of the Diesel RER scenario relative to the existing scenario, as well as that of the Electric RER scenario relative to the existing scenario.

As per the FTA Protocol, the diesel trains and electric trains were modelled with a noise source height of 2.4 metres (8 ft) and 0.6 metres (2ft), respectively. The noise from a diesel train is dominated by the engine (located at approximately 2.4 metres above the rail) with a lesser contribution from the wheels (located at approximately 0.6 metres above the rail). The noise from an electric train, on the other hand, is dominated by wheel noise (emitted approximately 0.6 metres above the rail), since the electric engine is relatively quiet.

Topography was included in the Cadna/A model to take into consideration the elevation differences of the railway, receptors and the intervening terrain. The topographical features were assumed to be the same in the existing and future scenarios. High-resolution (i.e., 5 m) topographical information was obtained from public databases (Ministry of Natural Resources and Forestry, 2016).

"Retained" Noise Barriers

The diesel and electric locomotives were defined using the FTA standards implemented into Cadna/A. At the time of the original noise assessment, the electric locomotive train type was defined mathematically within Cadna/A with a "K" constant[21] that differed from the "K" constant defined in the FTA model. Metrolinx presented the results of the preliminary noise modelling for electric RER service at a series of public consultations throughout the TPAP.

Following the original assessment, an option within Cadna/A to use the "K" constant which corresponds to the FTA model was created by Datakustik, the developers of the Cadna/A software. Re-assessment using this updated Cadna/A option showed that a limited number of areas where mitigation was previously identified using the preliminary noise modelling no longer achieves an increase of 5 dB or more

[21] The "K" constant is un unnamed parameter in the FTA calculations, which describes the locomotive type (i.e., passenger diesel, electric, DMU, etc.).

with the updated Cadna/A noise modelling. This was a result of the correction to the noise modelling input that more accurately reflects the quieter nature of electrified locomotives. Metrolinx believes these supplemental areas should still be included for consideration of noise mitigation. As a result, the locations of these particular mitigation barriers are identified as "retained mitigation barriers" throughout **EPR Appendix G**, and in the mapping provided in **EPR Appendix S**. Refer to the orange coloured lines/symbols shown on the Barrie Corridor **EPR Appendix S** maps.

6.8.4 Traction Power Facilities – Predicted Noise Impacts

Generally, the traction power substations are comprised of two power transformers and a control / switchgear room and the paralleling stations and switching stations are comprised of two autotransformers and a control / switchgear room.

The sound power level generated by a typical 10 MVA transformer, estimated at approximately 87 dBA (Metrolinx, 2014), was used as an estimate for the power transformers at the traction power substations and the autotransformers at the switching stations. The MOECC requires that a 5 dB tonal penalty be applied to sources exhibiting a humming characteristic. As transformers are known to exhibit tonal characteristics, the 5 dB penalty was applied to all the transformers.

The noise impacts from the traction power facilities were evaluated at nearby receptors and are summarized in **Table 6-50**. The figures contained in **Appendix S** show the receptors for each Traction Power Facility. The predicted noise impacts from the traction power facilities at nearby receptors were below the MOECC applicable exclusion limits, with exception of:

- Daytime, evening and/or nighttime predicted noise impacts of the Gilford PS at the façade and outdoor area of the residences represented by receptors R101, R102 and R103 are above the corresponding exclusion limits.

Evaluation of more accurate sound levels for transformers and, if necessary, mitigation measures such as low noise fans or barriers should be investigated for the Gilford PS location during Detailed Design.

Table 6-50 Noise Impacts – Barrie Traction Power Facilities

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
R035	Maple PS	Façade	Daytime	24	Class 2	50	Yes
		Façade	Evening	24		50	Yes
		Façade	Nighttime	24		45	Yes
		Outdoor Area	Daytime	22		50	Yes
		Outdoor Area	Evening	22		45	Yes
R036	Maple PS	Façade	Daytime	29	Class 2	50	Yes
		Façade	Evening	29		50	Yes
		Façade	Nighttime	29		45	Yes
		Outdoor Area	Daytime	28		50	Yes
		Outdoor Area	Evening	28		45	Yes
R037a	Maple PS	Façade	Daytime	19	Class 2	50	Yes
		Façade	Evening	19		50	Yes
		Façade	Nighttime	19		45	Yes
		Outdoor Area	Daytime	17		50	Yes
		Outdoor Area	Evening	17		45	Yes
R037b	Maple PS	Façade	Daytime	16	Class 1	50	Yes
		Façade	Evening	16		50	Yes
		Façade	Nighttime	16		45	Yes
		Outdoor Area	Daytime	14		50	Yes
		Outdoor Area	Evening	14		45	Yes
R063	Newmarket SWS	Façade	Daytime	20	Class 2	50	Yes
		Façade	Evening	20		50	Yes
		Façade	Nighttime	20		45	Yes
		Outdoor Area	Daytime	13		50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Evening	13		45	Yes
R064	Newmarket SWS	Façade	Daytime	22	Class 2	50	Yes
		Façade	Evening	22		50	Yes
		Façade	Nighttime	22		45	Yes
		Outdoor Area	Daytime	20		50	Yes
		Outdoor Area	Evening	20		45	Yes
R065	Newmarket SWS	Façade	Daytime	30	Class 2	50	Yes
		Façade	Evening	30		50	Yes
		Façade	Nighttime	30		45	Yes
		Outdoor Area	Daytime	29		50	Yes
		Outdoor Area	Evening	29		45	Yes
R066	Newmarket SWS	Façade	Daytime	25	Class 2	50	Yes
		Façade	Evening	25		50	Yes
		Façade	Nighttime	25		45	Yes
		Outdoor Area	Daytime	24		50	Yes
		Outdoor Area	Evening	24		45	Yes
R068	Newmarket SWS	Façade	Daytime	18	Class 2	50	Yes
		Façade	Evening	18		50	Yes
		Façade	Nighttime	18		45	Yes
		Outdoor Area	Daytime	16		50	Yes
		Outdoor Area	Evening	16		45	Yes
R067	Newmarket SWS	Façade	Daytime	43	Class 2	50	Yes
		Façade	Evening	43		50	Yes
		Façade	Nighttime	43		45	Yes
		Outdoor Area	Daytime	42		50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Evening	42		45	Yes
R068	Newmarket SWS	Façade	Daytime	18	Class 2	50	Yes
		Façade	Evening	18		50	Yes
		Façade	Nighttime	18		45	Yes
		Outdoor Area	Daytime	16		50	Yes
		Outdoor Area	Evening	16		45	Yes
R069	Newmarket SWS	Façade	Daytime	19	Class 2	50	Yes
		Façade	Evening	19		50	Yes
		Façade	Nighttime	19		45	Yes
		Outdoor Area	Daytime	14		50	Yes
		Outdoor Area	Evening	14		45	Yes
R070	Newmarket SWS	Façade	Daytime	14	Class 2	50	Yes
		Façade	Evening	14		50	Yes
		Façade	Nighttime	14		45	Yes
		Outdoor Area	Daytime	13		50	Yes
		Outdoor Area	Evening	13		45	Yes
R100	Gilford PS	Façade	Daytime	40	Class 3	45	Yes
		Façade	Evening	40		40	Yes
		Façade	Nighttime	40		40	Yes
		Outdoor Area	Daytime	39		45	Yes
		Outdoor Area	Evening	39		40	Yes
R101	Gilford PS	Façade	Daytime	56	Class 3	45	No
		Façade	Evening	56		40	No
		Façade	Nighttime	56		40	No
		Outdoor Area	Daytime	55		45	No

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Evening	55		40	No
R102	Gilford PS	Façade	Daytime	44	Class 3	45	Yes
		Façade	Evening	44		40	No
		Façade	Nighttime	44		40	No
		Outdoor Area	Daytime	43		45	Yes
		Outdoor Area	Evening	43		40	No
R103	Gilford PS	Façade	Daytime	48	Class 3	45	No
		Façade	Evening	48		40	No
		Façade	Nighttime	48		40	No
		Outdoor Area	Daytime	46		45	No
		Outdoor Area	Evening	46		40	No
R104	Gilford PS	Façade	Daytime	33	Class 3	45	Yes
		Façade	Evening	33		40	Yes
		Façade	Nighttime	33		40	Yes
		Outdoor Area	Daytime	31		45	Yes
		Outdoor Area	Evening	31		40	Yes
R105	Gilford PS	Façade	Daytime	18	Class 3	45	Yes
		Façade	Evening	18		40	Yes
		Façade	Nighttime	18		40	Yes
		Outdoor Area	Daytime	12		45	Yes
		Outdoor Area	Evening	12		40	Yes
R133	Allendale TPS	Façade	Daytime	41	Class 2	50	Yes
		Façade	Evening	41		50	Yes
		Façade	Nighttime	41		45	Yes
		Outdoor Area	Daytime	39		50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Evening	39		45	Yes

Notes:
[1] Daytime occurs from 0700-1900h. Evening occurs from 1900h-2300h. Nighttime occurs from 2300-0700h.

6.8.5 Noise Impacts from Layover Sites

The noise impacts from the layover sites were evaluated at nearby receptors and are summarised in **Table 6-51**. The predicted noise impacts from the Allendale layover site at nearby receptors were above the MOEE/GO NPC-300 exclusion limit of 55 dBA by as much as 3 dB at nearby receptors. To reduce sound levels at receptor R132 to meet the MOECC's NPC-300 limit of 55 dBA, a 3.5 metre noise barrier is required. Noise impacts from the future Bradford Layover site were below the exclusion limit; and therefore did not require mitigation investigation.

Table 6-51 Noise Impacts of the Electric RER Scenario – Barrie Layover Sites

Receptor ID	Existing					Electric RER			
	Layover Facility	Evaluation Location	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit [1] (dBA)	Compliance with Performance Limit (Yes/No)	Layover Facility	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit[1] (dBA)	Compliance with Performance Limit (Yes/No)
R092	N/A	Outdoor Area	-	55	Yes	Future Bradford Layover	42	55	Yes
		Façade	-	55	Yes		35	55	Yes
R093		Outdoor Area	-	55	Yes		41	55	Yes
		Façade	-	55	Yes		38	55	Yes
R132	Allandale Layover	Outdoor Area	54	55	Yes	Allandale Layover	58	55	No
		Façade	51	55	Yes		56	55	No

Notes:
[1] The LEQ is evaluated for any 1-hour period.

6.8.6 Barrie Corridor - Adjusted Noise Impact of the Electric RER Scenario

The following section summarizes the results of the noise modelling analysis for the Barrie corridor. The Adjusted Noise Impact between Existing and Electric RER noise levels for Barrie is summarised in **Table 6-52**.

Impact ratings for the 140 receptors listed in the table can be summarised as follows:

- 39 daytime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 62 daytime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB;
- 34 daytime Adjusted Noise Impacts were deemed to be Significant (i.e., greater than 5 dB increase).
- 5 daytime Adjusted Noise Impacts were deemed to be Very Significant (i.e., greater than 10 dB increase);
- 28 nighttime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 30 nighttime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB);
- 63 nighttime Adjusted Noise Impacts were deemed to be Significant (i.e., between 5 and 9.99 dB increase); and
- 19 nighttime Adjusted Noise Impacts were deemed to be Very Significant (i.e., greater than 10 dB increase).

Mitigation measures were investigated for all points of receptors with a Significant or Very Significant Adjusted Noise Impact (i.e., 5 dB increase or greater) in accordance with the MOEE/GO Protocol. The Adjusted Noise Impacts were predicted to be Significant or greater for 88 receptors. See Figures in **Appendix S** for locations of receptors.

There are instances where existing noise levels are greater than Electric RER noise levels at specific receptors, in spite of the fact that the electric RER scenario entails significantly more train traffic. In areas with obstacles such as terrain features or barriers that are existing or already planned, these obstacles are more effective at reducing noise from electric locomotives than the existing diesel locomotives, as the electric locomotives have a lower vertical noise profile. This can result in lower noise levels than those in the existing scenario, in spite of the significant increase in train volumes in the Electric RER scenario. Refer to Appendix G - Noise and Vibration Modelling Reports for further detail.

Table 6-52: Adjusted Noise Impacts of the Electric RER Scenario in Comparison to Existing GO Service – Barrie Corridor

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R001	Daytime	47.1	54.4	55.0	-0.6	Insignificant	No	No
	Nighttime	39.5	51.2	50.0	1.2	Insignificant	No	
R002	Daytime	52.2	60.9	55.0	5.9	Significant	Yes	Yes
	Nighttime	43.5	58.1	50.0	8.1	Significant	Yes	
R003	Daytime	54.3	62.3	55.0	7.3	Significant	Yes	Yes
	Nighttime	45.9	59.7	50.0	9.7	Significant	Yes	
R004	Daytime	65.0	74.6	65.0	9.6	Significant	Yes	Yes
	Nighttime	52.2	71.7	52.2	19.5	Very Significant	Yes	
R005	Daytime	60.0	68.8	60.0	8.8	Significant	Yes	Yes
	Nighttime	51.4	65.9	51.4	14.5	Very Significant	Yes	
R006	Daytime	68.3	77.8	68.3	9.5	Significant	Yes	Yes
	Nighttime	64.3	74.5	64.3	10.2	Very Significant	Yes	
R007	Daytime	54.7	63.2	55.0	8.2	Significant	Yes	Yes
	Nighttime	50.6	60.0	50.6	9.4	Significant	Yes	
R008a	Daytime	68.3	78.5	68.3	10.2	Very Significant	Yes	Yes
	Nighttime	64.4	75.0	64.4	10.6	Very Significant	Yes	
R008b	Daytime	51.5	61.2	55.0	6.2	Significant	Yes	Yes
	Nighttime	47.6	58.1	50.0	8.1	Significant	Yes	
R009	Daytime	50.7	62.0	55.0	7.0	Significant	Yes	Yes
	Nighttime	51.0	64.7	51.0	13.7	Very Significant	Yes	
R010	Daytime	50.0	56.2	55.0	1.2	Insignificant	No	No
	Nighttime	42.4	53.2	50.0	3.2	Noticeable	No	
R011	Daytime	56.7	63.0	56.7	6.3	Significant	Yes	Yes

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
	Nighttime	49.6	60.9	50.0	10.9	Very Significant	Yes	
R012	Daytime	55.1	60.1	55.1	5.0	Significant	Yes	Yes
	Nighttime	48.2	58.5	50.0	8.5	Significant	Yes	
R013	Daytime	57.4	62.9	57.4	5.5	Significant	Yes	Yes
	Nighttime	50.8	60.6	50.8	9.8	Significant	Yes	
R014	Daytime	59.8	66.8	59.8	7.0	Significant	Yes	Yes
	Nighttime	53.3	63.4	53.3	10.1	Very Significant	Yes	
R015	Daytime	60.0	64.5	60.0	4.5	Noticeable	No	Yes
	Nighttime	54.3	62.7	54.3	8.4	Significant	Yes	
R016	Daytime	55.6	57.8	55.6	2.2	Insignificant	No	Yes
	Nighttime	49.7	56.0	50.0	6.0	Significant	Yes	
R017	Daytime	52.3	55.1	55.0	0.1	Insignificant	No	Yes
	Nighttime	47.1	55.2	50.0	5.2	Significant	Yes	
R018	Daytime	53.9	58.7	55.0	3.7	Noticeable	No	Yes
	Nighttime	48.8	57.4	50.0	7.4	Significant	Yes	
R019	Daytime	60.7	63.5	60.7	2.8	Insignificant	No	Yes
	Nighttime	49.8	60.3	50.0	10.3	Very Significant	Yes	
R020	Daytime	62.9	61.4	62.9	-1.5	Insignificant	No	Yes
	Nighttime	49.8	58.0	50.0	8.0	Significant	Yes	
R021	Daytime	55.4	62.7	55.4	7.3	Significant	Yes	Yes
	Nighttime	49.5	59.8	50.0	9.8	Significant	Yes	
R022	Daytime	52.9	60.5	55.0	5.5	Significant	Yes	Yes
	Nighttime	47.0	57.5	50.0	7.5	Significant	Yes	
R023	Daytime	47.0	52.3	55.0	-2.7	Insignificant	No	No
	Nighttime	39.7	49.9	50.0	-0.1	Insignificant	No	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R024	Daytime	48.4	56.1	55.0	1.1	Insignificant	No	No
	Nighttime	42.2	53.3	50.0	3.3	Noticeable	No	
R025	Daytime	53.1	58.5	55.0	3.5	Noticeable	No	Yes
	Nighttime	48.5	59.1	50.0	9.1	Significant	Yes	
R026	Daytime	51.9	58.1	55.0	3.1	Noticeable	No	Yes
	Nighttime	47.0	55.0	50.0	5.0	Significant	Yes	
R027	Daytime	45.2	52.8	55.0	-2.2	Insignificant	No	Yes
	Nighttime	46.0	56.8	50.0	6.8	Significant	Yes	
R028	Daytime	52.5	58.5	55.0	3.5	Noticeable	No	Yes
	Nighttime	48.6	59.0	50.0	9.0	Significant	Yes	
R029	Daytime	50.1	49.5	55.0	-5.5	Insignificant	No	No
	Nighttime	50.2	52.0	50.2	1.8	Insignificant	No	
R030	Daytime	60.3	49.0	60.3	-11.3	Insignificant	No	No
	Nighttime	52.4	51.7	52.4	-0.7	Insignificant	No	
R031a	Daytime	49.9	50.1	55.0	-4.9	Insignificant	No	No
	Nighttime	45.8	49.7	50.0	-0.3	Insignificant	No	
R031b	Daytime	50.9	55.9	55.0	0.9	Insignificant	No	No
	Nighttime	45.9	53.9	50.0	3.9	Noticeable	No	
R032	Daytime	53.0	53.5	55.0	-1.5	Insignificant	No	Yes
	Nighttime	47.7	57.4	50.0	7.4	Significant	Yes	
R033	Daytime	58.7	68.0	58.7	9.3	Significant	Yes	Yes
	Nighttime	54.4	65.7	54.4	11.3	Very Significant	Yes	
R034	Daytime	59.4	66.6	59.4	7.2	Significant	Yes	Yes
	Nighttime	55.2	63.6	55.2	8.4	Significant	Yes	
R035	Daytime	50.8	60.3	55.0	5.3	Significant	Yes	Yes

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
	Nighttime	45.3	57.8	50.0	7.8	Significant	Yes	
R036	Daytime	52.3	61.8	55.0	6.8	Significant	Yes	Yes
	Nighttime	48.2	59.2	50.0	9.2	Significant	Yes	
R037a	Daytime	50.1	59.7	55.0	4.7	Noticeable	No	Yes
	Nighttime	43.1	57.1	50.0	7.1	Significant	Yes	
R037b	Daytime	48.9	58.7	55.0	3.7	Noticeable	No	Yes
	Nighttime	44.7	56.8	50.0	6.8	Significant	Yes	
R038a	Daytime	50.2	59.8	55.0	4.8	Noticeable	No	Yes
	Nighttime	47.9	57.0	50.0	7.0	Significant	Yes	
R038b	Daytime	57.4	64.2	57.4	6.8	Significant	Yes	Yes
	Nighttime	54.4	61.1	54.4	6.7	Significant	Yes	
R039	Daytime	68.5	77.9	68.5	9.4	Significant	Yes	Yes
	Nighttime	66.7	74.6	66.7	7.9	Significant	Yes	
R040	Daytime	59.8	68.8	59.8	9.0	Significant	Yes	Yes
	Nighttime	55.6	65.8	55.6	10.2	Very Significant	Yes	
R041	Daytime	57.1	66.3	57.1	9.2	Significant	Yes	Yes
	Nighttime	55.5	63.4	55.5	7.9	Significant	Yes	
R042	Daytime	57.5	67.6	57.5	10.1	Very Significant	Yes	Yes
	Nighttime	56.2	64.6	56.2	8.4	Significant	Yes	
R043	Daytime	62.0	72.1	62.0	10.1	Very Significant	Yes	Yes
	Nighttime	60.5	68.9	60.5	8.4	Significant	Yes	
R044	Daytime	47.5	55.8	55.0	0.8	Insignificant	No	Yes
	Nighttime	46.7	55.6	50.0	5.6	Significant	Yes	
R045	Daytime	49.1	55.7	55.0	0.7	Insignificant	No	Yes
	Nighttime	45.0	55.0	50.0	5.0	Significant	Yes	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R046	Daytime	46.1	55.0	55.0	0.0	Insignificant	No	Yes
	Nighttime	44.3	56.1	50.0	6.1	Significant	Yes	
R047	Daytime	52.5	59.2	55.0	4.2	Noticeable	No	Yes
	Nighttime	48.1	57.2	50.0	7.2	Significant	Yes	
R048	Daytime	59.2	69.1	59.2	9.9	Significant	Yes	Yes
	Nighttime	54.0	66.2	54.0	12.2	Very Significant	Yes	
R049	Daytime	66.2	76.2	66.2	10.0	Very Significant	Yes	Yes
	Nighttime	57.2	73.2	57.2	16.0	Very Significant	Yes	
R050	Daytime	64.3	73.8	64.3	9.5	Significant	Yes	Yes
	Nighttime	62.1	70.7	62.1	8.6	Significant	Yes	
R051	Daytime	56.4	67.4	56.4	11.0	Very Significant	Yes	Yes
	Nighttime	55.0	64.3	55.0	9.3	Significant	Yes	
R052	Daytime	53.4	61.7	55.0	6.7	Significant	Yes	Yes
	Nighttime	52.8	60.6	52.8	7.8	Significant	Yes	
R053	Daytime	51.2	60.6	55.0	5.6	Significant	Yes	Yes
	Nighttime	49.9	57.6	50.0	7.6	Significant	Yes	
R054	Daytime	44.9	50.8	55.0	-4.2	Insignificant	No	No
	Nighttime	51.2	56.1	51.2	4.9	Noticeable	No	
R055	Daytime	49.9	58.7	55.0	3.7	Noticeable	No	Yes
	Nighttime	48.8	56.2	50.0	6.2	Significant	Yes	
R056	Daytime	43.0	51.3	55.0	-3.7	Insignificant	No	No
	Nighttime	42.6	49.3	50.0	-0.7	Insignificant	No	
R057	Daytime	49.1	58.6	55.0	3.6	Noticeable	No	Yes
	Nighttime	44.9	55.7	50.0	5.7	Significant	Yes	
R058	Daytime	49.9	58.8	55.0	3.8	Noticeable	No	Yes

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
	Nighttime	47.9	56.1	50.0	6.1	Significant	Yes	
R059a	Daytime	54.3	63.8	55.0	8.8	Significant	Yes	Yes
	Nighttime	52.0	61.0	52.0	9.0	Significant	Yes	
R059b	Daytime	56.1	59.6	56.1	3.5	Noticeable	No	Yes
	Nighttime	51.8	57.5	51.8	5.7	Significant	Yes	
R059c	Daytime	59.5	63.4	59.5	3.9	Noticeable	No	No
	Nighttime	57.6	62.4	57.6	4.8	Noticeable	No	
R060	Daytime	60.4	66.6	60.4	6.2	Significant	Yes	Yes
	Nighttime	58.2	62.4	58.2	4.2	Noticeable	No	
R061	Daytime	55.3	59.4	55.3	4.1	Noticeable	No	Yes
	Nighttime	50.5	64.5	50.5	14.0	Very Significant	Yes	
R062	Daytime	53.0	57.1	55.0	2.1	Insignificant	No	Yes
	Nighttime	49.1	55.0	50.0	5.0	Significant	Yes	
R063	Daytime	53.0	57.6	55.0	2.6	Insignificant	No	No
	Nighttime	51.8	55.8	51.8	4.0	Noticeable	No	
R064	Daytime	52.0	56.4	55.0	1.4	Insignificant	No	No
	Nighttime	50.3	54.7	50.3	4.4	Noticeable	No	
R065	Daytime	50.1	54.0	55.0	-1.0	Insignificant	No	No
	Nighttime	46.3	52.4	50.0	2.4	Insignificant	No	
R066	Daytime	49.0	53.0	55.0	-2.0	Insignificant	No	No
	Nighttime	47.1	52.7	50.0	2.7	Insignificant	No	
R067	Daytime	50.0	54.0	55.0	-1.0	Insignificant	No	No
	Nighttime	45.3	52.4	50.0	2.4	Insignificant	No	
R068	Daytime	58.0	61.1	58.0	3.1	Noticeable	No	No
	Nighttime	55.3	59.6	55.3	4.3	Noticeable	No	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R069	Daytime	57.4	61.3	57.4	3.9	Noticeable	No	Yes
	Nighttime	50.7	59.7	50.7	9.0	Significant	Yes	
R070	Daytime	60.5	64.3	60.5	3.8	Noticeable	No	Yes
	Nighttime	55.3	62.3	55.3	7.0	Significant	Yes	
R071	Daytime	56.5	61.2	56.5	4.7	Noticeable	No	No
	Nighttime	55.2	57.4	55.2	2.2	Insignificant	No	
R072	Daytime	60.3	66.6	60.3	6.3	Significant	Yes	Yes
	Nighttime	58.8	61.1	58.8	2.3	Insignificant	No	
R073	Daytime	51.9	52.2	55.0	-2.8	Insignificant	No	No
	Nighttime	55.0	57.3	55.0	2.3	Insignificant	No	
R074	Daytime	51.7	52.3	55.0	-2.7	Insignificant	No	No
	Nighttime	51.7	51.3	51.7	-0.4	Insignificant	No	
R075	Daytime	60.9	55.9	60.9	-5.0	Insignificant	No	No
	Nighttime	55.4	53.3	55.4	-2.1	Insignificant	No	
R076	Daytime	52.8	54.1	55.0	-0.9	Insignificant	No	No
	Nighttime	47.3	52.3	50.0	2.3	Insignificant	No	
R077	Daytime	58.4	61.9	58.4	3.5	Noticeable	No	Yes
	Nighttime	49.7	60.3	50.0	10.3	Very Significant	Yes	
R078	Daytime	60.4	64.1	60.4	3.7	Noticeable	No	Yes
	Nighttime	54.0	62.2	54.0	8.2	Significant	Yes	
R079	Daytime	56.6	62.6	56.6	6.0	Significant	Yes	Yes
	Nighttime	52.3	56.5	52.3	4.2	Noticeable	No	
R080	Daytime	59.3	64.6	59.3	5.3	Significant	Yes	Yes
	Nighttime	59.1	61.5	59.1	2.4	Insignificant	No	
R081	Daytime	54.5	58.2	55.0	3.2	Noticeable	No	No

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
	Nighttime	52.3	55.4	52.3	3.1	Noticeable	No	
R082	Daytime	54.2	57.9	55.0	2.9	Insignificant	No	No
	Nighttime	52.0	55.2	52.0	3.2	Noticeable	No	
R083	Daytime	61.4	65.2	61.4	3.8	Noticeable	No	Yes
	Nighttime	51.3	64.1	51.3	12.8	Very Significant	Yes	
R084	Daytime	63.8	67.7	63.8	3.9	Noticeable	No	Yes
	Nighttime	55.7	66.0	55.7	10.3	Very Significant	Yes	
R085	Daytime	69.6	72.9	69.6	3.3	Noticeable	No	Yes
	Nighttime	63.5	70.9	63.5	7.4	Significant	Yes	
R086	Daytime	56.2	60.6	56.2	4.4	Noticeable	No	Yes
	Nighttime	51.5	58.5	51.5	7.0	Significant	Yes	
R087a	Daytime	58.8	62.7	58.8	3.9	Noticeable	No	Yes
	Nighttime	52.4	61.5	52.4	9.1	Significant	Yes	
R087b	Daytime	57.6	63.9	57.6	6.3	Significant	Yes	Yes
	Nighttime	56.4	60.1	56.4	3.7	Noticeable	No	
R088	Daytime	65.8	71.0	65.8	5.2	Significant	Yes	Yes
	Nighttime	64.7	66.9	64.7	2.2	Insignificant	No	
R089	Daytime	61.5	65.5	61.5	4.0	Noticeable	No	No
	Nighttime	58.2	62.9	58.2	4.7	Noticeable	No	
R090	Daytime	65.3	69.7	65.3	4.4	Noticeable	No	No
	Nighttime	63.3	66.2	63.3	2.9	Insignificant	No	
R091	Daytime	62.1	66.4	62.1	4.3	Noticeable	No	No
	Nighttime	60.7	62.6	60.7	1.9	Insignificant	No	
R092	Daytime	54.7	58.1	55.0	3.1	Noticeable	No	Yes
	Nighttime	50.8	56.4	50.8	5.6	Significant	Yes	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R093	Daytime	55.0	58.8	55.0	3.8	Noticeable	No	No
	Nighttime	52.1	56.5	52.1	4.4	Noticeable	No	
R094	Daytime	58.3	62.9	58.3	4.6	Noticeable	No	No
	Nighttime	57.0	60.2	57.0	3.2	Noticeable	No	
R095	Daytime	56.0	60.4	56.0	4.4	Noticeable	No	Yes
	Nighttime	50.3	58.3	50.3	8.0	Significant	Yes	
R096	Daytime	60.8	65.0	60.8	4.2	Noticeable	No	No
	Nighttime	59.2	62.2	59.2	3.0	Noticeable	No	
R097	Daytime	60.2	64.6	60.2	4.4	Noticeable	No	No
	Nighttime	57.5	61.8	57.5	4.3	Noticeable	No	
R098	Daytime	60.0	63.5	60.0	3.5	Noticeable	No	Yes
	Nighttime	56.0	61.1	56.0	5.1	Significant	Yes	
R099	Daytime	60.3	64.4	60.3	4.1	Noticeable	No	No
	Nighttime	58.6	61.6	58.6	3.0	Noticeable	No	
R100	Daytime	63.3	67.2	63.3	3.9	Noticeable	No	Yes
	Nighttime	54.0	65.1	54.0	11.1	Very Significant	Yes	
R101	Daytime	64.7	68.6	64.7	3.9	Noticeable	No	Yes
	Nighttime	58.7	66.3	58.7	7.6	Significant	Yes	
R102	Daytime	65.2	69.3	65.2	4.1	Noticeable	No	Yes
	Nighttime	61.1	66.8	61.1	5.7	Significant	Yes	
R103	Daytime	66.2	70.2	66.2	4.0	Noticeable	No	Yes
	Nighttime	62.1	67.7	62.1	5.6	Significant	Yes	
R104	Daytime	57.3	61.3	57.3	4.0	Noticeable	No	No
	Nighttime	54.9	58.8	54.9	3.9	Noticeable	No	
R105	Daytime	55.4	59.1	55.4	3.7	Noticeable	No	Yes

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
	Nighttime	51.3	57.1	51.3	5.8	Significant	Yes	
R106	Daytime	58.5	62.8	58.5	4.3	Noticeable	No	No
	Nighttime	57.1	60.0	57.1	2.9	Insignificant	No	
R107	Daytime	58.0	61.9	58.0	3.9	Noticeable	No	Yes
	Nighttime	50.5	60.1	50.5	9.6	Significant	Yes	
R108	Daytime	62.4	65.7	62.4	3.3	Noticeable	No	No
	Nighttime	58.3	63.2	58.3	4.9	Noticeable	No	
R109	Daytime	56.3	60.8	56.3	4.5	Noticeable	No	Yes
	Nighttime	53.5	58.5	53.5	5.0	Significant	Yes	
R110	Daytime	57.3	62.6	57.3	5.3	Significant	Yes	Yes
	Nighttime	52.3	60.5	52.3	8.2	Significant	Yes	
R111	Daytime	54.9	58.8	55.0	3.8	Noticeable	No	Yes
	Nighttime	49.9	57.1	50.0	7.1	Significant	Yes	
R112	Daytime	62.6	65.9	62.6	3.3	Noticeable	No	No
	Nighttime	58.8	63.3	58.8	4.5	Noticeable	No	
R113	Daytime	57.9	61.5	57.9	3.6	Noticeable	No	No
	Nighttime	54.5	59.3	54.5	4.8	Noticeable	No	
R114	Daytime	61.7	65.9	61.7	4.2	Noticeable	No	No
	Nighttime	60.4	63.0	60.4	2.6	Insignificant	No	
R115	Daytime	55.5	57.7	55.5	2.2	Insignificant	No	No
	Nighttime	53.5	56.9	53.5	3.4	Noticeable	No	
R116	Daytime	62.5	66.5	62.5	4.0	Noticeable	No	Yes
	Nighttime	51.5	64.6	51.5	13.1	Very Significant	Yes	
R117	Daytime	59.8	63.3	59.8	3.5	Noticeable	No	No
	Nighttime	56.2	60.9	56.2	4.7	Noticeable	No	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R118	Daytime	62.6	65.9	62.6	3.3	Noticeable	No	No
	Nighttime	58.7	63.1	58.7	4.4	Noticeable	No	
R119	Daytime	61.6	65.4	61.6	3.8	Noticeable	No	Yes
	Nighttime	53.3	63.3	53.3	10.0	Very Significant	Yes	
R120	Daytime	64.1	67.1	64.1	3.0	Noticeable	No	No
	Nighttime	59.7	64.6	59.7	4.9	Noticeable	No	
R121	Daytime	51.9	55.9	55.0	0.9	Insignificant	No	No
	Nighttime	49.9	53.7	50.0	3.7	Noticeable	No	
R122	Daytime	53.8	57.8	55.0	2.8	Insignificant	No	No
	Nighttime	51.8	55.4	51.8	3.6	Noticeable	No	
R123	Daytime	64.5	67.6	64.5	3.1	Noticeable	No	Yes
	Nighttime	58.0	65.3	58.0	7.3	Significant	Yes	
R124	Daytime	64.9	68.1	64.9	3.2	Noticeable	No	Yes
	Nighttime	58.0	65.9	58.0	7.9	Significant	Yes	
R125	Daytime	65.2	69.1	65.2	3.9	Noticeable	No	No
	Nighttime	63.3	66.2	63.3	2.9	Insignificant	No	
R126	Daytime	65.2	68.9	65.2	3.7	Noticeable	No	No
	Nighttime	62.9	66.0	62.9	3.1	Noticeable	No	
R127	Daytime	51.7	55.5	55.0	0.5	Insignificant	No	No
	Nighttime	48.3	52.9	50.0	2.9	Insignificant	No	
R128	Daytime	61.2	64.8	61.2	3.6	Noticeable	No	Yes
	Nighttime	54.5	62.7	54.5	8.2	Significant	Yes	
R129	Daytime	52.2	51.8	55.0	-3.2	Insignificant	No	No
	Nighttime	51.5	49.5	51.5	-2.0	Insignificant	No	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R130	Daytime	49.6	49.7	55.0	-5.3	Insignificant	No	No
	Nighttime	46.5	46.6	50.0	-3.4	Insignificant	No	
R131	Daytime	52.9	54.0	55.0	-1.0	Insignificant	No	No
	Nighttime	48.7	49.3	50.0	-0.7	Insignificant	No	
R132	Daytime	59.8	56.9	59.8	-2.9	Insignificant	No	No
	Nighttime	59.2	52.5	59.2	-6.7	Insignificant	No	
R133	Daytime	16.7	7.0	55.0	-48.0	Insignificant	No	No
	Nighttime	16.5	1.4	50.0	-48.6	Insignificant	No	

Notes:
[1] The LEQ (Day) is evaluated for a 16-hour period (i.e., from 0700h to 2300h) and the LEQ (Night) is evaluated for an 8 hour period (i.e., from 2300h to 0700h).
[2] The objective is the higher of the ambient sound level, combined with the existing rail activity, or 55 dBA (Daytime) / 50 dBA (Night-time).
[3] The potential to mitigate is considered when a significant (or greater) impact is predicted. This is equivalent to an increase of 5dB or greater, relative to the objective level, as per the MOEE / GO Protocol for Noise and Vibration Assessments. An adjusted noise impact greater than 5 dB requires the investigation of mitigation.

6.8.7 Retained Noise Barriers

he noise barriers that were recommended as a result of the *original assessment* were retained as part of the proposed mitigation. The locations of these barriers are shown as orange coloured lines/symbols shown on the Barrie Corridor **EPR Appendix S** maps. The *original assessment* is defined as the previously completed noise assessment reflecting the electric locomotive train type defined mathematically within Cadna/A with a “K” constant that differed from the “K” constant defined in the FTA mode as described above.

6.8.8 Approach to Investigation of Mitigation - Operational Noise

Based on the Adjusted Noise Impacts resulting from a project, an investigation of noise mitigation measures is required. MOEE/GO Protocol includes the following mitigation guidance:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering, economic and administrative feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

For the purposes of this study, it was assumed that noise mitigation would be limited to locations within the GO Transit right-of-way, and to be considered feasible, the mitigation measures should achieve at least a 5 dB reduction in noise at the first row of affected receptors. The ID numbers of the barriers correspond to the ID numbers of the representative first row receptors.

If the Adjusted Noise Impact at a receptor is deemed significant during the daytime period, technical feasibility of a noise barrier was evaluated based on the noise reduction achieved during the daytime period only. Similarly, if the Adjusted Noise Impact at a receptor was deemed significant during nighttime period, technical feasibility of a noise barrier is evaluated based on the noise reduction achieved during the nighttime period only. If the Adjusted Noise Impacts at a receptor were deemed significant during both the daytime and nighttime periods and noise reduction resulting from a noise barrier is at least 5 dB in either the daytime or nighttime period, the noise barrier was deemed technically feasible.

Noise barriers can be formed of earthen berms, engineered noise walls, or some combination of the two. Where earthen berms are used, side slopes of 3:1 should be used for drainage and erosion control and right-of-way maintenance. Where noise walls are to be used, they should be free of gaps and cracks, and have a minimum surface density (mass per unit of face area) of 20 kg/m^2 (4 lb. per sq. ft.). It is preferable that barriers are sound absorptive at least on the railway side, and this is mandatory in situations where parallel barriers (e.g., barriers on both sides of a railway) are proposed.

Metrolinx will use barriers with a height of 5 metres for all new or replacement noise barriers. Higher noise barriers require specially engineered footings, which may not be technically and/or economically feasible to implement. The investigation of mitigation was limited to noise barriers with heights of 5 metres.

During detailed design, each location identified as a technically feasible noise mitigation location along each rail corridor will be further reviewed to determine the administrative, operational, economic and technical feasibility and to further define what type of mitigation will be implemented.

6.8.9 Barrie Corridor - Investigation of Mitigation

The technically feasible and non-technically feasible noise barriers are shown in **Appendix S.** Of the 102 barrier groupings investigated for the Electric RER scenario, 52 are considered technically feasible, as they achieve at least a 5 dB reduction in sound levels at nearby receptors. For details regarding length of barrier, side of rail ROW, approximate number of receptors shielded by barrier, etc. please refer to **Appendix G - Noise and Vibration Assessment Report.**

For all locations where there will be a change in noise levels of 5dB or more and where noise barrier locations deemed either technically and non-technically feasible (as part of the study carried out for the TPAP), Metrolinx will undertake more detailed analysis during Detailed Design to assess technical, economic, administrative and operational feasibility as per the MOECC Protocol to finalize the type and locations of noise mitigation along the rail corridors. In addition, Metrolinx will investigate other forms of noise mitigation such as train technology, rail dampeners etc. during Detailed Design to assess feasibility. The MOEE/GO Protocol provides the following mitigation guidance with respect to noise mitigation measures:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering and economic feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

Metrolinx will continue to consult with the public during Detailed Design with respect to further assessment and implementation of noise mitigation along the rail corridors.

6.9 Vibration

The MOEE/GO Protocol outlines desired objectives for vibration levels from GO Transit projects. The requirement to investigate vibration mitigation focuses on the change between the existing vibration levels and the future vibration levels. Change in vibration levels may occur under the following circumstances: change in track alignment, addition of track, and change/addition of special track work (such as switches).

It should be noted that vibration impacts are associated with the characteristics of individual trains (especially the weight of the locomotive) and are not related to the increased rail traffic associated with future RER service.

Vibration effects were predicted in accordance with the methods of the United States Department of Transportation - Federal Transit Administration (FTA, 2006). Vibration levels were expressed in terms of root-mean-square (RMS) velocity in the vertical direction, which is the dominant axis for vibration generated from mobile sources such as trains and most closely correlated with human annoyance and perceptibility. The relative change between existing and future vibration levels is presented as a percentage. For further details ad supporting information please refer to **Appendix G - Noise and Vibration Assessment Report.**

6.9.1 Applicable Criteria

The desirable objective of the MOEE/GO Protocol is that the RMS velocity of vibration produced by the future GO Transit operations at a sensitive receptor should not exceed:

- 0.14 mm/s; or
- The existing vibration levels where existing operations already produce vibration that exceeds 0.14 mm/s.

Furthermore, the MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the RMS velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

The FTA vibration level predictions were calibrated by measuring existing vibration levels at a small selection of locations in the vicinity of the GO network. The measurements informed the selection of appropriate adjustment factors. The adjustment factors in the FTA vibration calculations account for:

- Vehicle speed;
- Track type and track conditions;
- Type of locomotive power; and
- Condition of wheels (i.e., wheel wear).

The intent of the MOEE/GO protocol's impact assessment is to evaluate change in vibration between the pre-project and post-project scenarios. One method (i.e. modelling) was chosen to evaluate both scenarios to ensure consistency. Comparing existing measured vibration levels to future modelled vibration levels inherently introduces an additional source of uncertainty into the impact assessment. For this reason, the assessment evaluates modelled existing vibration levels against modelled future vibration levels, as opposed to measured existing vibration levels against modelled future vibration level. At the detailed design stage, verification measurements of existing conditions at receptors where the greatest effect is expected and a reasonable number of additional receptors will be conducted to validate FTA vibration calculations.

A literature review was conducted to compare the gross weight of a diesel MP40 locomotive and an electric locomotive with a similar horsepower rating. It was determined that the difference in locomotive weight was not significant enough to have an impact on the vibration levels; therefore, a single set of predicted vibration levels applies to both diesel trains and electric trains.

6.9.2 Barrie Corridor - Vibration Impacts Electric RER Scenario

Within the Barrie Corridor, it was identified that receptors R015 and R032, near proposed new switches, and receptors R014, R027, R039 and R049, near proposed new track, were the closest receptors to a change in the track configuration that could affect vibration levels; therefore, the vibration assessment focused on these seven receptors.

The predicted existing and future vibration levels and change in vibration levels for a GO train pass-by, passenger train and a freight train are presented in **Table 6-53.**

The predicted change in vibration level between existing conditions and future conditions is in excess of the 25% increase threshold set out in the MOEE/GO Protocol, at all of the identified receptors except R027. In the case of receptors R015 and R032, the threshold is exceeded during pass-bys of both GO Trains and freight trains. In the case of receptors R014, R039 and R014, the threshold is exceeding only during freight pass-bys. Mitigation such as ballast mats, under sleeper pads or resilient fixation should be investigated for all receptors with similar conditions (i.e., 75 metre distance to proposed new switches or other special track work, or 20-25 metre distance to proposed new tracks) as the evaluated receptors. The approximate locations of trackwork and switches requiring mitigation are presented in **Appendix S**. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage.

Table 6-53 Vibration Impact Assessment Results of the Electric RER Scenario – Barrie Rail Corridor

Train Type Assessed	Receptor	Speed Over Track (km/h)	Special Trackwork Present?		Distance to Rail Component		Predicted Vibration Level		Objective (mm/s)	% Above Objective	Mitigation Required? [1]
			Existing	Future	Existing (m)	Future (m)	Existing (mm/s)	Future (mm/s)			
Go Train	R015	96	No	Yes	19	19	0.11	0.68	0.14	386%	Yes
Freight Train		56					0.77	4.58	0.77	494%	Yes
Go Train	R032	120	No	Yes	42	42	0.06	0.36	0.14	155%	Yes
Freight Train		32					0.16	0.96	0.16	494%	Yes
Go Train	R014	96	No	No	20	15	0.11	0.14	0.14	2%	No
Freight Train		56					0.73	0.99	0.73	37%	Yes
Go Train	R039	96	No	No	25	20	0.09	0.11	0.14	N/A	No
Freight Train		32					0.32	0.42	0.32	31%	Yes
Go Train	R049	96	No	No	30	25	0.07	0.09	0.14	N/A	No
Freight Train		32					0.25	0.32	0.25	27%	Yes
Go Train	R027	120	No	No	38	33	0.07	0.08	0.14	N/A	No
Freight Train		56					0.32	0.39	0.32	20%	No

Notes:
[1] The MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the vibration velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

6.10 Visual

Please refer to **Section 3.10** for a description of the methodology followed for assessment of visual impacts. Additional details can be found in the Visual Impact Assessment Report contained in **Appendix H2**.

6.10.1 Preferred and Alternative Allandale Tap Location

6.10.1.1 Potential Effects and Mitigation Measures

The Preferred Allandale Tap Area is located north of Tiffin Street adjacent to an existing Hydro One facility. The site is largely screened from Tiffin Street by existing mature vegetation consisting of a mix of deciduous and evergreen trees. If the facility is set back from Tiffin Street and these trees are preserved there will be negligible impact from the proposed Tap facility. A number of Hydro One transmission lines cross Tiffin Street in the vicinity of the Hydro One power station.

The Alternative Allandale Tap site is located along the Barrie-Collingwood rail corridor just west of Patterson Avenue, approximately 1.6 kilometres from Allandale Station. The site is on a vacant parcel of land adjacent to the Barrie-Collingwood rail corridor to the south and a commercial/ industrial building to the north. The site is visible from Patterson Road and from the rear yards of several single-family homes fronting on Phillips Street. Development at this site will have a low visual impact on views from the surrounding community. Screening along the Patterson Road frontage and along the railroad would reduce the visual impact for pedestrians on the street and the Phillips Avenue homes, but the facility would still be visible due to the height of the proposed infrastructure. Refer to **Figure 4-21** for photographs of typical Tap infrastructure.

6.10.1.2 Net Effects

There will be low net visual effects.

6.10.2 Allandale TPS and 25 kV Feeder Route

6.10.2.1 Potential Effects and Mitigation Measures

Allandale TPS Site is located along the Barrie-Collingwood rail corridor just west of Patterson Road approximately 1.6 kilometres from Allandale Station. The site fronts on Tiffin Street and is located on the sites of an existing commercial building and a single-family residence which run back to the Barrie-Collingwood rail corridor. The site is located between the rear of industrial buildings that front on Patterson Road and a junk yard. On the opposite side of the rail corridor are the back yards of two single family homes that front on Phillips Street. Development at this site will have a low visual impact on views from the surrounding community. Screening along the Tiffin Street frontage and along the railroad would reduce the visual impact for pedestrians on the street and the Phillips Avenue homes, but the TPS would still be visible due to the height of the infrastructure. Refer to **Figure 4-22** for a photograph of a typical Traction Power Substation (TPS).

The Barrie-Collingwood 25kV feeder route is located within the Barrie-Collinwood Corridor, a single-track rail corridor that passes through mostly industrial development. The only exception is where the rail corridor parallels Jacobs Terrace and residential properties front on Jacobs Terrace between Alfred and Anne Streets. Residents look out across Jacobs Terrace to the railroad which is only approximately 20 metres from their front doors. There is no existing screening between these homes and the rail corridor.

Development of the feeder route in this area will have a low visual impact on views from the surrounding area. Vegetation could be planted on the green strip between the railroad and Jacobs Terrace to help mitigate views of the new 25kV feeder line, if feasible. While vegetation would not entirely screen the infrastructure, it would help reduce the visual effect of the new infrastructure.

It is also noted that the installation of the Barrie Collingwood Railway 25kV feeder route will require attachment of the feeder cabling to the underside of the 400 bridge structure (if the aerial feeder route option is chosen – to be determined during detailed design). The figure provided in Section 3.2.4.1 depicts Typical Fastening of Feeder Cable. There will be a minimal visual impact related to the installation of the mechanical fastening and no mitigation measures are required/proposed.

6.10.2.2 Net Effects

There will be low net visual effects. With regards to the Barrie-Collingwood 25kV feeder route there will be low net visual effects in the residential area and negligible net visual effects in the remaining industrial areas.

6.10.3 Newmarket SWS

6.10.3.1 Potential Effects and Mitigation Measures

The Newmarket SWS is located on a site south of Mulock Drive which is accessed from an industrial cul-de-sac called Steven Court. From this site, power will be provided to the rail corridor via an underground duct bank to a gantry on the corridor. The site is surrounded by industrial properties. A residential development consisting of 28 condominium townhouses is planned on a site to the south west of the SWS site, on the opposite side of an electric utility corridor. Buildings on that site will be at least 200 metres from the SWS with closer views of industrial buildings and electric transmission towers. There are also existing trees outside the SWS fence line which, assuming they remain, will provide some visual screening from the proposed residential site.

Development on this site will have negligible visual impact on the surrounding area, and therefore, no mitigation measures are required. It is noted that Metrolinx's preferred design of the Newmarket SWS facility is to include some form of visual screening. In addition, during Detailed Design, further review will be undertaken in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible. Refer to **Figure 4-24** for a photograph of a typical Switching Station (SWS).

6.10.3.2 Net Effects

Adverse net visual effects will be minimized through implementation of screening measures.

6.10.4 Gilford PS

6.10.4.1 Potential Effects and Mitigation Measures

The Gilford PS is located on the south side of Gilford Road immediately east of the railroad. Gilford Road is a local road leading to Gilford and Gilford Beach with residences on either side of the road. Views from the road are long and open and the Gilford PS will be visible from the road approaching from both the east and west as well as from several residential properties. As such it will have a moderate potential visual impact. While the facility cannot be entirely screened from view, an evergreen buffer should be planted between the road and the facility, as well as along its east and west sides, to minimize its visual impact. In addition, during detailed design, further review will be undertaken in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible.

Refer to **Figure 5-5** for a photograph of a typical Paralleling Station (PS).

6.10.4.2 Net Effects

Adverse net visual effects will be minimized through implementation of screening measures.

6.10.5 Maple PS

6.10.5.1 Potential Effects and Mitigation Measures

The Maple Paralleling Station is located on a triangular parcel of land east of the rail corridor, west of

Keele Street just north of the bridge over the railroad. This is currently an open agricultural field. However, the City of Vaughan is undertaking a planning study, titled Block 27, Secondary Plan For the entire area bounded by Kirby Road, Teston Road, Keele Street and Jane Street. The proposal is to develop a mixed use urban community with a range of housing and transportation choices. No specific details of the plan were available at the time of writing this report. The Maple PS will ultimately be within the community and potentially surrounded by residential development.

Development at this site will have a moderate to high visual impact on views from the surrounding community depending on the ultimate plan for the surrounding development. Therefore, in order to mitigate future visual impacts the Maple PS should be screened with dense evergreen planting around its perimeter. In addition, a landscaped buffer should be established in future plans for Block 27 beyond the immediate screening which will separate the Maple PS from future development. The location of the PS should be identified in the Secondary Plan and considered in the planning process so that less sensitive development is placed in its vicinity and future buildings are oriented with windows facing away from the PS infrastructure. In addition, during detailed design, further review will be undertaken in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible. Refer to **Figure 5-5** for a photograph of a typical Paralleling Station (PS).

6.10.5.2 Net Effects

Adverse net visual effects will be minimized through implementation of screening measures.

6.10.6 OCS & Bridges: Section BR-1 – Parkdale Junction to Caledonia Station

6.10.6.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section BR-1 is mostly residential with single-family homes located more than 8 metres from the railroad, as well as high-rise buildings that are typically more than 30 metres from the railroad. Therefore the majority of this section is classified as having a potential low visual impact. However, there are several places where single family homes are located less than 8 metres from the railroad and are therefore classified as potential high visual impact due to the closeness of the vegetative clearing and installation of OCS infrastructure to the back yards and rear windows of these homes.

There are also several areas where industrial or commercial development is immediately adjacent to the railroad. Refer to **Figure 4-32** for photographs of OCS infrastructure in a suburban setting. Bert Robinson Park abuts the rail corridor but is heavily vegetated along the tracks and is also classified as negligible visual impact.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are no stations in this section.

Mitigation Recommendations:
No mitigation required.

Noise Barriers

Noise barriers are proposed on the east and west side of the railroad behind abutting residential and commercial properties as space allows. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are three bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

The Dundas Street and Eglinton Avenue Bridges have sidewalks on both sides which currently afford long views up and down the railroad, but these views are not visually sensitive. Both bridges will require protective barriers, and are classified as having potential low visual impacts. However, the Dundas Street Bridge must have the railroad tracks lowered to accommodate the new OCS infrastructure.

The pedestrian bridge at Innes Avenue connects two residential neighborhoods, and requires modification as part of this project. Pedestrian bridges will require protective barriers on both sides, and are classified as potential moderate visual impact. Pedestrian bridges should be designed to allow views to and from people walking across the bridge to avoid a claustrophobic tunnel effect and maintain a safe environment.

Therefore, there are potential low to moderate visual impacts due to the addition of bridge barriers on these bridges (see **Table 6-54**).

Table 6-54 Summary of Bridges - Section BR-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
BR-1	D-1	Dundas Street (#020)	Bridge	Yes. Preferred solution to vert. clearance issue: Lower tracks	Yes Low Visual Impact
BR-1	D-4	Innes Ave (#529)	Pedestrian Bridge	No. Preferred solution to address impacts due to attachment of protective barrier: Modify bridge with solid protective barriers	Yes Moderate Visual Impact

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
BR-1	D-5	Eglinton Ave (#118)	Bridge	Yes, Preferred solution to vertical clearance issue: lower tracks	Yes Low Visual Impact

In addition, there are eight rail overpasses in this section. These overpasses are all located in residential areas and are highly visible. However, there are potential negligible visual impacts due to the installation of OCS support structures on or in the vicinity of these rail overpass structures, with the exception of St. Clair Avenue West which is **Figure 3-7** classified a moderate visual impact due to the heritage nature of the structure (see **Table 6-55**). Refer to for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 6-55 Summary of Rail Overpasses - Section BR-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-1	D-1	Lansdowne Avenue (#546)	Rail Overpass	N/A. The Landsdowne Avenue rail overpass may be impacted due to lowering of the tracks at Dundas Street. Potential impacts may include: using a ballast mat, changing from ballasted deck to direct fixation, replacement with a shallower superstructure, or lowering of Dundas Street to accommodate lowering of the UG Bridge superstructure. The type of impact(s) cannot be confirmed until further design work is done.	No *Negligible Visual Impact*

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-1	D-1	Bloor St W (#063)	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-1		Paton Road	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-1	D-2	Dupont Street (#524)	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-1	D-3	Davenport Avenue (#516)	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-1	D-3	St Clair Ave W (#096)	Rail Overpass	N/A	Yes *Moderate Visual Impact*
BR-1	D-4	Rogers Road (#710)	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-1	D-4	Dunraven Drive (Pedestrian Underpass)	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the views from the surrounding area.

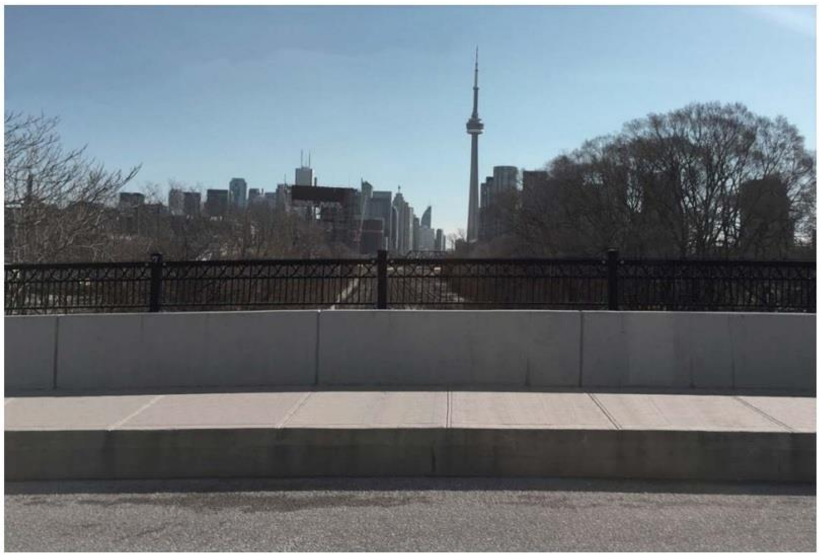
As part of detailed design, Metrolinx's Design Excellence Committee will be engaged to review possible design treatments/option for enhancing the aesthetics of bridge barriers where feasible/required. It is anticipated that the basis of the protection barrier will be a post and panel (solid-faced) design with customizable panels toward suiting visual preferences (in consultation with the applicable bridge owners as appropriate), such as:

- Multilane, restricted access highways and non-visually sensitive locations;
- Visually sensitive locations;
- Structures of heritage value or sensitivity.

An example of a bridge barrier in a visually sensitive location has been provided in **Figure 6-15**. Additional design option examples have been provided in **Figure 6-16** and **Figure 6-17.** It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

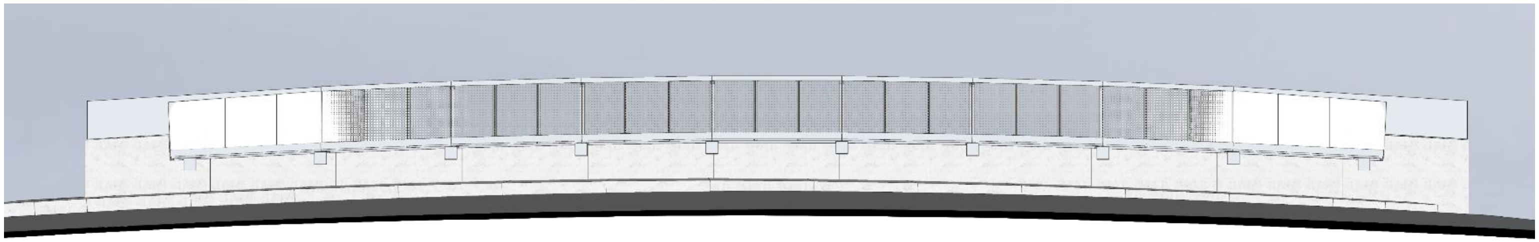
Figure 6-15: Example Of Bridge Barrier In A Visually Sensitive Location

Before



After

Figure 6-16: Illustrative Bridge Barrier Design Options (Examples)



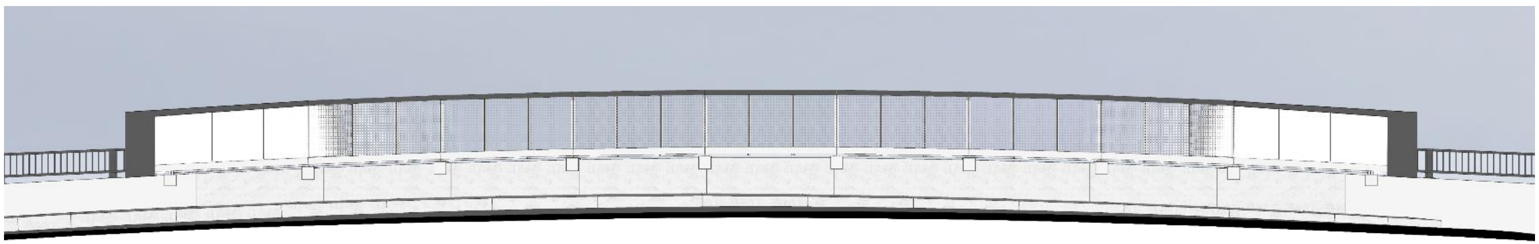


Figure 6-17: Bridge Barrier Design Option Example (Glass Back View)

Parallel Barriers

A parallel barrier will be required at a pedestrian bridge railing on the Dundas Street Bridge and at the pedestrian bridge and ramp at the end of Innes Avenue to protect pedestrians from possible accidental contact with live parts of the OCS. These barriers will be a minimum of 2 metres in height and solid material. These barriers are typically short in length and will result in negligible visual impact.

Mitigation Recommendations:
None required.

6.10.6.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-1 namely areas where homes are less than 8 metres from the railroad will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are mostly considered low. In areas where homes are less than 8 metres from the railroad the OCS infrastructure will be very visible to those homes, therefore, residual visual effects are considered moderate in these areas.

GO Stations

There are no stations in this section and therefore no residual visual effects.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to moderate.

Parallel Barriers

Residual visual effects will be negligible due to the relatively small area affected by the barriers.

6.10.7 OCS & Bridges: Section BR-2 – Caledonia Station to Downsview Park Station

6.10.7.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section BR-2 generally consists of industrial buildings adjacent to the corridor, resulting in negligible visual impact. However, in several areas, residential development is located within the corridor, at least 8 metres from the railroad and classified as having potential low visual impact

There are two parks adjacent to the railroad. North Park Greenbelt is heavily vegetated along the tracks and is adequately screened from the proposed OCS infrastructure, and is classified as negligible impact. Downsview Park is a new regional park and, is classified as having potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There will ultimately be two stations in this section – Caledonia GO Station, which is proposed at Eglinton Avenue, and Downfield Park GO Station, which is under construction at Sheppard Avenue West. These station areas are classified as having potential low visual impact. Platforms and the approaches to platforms will provide clear close up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on the east and west side of the railroad behind residential and some commercial properties abutting the railroad as space allows, as well as along an adjacent cemetery and Downsview Park. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There is only one bridge in this section: the Highway 401 Bridge. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

The Highway 401 Bridge has no sidewalks, but protective barriers are still required and the bridge is classified as having a potential low visual impact (see **Table 6-56**). However, the Highway 401 Bridge must have the railroad tracks lowered to accommodate the new OCS infrastructure.

Table 6-56 Summary of Bridges - Section BR-2

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
BR-2	D-8	Hwy 401 (#37-195/1-4)	Bridge	Yes. Preferred solution to vert. clearance issue: Lower tracks	Yes *Low Visual Impact*

There are two rail overpasses that cross over Lawrence Avenue and Wilson Avenue in this section. These overpasses are located on major roads and are highly visible. Therefore, there are negligible visual impacts due to the installation of OCS support structures on or in the vicinity of these rail overpass structures (see **Table 6-57**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Table 6-57 Summary of Rail Overpasses - Section BR-2

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-2	D-6	Lawrence Avenue West	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-2	D-8	Wilson Avenue	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented

where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In addition, the Highway 401 Bridge will require modification to incorporate the new OCS infrastructure. At this time, it is anticipated that the railroad tracks will be lowered to accommodate the new OCS requirements. If the bridge is raised, this may result in a visual impact on the surrounding area.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on views from the surrounding area. Among these areas, Caledonia GO Station and Downfield Park GO Station will be the most important features requiring careful design consideration.

Refer to Section 6.10.6 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

6.10.7.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-2 such as Downsfield Park will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered to be negligible.

GO Stations

Residual visual effects due to OCS installation within the Caledonia and Downfield Park GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

6.10.8 OCS & Bridges: Section BR-3 – Downsview Park Station to Rutherford Station

6.10.8.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

This section consists mostly of industrial land uses along both sides of the railroad. These areas have been classified as having negligible visual impact and require no mitigation. There are three areas where single-family homes back up to the corridor. These homes are more than 20 metres from the railroad, and are classified as having potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting. Langstaff Park abuts the rail corridor but has a maintenance yard adjacent to the tracks so is classified as negligible visual impact.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Rutherford GO Station, accessed only from the west side, is the only station in this section, and has been classified as low impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on the west side of the rail corridor behind residential properties south of Highway 7 and on the east side close to Rutherford Station. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there are six rail overpasses. Four overpasses cross over local roads, one passes over Highway 407, and one crosses over an east-west rail corridor. Six of these are in industrial areas and are classified as having negligible visual impact, with the exception Highway 407 which is classified as having a low visual impact due to the installation of OCS support structures on or in the vicinity of this structure. The overpass over Sheppard Avenue is adjacent to the Downsview Park GO Station and is classified as having a potential negligible (see **Table 6-58**).Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Table 6-58 Summary of Rail Overpasses - Section BR-3

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-3	D-10	Sheppard Avenue West (#321)	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-3	D-12	Finch Avenue West (#350)	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-3	D-12	York Sub	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-3	D-13	Steeles Avenue West	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-3	D-14	Hwy 407	Rail Overpass	N/A.	Yes *Low Visual Impact*
BR-3	D-15	Hwy 7	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the views from the surrounding area. Among these areas, Rutherford GO Station is the most important feature requiring careful design consideration.

6.10.8.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-3 in the residential areas will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Rutherford GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations such as placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

6.10.9 OCS & Bridges: Section BR-4 – Rutherford Station to King City Station

6.10.9.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section BR-4 is a mix of residential, industrial and open agricultural land. The industrial land is classified as negligible visual impact with no need for mitigation. Where there are open agricultural fields, the rail corridor and the future OCS infrastructure are within the viewshed, but the potential for this to affect many people's visual environment is small since few people will be within that viewshed. Therefore these areas are also classified as negligible impact with no requirement for mitigation.

Residential areas, which are mostly south of Maple GO Station, have rear yards that back up to the tracks or sides and fronts of homes that are close to the railroad but these homes are more than 20 metres from the railroad, and are classified as having potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area

allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Maple GO Station, accessed only from the east, is the only station within this section, and is classified as having potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on the east and west side of the railroad behind some of the residential properties both north and south of McKenzie Drive. Between McNaughton and Teston Roads noise barriers are proposed on the west side of the railroad to the rear of commercial/industrial land uses. Additional noise barriers are proposed farther to the north mostly to the east of the rail corridor adjacent to open and undeveloped farmland. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:

During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There is only one bridge in this section: the Keele Street Bridge. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

The Keele Street Bridge has no sidewalks and is classified as having potential low visual impacts due to the addition of a bridge barrier (see **Table 6-59**).

Table 6-59 Summary of Bridges - Section BR-4

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
BR-4	D-22	Keele Street	Bridge	No	Yes *Low Visual Impact*

There is also one rail overpass in this section over Major Mackenzie Drive, where there will be potential negligible visual impacts due to the installation of OCS support structures on or in the vicinity of this structure (see **Table 6-60**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 6-60 Summary of Rail Overpasses - Section BR-4

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-4	D-20	Major Mackenzie Drive	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the views from the surrounding area. Among these areas, Maple GO Station is the most important feature requiring careful design consideration.

Refer to Section 6.10.6 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

6.10.9.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-4 in the residential areas which will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Maple GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible.

6.10.10 OCS & Bridges: Section BR-5 – King City Station to Bathurst Street

6.10.10.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

This section passes through King City, where most of the adjoining development is residential with lots backing up to the railroad. These homes are more than 20 metres from the railroad, and are classified as having potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Recreational amenities in the Township of King along the corridor include Wellesley Park, a number of hiking trails and a pedestrian underpass that crosses the rail corridor west of Dufferin Street. In addition there is a proposed linkage trail north of the pedestrian underpass in the Township of King at 161 Dennison Street. As the pedestrian trail is under the railway, no impacts to this feature or the proposed extension of the trail, north of the rail way are anticipated.

Adjacent to the intersection of King and Keele Streets, the railroad is in a cut where it passes under both King and Keele. This area has been classified as moderate impact because this area is the gateway into King City and is considered a scenic view. The cut may be deep enough to hide the OCS infrastructure from its surroundings, but this should be examined in more detail during design.

Figure 6-18 Current View of Bridges over Railroad at Keele Street and King Road

Beyond King City, the railroad passes through an open rural area. Where there are open space or agricultural fields, the rail corridor and the future OCS infrastructure are within the viewshed, but the potential for this to affect many people's visual environment is small since few people will be within that viewshed. Therefore, these areas are classified as negligible impact with no requirement for mitigation.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations
King City GO Station is the only station within this area and is classified as having potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on both the east and west sides of the railroad through King City north of the King City Station as well as for a short length west of the railroad south of 4th Line. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:

During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are three bridges (i.e., rail under road, rail or pedestrian walkway) in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Two bridges are located at King Road and Keele Street, and one is at Bathurst Street. All of these bridges have sidewalks on both sides, and will be provided with protective barriers. The Bathurst Street Bridge is classified as having potential low visual impact. However, the King Road and Keele Street Bridges form a gateway to King City. The area around the bridges has been landscaped to enhance this gateway. Because the proposed OCS infrastructure may be visible from this area, these bridges are classified as having a moderate visual impact (see **Table 6-61**).

Table 6-61 Summary of Bridges - Section BR-5

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
BR-5	D-27	King Road	Bridge	No	Yes *Moderate Visual Impact*
BR-5	D-27	Keele Street	Bridge	No	Yes *Moderate Visual Impact*
BR-5	D-30	Bathurst Street	Bridge	No	Yes *Low Visual Impact*

There are no rail overpasses in this section.

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, King City GO Station is the most important feature requiring careful design consideration.

Refer to Section 6.10.6 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

6.10.10.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-5 such as the residential areas of King City will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the King City GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no rail overpasses in this section. Residual visual effects due to modifications to bridges will be minimized based on the implementation of mitigation measures outlined above. Residual visual effects are considered low to moderate.

6.10.11 OCS & Bridges: Section BR-6 – Bathurst Street to Aurora Station

6.10.11.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section BR-6 begins at Aurora GO Station. Beyond the station, the railroad passes through areas of residential development on the west side of the corridor. Houses in these areas are more than 20 metres from the railroad, and are classified as having potential low visual impact. Commercial and light industrial properties are located on the east side of the corridor, which is classified as negligible impact and requires no mitigation. South of Aurora Station the railroad is adjacent to Sheppards Bush Park. This is a large park with long views to the railroad across open areas. This area is therefore classified as low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

In addition, there is open space and agricultural fields in this section. The future OCS infrastructure is within this viewshed, but the potential for this to affect many people's visual environment is small since few people will be within that viewshed. Therefore, these areas are classified as negligible impact with no requirement for mitigation.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Aurora GO Station is the only station within this section and is classified as having potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on both sides of the railroad adjacent to residential properties in this section. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there is one rail overpass where the railroad crosses over Yonge Street. There are potential negligible visual impacts due to the installation of OCS support structures on or in the vicinity of the structures (see **Table 6-62**). Refer **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 6-62 Summary of Rail Overpasses - Section BR-6

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-6	D-32	Yonge Street	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Aurora GO Station is the most important feature requiring careful design consideration.

6.10.11.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-6 such as residential areas of King City will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Aurora GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no bridges in Section BR-6. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above. Residual visual effects are considered low.

6.10.12 OCS & Bridges: Section BR-7 – Aurora Station to East Gwillimbury Station

6.10.12.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section BR-7 contains several areas of residential development adjacent to the rail corridor. These houses are more than 8 metres from the railroad, and are classified as having low to moderate visual impact. There are also areas of industrial development which are classified as having negligible visual impact and requiring no mitigation measures. Where there are open agricultural fields, the rail corridor and the future OCS infrastructure are within the viewshed, but the potential for this to affect many people's visual environment is small since few people will be within that viewshed. Therefore these areas are also classified as negligible visual impact with no requirement for mitigation. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

The area alongside the St. Andrews Valley Golf Club is also classified as having potential low visual impact because the tees and greens are close to and parallel the railroad with little existing screening along the tracks.

There are several parks in this area including Bailey Ecological Park, Wesley Brooks Conservation Area and Fairy Lake. The Bailey Ecological Area is classified as negligible visual impact, since it appears to be a natural habitat area rather than a place for human activity. One small segment, adjacent to Fairy Lake in the Wesley Brooks Conservation Area, is classified as having potential low visual impact despite the scenic nature of the lake and its closeness to the railroad, since the view is already somewhat compromised by the electric transmission line that runs parallel to the tracks. There is also a playground called 'All Our Kids Playground' through which passes the Nokiidaa bike trail. This appears to be a well utilized playground and is therefore classified as low visual impact.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are two stations in this section, Newmarket GO Station and East Gwillimbury GO Station. Both these stations are classified as having potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on the west side of the railroad behind most of the residential development in this section. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There is only one bridge in this section at Queen Street. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

The Queen Street Bridge has sidewalks on both sides and connects a residential neighborhood to a linear park and multi-use trail. The bridge is classified as having potential low visual impact (see **Table 6-63**).

Table 6-63 Summary of Bridges - Section BR-7

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
BR-7	D-39	Queen Street	Bridge	No	Yes *Low Visual Impact*

There are two rail overpasses within this section which cross over waterways. The crossing of Clubinis Creek is classified as having negligible visual impact as it is in an area removed from potential views.

The crossing of the Holland River is immediately north of and visible from Water Street. In this location, there are potential negligible visual impacts due to the installation of OCS support structures in the vicinity of this structure (see **Table 6-64**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 6-64 Summary of Rail Overpasses - Section BR-7

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-7	D-36	Clubinis Creek	Rail Overpass	N/A	No *Negligible Visual Impact*
BR-7	D-38	Holland River	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Newmarket GO Station, East Gwillimbury GO Station, and the Wesley Brooks Conservation Area are the most important features requiring careful design consideration.

Refer to Section 6.10.6 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

6.10.12.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-7 such as St. Andrews Valley Golf Club and the Wesley Brooks Conservation Area will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Newmarket and East Gwillimbury GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible.

6.10.13 OCS & Bridges: Section BR-8 – East Gwillimbury Station to Bradford Station

6.10.13.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

The majority of Section BR-8 passes through vacant or agricultural land some of which is classified as the Reservoir Conservation Area. Where there are open agricultural fields, the rail corridor and the future OCS infrastructure are within the viewshed, but the potential for this to affect many people's visual environment is small since few people will be within that viewshed. Therefore these areas are also classified as negligible impact with no requirement for mitigation. There are also areas of residential development close to the railroad. Houses in these segments are located more than 8 metres from the railroad and are classified as having potential low to moderate visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

In several areas, there are roads closely paralleling the railroad, such as Regional Road 1 just south of the West Holland River crossing, where there will be clear views of the proposed OCS infrastructure from the roadway which are classified as having potential low visual impact.

The Holland River crossing is classified as having a moderate visual impact due to the picturesque views from the road which will be impacted by the installation of OCS infrastructure and the change in view for riverfront properties and recreational river users.

Figure 6-19 Current View of the West Holland River Rail Overpass

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are no stations within this section.

Mitigation Recommendations:

No mitigation is required.

Proposed Noise Barriers

Noise barriers are proposed in several areas on the east and west side of the railroad behind residential properties and adjacent to some open spaces. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section, and the only rail overpass is the one crossing the West Holland River (see **Figure 6-19**). This area is considered scenic with attractive views to and from the water and the river is used for recreational purposes. However, this crossing is classified as having low visual impacts (see **Table 6-65**). Refer to **Figure 4-36** for a visualization of typical OCS infrastructure at a scenic viaduct.

Table 6-65 Summary of Rail Overpasses - Section BR-8

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-8	D-45	West Holland River	Rail Overpass	N/A.	Yes *Low Visual Impact*

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there is one moderate impact viewshed to protect in Section BR-8, that of the New Holland River Bridge. However, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Bradford GO Station is the most important feature requiring careful design consideration.

6.10.13.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-8 such as along Regional Road 1 and several residential areas close to the railroad will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

There are no stations within this section.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no bridges in Section BR-8. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above. Residual visual effects are considered low.

6.10.14 OCS & Bridges: Section BR-9 – Bradford Station to 13th Line

6.10.14.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

In Section BR-9, beyond Bradford GO Station, the railroad passes through an industrial area which is classified as negligible impact and requires no mitigation measures. To the north of this industrial area, the section is entirely undeveloped. Where there are open space or agricultural fields including the Scanlon Creek Conservation Area, the rail corridor and the future OCS infrastructure are within the viewshed but the potential for this to affect many people’s visual environment is small since few people will be within that viewshed. Therefore these areas are classified as negligible visual impact with no requirement for mitigation. There is only one short exception where residential development is close to the railroad but more than 20 metres away which is classified as having potential low visual impact.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of ‘high’ visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

The only station within this section is Bradford GO Station, which is classified as having potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it. Therefore, less intrusive OCS structures, designed to fit in with the station architecture, should be considered. New OCS structures must be carefully placed to avoid overhead covers and other existing structures on the platforms.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There are no noise barriers within this section.

Mitigation Recommendations:
No mitigation is required.

Bridges/Rail Overpasses

There are no road bridges or rail overpasses in this section.

Mitigation Recommendations:
No mitigation required.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area.

6.10.14.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-9 will only exist for a short stretch of residential development and will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Bradford GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

There are no noise barriers within this section.

Bridges/Rail Overpasses

There are no road bridges or rail overpasses in this section.

6.10.15 OCS & Bridges: Section BR-10 – 13th Line to 6th Line Section

6.10.15.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section BR-10 is also almost entirely undeveloped where there are open agricultural fields. The rail corridor and the future OCS infrastructure are within the viewshed, but the potential for this to affect many people's visual environment is small since few people will be within that viewshed. Therefore these areas are also classified as negligible visual impact with no requirement for mitigation.

The two exceptions are where the railroad passes through the outskirts of the communities of Gilford and Lefroy. In these areas, there is adjacent residential development adjacent to the rail corridor. These houses are more than 20 metres from the railroad, and are classified as having potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are no stations within this section.

Mitigation Recommendations:
No mitigation is required.

Proposed Noise Barriers

There are no noise barriers within this section.

Mitigation Recommendations:
No mitigation is required.

Bridges/Rail Overpasses

There are no road bridges or rail overpasses in this section.

Mitigation Recommendations:
No mitigation is required.

In summary, there are several areas residential areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area.

6.10.15.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-10 such as the residential areas close to the railroad will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

There are no stations within this section.

Proposed Noise Barriers

There are no noise barriers within this section.

Bridges/Rail Overpasses

There are no road bridges or rail overpasses in this section.

6.10.16 OCS & Bridges: Section BR-11 – 6th Line to Barrie South Station

6.10.16.1 Potential Effects and Mitigation Measures

Most of Section BR-11 is undeveloped and therefore classified as negligible impact. Where there are open space or agricultural fields, the rail corridor and the future OCS infrastructure are within the viewshed but the potential for this to affect many people’s visual environment is small since few people will be within that viewshed. Therefore, these areas are also classified as negligible impact with no requirement for mitigation measures. In addition, there are areas of both new and old residential development close to the railroad. These houses are more than 20 metres from the railroad and are classified as having potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area

allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are no stations within this section.

Mitigation Recommendations:
No mitigation is required.

Proposed Noise Barriers

Noise barriers are proposed at two places in this section, on the east side of the railroad adjacent to a new residential subdivision south of Innisfil Beach Road and north and south of Lockhart Road. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There is one bridge in this section at 6th Line. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

6th Line is a rural road with no sidewalks where few pedestrians are likely to be crossing the bridge. Therefore, although protective barriers are required, this bridge is classified as having low visual impact (see **Table 6-66**).

Table 6-66 Summary of Bridges - Section BR-11

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
BR-11	D-62	6th Line	Bridge	No	Yes *Low Visual Impact*

There are no rail overpasses within this section.

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are several areas where carefully placed and designed OCS infrastructure or screening will result in minimal visual impact on the surrounding area.

Refer to Section 6.10.6 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

6.10.16.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-11 at areas where residential development is close to but more than 8 metres from the railroad will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

There are no stations within this section.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no rail overpasses in this section. Residual visual effects due to modifications to bridges will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered low.

6.10.17 OCS & Bridges: Section BR-12 – Barrie South Station to Allandale Waterfront Station

6.10.17.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section BR-12 passes through the community of Barrie, with residential development here the railroad passes through mostly residential areas. These houses are more than 20 metres from the railroad, and are classified as having potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

As the railroad approaches Allandale Waterfront GO Station it runs alongside Lakeshore Drive, where not only the mainline but also the storage tracks for overnight storage of commuter trains are located. On the opposite side of Lakeshore Drive is the lakefront and the Allandale Station Park. A row of deciduous trees has been planted between the railroad and Lakeshore Drive so screen the view of the railroad from the roadway and the lakeshore. In addition, portions of the corridor in this segment are within the City of Barrie's City Centre Revitalization Plan area. This area is classified as having potential moderate visual impact.

Figure 6-20 Current View of Allandale GO Station Area

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are two stations in this section – Barrie South and Allandale Waterfront GO Stations. Barrie GO Station is classified as having potential low visual impact. The Allendale Waterfront GO Station is classified as having potential moderate visual impact because of its location in the Allendale waterfront area, the proximity of the old Allendale station building and the fact that passengers will be required to walk through the rail storage yard where multiple OCS poles and wires will be constructed.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There are no noise barriers within this section.

Mitigation Recommendations:
No mitigation is required.

Bridges/Rail Overpasses

There is one bridge in this section at Big Bay Point Road. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

The Big Bay Point Road Bridge crosses over the railroad. This road has sidewalks on either side. On the south side, the bridge affords views of Painswick Park. Protective barriers will be required on the bridge which is classified as having potential low visual impact (see **Table 6-67**).

Table 6-67 Summary of Bridges - Section BR-12

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
BR-12	D-68	Big Bay Point Road	Bridge	No	Yes *Low Visual Impact*

Two rail overpasses are located in this section, crossing Cox Mill Road and Tollendale Creek, which appear as one continuous viaduct crossing both the road and the creek. These are both classified as having potential low visual impact due to the installation of OCS support structures on or in the vicinity of these structures (see **Table 6-68**).

Table 6-68 Summary of Rail Overpasses - Section BR-12

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
BR-12	D-69	Cox Mill Road	Rail Overpass	N/A	Yes *Low Visual Impact*
BR-12	D-69	Tollendale Creek	Rail Overpass	N/A	Yes *Low Visual Impact*

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Allandale Waterfront GO Station, along will Barrie GO Station and the Cox Mill Road Viaduct are the most important features requiring careful design consideration.

Refer to Section 6.10.6 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

6.10.17.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along BR-12 such as the Allendale waterfront and residential areas which are close to but more than 8 metres away from the railroad will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Barrie South and Allandale Waterfront GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

There are no noise barriers within this section.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered low.

6.11 Utilities

A Utilities Impact Assessment study was completed as part of the TPAP to carry out preliminary identification of existing utilities within the study area and to identify possible utility conflicts between these utilities and the planned electrification infrastructure. Conflicts were characterized under the following three categories:

1. **Spatial Conflicts**

Spatial conflicts occur where OCS structures and foundations occupy the same physical space as overhead or buried utilities. Spatial conflicts can also occur where utilities attached to bridges occupy the same space as proposed bridge barriers or bridge barrier fixing points. Overhead transmission, distribution, and communication lines are identified as potential spatial conflicts if they are located within the OCS impact zone and have a vertical clearance from top of rail of less than 10.7 metres. Buried utilities running parallel to the rail corridor within the OCS impact zone are identified as potential spatial conflicts, irrespective of depth.

2. Electrical Zone of Influence Conflicts

"Influence" describes the unintended effect of electrified OCS wires on adjacent infrastructure and includes the induction of current (counteracted by grounding and bonding) and electromagnetic interference (EMI). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the Overhead Contact Line Zone (OCLZ) (see **Figure 6-21**). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the OCLZ. Because vertical spatial clearance requirements (10.7 metres) are more conservative than those shown in **Figure 6-21**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

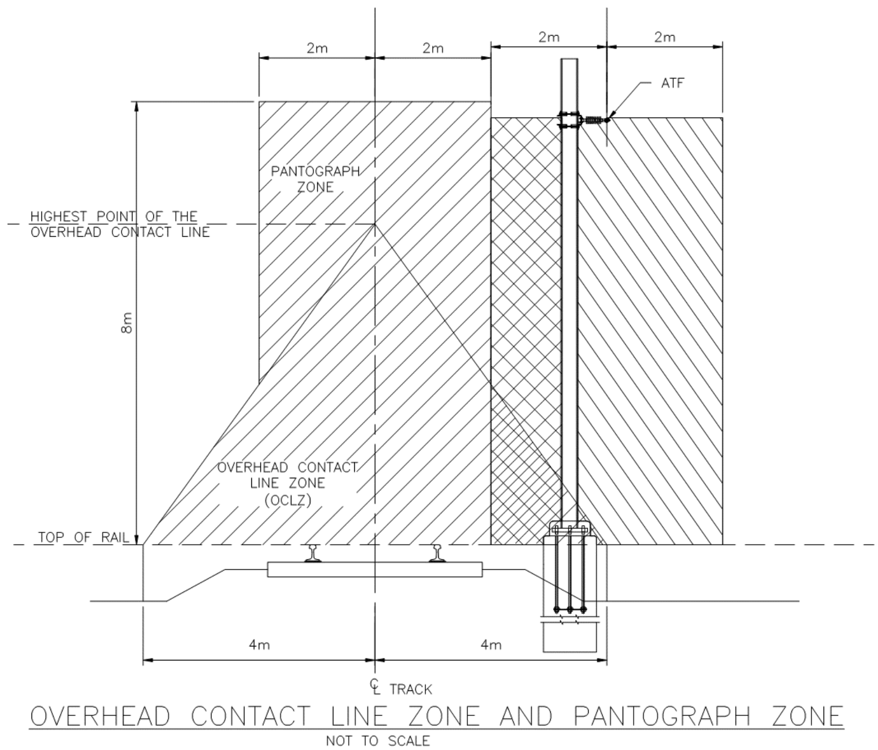
Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements (5.0 metres from centerline of track as captured in the OCS impact zone) are more conservative than the OCLZ clearance requirements (4.0 metres from centerline of track as shown in **Figure 6-21**) those shown in **Figure 6-21**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

Infrastructure that is considered an electrical zone of influence conflict is also a spatial conflict. The resolution for a spatial conflict (usually relocation) will also remove the utility from the electrical zone of influence and thus grounding and bonding will not be required. Existing utilities in the rail corridor outside of the electrical zone of influence may be grounded and bonded at the request of the owner but it is not a requirement for Electrification as the effects of stray current are anticipated to be minimal. Future utilities in the rail corridor outside of the electrical zone of influence should be grounded and bonded at installation.

With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.

Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

Figure 6-21 Overhead Contact Line Zone



3. Electrical Clearance Conflicts

Electrical clearance is defined as the minimum distance between live components and grounded structures or rolling stock. Electrical clearance conflicts occur where the minimum required vertical (see **Table 6-69**) or parallel (see

Table 6-70) clearances are not met. Electrical clearance does not apply to buried utilities.

Table 6-69 Vertical Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Min. Vertical Clearance Between Wires Crossing Each Other (m)	Min. Distance Above OCS (m) for Max. Wire Sag (Measured From Track)
>0 ≥ 150kV	5.0	15.7
>150kV ≥ 250kV	6.5	17.2
250kV	8.0	18.7

Table 6-70 Lateral Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Minimum Distance (m)
>0 ≥ 150kV	5.2
>150kV ≥ 250kV	6.7
250kV	8.2

Additional details on the methodology followed for assessment of utilities impacts can be found in the Utilities Impact Assessment Report contained in Appendix I2.

6.11.1 Allandale Tap Location

6.11.1.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in the area of the Allandale Tap area are:

Table 6-71 Allandale TPS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Conduit	Unknown	Metallic	Patterson Rd
Bell	Buried	Conduit	Unknown	Metallic	Tiffin St
Bell	Buried	Conduit	Unknown	Metallic	Tiffin St
Bell	Buried	Conduit	Unknown	Metallic	Tiffin St
City of Barrie	Buried	Ditch Culvert	975mm	Reinforced Concrete	Patterson Rd
City of Barrie	Buried	Sewer	610mm	Concrete (Unreinforced)	Patterson Rd
City of Barrie	Buried	Ditch Culvert	600mm	Metallic	Patterson Rd
City of Barrie	Buried	Water	406mm	Metallic encasing	Patterson Rd
City of Barrie	Buried	Ditch Culvert	975mm	Reinforced Concrete	Tiffin St
Enbridge Gas	Buried	Gas	4"	Metallic	Patterson Rd
Hydro One	Overhead	Electrical	44kV	Metallic	Tiffin St
Rogers	Buried	Conduit	Unknown	Metallic	Patterson Rd
Rogers	Buried	Conduit	Unknown	Metallic	Patterson Rd
Rogers	Overhead	Conduit	Unknown	Metallic	Patterson Rd
Rogers	Buried	Conduit	Unknown	Plastic	Tiffin St

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

6.11.1.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.2 Allandale TPS & 25kV Feeder Route

6.11.2.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in the area of the Allandale TPS area are:

Table 6-72 Allandale TPS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Conduit	Unknown	Metallic	Patterson Rd
Bell	Buried	Conduit	Unknown	Metallic	Tiffin St
Bell	Buried	Conduit	Unknown	Metallic	Tiffin St
Bell	Buried	Conduit	Unknown	Metallic	Tiffin St
City of Barrie	Buried	Ditch Culvert	975mm	Reinforced Concrete	Patterson Rd
City of Barrie	Buried	Sewer	610mm	Concrete (Unreinforced)	Patterson Rd
City of Barrie	Buried	Ditch Culvert	600mm	Metallic	Patterson Rd
City of Barrie	Buried	Water	406mm	Metallic encasing	Patterson Rd
City of Barrie	Buried	Ditch Culvert	975mm	Reinforced Concrete	Tiffin St
Enbridge Gas	Buried	Gas	4''	Metallic	Patterson Rd
Hydro One	Overhead	Electrical	44kV	Metallic	Tiffin St
Rogers	Buried	Conduit	Unknown	Metallic	Patterson Rd
Rogers	Buried	Conduit	Unknown	Metallic	Patterson Rd
Rogers	Overhead	Conduit	Unknown	Metallic	Patterson Rd
Rogers	Buried	Conduit	Unknown	Plastic	Tiffin St

Table 6-73 Allandale 25kV Feeder Route Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
63.07		Enbridge Gas	Buried – Parallel to ROW	Gas	4''	Metallic	Essa Rd
63.07		Enbridge Gas	Buried – Parallel to ROW	Gas	2''	Metallic	Essa Rd
63.10	63.15	City of Barrie	Buried	Water	200mm	Plastic	Gowan St
63.10	63.13	Bell	Buried	Conduit	Unknown	Metallic	Gowan St
63.10	63.13	Bell	Buried	Conduit	Unknown	Metallic	Essa Rd
63.11	63.15	City of Barrie	Buried	Sewer	300mm	Other	Essa Rd

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
63.11	63.14	City of Barrie	Buried	Storm	2.4x1.5m	Concrete (Unreinforced)	Gowan St
63.11	63.15	City of Barrie	Buried	Water	Unknown	Other	Gowan St
63.11	63.12	Bell	Buried	Conduit	Unknown	Metallic	Essa Rd
63.12	63.12	Bell	Buried	Conduit	Unknown	Plastic	Essa Rd
63.12	63.13	Bell	Buried	Conduit	Unknown	Metallic	Gowan St
63.12	63.13	Bell	Buried	Conduit	Unknown	Metallic	Essa Rd
63.13		Bell	Buried	Conduit	Unknown	Metallic	Essa Rd
63.13		City of Barrie	Buried	Storm	300mm	Reinforced Concrete	Gowan St
63.13		Rogers	Buried	Conduit	Unknown	Metallic	Essa Rd
63.14		City of Barrie	Buried	Storm	600mm	Reinforced Concrete	Essa Rd
63.14		City of Barrie	Buried	Storm	450mm	Reinforced Concrete	Essa Rd
63.14		City of Barrie	Buried	Storm	750mm	Reinforced Concrete	Essa Rd
63.14		City of Barrie	Buried	Sewer	500mm	Reinforced Concrete	Essa Rd
63.14		Enbridge Gas	Buried	Gas	8''	Plastic	Essa Rd
63.15		City of Barrie	Buried	Water	200mm	Other	Essa Rd
63.15		City of Barrie	Buried	Water	600 mm	Other	Essa Rd
63.15		City of Barrie	Buried	Water	300mm	Plastic	Essa Rd
63.16	63.25	Bell	Buried	Conduit	Unknown	Metallic	Innisfil St
63.16	63.18	Bell	Buried	Conduit	Unknown	Metallic	Tiffin St
63.25		Bell	Buried	Conduit	Unknown	Metallic	Innisfil St
63.29		Rogers	Overhead	Conduit	Unknown	Metallic	Innisfil St
63.29	63.31	City of Barrie	Buried	Storm	Unknown	Reinforced Concrete	Innisfil St
63.29		City of Barrie	Buried	Gas	300mm	Metallic	Innisfil St
63.29		PowerStream	Overhead	Electrical	Unknown	Metallic	Innisfil St
63.30		City of Barrie	Buried	Storm	1067mm	Reinforced Concrete	Innisfil St
63.30		City of Barrie	Buried	Sewer	unknown	Reinforced Concrete	Innisfil St
63.30		City of Barrie	Buried	Water	300 mm	Reinforced Concrete	Innisfil St
63.31	63.33	City of Barrie	Buried	Water	Unknown	Reinforced Concrete	Innisfil St
63.31	63.35	Bell	Buried	Conduit	Unknown	Metallic	Innisfil St
63.33	63.47	Enbridge Gas	Buried	Gas	4''	Plastic	Jacobs Terrace

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
63.35	63.37	Bell	Buried	Conduit	Unknown	Plastic	Jacobs Terrace
63.37	63.38	Bell	Buried	Cable	Unknown	Plastic	Jacobs Terrace
63.38	63.46	Bell	Buried	Cable	Unknown	Metallic	Anne St
63.38	63.39	Bell	Buried	Conduit	Unknown	Plastic	Jacobs Terrace
63.39	63.43	Bell	Buried	Cable	Unknown	Plastic	Anne St
63.43	63.44	Bell	Buried	Conduit	Unknown	Plastic	Anne St
63.44	63.45	Bell	Buried	Cable	Unknown	Plastic	Anne St
63.45	63.46	Bell	Buried	Conduit	Unknown	Plastic	Anne St
63.46	63.46	Bell	Buried	Cable	Unknown	Plastic	Anne St
63.46		City of Barrie	Buried	Water	300mm	Reinforced Concrete	Anne St S
63.46		City of Barrie	Buried	Water	600mm	Metallic encasing	Anne St S
63.46		City of Barrie	Buried	Water	400mm	Reinforced Concrete	Anne St S
63.47		City of Barrie	Buried	Storm	600 mm	Metallic encasing	Anne St S
63.47		Rogers	Overhead	Conduit	Unknown	Metallic	Anne St
63.47		Enbridge Gas	Buried	Gas	4''	Plastic	Jacobs Terrace
63.47		Bell	Buried	Conduit	Unknown	Metallic	Anne St
63.47	64.14	Bell	Buried	Cable	Unknown	Plastic	Jacobs Terrace
63.47		Rogers	Buried	Conduit	Unknown	Metallic	Anne St
63.47		PowerStream	Overhead	Electrical	Unknown	Metallic	Anne St S
63.52	63.53	Bell	Buried	Conduit	Unknown	Plastic	Jacobs Terrace
63.52		Enbridge Gas	Buried – Parallel to ROW	Gas	2''	Metallic	Jacobs Terrace
63.53	63.55	Bell	Buried	Cable	Unknown	Plastic	Jacobs Terrace
63.55		Bell	Buried	Conduit	Unknown	Metallic	Anne St
63.56	63.56	Bell	Buried	Cable	Unknown	Plastic	Jacobs Terrace
63.56	63.57	Bell	Buried	Conduit	Unknown	Plastic	Jacobs Terrace
63.60	63.57	Bell	Buried	Cable	Unknown	Plastic	Jacobs Terrace
63.61		City of Barrie	Buried	Storm	600mm	Reinforced Concrete	Jacobs Terrace
63.98		Bell	Buried	Conduit	Unknown	Metallic	HWY 400
64.08		PowerStream	Overhead	Electrical	Unknown	Metallic	Patterson Rd
64.08	64.09	City of Barrie	Buried	Ditch Culvert	600mm	Metallic	Patterson Rd
64.08		Enbridge Gas	Buried – Crossing ROW	Gas	1 1/4''	Metallic	Patterson Rd

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
64.08		City of Barrie	Buried	Water	200mm	Plastic	Patterson Rd
64.08		City of Barrie	Buried	Sewer	610mm	Concrete (Unreinforced)	Patterson Rd
64.09		Rogers	Buried	Conduit	Unknown	Metallic	Patterson Rd
64.09		PowerStream	Overhead	Electrical	Unknown	Metallic	Patterson Rd
64.09		Bell	Buried	Conduit	Unknown	Metallic	Patterson Rd
64.10		Rogers	Buried	Conduit	Unknown	Metallic	Patterson Rd
64.10		Rogers	Overhead	Conduit	Unknown	Metallic	Patterson Rd
64.11		Hydro One	Overhead	Electrical	44kV	Metallic	Patterson Rd

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

6.11.2.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.3 Newmarket SWS

6.11.3.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-74 Newmarket SWS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Conduit	Unknown	Metallic	Steven Court
Bell	Buried	Conduit	Unknown	Metallic	Steven Court
Enbridge Gas	Buried	Gas	4"	Plastic	Steven Court
Enbridge Gas	Overhead	Gas	100	Metallic	Steven Court
Enbridge Gas	Buried	Gas	100	Metallic	Steven Court
Hydro One	Buried	Electrical	Unknown	Metallic	Rail
Newmarket Hydro	Overhead	Electrical	Unknown	Metallic	Steven Court
Newmarket Hydro	Overhead	Electrical	Unknown	metallic	Steven Court
Newmarket Hydro	Overhead	Electrical	Unknown	Metallic	Steven Court
Newmarket Hydro	Overhead	Electrical	Unknown	Metallic	Steven Court
Private	Buried	Storm	Unknown	Metallic	Steven Court

Owner	Utility Class	Description	Size	Material	Nearest Street
Private Gate	Overhead	Electrical	Unknown	metallic	Steven Court
Private Hydro	Overhead	Electrical	Unknown	Metallic	Steven Court
Private Hydro	Overhead	Electrical	Unknown	metallic	Steven Court
Private Hydro	Overhead	Electrical	Unknown	metallic	Steven Court
Private Hydro	Overhead	Electrical	Unknown	metallic	Steven Court
Private Hydro	Overhead	Electrical	Unknown	metallic	Steven Court
Rogers	Buried	Conduit	Unknown	Metallic	Steven Court
Rogers	Buried	Conduit	Unknown	Metallic	Steven Court
Town of Newmarket	Buried	Sewer	250mm	Other	Steven Court
Town of Newmarket	Buried	Water	300mm	Metallic	Steven Court
Town of Newmarket	Buried	Sewer	200mm	Other	Steven Court

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

6.11.3.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.4 Gilford PS

6.11.4.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-75 Gilford PS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Rogers	Buried	Conduit	Unknown	Plastic	Gilford Rd
Rogers	Overhead	Cable	Unknown	Metallic	Gilford Rd
Bell	Buried	Conduit	Unknown	Plastic	Gilford Rd
Innpower	Overhead	Electrical	Unknown	Metallic	Gilford Rd
Innpower	Overhead	Electrical	Unknown	Metallic	Gilford Rd
Innpower	Overhead	Electrical	Unknown	Metallic	Gilford Rd
Enbridge Gas	Buried	Gas	4"	Plastic	Gilford Rd

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

6.11.4.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.5 Maple PS

6.11.5.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-76. Maple PS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Conduit	Unknown	Metallic	Keele St
Bell	Buried	Conduit	Unknown	Metallic	Keele St
Bell	Buried	Conduit	Unknown	Metallic	Keele St
Bell	Buried	Cable	Unknown	Metallic	Keele St
City of Vaughan	Buried	Ditch Culvert	400mm	Concrete (Unreinforced)	Keele St
Enbridge Gas	Buried	Conduit	NPS 8	Metallic	Keele St
Unknown	Buried	Ditch Culvert	Unknown	Unknown	Keele St
Unknown	Buried	Ditch Culvert	750mm	Metallic	Keele St
York Region	Buried	Water	900mm	Concrete (Unreinforced)	Keele St
York Region	Buried	Water	1200mm	Concrete (Unreinforced)	Keele St

Using the criteria set out in Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

6.11.5.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.6 OCS & Bridges: Section BR-1 – Parkdale Junction to Caledonia Station

6.11.6.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-77 Section BR-1 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
2.98	3.11	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	St Clarens Ave to Lansdowne Ave	Y	Y	N
3.16	4.17	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Lansdowne Ave to Wallace Ave	Y	Y	N
3.21	3.39	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Lansdowne Ave to Dundas St W	Y	N	N
4.07		Toronto Hydro	OH - Crossing ROW	Electrical	1 cable	Metallic	Paton Rd	Y	Y	N
4.12	4.62	Hydro One	Buried - Parallel to ROW	Electrical	High voltage	Metallic	Dufferin St to Brandon Street	Y	N	N
4.18		Toronto Hydro	OH - Crossing ROW	Electrical	13.8kV, 120/240V	Metallic	Wallace Ave	Y	Y	Y
4.28	4.31	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Sarnia Ave	Y	Y	Y
4.38	4.44	Toronto Hydro	Buried - Parallel to ROW	Electrical	13.8kV/8kV	Metallic	Antler St.	Y	N	N
4.39	4.45	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Sarnia Ave	Y	Y	N
4.62	4.97	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Davenport Rd	Y	Y	N
4.75	5.90	Hydro One	OH - Parallel to ROW	Electrical	115kV	Metallic	St Clair Ave W	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
4.85		Hydro One	OH - Crossing ROW	Electrical	115kV	Metallic	Davenport Rd	Y	Y	N
4.85		Hydro One	OH - Crossing ROW	Electrical	115kV	Metallic	Davenport Rd	Y	Y	N
5.46	5.55	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Gilbert Ave	N	Y	N
5.48		Unknown	OH - Crossing ROW	Electrical	Unknown	Metallic	Gilbert Ave	Y	Y	Y
5.86		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Rogers Rd	Y	Y	N
5.86		Unknown	OH - Crossing ROW	Cable	Unknown	Unknown	Rogers Rd	Y	Y	N
5.90	5.99	Hydro One	OH - Crossing ROW	Electrical	115kV	Metallic	St Clair Ave W	Y	Y	N
5.98	6.00	Unknown	OH - Crossing ROW	Electrical	Unknown	Metallic	Kenora Crescent	N	Y	N
5.99	6.74	Hydro One	OH - Parallel to ROW	Electrical	115kV	Metallic	St Clair Ave W	Y	Y	N
6.23		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Kitchener Ave	Y	Y	Y

Mitigation/Avoidance Measures

- Further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Spatial and electrical conflicts will be mitigated by the removal, relocation, reconfiguration or burial of overhead utilities. Further consultation and coordination with affected utility companies will need to be undertaken during Detailed Design to confirm conflicts and to establish the preferred mitigation approach. In some cases, primarily relating to those utilities attached to bridges, further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Electrical zone of influence conflicts will be resolved by installing appropriate grounding and bonding measures to counteract electromagnetic interference (EMI). Because vertical spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- With regard to existing buried utilities, notification shall be provided to the third party of the anticipated AC electrification of the rail ROW.
- With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.
- Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

6.11.6.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.7 OCS & Bridges: Section BR-2 – Caledonia Station to Downsview Park Station

6.11.7.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-78 Section BR-2 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
6.50		Toronto Hydro	OH - Crossing ROW	Electrical	600/347V, 120V/240V	Metallic	Eglinton Ave W	N	Y	N
6.50		Bell	Buried - Crossing ROW	Duct Bank	2 Ducts	Reinforced Concrete	Eglinton Ave W	Y	N	N
6.50		Bell	Buried - Crossing ROW	Cable	Unknown	Metallic	Eglinton Ave W	Y	N	N
6.53	6.54	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Eglinton Ave W	Y	Y	N
6.88		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV, 120V/240V	Metallic	Castlefield Ave	Y	Y	N
6.95	7.80	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Raitherm Rd	Y	Y	N
6.99	7.81	Rogers	OH - Parallel to ROW	Conduit	Unknown	Plastic	Castlefield Ave to Lawrence Ave W	Y	Y	N
7.13		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Raitherm Rd	Y	N	N
7.80		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV, 27.6kV, 600/347V	Metallic	Lawrence Ave W	Y	Y	N
7.81		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Lawrence Ave W	Y	Y	N
7.88	7.90	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Lawrence Ave W	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
7.97	8.76	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Circle Ridge to Bridgeland Ave	Y	Y	N
8.01		Unknown	OH - Crossing ROW	Electrical	Unknown	Metallic	Lawrence Ave W	Y	Y	Y
8.05	9.10	Rogers	OH - Parallel to ROW	Conduit	Unknown	Plastic	Bridgeland Ave to Wilson Ave	Y	Y	N
8.08		Unknown	OH - Crossing ROW	Electrical	Unknown	Metallic	Circle Ridge	Y	Y	N
8.51		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Cartwright Ave	Y	Y	N
8.70	8.72	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Highway 401	Y	N	N
8.70		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Bridgeland Ave	Y	Y	N
8.70		Toronto Hydro	OH - Crossing ROW	Electrical	120V/240V, 27.6kV/16kV	Metallic	Bridgeland Ave	Y	Y	N
8.71		Enbridge Gas	Buried - Crossing ROW	Gas	NPS 4	Metallic	Highway 401	Y	N	N
8.74	8.82	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Highway 401	Y	N	N
8.76		MTO	On Bridge	Conduit	Unknown	Metallic	Highway 401	Y	Y	N
8.76		Allstream	On Bridge	Conduit	Unknown	Plastic	Highway 401	Y	Y	Y
8.85	9.88	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Hwy 401 to Piewes Rd	Y	Y	N
9.08		Unknown	OH - Crossing ROW	Electrical	Unknown	Metallic	Wilson Ave	Y	Y	N
9.08		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Wilson Ave	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
9.10		Toronto Hydro	OH - Crossing ROW	Electrical	120V/240V, 27.6kV/16kV	Metallic	Wilson Ave	N	Y	N
9.10		Cogeco Data	OH - Crossing ROW	Conduit	96 ct	Metallic	Wilson Ave	Y	Y	N
9.51	9.88	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Downsview Park	Y	Y	N
9.79	10.37	Bell	Buried - Parallel to ROW	Duct Bank	1 duct	Reinforced Concrete	Carl Hall Rd	Y	N	N
10.37	10.49	Bell	Buried - Parallel to ROW	Duct Bank	2 ducts	Reinforced Concrete	Carl Hall Rd	Y	N	N
10.41		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Carl Hall Rd	Y	Y	N
10.41		Parc Downsview Park	OH - Crossing ROW	Conduit	4.16kV	Metallic	Carl Hall Rd	Y	Y	N
10.43	10.76	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Carl Hall Rd to Sheppard Ave W	Y	Y	Y
10.45		Parc Downsview Park	OH - Crossing ROW	Electrical	4.16kV	Metallic	Carl Hall Rd	Y	Y	Y
10.49	10.87	Bell	Buried - Parallel to ROW	Duct Bank	1 Duct	Reinforced Concrete	Carl Hall Rd to Sheppard Ave W	Y	N	N
10.49	10.87	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Carl Hall Rd to Sheppard Ave W	Y	N	N
10.54		Parc Downsview Park	OH - Crossing ROW	Electrical	4.16kV	Metallic	Carl Hall Rd	Y	Y	N
10.60	10.61	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Carl Hall Rd	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
10.64	10.87	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Sheppard Ave W	Y	N	N
10.65	10.87	Bell	Buried - Parallel to ROW	Duct Bank	2 ducts	Reinforced Concrete	Sheppard Ave W	Y	N	N
10.84	11.82	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Sheppard Ave W to Ashwarren Rd	Y	Y	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-2.

6.11.7.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.8 OCS & Bridges: Section BR-3 – Downsview Park Station to Rutherford Station

6.11.8.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-79 Section BR-3 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
11.56	11.67	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Finch Ave W	Y	N	N
11.67		Toronto Hydro	OH - Crossing ROW	Electrical	120V/240V, 27.6kV/16kV/	Metallic	Finch Ave W	Y	Y	N
11.84		Imperial Oil	Buried - Crossing ROW	Oil	300mm	Metallic	York University Busway	Y	N	N
11.84		Enbridge Pipelines	Buried - Crossing ROW	Oil	1000mm	Metallic	York University Busway	Y	N	N
11.85		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	York University Busway	Y	Y	N
11.87		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	York University Busway	Y	Y	N
11.88		Sun-Canadian	Buried - Crossing ROW	Oil	200mm	Metallic	York University Busway	Y	N	N
11.88		Suncor	Buried - Crossing ROW	Oil	250mm	Metallic	York University Busway	Y	N	N
11.88		Imperial Oil	Buried - Crossing ROW	Oil	380mm	Metallic encasing	York University Busway	Y	N	N
11.89		Trans-Northern	Buried - Crossing ROW	Oil	250mm	Metallic	York University Busway	Y	N	N
11.89		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	York University Busway	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
11.90		Suncor	Buried - Crossing ROW	Oil	200mm	Metallic	York University Busway	Y	N	N
11.91	12.08	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	York University Busway to Martin Ross Ave	N	Y	N
12.10	12.18	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Martin Ross Ave	Y	Y	N
12.90		Toronto Hydro	OH - Crossing ROW	Electrical	120V/240V, 27.6kV/16kV	Metallic	Steeles Ave W	Y	Y	N
12.93		PowerStream	OH - Crossing ROW	Electrical	Unknown	Metallic	Steeles Ave W	N	Y	N
12.93		Telus	OH - Crossing ROW	Conduit	144F	Metallic	Steeles Ave W	Y	Y	N
12.94		Unknown	OH - Crossing ROW	Electrical	Unknown	Metallic	Steeles Ave W	Y	Y	Y
13.52		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	Highway 407	Y	Y	N
13.55		Hydro One	OH - Crossing ROW	Electrical	500kV	Metallic	Highway 407	Y	Y	N
13.60		Hydro One	OH - Crossing ROW	Electrical	500kV	Metallic	Highway 407	Y	Y	N
14.22		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Highway 7	Y	Y	N
14.24		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Highway 7	Y	Y	Y
14.24		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Highway 7	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
15.53		Powerstream	OH - Crossing ROW	Electrical	27.6/16kV	Metallic	Langstaff Rd	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-3.

6.11.8.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.9 OCS & Bridges: Section BR-4 – Rutherford Station to King City Station

6.11.9.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-80 Section BR-4 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
16.83		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Rutherford Rd	Y	Y	Y
18.09		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Major MacKenzie Dr	Y	Y	N
18.10		York Telecom Network	OH - Crossing ROW	Conduit	96 FOC	Plastic	Major MacKenzie Dr	Y	Y	N
18.11	18.11	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Major MacKenzie Dr	Y	N	N
18.14	18.25	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Major Mackenzie Dr W to Railway St	Y	N	N
18.48		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	McNaughton Rd E	Y	Y	N
19.39		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Teston Road	Y	Y	N
19.39		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Teston Road	Y	Y	N
19.51		York Region	Buried - Crossing ROW	Water	750mm	Metallic	Keele St	Y	N	N
19.51	19.55	Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Keele St	N	Y	N
19.54		City of Vaughan	Buried - Crossing ROW	Sewer	900mm	Metallic	Keele St	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
19.54		Unknown	Buried - Crossing ROW	Ditch Culvert	Unknown	Unknown	Keele St	Y	N	N
19.54		York Telecom Network	OH - Crossing ROW	Conduit	144 FOC	Plastic	Keele St	Y	Y	N
19.55		Bell	Buried - Crossing ROW	Duct Bank	2 ducts	Reinforced Concrete	Keele St	Y	N	N
20.22		Unknown	OH - Crossing ROW	Electrical	Unknown	Metallic	Keele St	Y	Y	Y
20.37		TransCanada	Buried - Crossing ROW	Oil	610mm	Metallic	Kirby Rd	Y	N	N
20.37		TransCanada	Buried - Crossing ROW	Oil	508mm	Metallic	Kirby Rd	Y	N	N
20.38		TransCanada	Buried - Crossing ROW	Oil	762mm	Metallic	Kirby Rd	Y	N	N
20.66		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Kirby Rd	Y	Y	Y
21.07		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Kirby Rd	Y	Y	N
21.38		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	King Vaughan Road	Y	Y	N
21.59		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	King Vaughan Road	Y	Y	N
21.94	22.00	Powerstream	OH - Parallel to ROW	Electrical	Unknown	Metallic	King Vaughan Road	N	Y	N
21.99		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	King Vaughan Road	Y	Y	N
22.68	22.73	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Station Road	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
22.69	22.72	Hydro One	Buried - Parallel to ROW	Electrical	Unknown	Metallic	Station Road	Y	N	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-4.

6.11.9.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.10 OCS & Bridges: Section BR-5 – King City Station to Bathurst Street

6.11.10.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-81 Section BR-5 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
22.73		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Station Road	Y	Y	N
23.26		Unknown	Buried - Crossing ROW	Ditch Culvert	300mm	Other	King Rd	Y	N	N
23.28		Bell	On Bridge	Duct Bank	4 - 12 ducts	Reinforced Concrete	King Rd	Y	Y	Y
23.28		York Telecom Network	OH - Crossing ROW	Conduit	144 Fibre SM Cable	Plastic	King Rd	Y	Y	N
23.30		York Region	Buried - Crossing ROW	Sewer	508mm	Plastic	Keele St	Y	N	N
23.30		Township of King	Buried - Crossing ROW	Storm	300mm	Reinforced Concrete	Keele St	Y	N	N
23.34		Bell	On Bridge	Duct Bank	12 ducts	Reinforced Concrete	Keele St	Y	N	N
24.59		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	Dufferin St	Y	Y	N
26.11		Hydro One	OH - Crossing ROW	Electrical	5kV	Metallic	15th Sideroad	Y	Y	N
26.49		PowerStream	OH - Crossing ROW	Electrical	16 / 27.6kV	Metallic	Bathurst St (South)	N	Y	N
26.49		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Bathurst St (South)	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-5

6.11.10.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.11 OCS & Bridges: Section BR-6 – Bathurst Street to Aurora Station

6.11.11.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-82 Section BR-6 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
26.50		York Telecom Network	Buried - Crossing ROW	Conduit	100mm	Plastic	Bathurst St (South)	Y	N	N
26.52		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Bathurst St (South)	Y	Y	N
26.52		York Region	Buried - Crossing ROW	Water	1800mm	Reinforced Concrete	Bathurst St (South)	Y	N	N
26.52		Bell	OH - Crossing ROW	Conduit	Unknown	Metallic	Bathurst St (South)	Y	Y	N
26.52		Enbridge Gas	Buried - Crossing ROW	Gas	NPS 12	Metallic	Bathurst St (South)	Y	N	N
28.48		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Yonge St	Y	Y	Y
28.49		Rogers	Buried - Crossing ROW	Conduit	Unknown	Plastic	Yonge St	Y	Y	N
29.16	29.72	Powerstream	OH - Parallel to ROW	Electrical	Unknown	Metallic	Engelhard Dr to Wellington St E	N	Y	N
29.17	29.18	Town of Aurora	Buried - Parallel to ROW	Storm	12''	Reinforced Concrete	Engelhard Dr	Y	N	N
29.30	29.36	Powerstream	OH - Parallel to ROW	Electrical	Unknown	Metallic	Engelhard Dr to Dunning Ave	N	Y	N
29.36		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Dunning Ave	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
29.42		Bell	Hardware	Conduit	Unknown	Other	Dunning Ave	N	Y	N
29.42	29.53	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Dunning Ave to Cousins Dr	Y	N	N
29.43	29.71	York Telecom Network	OH - Parallel to ROW	Conduit	48 FOC	Plastic	Industrial Parkway S	N	Y	N
29.49		Powerstream	OH - Crossing ROW	Electrical	27.6kV	Metallic	Cousins Dr	Y	Y	N
29.49	29.53	Bell	Buried - Parallel to ROW	Cable	Unknown	Metallic	Cousins Dr	Y	N	N
29.58		PowerStream	OH - Crossing ROW	Electrical	11kV	Metallic	Connaught Ave.	N	Y	N
29.89		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Aurora GO Station	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-6.

6.11.11.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.12 OCS & Bridges: Section BR-7 – Aurora Station to East Gwillimbury Station

6.11.12.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-83 Section BR-7 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
30.04		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Wellington St E	Y	Y	N
30.20		Unknown	OH - Crossing ROW	Electrical	Unknown	Metallic	Scanlon Ct	Y	Y	N
31.29	32.87	Hydro One	OH - Parallel to ROW	Electrical	Unknown	Metallic	St. John's sideroad to Mulock dr.	Y	Y	N
31.29	32.87	Powerstream	OH - Parallel to ROW	Electrical	Unknown	Metallic	St. John's sideroad to Mulock dr.	Y	Y	N
31.30		PowerStream	OH - Crossing ROW	Electrical	Unknown	Metallic	St Jonh's Sideroad E	Y	Y	Y
32.10		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	Madeline Heights	Y	Y	N
32.76		Newmarket-Tay Power	OH - Crossing ROW	Electrical	13.8kV	Metallic	Mulock Dr	Y	Y	N
32.76		Hydro One	OH - Crossing ROW	Electrical	2 Circuits	Metallic	Mulock Dr	Y	Y	N
32.78		Newmarket-Tay Power	OH - Crossing ROW	Electrical	13.8kV & 44kV	Metallic	Mulock Dr	Y	Y	Y
32.85		Hydro One	OH - Crossing ROW	Electrical	44kV	Metallic	Mulock Dr	Y	Y	N
32.87	32.96	Newmarket-Tay Power	OH - Parallel to ROW	Electrical	44 kV	Metallic	Mulock Dr to Penrose St	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
32.87		Newmarket-Tay Power	OH - Crossing ROW	Electrical	44kV	Metallic	Mulock Dr	Y	Y	Y
32.87	33.54	Hydro One	OH - Parallel to ROW	Electrical	Unknown	Metallic	Mulock Dr to Cotter St	Y	Y	N
32.96		Newmarket-Tay Power	OH - Crossing ROW	Electrical	13.8kV	Metallic	Penrose St	Y	Y	N
33.36		Newmarket-Tay Power	OH - Crossing ROW	Electrical	8kV	Metallic	Oak St	Y	Y	N
33.57		Newmarket-Tay Power	OH - Crossing ROW	Electrical	8kV	Metallic	Water Street	Y	Y	N
33.67		Newmarket-Tay Power	OH - Crossing ROW	Electrical	13.8kV	Metallic	Timothy St	Y	Y	N
33.69	33.87	Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Queen St	Y	Y	N
33.69		Newmarket-Tay Power	OH - Crossing ROW	Electrical	44kV & 13.8 kV	Metallic	Timothy St	Y	Y	N
33.70		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Timothy St	Y	Y	Y
33.76		Newmarket-Tay Power	OH - Crossing ROW	Electrical	13.8kV	Metallic	Timothy St	Y	Y	N
33.87		Hydro One	OH - Crossing ROW	Electrical	44kV	Metallic	Queen St	Y	Y	N
33.87		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Queen St	Y	Y	N
33.94		Rogers	Buried - Crossing ROW	Conduit	Unknown	Plastic	Queen St	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
33.95		Bell	Buried - Crossing ROW	Duct Bank	20 ducts	Reinforced Concrete	Queen St	Y	N	N
33.97		Town of Newmarket	Buried - Crossing ROW	Sewer	450mm	Metallic encasing	Queen St	Y	N	N
34.16		Newmarket-Tay Power	OH - Crossing ROW	Electrical	1x13.8kV, 1x44 kV	Metallic	Davis Dr	Y	Y	N
34.81	34.91	Newmarket-Tay Power	OH - Parallel to ROW	Electrical	13.8kV	Metallic	Deviation Rd to Nokiidaa Bike Trail	N	Y	N
34.81		Newmarket-Tay Power	OH - Crossing ROW	Electrical	44kV & 2 x 13.8 kV	Metallic	Deviation Rd	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-7.

6.11.12.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.13 OCS & Bridges: Section BR-8 – East Gwillimbury Station to Bradford Station

6.11.13.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-84. Section BR-8 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
35.61		Newmarket-Tay Power	OH - Crossing ROW	Electrical	44kV & 13.8kV	Metallic	Green Lane E	Y	Y	N
35.61		York Telecom Network	OH - Crossing ROW	Conduit	48 FOC	Plastic	Green Lane E	Y	Y	N
35.63		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Green Lane E	Y	Y	N
35.63		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Green Lane E	Y	Y	N
35.64		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Green Lane E	Y	Y	N
36.40		York Region	On Bridge	Water	508mm	Plastic	2nd Concession Road	Y	N	N
36.40		York Region	On Bridge	Sewer	335mm	Plastic	2nd Concession Road	Y	N	N
36.43		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	2nd Concession Road	Y	Y	N
37.79	37.81	York Telecom Network	Buried - Parallel to ROW	Conduit	100mm	Metallic encasing	Yonge St	Y	N	N
37.80		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	Yonge St	Y	Y	N
38.82		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	Centennial St	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
39.16		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	Oriole Dr	Y	Y	N
39.36		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Oriole Dr	Y	Y	N
39.36		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Oriole Dr	Y	Y	N
39.43		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	Oriole Dr	Y	Y	N
39.64	39.66	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Holland Landing Rd	Y	Y	N
39.67		Hydro One	OH - Crossing ROW	Electrical	5kv	Metallic	Bathurst St (North)	Y	Y	Y
39.67		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Bathurst St (North)	Y	Y	N
40.49		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Kalver St	Y	Y	Y
40.55	40.72	Hydro One	OH - Parallel to ROW	Electrical	Unknown	Metallic	Toll Rd	N	Y	N
40.72		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Kalver St	Y	Y	N
40.91	40.94	Bell	Buried - Parallel to ROW	Duct Bank	1 duct	Reinforced Concrete	Toll Rd	Y	N	N
40.94		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Toll Rd	Y	Y	N
40.95		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Toll Rd	Y	Y	N
41.05		Powerstream	OH - Crossing ROW	Electrical	11kV	Metallic	Private Dr	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
41.26	41.29	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Bridge st	Y	Y	N
41.27		PowerStream	OH - Crossing ROW	Electrical	5kV	Metallic	Given Rd	Y	Y	N
41.38	41.41	Bell	Buried - Parallel to ROW	Duct Bank	2 ducts	Reinforced Concrete	Given Rd	Y	N	N
41.42		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Given Rd	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-8.

6.11.13.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.14 OCS & Bridges: Section BR-9 – Bradford Station to 13th Line

6.11.14.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-85: Section BR-9 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
41.77	41.88	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Dissette ST	Y	Y	Y
41.98		PowerStream	OH - Crossing ROW	Electrical	11kV	Metallic	Bradford Layover	Y	Y	N
41.98		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Dissette St	Y	Y	N
42.27		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Industrial Rd	Y	Y	N
42.48		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	8th Line	Y	Y	N
42.48		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	8th Line	Y	Y	N
43.38		Hydro One	OH - Crossing ROW	Electrical	5kV	Metallic	9th Line	Y	Y	N
44.35		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	10th Line	Y	Y	N
45.36		Hydro One	OH - Crossing ROW	Electrical	5kV	Metallic	11th Line	Y	Y	N
46.28		Hydro One	OH - Crossing ROW	Electrical	5kV	Metallic	12th Line	Y	Y	N
47.20		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	13th line	Y	Y	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-9.

6.11.14.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.15 OCS & Bridges: Section BR-10 – 13th Line to 6th Line

6.11.15.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-86. Section BR-10 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
48.19		InnPower	OH - Crossing ROW	Electrical	5kV	Metallic	14th Line	Y	Y	N
49.06		InnPower	OH - Crossing ROW	Electrical	11kV	Metallic	Gilford Rd	Y	Y	N
49.26		InnPower	OH - Crossing ROW	Electrical	11kV	Metallic	Shore Acres Dr	Y	Y	N
50.13		InnPower	OH - Crossing ROW	Electrical	11kV	Metallic	2nd Line	Y	Y	N
50.99	51.20	InnPower	OH - Parallel to ROW	Electrical	5kV	Metallic	3rd Line	Y	Y	N
50.99		InnPower	OH - Crossing ROW	Electrical	5kV	Metallic	3rd Line	Y	Y	N
51.90		Unknown	OH - Crossing ROW	Conduit	Unknown	Plastic	Killarney Beach Rd	Y	Y	N
51.90	52.07	InnPower	OH - Parallel to ROW	Electrical	11kV	Metallic	Killarney Beach Rd	Y	Y	N
51.90	52.00	Rogers	OH - Parallel to ROW	Conduit	Unknown	Plastic	Killarney Beach Rd	Y	Y	N
51.91		InnPower	OH - Crossing ROW	Electrical	11kV	Metallic	Killarney Beach Rd	Y	Y	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-10.

6.11.15.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.16 OCS & Bridges: Section BR-11 – 6th Line to Barrie South Station

6.11.16.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-87 Section BR-11 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
54.56		InnPower	OH - Crossing ROW	Electrical	27.6kV	Metallic	7th Line	Y	Y	N
54.56		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	7th Line	Y	Y	N
55.55		InnPower	OH - Crossing ROW	Electrical	44kV / 27.6kV	Metallic	Innisfil Beach Rd	Y	Y	Y
55.55		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	Innisfil Beach Rd	Y	Y	Y
55.56	55.57	County of Simcoe	OH - Parallel to ROW	Conduit	Unknown	Metallic	Innisfil Beach Rd	Y	Y	N
56.59		InnPower	OH - Crossing ROW	Electrical	16kV	Metallic	9th Line	Y	Y	N
57.49		InnPower	OH - Crossing ROW	Electrical	11kV	Metallic	Victoria St / 10th Line	Y	Y	N
57.49	57.56	Rogers	OH - Parallel to ROW	Conduit	Unknown	Plastic	Victoria St / 10th Line	Y	Y	N
58.45		InnPower	OH - Crossing ROW	Electrical	Unknown	Metallic	Lockhart Rd	Y	Y	N
58.46		InnPower	OH - Crossing ROW	Electrical	11kV	Metallic	Lockhart Rd	Y	Y	N
58.53	58.57	City of Barrie	Buried - Parallel to ROW	Storm	Unknown	Reinforced Concrete	Lockhart Rd	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
58.53	58.57	City of Barrie	Buried - Parallel to ROW	Storm	Unknown	Reinforced Concrete	Lockhart Rd	Y	N	N
59.09	59.30	City of Barrie	Buried - Parallel to ROW	Storm	Unknown	Reinforced Concrete	Mapleview Dr E	Y	N	N
59.29		PowerStream	OH - Crossing ROW	Electrical	Unknown	Metallic	Mapleview Dr E	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-11.

6.11.16.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.11.17 OCS & Bridges: Section BR-12 – Barrie South Station to Allandale Waterfront Station

6.11.17.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 6-88 Section BR-12 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
59.52	59.67	City of Barrie	Buried - Parallel to ROW	Storm	Unknown	Reinforced Concrete	Barrie South GO Station	Y	N	N
60.30		Enbridge Gas	Buried - Crossing ROW	Gas	NPS 4	Metallic	Big Bay Point Rd	Y	N	N
60.31		City of Barrie	Buried - Crossing ROW	Water	1200mm	Metallic	Big Bay Point Rd	Y	N	N
60.31		Bell	Buried - Crossing ROW	Duct Bank	6 - 10 ducts	Reinforced Concrete	Big Bay Point Rd	Y	N	N
60.32		City of Barrie	Buried - Crossing ROW	Storm	Unknown	Reinforced Concrete	Big Bay Point Rd	Y	N	N
60.33		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Big Bay Point Rd	N	Y	N
60.33		City of Barrie	Buried - Crossing ROW	Water	900mm	Metallic	Big Bay Point Rd	Y	N	N
61.34	61.42	City of Barrie	Buried - Parallel to ROW	Storm	375mm	Reinforced Concrete	Little Ave	Y	N	N
61.37	61.72	City of Barrie	Buried - Parallel to ROW	Storm	Unknown	Reinforced Concrete	Little Ave to Brennan Ave	Y	N	N
61.60		Powerstream	OH - Crossing ROW	Electrical	Unknown	Metallic	Tollendal Mill Rd	Y	Y	N
62.04		City of Barrie	Buried - Crossing ROW	Storm	300mm	Reinforced Concrete	Minet's Point Rd	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
62.04	62.14	Enbridge Gas	Buried - Parallel to ROW	Gas	Unknown	Metallic	Minet's Point Rd	Y	N	N
62.04		Powerstream	OH - Crossing ROW	Electrical	11kV	Metallic	Minet's Point Rd	Y	Y	N
62.05		Powerstream	OH - Crossing ROW	Electrical	11kV	Metallic	Minet's Point Rd	N	Y	N
62.05	62.07	Powerstream	OH - Parallel to ROW	Electrical	11Kv	Metallic	Minet's Point Rd	Y	Y	N
62.07	62.26	Powerstream	Buried - Parallel to ROW	Electrical	Unknown	Metallic	Minets Point Rd to Barrie Layover	Y	N	N
62.66	62.79	City of Barrie	Buried - Parallel to ROW	Storm	375mm	Reinforced Concrete	Cumberland St to Milburn St	Y	N	N
62.73	63.12	Powerstream	OH - Parallel to ROW	Electrical	Unknown	Metallic	Milburn St to Essa Rd	Y	Y	N
62.74	63.03	Bell	Buried - Parallel to ROW	Duct Bank	6 - 12 ducts	Reinforced Concrete	Milburn St to William St	Y	N	N
62.76	62.79	City of Barrie	Buried - Parallel to ROW	Storm	400mm	Reinforced Concrete	Milburn St	Y	N	N
62.92	62.95	City of Barrie	Buried - Parallel to ROW	Storm	Unknown	Concrete (Unreinforced)	Bayview Dr to Allandale GO Station	Y	N	N
62.92	62.99	City of Barrie	Buried - Parallel to ROW	Storm	Unknown	Concrete (Unreinforced)	Bayview Dr to Allandale GO Station	Y	N	N
62.95	63.08	City of Barrie	Buried - Parallel to ROW	Storm	Unknown	Concrete (Unreinforced)	Allandale GO Station	Y	N	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **6.11.6.1** also apply to BR-12.

6.11.17.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

6.12 EMI & EMF

This section provides a summary of the key potential EMI/EMF effects, mitigation measures, and (resultant) net effects. The impact assessment was carried out using the baseline conditions data summarized in the EMI/EMF Baseline Conditions Report which entailed a survey of existing EMI/EMF conditions throughout the study area including along the rail corridors, feeder routes and at Taps/TPF locations (see **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report**).

Please refer to Appendix J2 for a description of the methodology followed for assessment of EMI/EMF impacts. Additional details can be found in the Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Impact Assessment Report contained in Appendix J2.

The primary effects assessed with regard to electromagnetic compatibility (EMC) relate to human exposure, i.e., Extremely Low Frequency (ELF) Electromagnetic Fields (EMF).

With regard to Electromagnetic Interference (EMI), the primary concern is adverse effects on electronics.

6.12.1 Conservative 10 mG Reassessment Value

As part of carrying out the EMI/EMF Impact Assessment for the TPAP, a conservative value of 10.0 mG magnetic field strength was established as the threshold for which a measured location along the rail corridors or at Taps/TPFs would trigger the recommendation for re-assessing/confirming baseline EMF and EMI measurements during the next phase of the project and before operation commences. This value was based upon the values summarized in **Table 6-89**, which presents information found in *NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power*. Additional supporting technical information may be found in EN 62233:2008, *Measurement Methods for EMF of Household Appliances and Similar Apparatus with Regard to Human Exposure.*

Table 6-89. Typical Magnetic Field Strengths

Electrical Appliances in Home or Office	Magnetic Field Strength
Dishwasher	30 mG (at 30 cm)
Vacuum Cleaner	200 mG (at 30 cm)
Hair Dryer	70 mG (at 30 cm)
Electric Shaver	100 mG (at 30 cm)
Video Display	6 mG (at 30 cm)

Electrical Appliances in Home or Office	Magnetic Field Strength
Other Environmental Sources	
Electric Power Distribution/Subtransmission Lines[22] (4 to 24 kV)	
Within Right-of-Way	10 to 70 mG
Edge of Right-of-Way	N/A
High-Voltage Transmission Lines[23] (115 kV to 500 kV)	
Within Right-of-Way	30 to 87 mG (at 1 metre height above ground)
Edge of Right-of-Way	7 to 29 mG (at 1 metre height above ground)

6.12.2 Barrie Rail Corridor

6.12.2.1 Potential Effects and Mitigation Measures – General

- Radio Frequency EMI from the control system(s) leading to improper operation of electronics on-board the train or in the surrounding neighbourhood.
- Radiated Magnetic Fields and Time-Varying EMFs leading to damage to belongings, i.e., magnetic media, of passengers.
- Induced Current in metallic wires, rail transit tracks, metallic fences, underground communication cables, gas pipelines, and track circuits in neighbouring rail properties leading to contact burns or shocks, or communication errors.
- ELF EMF from the power system(s) leading to effects on workers, passengers, or residents.

Mitigation Measures - General

- Implementation of an EMC Control Plan, the objective of which is to is to facilitate and confirm formal qualification of the electrification system and all its components with respect to the required EMC standards. The components of the EMC Control Plan will include but are not limited to:
    - Characterizes potential EMI sources and hazards to transit/rail operations;
    - Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed);
    - Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.);

[22] As per NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power, these values "can vary considerably depending on the current carried by the line."
[23] Ibid. "During peak loads (about 1% of the time), magnetic fields are about twice as strong as the mean levels" quoted here.

- Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B EMF Modeling and Measurement Tools.;
- Includes (or references) a safety analysis and failure analysis of the transit system;
- Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a key input to the detailed, post-electrification EMI scans taken at each TPF and compared to levels shown in EN 50121.)
- Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions;
- Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.).

- Baseline EMF and EMI measurements before and after system construction and operation.
- Use of ATF power systems.
- Design and installation of the electrification system and all of its components using industry-standard practices, including:
  - Good electrical grounds;
  - Proper shielding;
  - Physical separation, including burial to proper depths; and,
  - The installation of filters, capacitors, and inductors.

6.12.2.2 Net Effects – General

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

6.12.2.3 Potential Effects and Mitigation Measures – Specific Commitments (Barrie)

- No ELF EMF at higher-than-background levels was found along Barrie corridor.
- No EMI signals measured in Barrie emanated from unknown sources.

- Areas requiring special attention in relation to re-assessment of background EMI/EMF levels, as summarized in **Table 6-90**.

Table 6-90 EMI/EMF Commitments – Specific Locations Along Barrie Rail Corridor

Location	Commitment
Allandale, Newmarket, Gilford, and Maple Traction Power Facilities	Re-Assessment of Background EMI
Allandale, Newmarket, Gilford, and Maple Traction Power Facilities	Full Characterization of EMI Profile, using Frequencies Identified in EMC Control Plan and Corresponding Harmonics as per EN 50121.
Allandale, Newmarket, Gilford, and Maple Traction Power Facilities, and Allandale Tap Location	Confirmation/Re-Assessment of ELF EMF

Specific Mitigation Measures – Barrie

As per **Table 6-90**:

- Confirmation/Re-assessment of ELF EMF levels post-electrification, particularly at TPFs.
- Re-assessment of EMI levels post-electrification, specifically at TPFs.

6.12.2.4 Net Effects

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

6.13 Stormwater Management

A Preliminary Stormwater Management Assessment (see **Appendix K – Preliminary Stormwater Management Report** for additional detail) was undertaken at each Tap/TPF site as part of the TPAP to: determine existing and proposed drainage features/patterns, carry out a preliminary flow analysis, establish proposed drainage patterns once the Taps/TPFs are implemented, and to carry out a preliminary assessment of the development impact on drainage (including recommendations for mitigation measures as required). As this preliminary assessment was based on conceptual design information, a more detailed review and SWM analysis will need to be carried out as part of the Detailed Design phase once final design is prepared and additional information (e.g., survey results) is available for each Tap/TPF site.

Please refer to Appendix K for a description of the methodology followed for assessment of stormwater management impacts. Additional details can be found in the Preliminary Stormwater Management Report contained in Appendix K.

With respect to track lowering, it is noted that no adverse impacts to watercourses are anticipated based on the conceptual design developed as part of the TPAP. Similarly, with respect to drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to track lowering activities (or other electrification infrastructure proposed along the corridors) based on the preliminary analysis undertaken as part of the conceptual design work. Notwithstanding this, if environmental impacts are subsequently identified as part of Detailed Design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction.

6.13.1 Preferred and Alternative Allandale Tap Locations and Allandale TPS

The site for the proposed Allandale Tap/TPS is located to the north of the Barrie-Collingwood Railway and west of Highway 400 near the intersection of Tiffin Street and Patterson Road in the City of Barrie, Ontario.

Two options are considered for the Tap location. Either it will be located north of the Tiffin Street adjacent to the existing Hydro One Site which is the preferred location (Option 1) or it will be located immediately north of Barrie-Collingwood Railway, west of Patterson Road which is the alternative location (Option 2).

The proposed site is a tributary to the Hotchkiss Creek and is located within the conservation area of Lake Simcoe Region Conservation Authority (LSRCA). A portion of the preferred Tap location is within the LSRCA regulated area, however the TPS site and alternative Tap location is outside the regulated area.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

6.13.1.1 Hydrologic Analysis

Drainage Areas

The total TPF Assessment Area for the two options mentioned above is approximately 4.31 ha. Within the property parcel areas are designated for the construction and placement of TPS and Tap equipment. The portion of the parcel designated for the TPS equipment, including 0.05 ha for the future access road, is approximately 0.73 ha. Under existing condition, approximately 50 % of the TPS area is paved. Rest of the area is undeveloped open land. A composite runoff coefficient, C, of 0.57 is estimated for 0.73 ha, however for the analysis a C value of 0.5 is assumed for the existing condition.

The area designated for the Tap equipment is approximately 0.4 ha and is an undeveloped land. The estimated runoff coefficient for this area is 0.2.

The proposed development areas and their location shown on **Figure 6-23** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

Figure 6-22 – Allandale Tap/TPS Existing Drainage Conditions

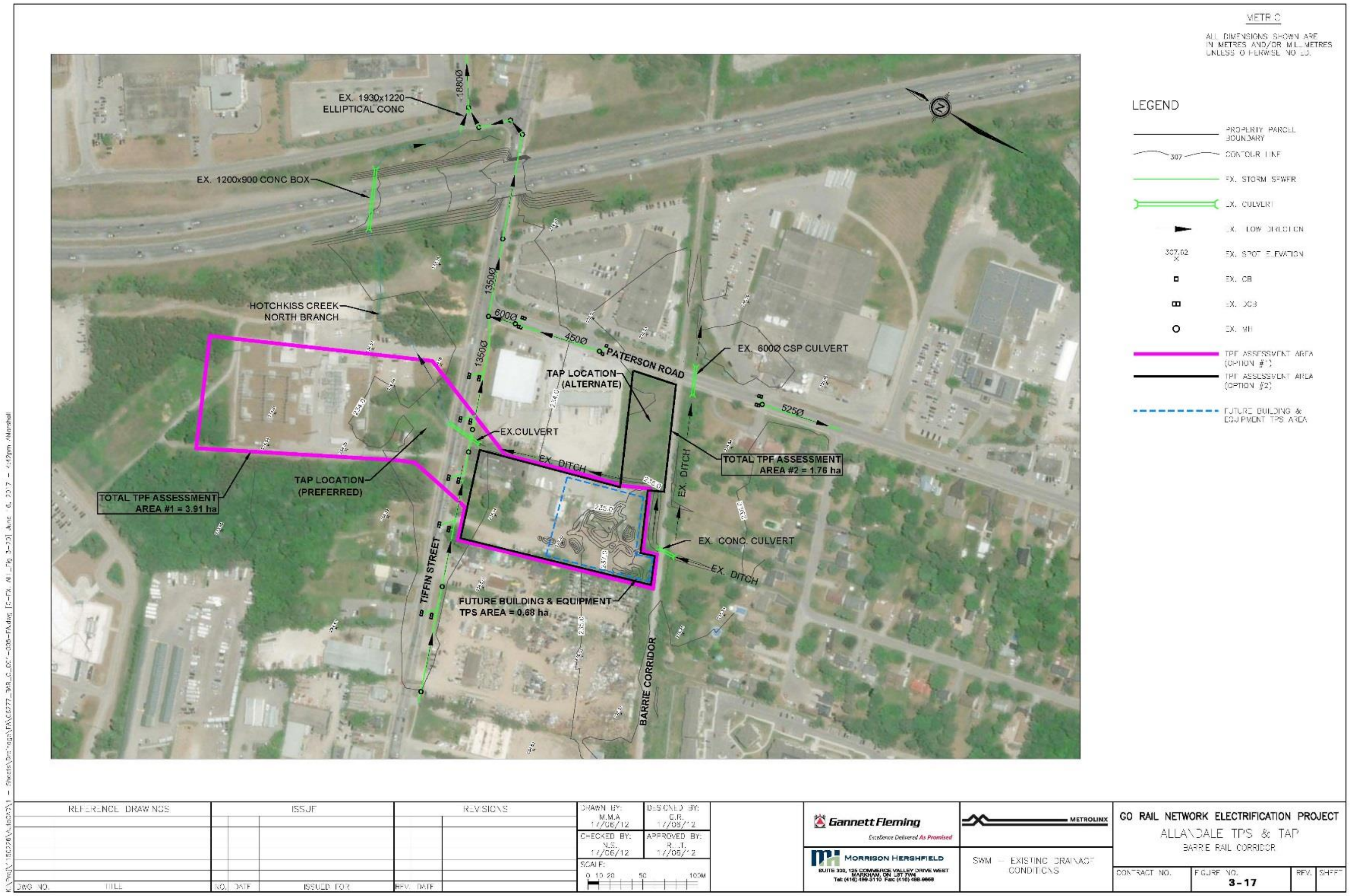
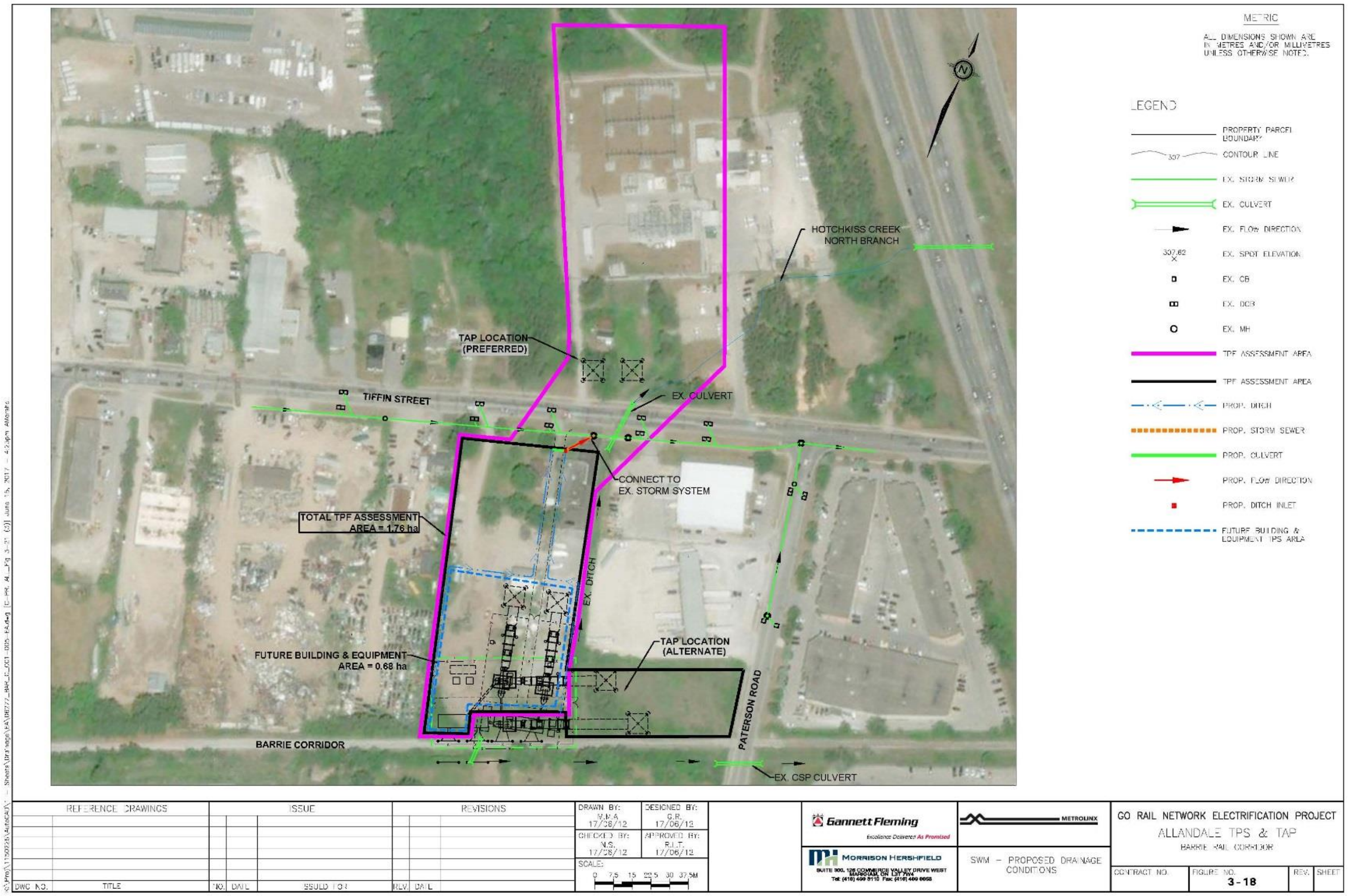


Figure 6-23 – Allandale Tap/TPS Proposed Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 6-91.**

Table 6-91: Allandale Tap/TPS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
TPS Location					
Undeveloped	0.34	0.2	Building	0.02	0.9
Paved Area including future access road area	0.39	0.9	*Access Road	0.09	0.9
			Granular	0.62	0.8
Total/Composite	**0.73 ha @ C = 0.57 Used in the Analysis C = 0.5 OR 43% Impervious**			**0.73 ha @ C = 0.82 Or 89% Impervious**	
TAP Location					
Undeveloped	0.4	0.2	Landscape	0.2	0.2
			Granular	0.2	0.8
Total/Composite	**0.4 ha @ C = 0.2 Or 0 % Impervious**			**0.4 ha @ C = 0.5 Or 43% Impervious**	

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. It can be seen in **Table 6-91** that that there is an increase of 46% and 43% in impervious area for the TPS and Tap locations respectively, and the development will cause increase in the stormwater runoff.

Flows were computed for the 2 year to 100 year storm event using City of Barrie rainfall data. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 10 minutes was used in the flow computations

A more refined flow analysis for the site drainage would be required at Detailed Design phase.

Runoff computations and the Parameters used for the computations and MTO rainfall data are presented in **Appendix K – Preliminary Stormwater Management Report**. Results are summarized below in **Table 6-92**.

Table 6-92: Allandale Tap/TPS - Pre and Post Development Flows

Storm event	TPS Area 0.73 ha			Tap Area 0.4 ha		
	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.028	0.068	0.040	0.003	0.015	0.012
2yr	0.084	0.137	0.053	0.018	0.046	0.028
5yr	0.110	0.180	0.070	0.024	0.061	0.036
10yr	0.128	0.209	0.081	0.028	0.070	0.042
25yr	0.165	0.269	0.104	0.036	0.091	0.054
50yr	0.200	0.316	0.117	0.044	0.109	0.066
100yr	0.228	0.347	0.119	0.050	0.125	0.075

6.13.1.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Allandale Tap/TPS will result in 46 % increase in impervious area for the TPS location and 43 % increase for the Tap location. However the total site area is small (less than 2 ha) and the impervious area is even smaller. From **Table 3-13**, it can be seen that the increase in flows resulting from the construction of the Allandale TPS/tap is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control at the TPS location. To meet City / LSRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can also be used for quantity and quality control. The proposed perimeter ditch will discharge either to the existing ditch or to the existing storm sewer system on Tiffin Street.

It is anticipated that the quantity and quality control criteria will be met by the runoff infiltration within the ditches and the bio-swale.

Quantity and quality control targets for the Tap location will be achieved by the runoff infiltration within the gravel pad and landscaped area for the small amount of runoff.

A more detailed analysis for the quantity, quality, erosion control and water balance will be required at Detailed Design phase.

6.13.1.3 Recommendations

A site visit is needed to assess the existing site condition and land use for a better estimation of the runoff coefficient for Tap location Option 1.

From the hydrological analysis and the consequent discussion, it is concluded that the construction of the Allandale Tap/TPS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures at the site runoff outfalls.

6.13.2 Newmarket SWS

The total TPF Assessment Area is approximately 1.2 ha consisting of a building, parking area and undeveloped area. The portion of the property parcel affected by the construction of future building and gravel pad, for the placement of electrical equipment will be approximately 0.4 ha as shown on **Figure 6-22**. Future access road outside this area will be approximately 0.03 ha. In the subsequent sections of this report only the area affected by the development, including future access road (total of 0.43 ha), is considered for the analysis.

Under existing condition, in general the property parcel drains towards south west to an existing ponding area at the southwest corner of the Assessment Area. The area designated for the SWS is undeveloped field area and drains to an existing ditch, located on the south side of the area, which discharges to the same ponding area.

The outflow from the ponding area keep flowing in west direction to ultimately discharge to the Weslie Creek.

Based on the information extracted from Ontario Soil Survey Report No. 19 by Regional Municipality of York, the soil type for the TPF Property Parcel area is generally Clay Loam (see **Appendix K)**. Detailed geotechnical investigations will be done at Detailed Design phase to precisely determine the soil type

For the existing condition, based on the soil type and land use, the runoff coefficient, 'C' is estimated at 0.3.

The stormwater drainage outlets mentioned above for the site are for both the minor and the major storm runoff. As the external flow contribution to the existing ditches and culverts, and the capacity of the conveyance system is not known, it cannot be determined that these outlets are sufficient and adequate for the runoff from the site to discharge at the existing locations. This will be further investigated at the

Detailed Design phase.For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

6.13.2.1 Hydrologic Analysis

Drainage Areas

The drainage area boundaries, with runoff coefficients, for the existing condition are shown on **Figure 6-24**. The site under existing condition is an undeveloped field area. A runoff coefficient, 'C' of 0.3 is estimated for the site area of 0.43 ha.

The proposed development of Newmarket SWS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be either asphalt or gravel. The rest of the site will be revegetated. The foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.40 ha and for the access road it will be approximately 0.03 ha at the location shown on **Figure 6-25**.

The runoff coefficient for the granular surface is estimated at 0.8 while for the building and access road it is estimated at 0.9. The composite runoff coefficient for the whole site area of 0.43 ha, after development, will be approximately 0.81.

The proposed development areas and their locations, shown on **Figure 6-25,** are based on available conceptual design and may be refined as the design progresses. Therefore if necessary, reassessment of the drainage areas will be required at subsequent Detailed Design phases.

Figure 6-24 – Newmarket SWS Existing Drainage Conditions

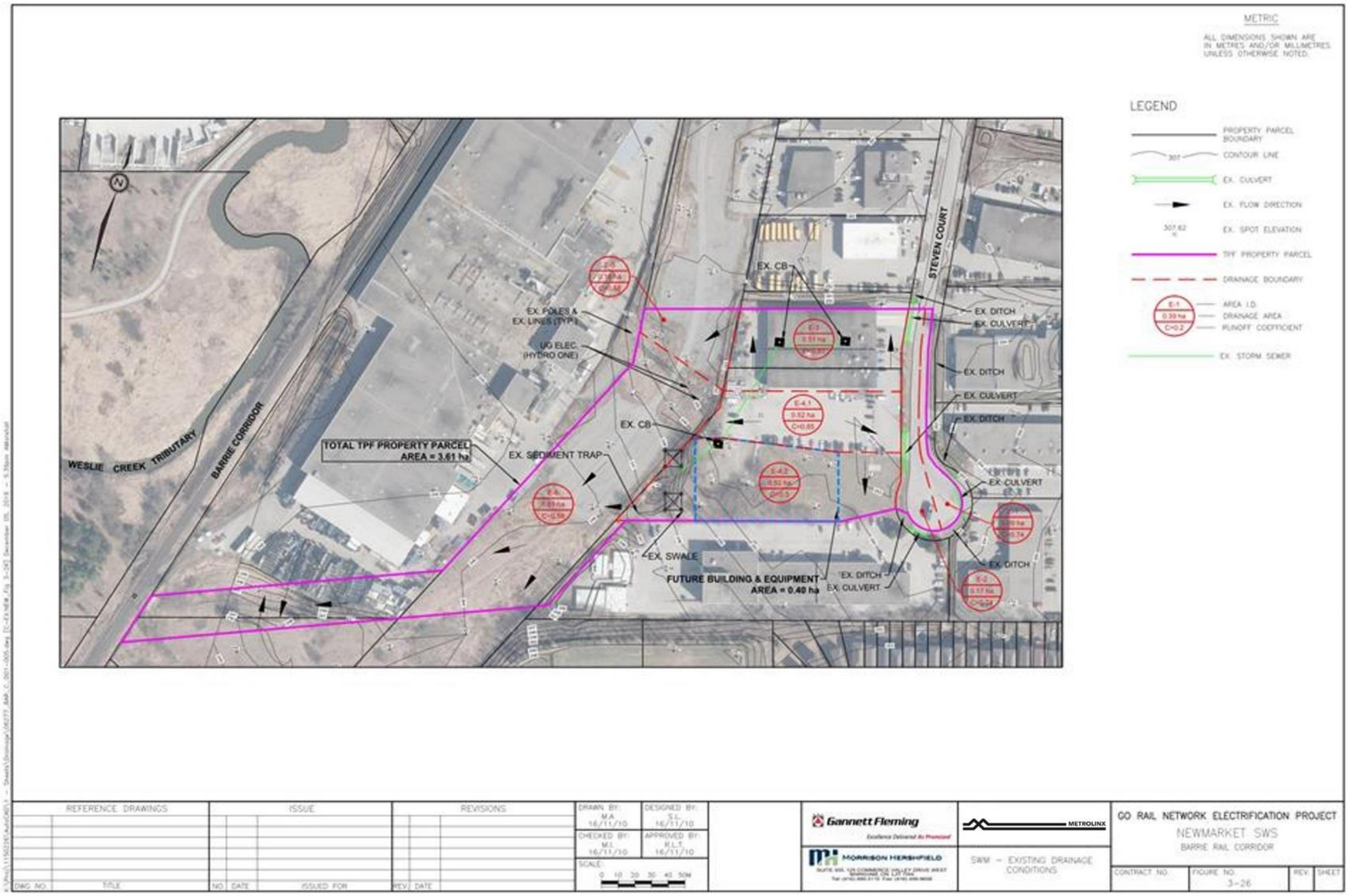
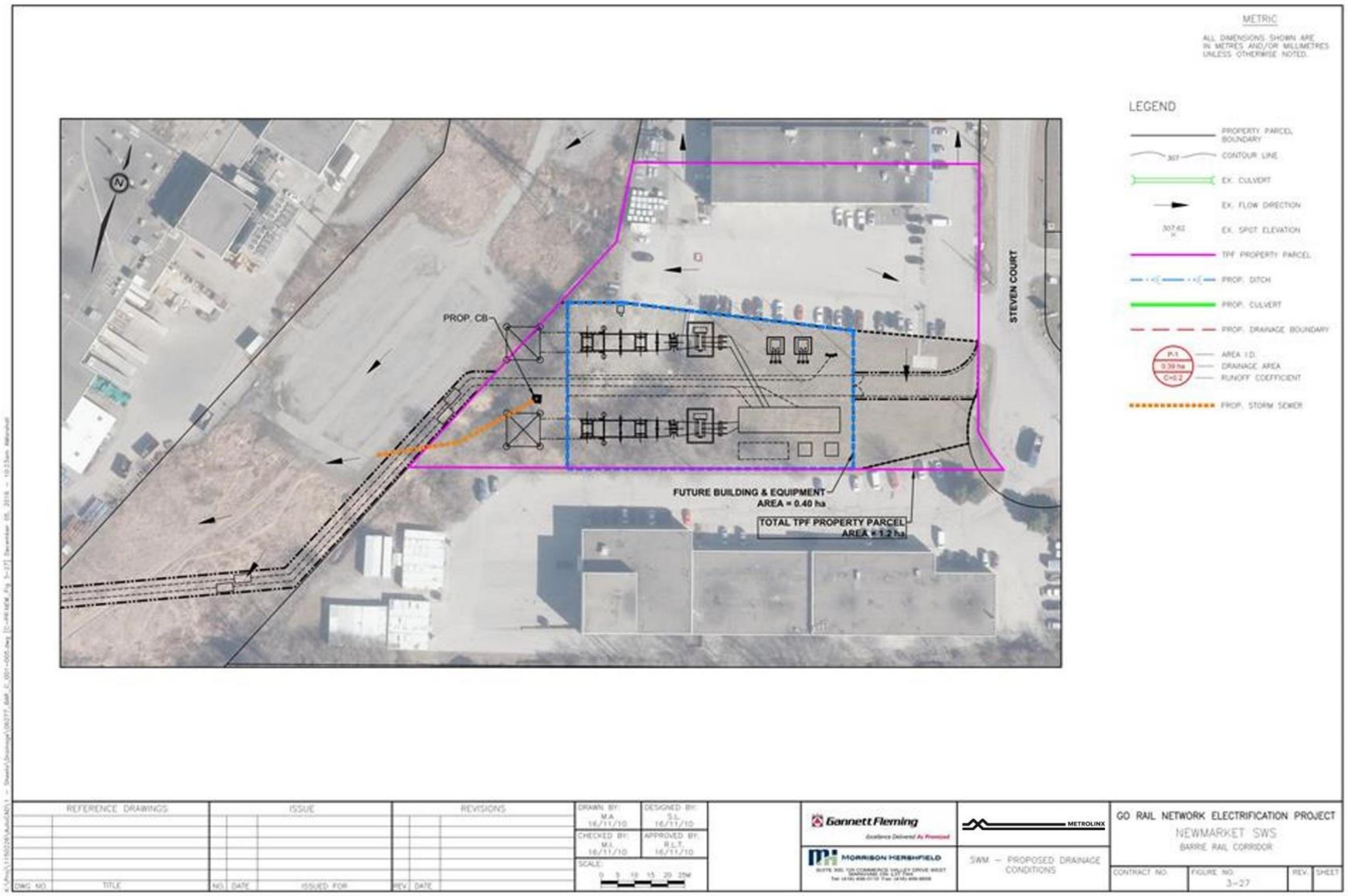


Figure 6-25 – Newmarket SWS Proposed Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are presented below in the following **Table 6-93**.

Table 6-93 Newmarket SWS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped	0.43	0.3	Building	0.02	0.9
			*Access Road	0.03	0.9
			Granular Surface	0.38	0.8
Total/Composite	**0.43**	**0.3 or 14% Impervious**		**0.43**	**0.81 or 87 % Impervious**

** The type of the proposed Access Road is not confirmed. It might be a gravel or asphalt. As a conservative approach, at this stage, it is assumed as asphalt.*

Rational formula was utilized to determine the pre and the post development flows from the site area. Flows were computed for 2 year to 100 year storm event using MTO rainfall data. Runoff computations and the Parameters used for the computations and MTO rainfall data are presented in **Appendix K**. Results are summarized below in **Table 6-94.**

Flow Analysis

Portion of the site area impacted by the development is approximately 0.46 ha and is consisted of a power station building, a gravel pad for the electrical equipment and an access road. It can be seen in **Table 6-93** that the drainage areas are small and the runoffs generated from those area are also small. Therefore the impact of the construction of the station on the drainage will be minimal. The increases of runoff are approximately 28% for various storm events.

Table 6-94 Newmarket SWS - Existing and Proposed Development Flows

Storm event	Exis. Flow m3/s	Proposed Dev Flow m3/s	Flow Increase m3/s
25mm	0.007	0.040	0.033
2yr	0.029	0.079	0.050
5yr	0.041	0.110	0.069
10yr	0.049	0.131	0.083
25yr	0.063	0.171	0.108
50yr	0.082	0.215	0.134
100yr	0.091	0.231	0.140

6.13.2.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Newmarket SWS will result in 73 % increase in impervious area. However, the total site area is very small (0.43 ha) and the impervious area is even smaller. From **Table 6-94**, it can be seen that the increase in flows resulting from the construction of the Newmarket SWS is not substantial, therefore, extensive measures for the quantity, quality or water balance will not be required

A perimeter ditch is proposed around the building and equipment area, and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City / LSRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can be used for quantity and quality control as well. The proposed perimeter ditch will discharge to the existing ponding area to the west as discussed previously in this report.

It is anticipated that the quantity and quality control criteria will be met by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be required at Detailed Design phase.

6.13.2.3 Recommendations

From the hydrological analysis, it is concluded that the construction of the Newmarket SWS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

6.13.3 Gilford PS

The proposed site is a tributary to the Gilford Creek and is located within the jurisdiction of LSRCA regulated area. The site is located approximately one km to the west of the Lake Simcoe.

The existing drainage pattern for the study area is shown on **Figure 6-26**. The total TPF Assessment Area including future access road is approximately 0.22 ha of undeveloped land. The portion of the site area affected by the development, including future access road area, will approximately be 0.10 ha as shown on **Figure 6-27**. Under existing condition, there is no defined drainage system for the site area. Storm water runs overland in the south east direction to Gilford Creek which flows from west to east direction. Further downstream, it runs along the Gilford Road for some distance and then discharges into Lake Simcoe. Gilford Road, which runs adjacent to the site, has a well defined ditch on the south side of the road which flows in east direction to discharge to Gilford Creek. More investigations, at the Detailed Design phase, would determine the outfall locations for the site runoff.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

6.13.3.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 6-26.** The site under existing condition is undeveloped land with no impervious area. A runoff coefficient, 'C' of 0.2 is estimated for the site area of 0.22 ha.

The proposed development of Gilford PS will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be asphalt set at lower grades. The foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.08 ha and for the access road approximately 0.02 ha at the location shown on **Figure 6-27**. The runoff coefficient for the granular surface is estimated 0.8 while for the building and access road it is estimated 0.9. The composite runoff coefficient for the whole site area of 0.22 ha, after development, will be approximately 0.49.

The proposed development areas and their location shown on **Figure 6-27** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

Figure 6-26 – Gilford PS Existing Drainage Conditions

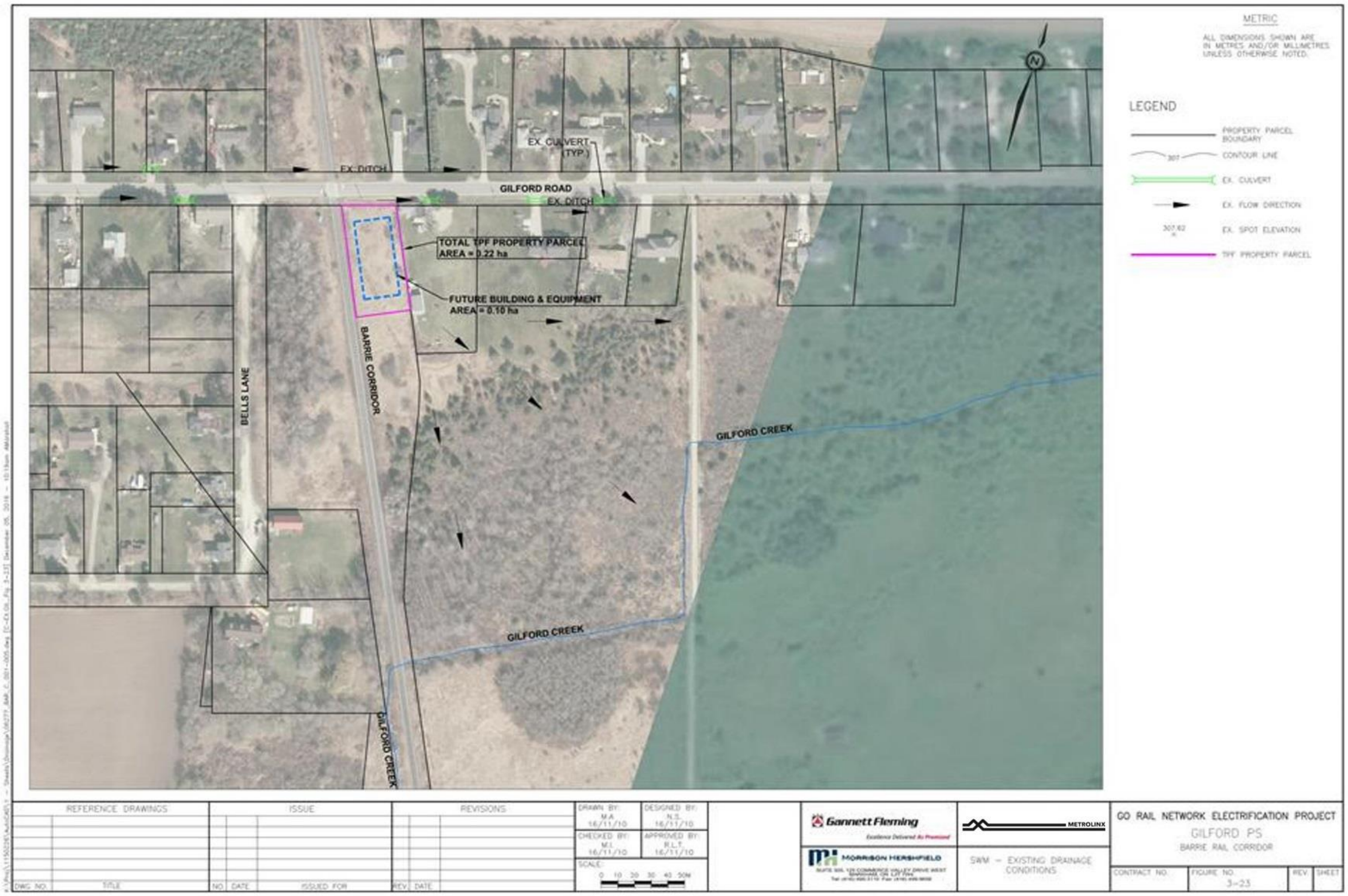
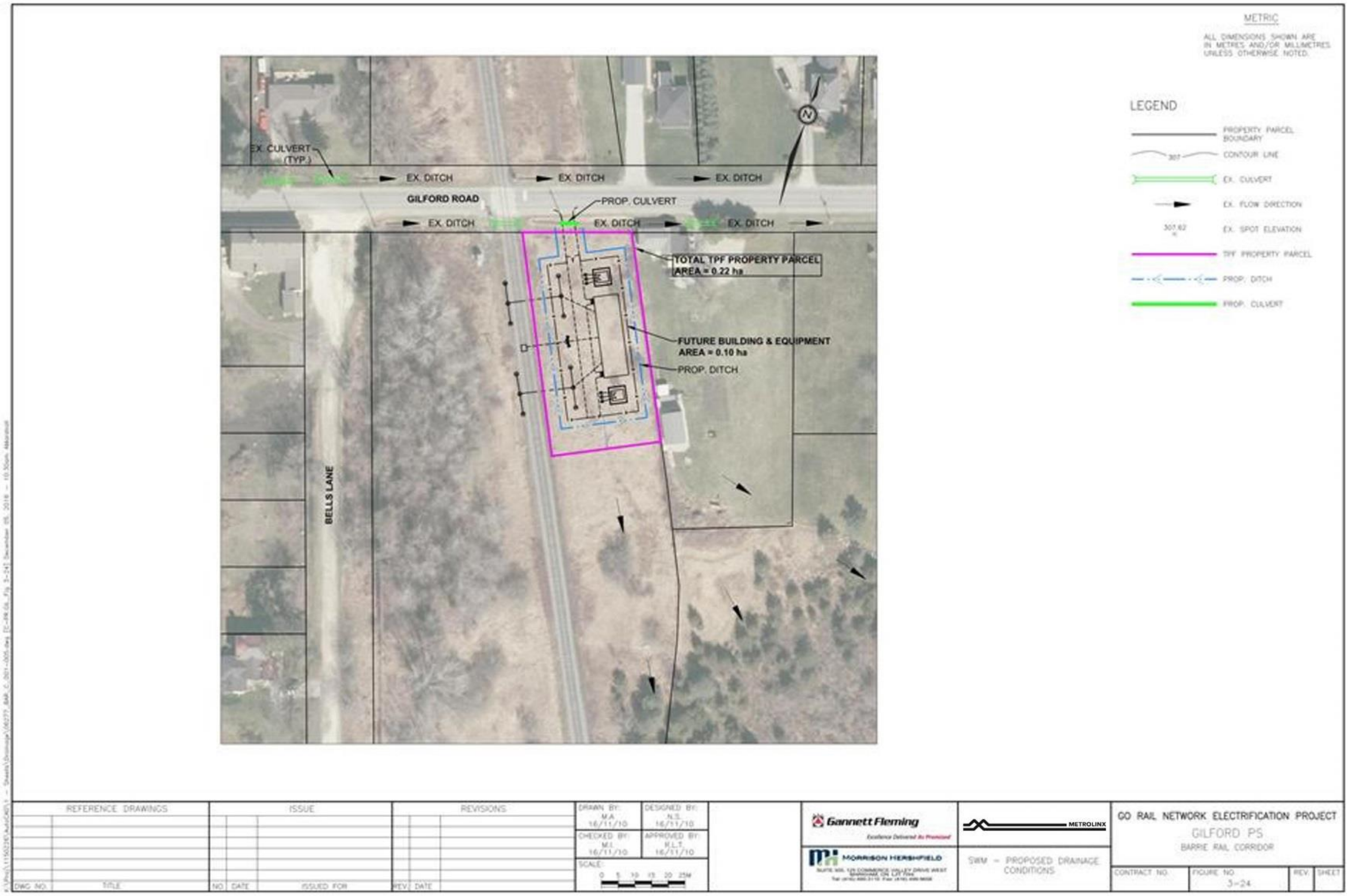


Figure 6-27 – Gilford PS Proposed Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 6-95.**

Table 6-95: Gilford PS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped Including Future Access Road Area	0.22	0.2	Building	0.02	0.9
			*Access Road	0.02	0.9
			Granular	0.06	0.8
			Undeveloped	0.12	0.2
Total/Composite	**0.22**	**0.2 Or 0% Impervious**		**0.22**	**0.49 Or 42%Impervious**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. It can be seen in **Table 6-95** that there is 42% increase in impervious area and the development will cause increase in the stormwater runoff.

Flows were computed for the 2 year to 100 year storm event using MTO rainfall data. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 10 minutes was used in the flow computations

A more refined flow analysis for the site drainage would be required at Detailed Design phase.

Runoff computations and the Parameters used for the computations and MTO rainfall data are presented in Appendix B. Results are summarized below in **Table 6-96**.

Table 6-96: Gilford PS - Existing and Proposed Development Flows

Storm event	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.002	0.008	0.006
2yr	0.009	0.022	0.013
5yr	0.012	0.029	0.017

Storm event	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
10yr	0.014	0.034	0.020
25yr	0.018	0.045	0.026
50yr	0.022	0.054	0.032
100yr	0.025	0.063	0.037

6.13.3.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Gilford PS will result in 42 % increase in impervious area. However the total site area is very small (0.22 ha) and the impervious area is even smaller. Based on this preliminary assessment the increase in flows resulting from the construction of the Gilford PS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City / LSRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can be used for quantity control as well. The proposed perimeter ditch will discharge to the existing Gilford Roadside ditch which flows towards east to discharge to the Gilford Creek.

It is anticipated that the quantity and quality control targets will be achieved by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be provided at Detailed Design phase.

6.13.3.3 Recommendations

As the site is located within the floodplain, the facility should be built 0.3m above the floodplain. Fill below the flood line will need to be compensated with a cut volume for the cut-fill balance. Whether the site can accommodate compensating cut or not is to be finalized during the Detailed Design stage.

External drainage onto and off the site require determination at Detailed Design stage.

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Gilford PS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

6.13.4 Maple PS

Total site area is 2.74 ha and mainly covered by agricultural land with row crops, which is considered to be part of the Rail Corridor. There is no sewer network in the vicinity of the study area, except on the south side of the Keele Street overpass. The road runoff from Keele Street to the north of the overpass and to the east of the site are collected by the road side ditches. Then the ditch flow and the overland flow of the study area drain to the southwest by sheet flow and cross the railway track through two culverts (CSP and culvert: refer to the photos illustrated below and Appendix K). Eventually they enter the tributary of West Don River.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

6.13.4.1 Hydrologic Analysis

Drainage Areas

The drainage area boundaries for the existing condition are shown on **Figure 6-28.** The site under existing condition is an undeveloped agriculture land. A runoff coefficient, 'C' of 0.25 is estimated for the site area of 0.18 ha.

The proposed development of Maple PS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be either asphalt or gravel. The rest of the site will be revegetated. The approximate foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.10 ha and for the access road it will be approximately 0.08 ha at the location shown on **Figure 6-29.** The runoff coefficient for the granular surface is estimated at 0.8 while for the building and access road it is estimated at 0.9. The composite runoff coefficient for the whole site area of 0.18 ha, after development, will be approximately 0.86.

The proposed development areas and their location shown on **Figure 6-29** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

The existing and the proposed drainage areas and runoff coefficients are presented below in the following **Table 6-97**.

Table 6-97 Maple PS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped	0.18	0.25	Building	0.02	0.9
			*Access Road	0.08	0.9
			Granular Surface	0.08	0.8
Total/Composite	**0.18**	**0.25 or 7% Impervious**		**0.18**	**0.86 or 94 % Impervious**

Figure 6-28 – Maple PS Existing Drainage Conditions

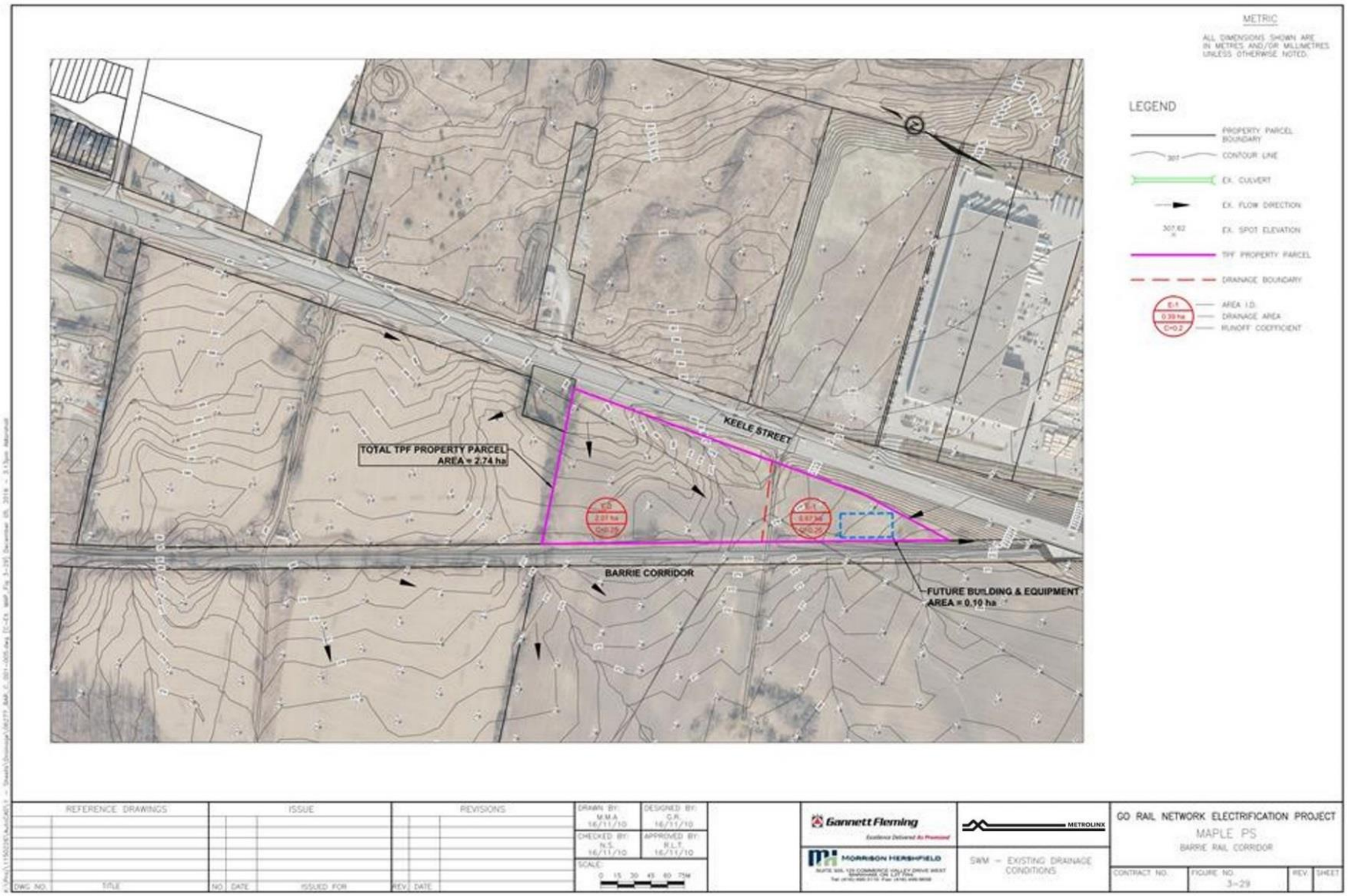
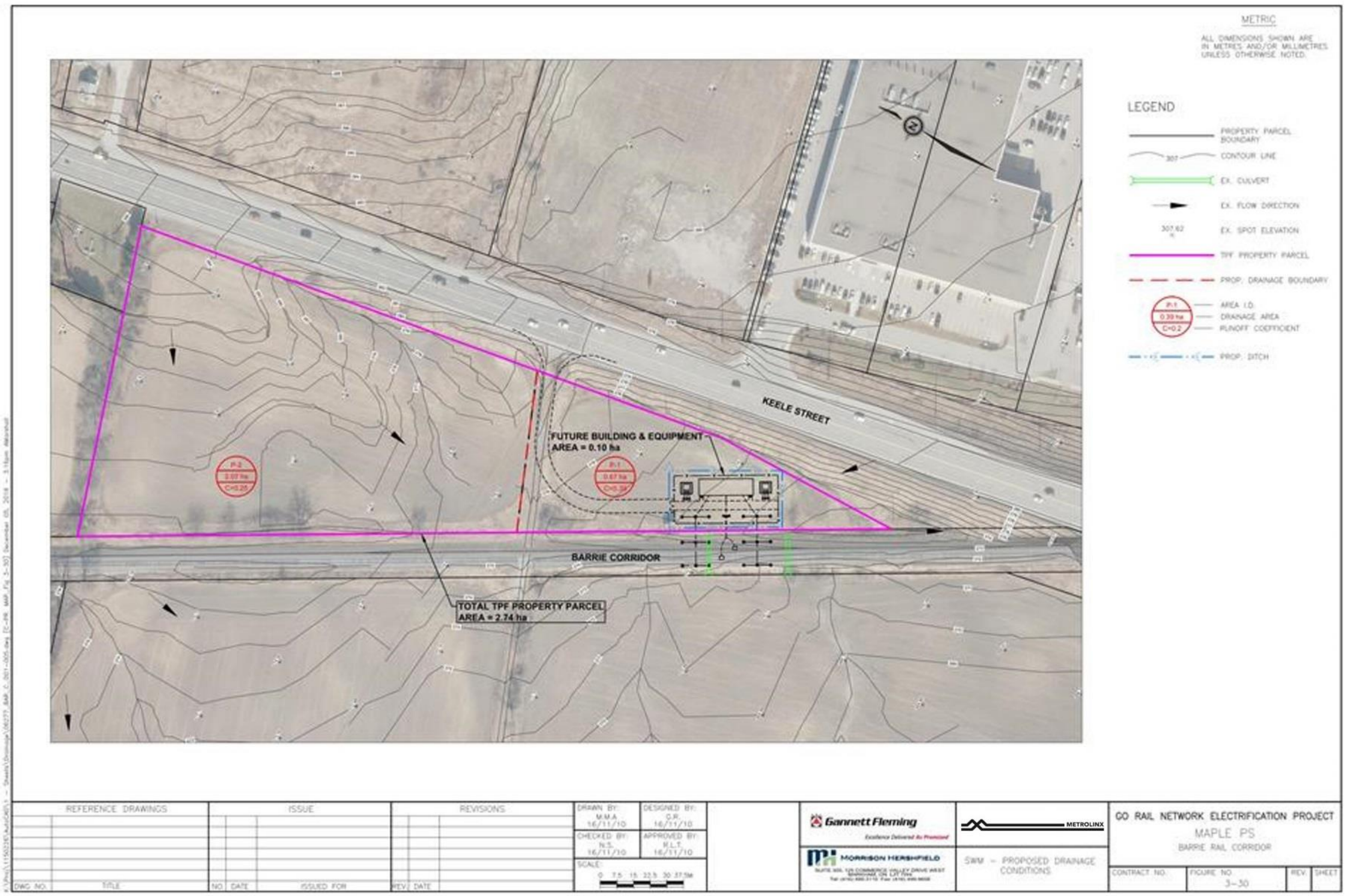


Figure 6-29 – Maple PS Proposed Drainage Conditions



Flow Analysis

Rational formula was utilized to determine the pre and the post development flows from the site area. Flows were computed for 2 year to 100 year storm event using City of Vaughan rainfall data. Runoff computations and the Parameters used for the computations and City of Vaughan rainfall data are presented in **Appendix K**. Results are summarized below in **Table 6-98**.

Table 6-98 Maple PS - Existing and Proposed Development Flows

Storm event	Area Draining to South West		
	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s (%)
25mm	0.002	0.018	0.016
2yr	0.042	0.035	0.025
5yr	0.057	0.048	0.034
10yr	0.066	0.058	0.041
25yr	0.079	0.075	0.053
50yr	0.087	0.088	0.060
100yr	0.096	0.097	0.065

6.13.4.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Maple PS will result in 87 % increase in impervious area. However, the total site area is very small (0.18 ha) and the impervious area is even smaller. From **Table 6-98**, it can be seen that the increase in flows resulting from the construction of the Maple PS is not substantial, therefore, extensive measures for the quantity, quality or water balance will not be required

A perimeter ditch is proposed around the building and equipment area, and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City of Vaughan / TRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can be used for quantity and quality control as well. The proposed perimeter ditch will flow in south west direction to existing culverts which will convey runoff to the west side of the rail corridor as discussed previously in this report.

It is anticipated that the quantity and quality control criteria will be met by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be required at Detailed Design phase.

6.13.4.3 Recommendations

From the hydrological analysis and the consequent discussion presented in this section of the report, it is concluded that the construction of the Maple PS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

6.14 Groundwater and Wells

Please refer to Appendix V for a description of the methodology followed for assessment of groundwater impacts. Additional details can be found in the Groundwater Impact Assessment Report contained in Appendix V.

6.14.1 Preferred and Alternative Allandale Tap Location

6.14.1.1 Potential Effects and Mitigation Measures

There were 36 domestic supply wells, two (2) agricultural supply wells, four (4) industrial/commercial supply wells and one (1) municipal supply well identified within 500 metres of the Preferred and Alternative Allandale Tap location. The surrounding area is characterized by an urban setting and the use of private water wells in this area is likely negligible. Of the identified wells, one (1) domestic supply well, one (1) agricultural supply well and one (1) industrial/commercial supply well are shown as being located within the property boundaries of the Preferred Tap location. It should be confirmed that these wells are not present, or, if present, they should be decommissioned in accordance with Ontario Regulation 903 prior to commencement of any construction activities. There is one (1) waterbody, Bear Creek Wetland, located within 500 metres of the tap location.

The subsurface footprint of the Preferred and Alternate Allandale Tap structure foundations and duct banks are relatively small and shallow (i.e., up to 10 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Bear Creek Wetland. Therefore, no mitigation measures are recommended.

6.14.1.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.2 Allandale TPS

6.14.2.1 Potential Effects and Mitigation Measures

There were 36 domestic supply wells, two (2) agricultural supply wells, four (4) industrial/commercial supply wells and one (1) supply well of unknown type identified within 500 metres of the Allandale traction power station. The surrounding area is characterized by an urban setting and the use of private water wells in this area is likely negligible. Of the identified wells, three (3) domestic supply wells, one (1) agricultural supply well and one (1) industrial/commercial supply well are shown as being located within the property boundaries of the TPS. It should be confirmed that these wells are not present, or, if present, they should be decommissioned in accordance with Ontario Regulation 903 prior to commencement of any construction activities.

There is one (1) waterbody, Bear Creek, located within 500 metres of the TPS location.

The subsurface footprint of the Allandale traction power station grounding grid, gantry foundations and duct banks is relatively small and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Bear Creek. Therefore, no mitigation measures are recommended.

6.14.2.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.3 Barrie-Collingwood 25kV Feeder Route

6.14.3.1 Potential Effects and Mitigation Measures

There were two (2) domestic supply wells, one (1) agricultural supply well, two (2) industrial/commercial supply wells and two (2) municipal supply wells identified within 500 metres of the Barrie-Collingwood 25kV Feeder Route. However, this section is characterized by an urban setting and the use of private water wells is likely negligible. There are two (2) waterbodies, Lake Simcoe and unnamed creek, located within 500 metres of the 25kV Feeder Route.

The Barrie-Collingwood feeder route will commence at the Allandale TPS location and will run east along the Barrie-Collingwood Railway ROW under Highway 400 to the termination limit of electrification at Allandale Waterfront GO Station. During Detailed Design, either an aerial or underground cable design option will be confirmed. The installation of 25kV cables in underground duct banks would be relatively small and shallow and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Lake Simcoe and unnamed creek. Therefore, no mitigation measures are recommended.

6.14.3.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.4 Newmarket SWS

6.14.4.1 Potential Effects and Mitigation Measures

There were four (4) domestic supply wells and two (2) agricultural supply wells identified within 500 metres of the Newmarket switching station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There is one (1) waterbody, Holland River East Branch, located within 500 metres of the SWS location.

The subsurface footprint of the Newmarket switching station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Holland River East Branch. Therefore, no mitigation measures are recommended.

6.14.4.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.5 Gilford PS

6.14.5.1 Potential Effects and Mitigation Measures

There were 20 domestic supply wells and two (2) supply wells of unknown type identified within 500 metres of the Gilford paralleling station. The surrounding area is characterized by rural setting with likely private water well use. There are two (2) waterbodies, White Birch Creek and Gilford Creek, located within 500 metres of the tap location.

The subsurface footprint of the Gilford paralleling station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including White Birch Creek and Gilford Creek. Therefore, no mitigation measures are recommended.

6.14.5.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.6 Maple PS

6.14.6.1 Potential Effects and Mitigation Measures

There were eight (8) domestic supply wells and two (2) industrial/commercial supply wells identified within 500 metres of the Maple paralleling station. The surrounding area is characterized by a mixed urban and rural setting with possible private water well use. There is one (1) waterbody, an unnamed pond, located within 500 metres of the rail corridor.

The subsurface footprint of the Maple paralleling station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including the unnamed pond. Therefore, no mitigation measures are recommended.

6.14.6.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.7 OCS & Bridges: Section BR-1 – Parkdale Junction to Caledonia Station

6.14.7.1 Potential Effects and Mitigation Measures

There was one (1) industrial/commercial supply well identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There were no waterbodies identified within 500 metres of the rail corridor in this section.

There are four (4) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at Dundas Street, Innes Avenue, St. Clair Avenue West, and Eglinton Avenue. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.
- Track lowering at Dundas Street. No adverse effect on groundwater is anticipated; however, this will be assessed during the Detailed Design phase for the affected structure.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells or groundwater. Therefore, no mitigation measures are recommended.

6.14.7.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.8 OCS & Bridges: Section BR-2 – Caledonia Station to Downsview Park Station

6.14.8.1 Potential Effects and Mitigation Measures

There was one (1) domestic supply well and one (1) agricultural supply well identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There is one (1) waterbody, Maple Leaf Creek, located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation of flash plates, bridge barriers and OCS wires at Highway 401. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.
- Track lowering at Highway 401. No adverse effect on groundwater is anticipated; however, this will be assessed during the Detailed Design phase for the affected structure.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Maple Leaf Creek. Therefore, no mitigation measures are recommended.

6.14.8.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.9 OCS & Bridges: Section BR-3 – Downsview Park Station to Rutherford Station

6.14.9.1 Potential Effects and Mitigation Measures

There were 28 domestic supply wells, seven (7) industrial/commercial supply wells, one (1) agricultural supply well, two (2) municipal supply wells, and two (2) supply wells of unknown type identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are three (3) waterbodies, an unnamed pond, Don River West Branch, and Westminster Creek, located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation OCS wires at Highway 407. This modification will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including the unnamed pond, Don River West Branch, and Westminster Creek. Therefore, no mitigation measures are recommended.

6.14.9.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.10 OCS & Bridges: Section BR-4 – Rutherford Station to King City Station

6.14.10.1 Potential Effects and Mitigation Measures

There were 72 domestic supply wells, 22 industrial/commercial supply wells, six (6) agricultural supply wells and four (4) municipal supply wells identified within 500 metres of the rail corridor in this section. The section is characterized by a mixed urban and rural setting with possible private water well use. There are three (3) waterbodies, King-Vaughan Wetland Complex, Don River West Branch, and East Humber River, located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and OCS wires at Keele Street. These modifications will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including King-Vaughan Wetland Complex, Don River West Branch, and East Humber River. Therefore, no mitigation measures are recommended.

6.14.10.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.11 OCS & Bridges: Section BR-5 – King City Station to Bathurst Street

6.14.11.1 Potential Effects and Mitigation Measures

There were 53 domestic supply wells, one (1) agricultural supply well, four (4) commercial/industrial supply wells and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. The section is characterized by a mixed urban and rural setting with possible private water well use. There are three (3) waterbodies, Eaton Hall-Mary-Hackett Lakes Wetland Complex, King-Vaughan Wetland Complex, and East Humber River, located within 500 metres of the rail corridor.

There are three (3) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at King Road, Keele Street, and Bathurst Street. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Eaton Hall-Mary-Hackett Lakes Wetland Complex, King-Vaughan Wetland Complex, and East Humber River. Therefore, no mitigation measures are recommended.

6.14.11.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.12 OCS & Bridges: Section BR-6 – Bathurst Street to Aurora Station

6.14.12.1 Potential Effects and Mitigation Measures

There were 113 domestic supply wells, four (4) agricultural supply well, one (1) commercial/industrial supply well and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. The section is characterized by a mixed urban and rural setting with possible private water well use. There is one (1) waterbody, Holland River East Branch, located within 500 metres of the rail corridor.

There are no bridge modifications in this section of the rail corridor.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Holland River East Branch. Therefore, no mitigation measures are recommended.

6.14.12.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.13 OCS & Bridges: Section BR-7 – Aurora Station to East Gwillimbury Station

6.14.13.1 Potential Effects and Mitigation Measures

There were 15 domestic supply wells, eight (8) agricultural supply wells, two (2) commercial/industrial supply wells, two (2) municipal supply wells, and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. However, the section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There are five (5) waterbodies, Aurora (McKenzie) Marsh Wetland Complex, Newmarket Wetland, Rogers Reservoir, Holland River East Branch, and Clubinis Creek, located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation of flash plates and bridge barriers at Queen Street. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Aurora (McKenzie) Marsh Wetland Complex, Newmarket Wetland, Rogers Reservoir, Holland River East Branch, and Clubinis Creek. Therefore, no mitigation measures are recommended.

6.14.13.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.14 OCS & Bridges: Section BR-8 – East Gwillimbury Station to Bradford Station

6.14.14.1 Potential Effects and Mitigation Measures

There were 142 domestic supply wells, five (5) agricultural supply wells, 22 commercial/industrial supply wells, three (3) municipal supply wells and five (5) supply wells of unknown type identified within 500 metres of the rail corridor in this section. The section is characterized by a mixed urban and rural setting with possible private water well use. There are three (3) waterbodies, Rogers Reservoir, Holland Marsh Wetlands Complex, and Holland River East Branch, located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation of OCS wires at Holland River. This modification will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Rogers Reservoir, Holland Marsh Wetlands Complex, and Holland River East Branch. Therefore, no mitigation measures are recommended.

6.14.14.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.15 OCS & Bridges: Section BR-9 – Bradford Station to 13th Line

6.14.15.1 Potential Effects and Mitigation Measures

There were 29 domestic supply wells, three (3) agricultural supply wells, eight (8) commercial/industrial supply wells and one (1) municipal supply well, identified within 500 metres of the rail corridor in this section. The section is characterized by a mixed urban and rural setting with possible private water well use. There are two (2) waterbodies within this segment, Holland Marsh Wetlands Complex and Holland River West Branch, located within 500 metres of the rail corridor.

There are no bridge modifications in this section of the rail corridor.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Holland Marsh Wetlands Complex and Holland River West Branch. Therefore, no mitigation measures are recommended.

6.14.15.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.16 OCS & Bridges: Section BR-10 – 13th Line to 6th Line Section

6.14.16.1 Potential Effects and Mitigation Measures

There were 189 domestic supply wells, three (3) commercial/industrial supply wells, one (1) municipal supply well and 15 supply wells of unknown type identified within 500 metres of the rail corridor in this section. This section is characterized by a primarily rural setting with likely private water well use. There are seven (9) waterbodies, Holland Marsh Wetlands Complex, Carson Creek, Gilford Creek, White Birch Creek, Belle Aire Creek, Wilson Creek, Wilson Creek Marsh, Little Cedar Point (wetland), and Holland River West Branch, located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation of flash plates and bridge barriers at 6th Line. These modifications will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Holland Marsh Wetlands Complex, Carson Creek, Gilford Creek, White Birch Creek, Belle Aire Creek, Wilson Creek, Wilson Creek Marsh, Little Cedar Point (wetland), and Holland River West Branch. Therefore, no mitigation measures are recommended.

6.14.16.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.17 OCS & Bridges: Section BR-11 – 6th Line to Barrie South Station

6.14.17.1 Potential Effects and Mitigation Measures

There were 84 domestic supply wells, three (3) agricultural supply wells, three (3) commercial/industrial supply wells, two (2) municipal supply wells, and one (1) supply wells of unknown type identified within 500 metres of the rail corridor in this section. The section is characterized by a mixed urban and rural setting with possible private water well use. There are three (3) waterbodies, St. Paul's Swamp, Hewitt's Creek, and Banks Creek, located within 500 metres of the rail corridor.

There are no bridge modifications in this section of the rail corridor.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including St. Paul's Swamp, Hewitt's Creek, and Banks Creek. Therefore, no mitigation measures are recommended.

6.14.17.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

6.14.18 OCS & Bridges: Section BR-12 – Barrie South Station to Allandale Waterfront Station

6.14.18.1 Potential Effects and Mitigation Measures

There were 139 domestic supply wells, two (2) agricultural supply wells, six (6) commercial/industrial supply wells, five (5) municipal supply wells and six (6) supply wells of unknown type identified within 500 metres of the rail corridor in this section. This section is characterized by a mixed urban and rural setting with possible private water well use. There are three (3) waterbodies, Lake Simcoe, Whiskey Creek, and Lovers Creek, located within 500 metres of the rail corridor.

There are three (3) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and OCS wires at Big Bay Point Road, Cox Mill Road, and Tollendale Creek. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Lake Simcoe, Whiskey Creek, and Lovers Creek. Therefore, no mitigation measures are recommended.

6.14.18.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7 Impact Assessment - Stouffville Corridor

7.1 Natural Environment

Vegetation Clearing Zone

As described in Volume 1, a Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the 5m OCS Impact Zone plus an additional 2 metre offset area on either side of the OCS components. As a result, the total clearing area is defined as 7 metres measured from the centerline of the outermost tracks to be electrified on either side of each rail corridor. The 7 metre zone is considered a maximum removal zone; during Detailed Design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

As part of the TPAP, the following approach was taken to assess potential ecological impacts associated with the required vegetation removal for the Electrification Project. There were two components to the analysis:

1. Identification of ecological impacts related to vegetation removals, and
2. Characterization of the extent of tree removals.

Approach/Methodology for Assessing Ecological Impacts

To classify potential ecological impacts due to vegetation removal, they were categorized as either: ***negligible, low, moderate, or high*** based on the rationale outlined below. Using Geographic Information Systems (GIS) technology, Ecological Land Classification (ELC) communities along the corridors/feeder routes were mapped (via aerial photo interpretation as part of the baseline conditions phase), and the areas (in hectares [ha]) of potential vegetation removal (including trees) were calculated for each type of ELC community within a given corridor segment. It should be noted that the assessment did not entail field surveys or ground trothing to delineate impact areas within the vegetation clearing zone. However field investigations were undertaken along corridor sections identified within the *GO Rail Network Electrification TPAP - Natural Environmental Baseline Conditions Report* (Future/Work & Commitments section) to assess habitat suitability within various ELC communities to be affected.

In order to further characterize tree removals specifically, the extent of tree removals within each ELC community was categorized as ***minor, fair, or extensive*** based on the canopy cover within each respective ELC community (see **Table 7-1** below).

- Where canopy cover is minimal (<10%) or limited (10-20%), the extent of removals is considered ***minor.***
- For areas with intermediate (20-70%) canopy cover, the extent of tree removals is considered ***fair.***

- For communities with high (>70%) canopy cover, tree removals are anticipated to be ***extensive.***

Table 7-1: Extent of Tree Removals

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Agriculture (AG)	AG communities include intensive and non-intensive farming. Intensive practices includes cultivated field producing crops (e.g. corn and wheat) and specialty agricultural crops (e.g. orchards, and nurseries). Non-intensive fields are dominated with herbaceous vegetation and grasses primarily used for pasture and grazing areas. Treed areas may be located along the perimeter of AG communities. AG communities contain minimal (<10%) canopy cover	Minor	Vegetation removals within AG lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Commercial and Institutional (CVC)	CVC communities contain constructed areas, including businesses, light industry, heavy industry, educational and health buildings, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Constructed (CV)	CV communities contain constructed areas, including light and heavy industry, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Transportation and Utility (CVI)	CVI communities include roads, highways, right of ways, railways, airports, and sewage treatment facilities, and are dominated by non-native grasses and	Minor	Vegetation removals with CVI lands are considered to have negligible ecological impact since the affected areas provide limited to no habitat for wildlife.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	herbaceous species common to disturbed habitat. CVI communities contain minimal (<10%) canopy cover.		
Residential (CVR)	CVR communities include low to high residential housing, rural property, single family homes, and trailer parks, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. Due to the presence of treed areas along the boundary between the CVI and CVR communities, the canopy cover within the impacted areas is considered intermediate (20-70%).	Fair	Vegetation removals with CVR lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Green Land (CGL)	CGL communities are composed of open areas such as parks, golf courses, playing fields, picnic areas, and cemeteries, and are primarily dominated by non-native grass species (Kentucky Blue Grass), as well as herbaceous species common to disturbed habitat. CGL communities contain varying levels of canopy cover from minimal (<10%) to limited (10-20%) dependent on the community.	Minor	Vegetation removals with CGL communities are considered to have a low ecological impact since these communities provide limited to no habitat for wildlife.
Cultural Meadow (CUM)	CUM communities result from, or are maintained by, cultural or anthropogenic-based disturbances and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CUM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CUM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Red Pine Coniferous Plantation (CUP)	CUP communities greater than 75% coniferous tree composition. CUP communities generally contain high (>70%) canopy cover.	N/A	Vegetation removals within the CUP communities are considered to have a low ecological impact.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Cultural Woodland (CUW)	CUW communities are culturally influenced and contain high (>70%) canopy cover.	Extensive	Vegetation removals within CUW communities have low ecological impacts.
Treed Agriculture (TAG)	TAG communities include coniferous, deciduous and mixed plantations, treed pastures and fencerows. TAG communities contain TAG communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the TAG communities are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Deciduous Thicket (THD)	THD communities contain some shrub and tree cover. The communities are culturally influenced and dominated by non-native and invasive species. THD communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the THD communities are considered to have low ecological impact as the areas affected provide limited wildlife habitat.
Deciduous Forest (FOD)	FOD communities contain are dominated by deciduous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Forest (FOM)	FOM communities contain >60% tree cover and dominated by a mix of deciduous and coniferous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOM communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Marsh (MA)	MA communities are dominated by emergent hydorphytic macrophytes with some tree and shrub cover. MA communities	Minor	Vegetation removals within MA communities have varying levels of ecological impacts, ranging from low to high and are

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	contain minimal (<10%) canopy cover.		dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Meadow Marsh (MAM)	MAM communities represent areas that experience seasonal flooding, and contain species that are less tolerant of prolonged flooding. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within the MAM communities have varying levels of ecological impacts, ranging from low to moderate and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, and wildlife habitat suitability.
Shallow Marsh (MAS)	MAS communities are restricted to facultative and obligate wetland plants. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MAS communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Meadow (MEM)	MEM communities contain a mix of grass-like and broadleaf species and include non-native and invasive species. MEM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with MEM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Open Shoreline (SHO)	SHO communities are associated with and adjacent to permanent or ephemeral water and subject to active shoreline processes. Vegetation cover varies from patchy to barren to more closed and treed. SHO communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within SHO communities result in a moderate ecological impact and as they contain specialized habitat for wildlife.
Open Water (OA)	OA communities include watercourses, rivers, streams, and ponds.	N/A	There are no footprint impacts associated with OA communities as all OCS components will be

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
			attached to bridge structures and no vegetation removals are required in these areas.
Swamp (SW)	SW communities contain tree or shrub cover with variable flooding regimes and areas with standing water. SW communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within SW communities have varying levels of ecological impacts, ranging from moderate to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Swamp (SWM)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWM communities contain tree both deciduous and coniferous composition. SWM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals with SWM lands are considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.
Deciduous Swamp (SWD)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWD communities contain deciduous content. SWD communities generally contain high (>70%) canopy cover.	Extensive	There are no anticipated impacts to this community.
Deciduous Woodland (WOD)	WOD communities contain semi-closed tree cover and are dominated by mid-aged deciduous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within WOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Mixed Woodland (WOM)	WOM communities contain semi-closed tree cover and are dominated by mid-aged deciduous and coniferous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within the WOM community is considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.

Additional details can be found in the Natural Environment Impact Assessment Report contained in **Appendix A2.**

7.1.1 Scarborough Tap Location

7.1.1.1 Potential Effects and Mitigation Measures

7.1.1.1.1 Terrestrial

The proposed Tap Location will include two structures with an approximate footprint of 10m^2 and up to 30m tall and include a 25kV feeder route to facilitate tapping the Hydro One transmission line.

Impacts Related to TPF Vegetation Clearing

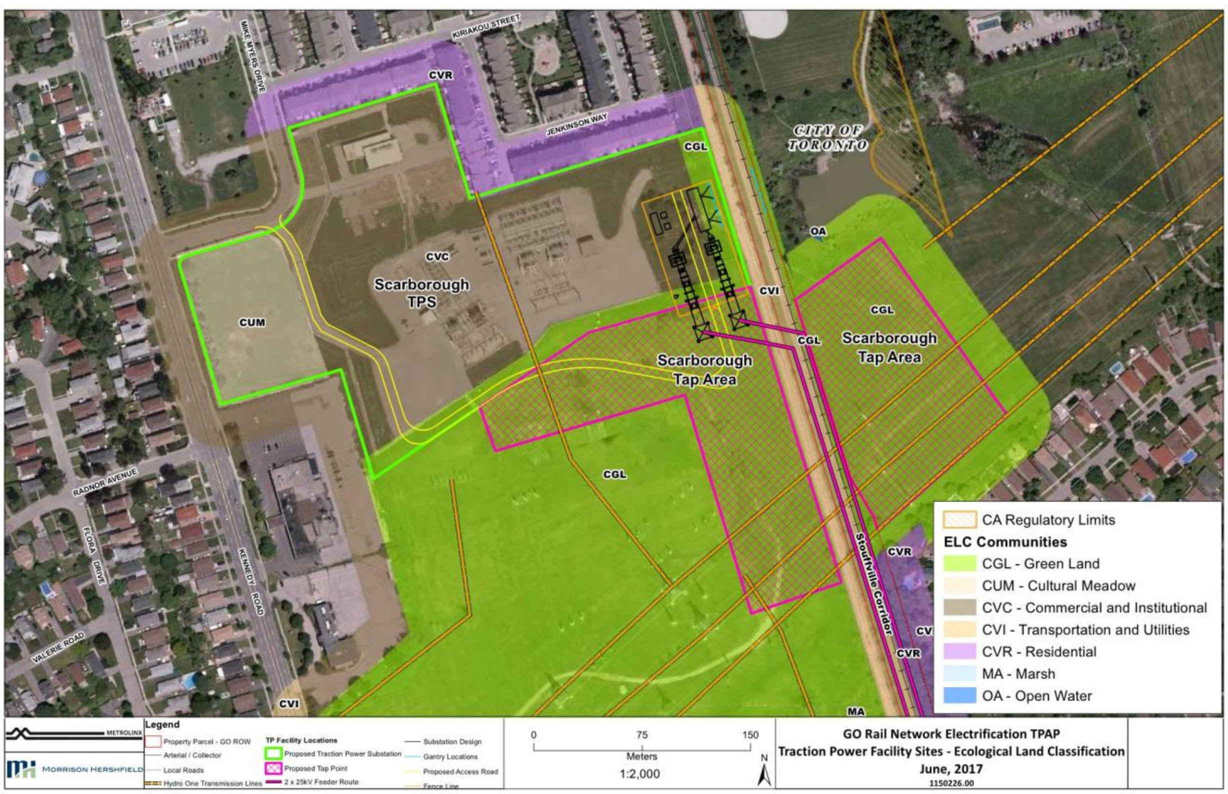
Vegetation removal areas for Scarborough Tap Location are presented in **Table 7-2**. As depicted in **Figure 7-1** the footprint impacts associated with the Tap Location are located mainly within Green Lands (CGL) which contain mostly turf grass with sparse tree cover, including Kentucky Blue Grass, Blue Spruce, and Norway Maple. A small portion of Transportation and Utilities (CVI) area will be impacted and contains non-native and invasive species commonly found in disturbed areas and edge habitats, including Tall Goldenrod, and Common Buckthorn. These areas do not provide any habitat for wildlife and ecological impacts to these areas are considered low. Due to the minimal/limited canopy cover within the CGL and CVI communities, the extent of tree removals in this area is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for migratory birds is identified below. No vegetation clearing within the Cultural Meadow (CUM), Residential (CVR), Meadow Marsh (MAM), Marsh (MA) or Commercial and Institutional (CVC) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

Table 7-2: Summary of Vegetation Removal Areas within ELC Communities – Scarborough Tap Location*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Transportation and Utilities (CVI)	0.045	Minor
Green Land (CGL)	3.57	Minor
Cultural Meadow (CUM)	0	N/A
Commercial and Institutional (CVC)	0	N/A
Residential (CVR)	0	N/A
Meadow Marsh (MAM)	0	N/A
Marsh (MA)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 7-1 Footprint Impacts Ecological Land Classification - Scarborough Tap/TPS



Mitigation Measures

Hydro One must maintain specific clearances between lines and trees/vegetation to prevent tree caused outages and electrocutions and therefore any trees removed from the TAP location will not be replaced.

However, considerations for plantings that are compatible with transmission lines may be considered. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to migratory birds:

- Compliance with the Migratory Birds Convention Act (MBCA).

7.1.1.1.2 Aquatic

There are no aquatic features within the Tap property parcel, and therefore no aquatic footprint impacts.

7.1.1.1.3 Species at Risk

There are no Species at Risk or Species at Risk habitat identified within the Tap property parcel and therefore no footprint impacts.

7.1.1.1.4 Designated Areas

There are no Designated Areas within the Tap property parcel, and therefore no footprint impacts.

7.1.1.2 Net Effects

7.1.1.2.1 Terrestrial

There are no net adverse effects to the CUM, CVR, MAM, or CVC communities as there are no anticipated impacts to these areas. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the Tap Location as the CGL and CVI communities do not provide suitable habitat for wildlife.

7.1.1.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the Tap property parcel.

7.1.1.2.3 Species at Risk

There are no net adverse effects to Species at Risk or Species at Risk habitat within the Tap property parcel as there are no footprint impacts.

7.1.1.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the Tap property parcel as there are no footprint impacts.

7.1.2 Scarborough TPS & 25kV Feeder Route

7.1.2.1 Potential Effects and Mitigation Measures

7.1.2.1.1 Terrestrial

The approximate footprint dimension of the TPS facility is 75m x 50m and will contain ancillary components associated with the TPF including gantries, access road, and 25kV aerial feeder route.

The 25kV Feeder Route includes the installation of two aerial 2x25kV feeders on top of independent single pole OCS structures (approximately 13 metres in height, and 65 metres apart). The Scarborough feeder route will commence at the Scarborough TPS location and will run south along the Stouffville corridor to the point where the Stouffville corridor converges with the Lakeshore East Corridor.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Scarborough TPS are presented in **Table 7-3**. **Figure 7-2** depicts the footprint impacts associated with the TPS facility, gantries, and access road are within the Commercial and Institutional (CVC) and Green Land (CGL) communities. Vegetation removals will be required within the footprint for the facility and associated components. The majority of the vegetation to be removed is composed of non-native and invasive species common to disturbed areas, including Trembling Aspen, Buckthorn, Tall Goldenrod, Willow species (*Salix sp*), and Phragmities (*Phragmites australis subsp. australis*). These areas provide limited habitat for wildlife and ecological impacts are considered low. Due to the limited/minimal canopy cover within the CGL and CVC communities, the extent of tree removals in these areas is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing are identified below. No vegetation clearing within the Cultural Meadow (CUM), Meadow Marsh (MAM), Marsh (MA) or Residential (CVR) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

The gantries are located within the Transportation and Utilities (CVI) lands and have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment. **Figure 7-2** to **Figure 7-5** depicts the footprint impacts associated with the 25kV Feeder Route, from Scarborough TPS south to Lakeshore East Rail Corridor, are located entirely within Transportation and Utilities (CVI) lands. The 25 kV Feeder Route is entirely within Stouffville OCS/Vegetation Removal Zone and assessed in the corridor calculations. Refer to **Section 7.1.5** for further discussion.

Table 7-3: Summary of Vegetation Removal Areas within ELC Communities – Scarborough TPS

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.346	Minor
Green Land (CGL)	0.378	Minor
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0	N/A
Meadow Marsh (MAM)	0	N/A
Marsh (MA)	0	N/A
Residential (CVR)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 7-2 Footprint Impacts Ecological Land Classification - Scarborough Tap/TPS & 25kV Feeder Route

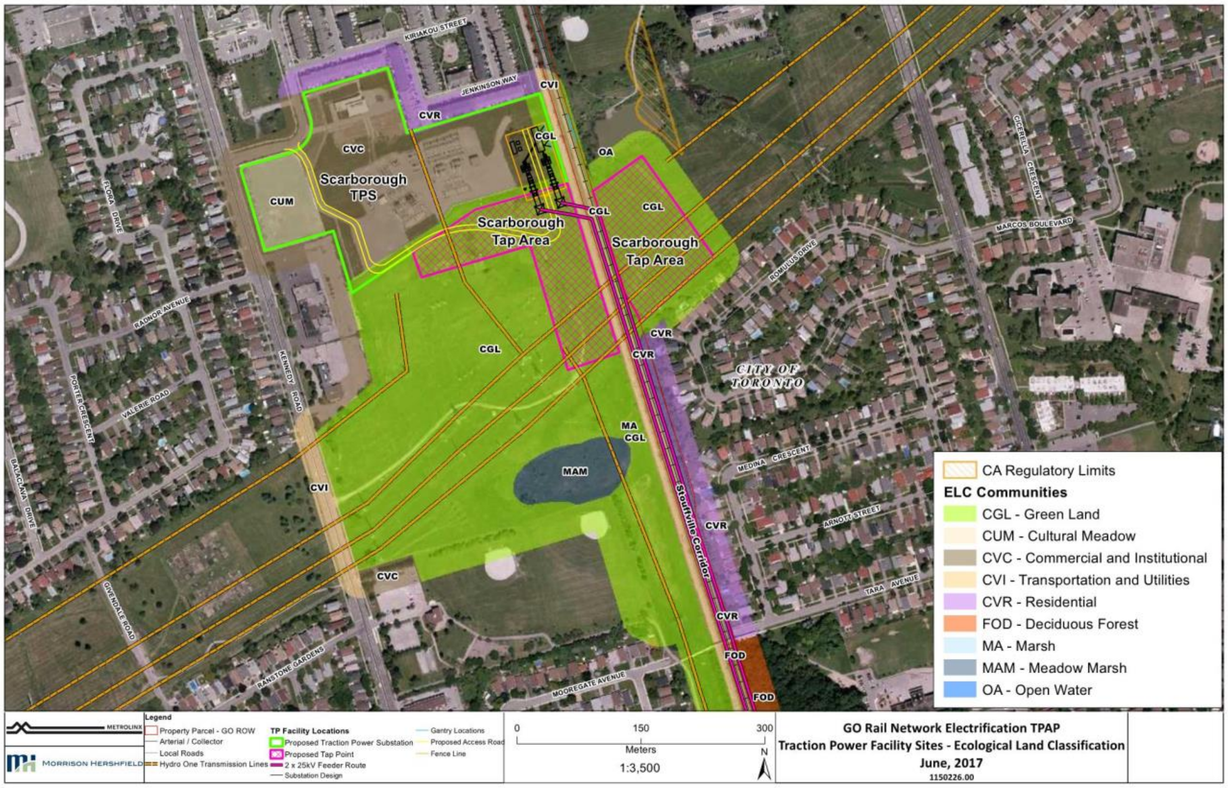


Figure 7-3 Footprint Impacts Ecological Land Classification - Scarborough 25kV Feeder Route - Image 1

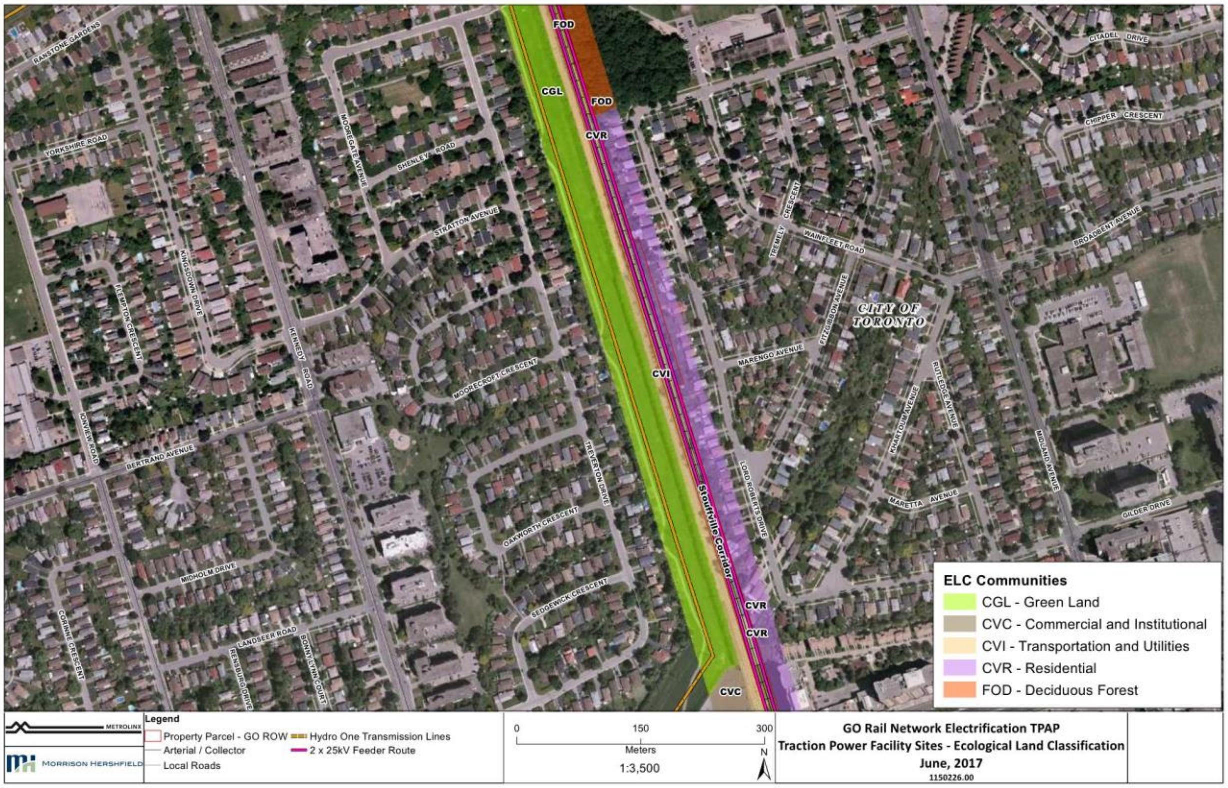


Figure 7-4 Footprint Impacts Ecological Land Classification - Scarborough 25kV Feeder Route - Image 2

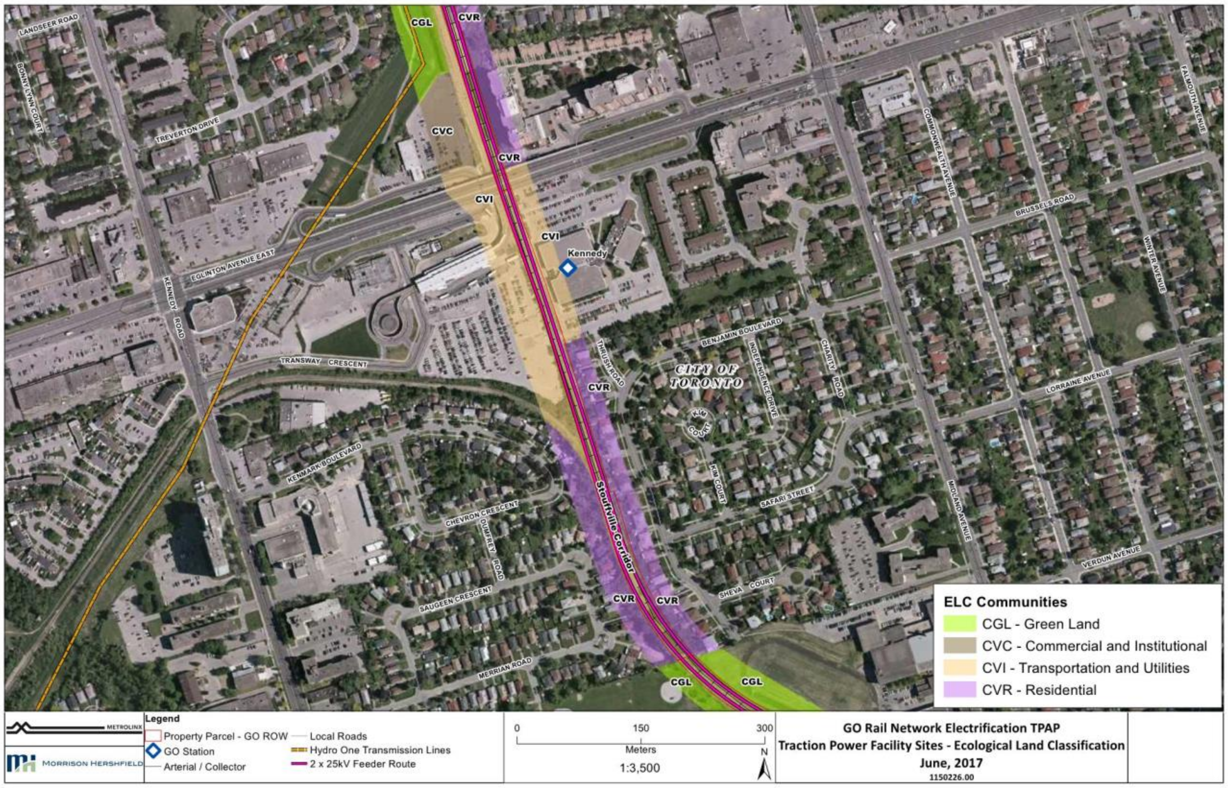


Figure 7-5 Footprint Impacts Ecological Land Classification - Scarborough SWS & 25kV Feeder Route

Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing within the TPS, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

7.1.2.1.2 Aquatic

There are no aquatic features within the TPS property parcel and therefore no aquatic footprint impacts.

Since the Scarborough 25kV Feeder Route runs entirely within the Stouffville Corridor Segment 1 OCS/Vegetation Removal Zone potential aquatic effects are discussed in **Section 7.1.5** below.

7.1.2.1.3 Species at Risk

There are no Species at Risk or Species at Risk habitat identified within the TPS property parcel and therefore no footprint impacts.

Since the Scarborough 25kV Feeder Route runs entirely within the Stouffville Corridor Segment 1 OCS/Vegetation Removal Zone potential Species at Risk effects are discussed in **Section 7.1.5** below.

7.1.2.1.4 Designated Areas

There are no Designated Areas within the TPS property parcel, therefore no footprint impacts.

Since the Scarborough 25kV Feeder Route runs entirely within the Stouffville Corridor Segment 1 OCS/Vegetation Removal Zone potential Designated Areas effects are discussed in **Section 7.1.5** below.

7.1.2.2 Net Effects

7.1.2.2.1 Terrestrial

There are no net adverse effects to the CUM, MAM or CVR communities as there are no anticipated impacts to these areas. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the Scarborough TPS location as the CVC and CGL communities provide only limited habitat for wildlife.

Net effects associated with the Scarborough 25kV Feeder Route are discussed in **Section 7.1.5** below.

7.1.2.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the TPS property parcel.

Net effects associated with the Scarborough 25kV Feeder Route are discussed in **Section 7.1.5** below.

7.1.2.2.2.1 Species at *Risk*

There are no net adverse effects to Species at Risk or Species at Risk habitat within the TPS property parcel as there are no footprint impacts.

Net effects associated with the Scarborough 25kV Feeder Route are discussed in **Section 7.1.5** below.

7.1.2.2.3 Designated Areas

There are no net adverse effects to Designated Areas within the TPS property parcel as there are no footprint impacts.

Net effects associated with the Scarborough 25kV Feeder Route are discussed in **Section 7.1.5** below.

7.1.3 Unionville PS

7.1.3.1 Potential Effects and Mitigation Measures

7.1.3.1.1 Terrestrial

The approximate footprint dimension of the PS facility is 22 metres x 47 metres and will contain ancillary components associated with the TPF including gantries, access road and underground duct banks.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Unionville PS are presented in **Table 7-4**. As depicted in **Figure 7-7** the footprint impacts associated with the PS facility, access road and gantries are located entirely within the Cultural Meadow (CUM) community and vegetation removals will be required. The majority of the vegetation to be removed is composed of non-native and invasive species commonly found in disturbed areas, including Dog Strangling Vine, Tall Goldenrod, White Clover, Canada Thistle (*Cirsium arvense*), and Canada Wild Rye (*Elymus canadensis*). There is minimal wildlife habitat within the CUM and the impacts associated with the Unionville PS location are considered low from an ecological perspective. Due to the minimal/limited canopy cover in the CUM, the extent of tree removals is minor and the overall loss of vegetation in this community is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. No vegetation clearing within the Agriculture (AG), Treed Agriculture (TAG), Shallow Marsh (MAS), or Commercial and Institutional (CVC) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

The gantries are located within the Transportation and Utilities (CVI) lands have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

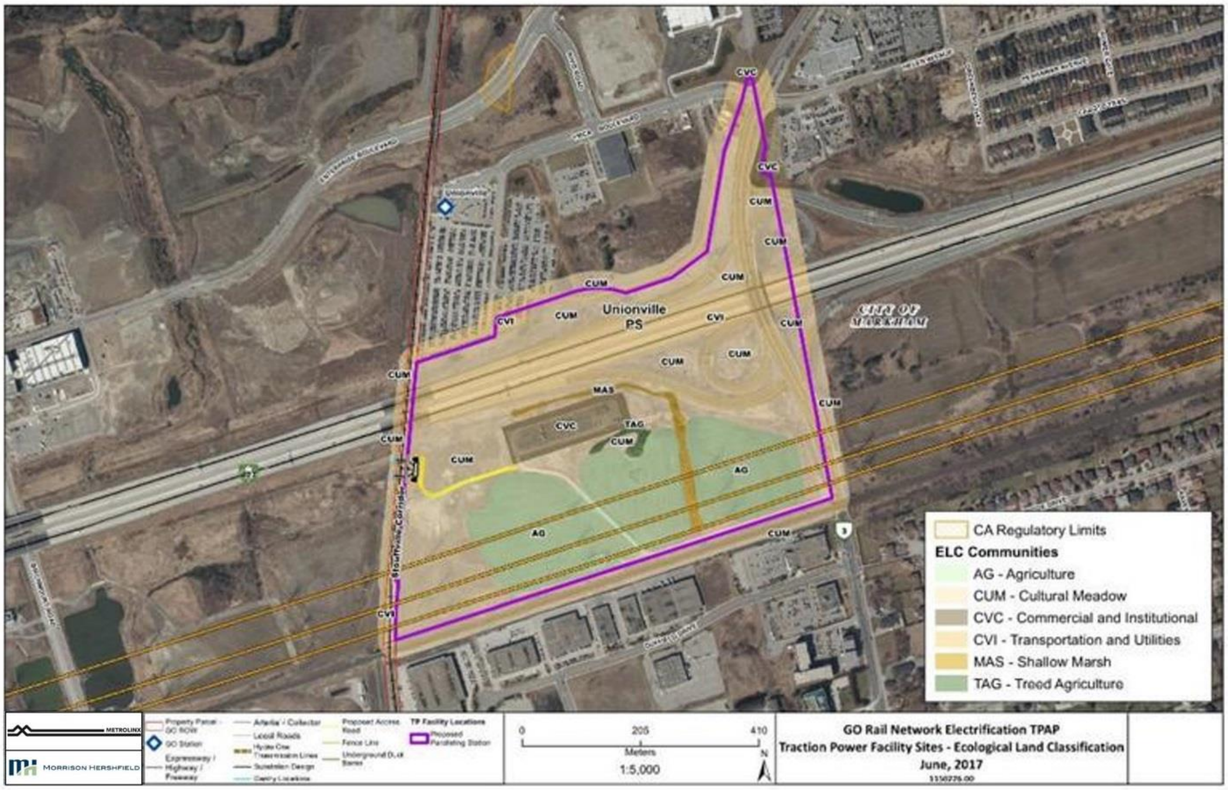
Table 7-4: Summary of Vegetation Removal Areas within ELC Communities – Unionville PS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Agriculture (AG)	0	N/A
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0.216	Minor
Treed Agriculture (TAG)	0	N/A
Shallow Marsh (MAS)	0	N/A
Commercial and Institutional (CVC)	0	N/A

***areas are approximations for discussion purposes only and not based on surveyed data*

Figure 7-6 Existing Conditions - Unionville PS

Figure 7-7 Footprint Impacts Ecological Land Classification - Unionville PS



<u>Mitigation Measures</u>

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

7.1.3.1.2 Aquatic

There are no aquatic features within the PS property parcel, and therefore no aquatic footprint impacts.

7.1.3.1.3 Species at Risk

There is low potential for Eastern Meadowlark and Bobolink within the AG and CUM communities. Targeted SAR bird surveys were conducted in June, 2016. The full SAR breeding bird assessment report can be found in **Appendix A2**. The AG communities at the time of investigations consisted primarily of soybean, an annual crop cover. The CUM community consisted mainly of grasses (*Poa sp*., *Bromus sp*.), Canada Goldenrod (*Solidago canadensis*), Cow Vetch (*Vicia cracca*), Red Clover (*Trifolium pretense*) and Asters (*Aster sp*.) Transects were completed within the CUM at the northwest corner of the property and along the northern and southern portions of the soy field. The current site conditions do not support breeding habitat conditions for Eastern Meadowlark or Bobolink. No Butternuts were observed during field investigations and there are no footprint impacts.

7.1.3.1.4 Designated Areas

There are no Designated Areas within the PS property parcel and therefore no footprint impacts.

7.1.3.2 Net Effects

7.1.3.2.1 Terrestrial

There are no net adverse effects to the AG, TAG, MAS or CVC communities as there are no anticipated impacts to these areas. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the PS property parcel as the CUM community provides only limited habitat for wildlife.

7.1.3.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the PS property parcel.

7.1.3.2.3 Species at Risk

No habitat was identified for Eastern Meadowlark or Bobolink within the CUM areas during targeted SAR breeding bird surveys and therefore there are no net adverse effects to these species based on the current vegetative conditions. There are no net adverse effects on Butternut as there are no footprint impacts.

7.1.3.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the PS property parcel as there are no footprint impacts.

7.1.4 Lincolnville PS

7.1.4.1 Potential Effects and Mitigation Measures

7.1.4.1.1 Terrestrial

The approximate footprint dimension of the PS facility is 22 metres x 47 metres and will contain ancillary components associated with the TPF including gantries and access road.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Lincolnville PS are presented in **Table 7-5**. **Figure 7-8** depicts the footprint impacts associated with the PS facility and access road are mainly located within Cultural Meadow (CUM) communities and vegetation removals will be required. A small portion of the proposed access road is located within the CVI area which contains no natural features or habitat for wildlife. The majority of the vegetation to be removed within the CUM community is composed of non-native and invasive species common to disturbed areas, including Trembling Aspen, Norway Maple, Manitoba Maple, and Buckthorn. There is minimal wildlife habitat within the CUM community. The impacts associated with the Lincolnville

PS location are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the CUM community, the extent of tree removals is minor and the overall loss of vegetation in this community is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. No vegetation clearing within the Agriculture (AG) or Commercial and Institutional (CVC) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

The gantries are located within the Transportation and Utilities (CVI) lands have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

Table 7-5: Summary of Vegetation Removal Areas within ELC Communities –Lincolnville PS

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0	N/A
Transportation and Utilities (CVI)	0.001	Minor
Cultural Meadow (CUM)	0.207	Minor
Agriculture (AG)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 7-8 Existing Conditions - Lincolnville PS

Figure 7-9 Footprint Impacts Ecological Land Classification - Lincolnville PS

Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

7.1.4.1.2 Aquatic

There are no aquatic features within the PS property parcel, and therefore no aquatic footprint impacts.

7.1.4.1.3 Species at Risk

There is low potential for Eastern Meadowlark and Bobolink within the AG and CUM communities. Targeted SAR bird surveys were conducted in June, 2016. The full SAR breeding bird assessment report can be found in **Appendix A2**. The AG communities at the time of investigations consisted primarily of soybean, an annual crop cover. The CUM communities consisted primarily of Alfalfa (*Medicago sativa*), Canada Goldenrod, Cow Vetch, and other weedy/cultural species. A transects was completed within the CUM directly adjacent to the corridor and point counts were completed along the CUM adjacent to the driveway to the Lincolnville GO station. While suitable habitat was present, Eastern Meadowlark and Bobolink were not observed using the site for breeding. One additional SAR bird, Barn Swallow, was identified as potentially breeding in the area. However, no structures suitable for Barn Swallow nesting will be impacted.

7.1.4.1.4 Designated Areas

There are no Designated Areas within the PS property parcel, and therefore no footprint impacts.

7.1.4.2 Net Effects

7.1.4.2.1 Terrestrial

There are no net adverse effects to the AG or CVC communities as there are no anticipated impacts to these areas. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the PS property parcel as the CUM community provide only limited habitat for wildlife.

7.1.4.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the PS property parcel.

7.1.4.2.3 Species at Risk

No habitat was identified for Eastern Meadowlark or Bobolink within the CUM areas during targeted SAR breeding bird surveys and therefore there are no net adverse effects to these species based on the current vegetative conditions.

7.1.4.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the PS property parcel as there are no footprint impacts.

7.1.5 OCS & Bridges: Section SV-1 – Scarborough Junction to Agincourt Station

7.1.5.1 Potential Effects and Mitigation Measures

7.1.5.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment SV-1 are presented in **Table 7-6**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal

canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Green Land (CGL), and Cultural Meadow (CUM), and Deciduous Thicket (THD) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL, CUM, and THD communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within a small Deciduous Woodland (WOD) and Deciduous Forest (FOD) communities will result in a loss of vegetation along the edge of these natural vegetation communities. However, the WOD and FOD communities within the corridor segment are located adjacent to the rail corridor and CVR communities. This area provides only non-specialized habitat for wildlife which results in low potential ecological impacts. The high amount of canopy cover in the WOD and FOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

There is no vegetation clearing required within the Marsh (MA) community and therefore no footprint impacts.

Table 7-6: Summary of Vegetation Removal Areas within ELC Communities SV-1*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.971	0.577	1.548	Minor
Transportation and Utilities (CVI)	8.059	0.412	8.471	Minor
Residential (CVR)	1.453	0.319	1.772	Fair
Green Land (CGL)	0.249	0.107	0.356	Minor
Deciduous Woodland (WOD)	0.087	0.056	0.143	Extensive
Cultural Meadow (CUM)	1.241	0.241	1.482	Minor
Deciduous Forest (FOD)	0.099	0.026	0.125	Extensive
Deciduous Thicket (THD)	0.076	0.003	0.078	Minor
Marsh (MA)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers include:

- Eglinton Avenue East (Uxbridge Sub Mile 59.49)
- Lawrence Avenue East (Uxbridge Sub Mile 58.30)
- Ellesmere Road (Uxbridge Sub Mile 57.05)

- Highway 401 (Uxbridge Sub Mile 56.30)
- CP Belleville Sub (Uxbridge Sub Mile 56.00)
- West Highland Creek (Uxbridge Sub Mile 55.99)

Bridges where the preferred alternative to address issues related to attachment of protective barriers is bridge modification include:

- Mooregate Ave/Tara Avenue Pedestrian Bridge (Uxbridge Sub Mile 58.79) – modify pedestrian bridge

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

7.1.5.1.2 Aquatic

There are two watercourses within the corridor segment, Southwest Highland Creek and West Highland Creek (three crossings). No bridge modifications are required on the West Highland Creek Bridges (Uxbridge Sub Mile 56.60 and Mile 56.66), and therefore there are no footprint impacts. Bridge modifications will occur within the existing route/corridor on the existing West Highland Creek Bridge (Uxbridge Sub Mile 55.99). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to West Highland Creek or fish/fish habitat. Similarly, no adverse effects to West Highland Creek are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. Southwest Highland Creek is conveyed under the corridor by a culvert therefore no footprint impacts to the culvert or watercourse are anticipated to result from the installation of OCS within the existing corridor above the culvert. To mitigate the potential indirect impacts to the watercourses and appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

7.1.5.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL, THD and CVR communities and moderate potential within the FOD and WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. Three bridges over West Highland Creek (Uxbridge Sub Mile 55.56, 55.60, 55.99) were surveyed for active nests and individuals. No Barn Swallows nests observed at any of the bridge locations. A Barn Swallow was observed flying overhead at West Highland Creek Bridge (Uxbridge Sub Mile 55.56). As no evidence of Barn Swallow nesting was found, there are no anticipated impacts. Due to bridge modifications (OCS wires) required at the West Highland Creek Bridge, a follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. While Chimney Swift have a moderate potential of occurrence within chimney structures that are part of the CVC, there are no footprint impacts to these areas. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD, FOD and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD and FOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

Given the low potential of occurrence of Snapping Turtle the lack of footprint impacts with the OA, there are no anticipated footprint impacts to this species or their habitat.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a low potential to occur within the FOD and WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

7.1.5.1.4 Designated Areas

Footprint impacts to CUM, CVC, CVI, CVR, CGL, THD and WOD lands within TRCA Regulated Areas are identified in **Table 7-7**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 7-7: Summary of Vegetation Removal Areas within Designated Areas SV-1*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.615	0.076	0.692	Minor
Transportation and Utilities (CVI)	1.017	0.007	1.024	Minor
Residential (CVR)	0.019	0	0.019	Fair

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Green Land (CGL)	0.013	0	0.013	Minor
Deciduous Woodland (WOD)	0.087	0.056	0.143	Extensive
Cultural Meadow (CUM)	0.308	0.030	0.338	Minor
Deciduous Forest (FOD)	0	0	0	N/A
Deciduous Thicket (THD)	0.075	0.003	0.078	Minor
MA (Marsh)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

7.1.5.2 Net Effects

7.1.5.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CUM, CGL, CVC, CVI, THD and CVR lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the FOD and WOD communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the FOD and WOD communities including wildlife or wildlife habitat. There are no footprint impacts to the MA community and therefore no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

7.1.5.2.2 Aquatic

There are no net adverse effects on West Highland Creek and Southwest Highland Creek as there are no anticipated footprint impacts.

7.1.5.2.3 Species at Risk

There are no footprint impacts for Snapping Turtle, Barn Swallow, or Chimney Swift and therefore no net adverse effects. While there are footprint impacts to the WOD, FOD and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detail Design.

7.1.5.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CUM, CVC, CVI, CVR, CGL, THD and WOD lands are identified in **Table 7-7**. No vegetation clearing within the TRCA Regulated Area within the CGL or CVR communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CUM, CVC, CVI, THD and WOD communities are required outside of the ROW.

7.1.6 OCS & Bridges: Section SV-2 – Agincourt Station to Milliken Station

7.1.6.1 Potential Effects and Mitigation Measures

7.1.6.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment SV-2 are presented in **Table 7-8**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Green Land (CGL), Agriculture (AG), and Cultural Meadow (CUM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL, AG, and CUM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 7-8: Summary of Vegetation Removal Areas within ELC Communities SV-2*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	1.065	0.561	1.626	Minor
Transportation and Utilities (CVI)	4.412	0.124	4.535	Minor
Residential (CVR)	1.052	0.340	1.392	Fair
Green Land (CGL)	0.117	0.050	0.167	Minor
Agriculture (AG)	0	0.003	0.003	Minor

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Cultural Meadow (CUM)	0.562	0.203	0.764	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and

- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

There are no bridges requiring modifications and therefore, no impacts.

7.1.6.1.2 Aquatic

There are no aquatic features within this corridor segment, and therefore no aquatic footprint impacts.

7.1.6.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL and CVR communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. While Chimney Swift have a moderate potential of occurrence within chimney structures that are part of the CVC, there are no footprint impacts to these areas. While the Red-headed Woodpecker has a moderate potential of occurrence in the CGL communities, this species is generally tolerant of disturbance and individual tree removals within the CGL is not anticipated to have an impact on this species.

Given the low potential of occurrence of Snapping Turtle and lack of footprint impacts with the OA, there are no anticipated footprint impacts to this species or their habitat.

7.1.6.1.4 Designated Areas

There are no footprint impacts to ELC communities within TRCA Regulated Areas within this corridor section (See **Table 7-9)**.

Table 7-9: Summary of Vegetation Removal Areas within Designated Areas SV-2*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	0	0	0	N/A
Residential (CVR)	0	0	0	N/A
Green Land (CGL)	0	0	0	N/A
Agriculture (AG)	0	0	0	N/A

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Cultural Meadow (CUM)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

7.1.6.2 Net Effects

7.1.6.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CUM, CGL, CVC, CVI, CVR, and AG lands as these communities contain limited habitat for wildlife.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

7.1.6.2.2 Aquatic

There are no net adverse effects as there are no watercourses within this corridor segment.

7.1.6.2.3 Species at Risk

There are no footprint impacts for Snapping Turtle, Barn Swallow or Chimney Swift and therefore no net adverse effects. While there are footprint impacts to the CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Net effects to Butternut will be determined during Detailed Design.

7.1.6.2.4 Designated Areas

There are no net adverse effects to TRCA Regulated areas as there are no anticipated footprint impacts.

7.1.7 OCS & Bridges: Section SV-3 – Milliken Station to Unionville Station

7.1.7.1 Potential Effects and Mitigation Measures

7.1.7.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment SV-3 are presented in **Table 7-10**. As depicted in mapping provided in Appendix A2 the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal

canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), and Cultural Meadow (CUM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, the areas are highly urban, and they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CUM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Deciduous Forest (FOD) and Cultural Woodland (CUW) communities, which are isolated and located mainly adjacent to the rail corridor and surrounded by CVR provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the FOD and CUW communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the FOD and CUW communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

There is no vegetation clearing required within the Shallow Marsh (MAS), Deciduous Swamp (SWD) and Green Land (CGL) communities and therefore no footprint impacts.

Table 7-10: Summary of Vegetation Removal Areas within ELC Communities SV-3*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.254	0.319	0.586	Minor
Transportation and Utilities (CVI)	3.273	1.231	4.504	Minor
Residential (CVR)	0.081	0.054	0.136	Fair
Deciduous Forest (FOD)	0.006	0.024	0.030	Extensive
Cultural Woodland (CUW)	0.063	0.055	0.118	Extensive
Cultural Meadow (CUM)	0.414	0.658	1.072	Minor
Green Land (CGL)	0	0	0	N/A
SWD (Deciduous Swamp)	0	0	0	N/A
Shallow Marsh (MAS)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*
***ELC classification from North-South Environmental Inc., 2016 report*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
    - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
    - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
    - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
        - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
        - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
        - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
        - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
        - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- 14^{th} Avenue (Uxbridge Sub Mile 51.50)
- CN York Sub (over Uxbridge Sub) (Uxbridge Sub Mile 51.10)
- Highway 407 West (Uxbridge Sub Mile 51.01)

- Highway 407 East (Uxbridge Sub Mile 50.95)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

7.1.7.1.2 Aquatic

There are no watercourses within this corridor segment, and therefore no aquatic footprint impacts.

7.1.7.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL, CUW, and CVR communities and a moderate potential within the FOD and SWD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. While the Red-headed Woodpecker has a moderate potential of occurrence in the FOD communities, this species is generally tolerant of disturbance and small amount of woodland edge within the FOD are not anticipated to have an impact on this species. While Chimney Swift have a moderate potential of occurrence within chimney structures that are part of the CVC, there are no footprint impacts to these areas.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a low potential to occur within the FOD and SWD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

7.1.7.1.4 Designated Areas

There are no footprint impacts to ELC communities within TRCA Regulated Areas within this corridor section (See **Table 7-11**).

Table 7-11: Summary of Vegetation Removal Areas within Designated Areas SV-3*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	0	0	0	N/A
Residential (CVR)	0	0	0	N/A
Deciduous Forest (FOD)	0	0	0	N/A
Cultural Woodland (CUW)	0	0	0	N/A
Cultural Meadow (CUM)	0	0	0	N/A
Green Land (CGL)	0	0	0	N/A
Deciduous Swamp (SWD)	0	0	0	N/A
Shallow Marsh (MAS)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

7.1.7.2 Net Effects

7.1.7.2.1 Terrestrial

There are no net adverse effects to the natural environment associated with vegetation clearing within the CUM, CVC, CVI, and CVR lands as these communities contain limited habitat for wildlife. There is no vegetation clearing required within the MAS, SWD and CGL communities, and therefore no net adverse effects. The vegetation clearing will result in the loss of edge trees within the FOD and CUW communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the FOD and CUW communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

7.1.7.2.2 Aquatic

There are no net adverse effects as there are no watercourses within this corridor segment.

7.1.7.2.3 Species at Risk

There are no footprint impacts for Barn Swallow, or Chimney Swift and therefore no net impacts. While there are footprint impacts to the FOD communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detailed Design.

7.1.7.2.4 Designated Areas

There are no net adverse effects to TRCA Regulated areas as there are no anticipated footprint impacts.

7.1.8 OCS & Bridges: Section SV-4 – Unionville Station to Markham Station

7.1.8.1 Potential Effects and Mitigation Measures

7.1.8.1.1 *T*errestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment SV-4 are presented in **Table 7-12**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including, Residential (CVR), Commercial and Institutional (CVC), Green Land (CGL), and Cultural Meadow (CUM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, the areas are highly urban, and they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL, and CUM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required along the edges of the Deciduous Woodland (WOD) and Swamp (SW) communities associated with Robinson Creek, Eckardt Creek, and Bruce Creek, which provide habitat for wildlife and act as movement corridors. These WOD communities have been designated as Woodlands by the City of Markham. Due to the natural attributes of these woodland communities, ecological impacts to these areas are considered moderate. Other Deciduous Woodland (WOD) communities, located mainly adjacent to the rail corridor and CVR communities provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the WOD communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the WOD and SW communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation will be required within the Marsh (MA) community associated with Robinson Creek. However, the vegetation clearing within the MA is only required within the existing Metrolinx ROW. An amphibian survey was conducted during the 2016 field season to determine potential for amphibian breeding habitat. No Species at Risk were observed; however, two species, American Toad and Bullfrog, were recorded within the MA community outside of the vegetation removal zone. Therefore, no specialized amphibian habitat will be impacted as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. As such, ecological impacts to these areas are low. Due to the minimal canopy cover in the MA communities, the extent of tree removals in these areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the MA area should occur to buffer the adjacent wetland.

Table 7-12: Summary of Vegetation Removal Areas within ELC Communities SV-4*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.532	0.021	0.553	Minor
Transportation and Utilities (CVI)	0.609	0.040	0.649	Minor
Residential (CVR)	0.494	0.017	0.511	Fair
Green Land (CGL)	0.062	0	0.062	Minor
Deciduous Woodland (WOD)	0.217	0.085	0.302	Extensive
Cultural Meadow (CUM)	0.629	0.086	0.715	Minor
Marsh (MA)	0.023	0	0.023	Minor
Swamp (SW)	0.051	0	0.051	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Bruce Creek (Uxbridge Sub Mile 49.60)
- Enterprise Drive (Uxbridge Sub Mile 50.59)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

7.1.8.1.2 Aquatic

There are five watercourses within the corridor segment: Rouge River, Bruce Creek (main branch and tributary), Eckardt Creek, Unnamed Tributary of Rouge River and Robinson Creek. The watercourse corridors associated with Rouge River, Robinson Creek, Eckardt Creek, and Bruce Creek are classified as Valleyland/Stream Corridors and are part of the City of Markham Natural Heritage Network. No bridge modifications are required on Rouge River Bridge (Uxbridge Sub Mile 50.30) and Robinson Creek Bridge (Uxbridge Sub Mile 47.30), and therefore there are no footprint impacts to Rouge River, and Robinson Creek. Bridge modifications will occur within the existing route/corridor on the existing Bruce Creek Bridge (Uxbridge Sub Mile 49.60). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Bruce Creek or fish/fish habitat. Similarly, no adverse effects to Rouge River, Bruce Creek, and Robinson Creek are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. Eckardt Creek, Bruce Creek Tributary, and Unnamed Tributary of Rouge River are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses and appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

7.1.8.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL and CVR communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Bruce Creek Bridge (Uxbridge Sub Mile 49.60), Robinson Creek Bridge (Uxbridge Sub Mile 47.30), and Tributary of Rouge River Bridge (Uxbridge Sub Mile 50.30) were surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at these sites. As there are no bridge modifications required at the Robinson Creek or Tributary of Rouge River Bridge structures and no evidence of Barn Swallow nesting was found, there are no anticipated impacts. Due to bridge modifications (OCS wires) required at the Bruce Creek Bridge, a follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. While Chimney Swift have a moderate potential of occurrence within chimney structures that are part of the CVC, there are no footprint impacts to these areas. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CGL communities, this species is generally tolerant of disturbance and a small amount of woodland edge removal in the WOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

Snapping Turtle has a moderate potential of occurrence within the Open Water (OA) and MA communities. There are no footprint impacts to the OA areas. The MA areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD and SW communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

Regulated habitat for Redside Dace was identified within Rouge River, Robinson Creek (Occupied) and Bruce Creek (Recovery). No footprint impacts to these watercourses will occur. The regulation for Redside Dace under the ESA, 2007 includes the meander belt width plus thirty (30) metres, therefore further consultation with the MNRF during Detailed Design will be required for any work that occurs within the regulated area, especially as it relates to sediment and erosion control measures associated with construction or site disturbance activities. Footprint impacts within Redside Dace regulated areas should be minimized to the greatest extent possible.

7.1.8.1.4 Designated Areas

Footprint impacts to CUM, CVC, CVI, CVR, CGL, MA, SW and WOD lands within TRCA Regulated Areas are identified in **Table 7-13**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 7-13: Summary of Vegetation Removal Areas within Designated Areas SV-4*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside Metrolinx ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.120	0	0.120	Minor

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside Metrolinx ROW (ha)	Total Area (ha)	
Transportation and Utilities (CVI)	2.082	0.020	2.102	Minor
Residential (CVR)	0.201	0.010	0.211	Fair
Green Land (CGL)	0.025	0	0.025	Minor
Deciduous Woodland (WOD)	0.166	0	0.166	Extensive
Cultural Meadow (CUM)	0.085	0	0.085	Minor
Marsh (MA)	0	0.023	0.023	Minor
Swamp (SW)	0.051	0	0.051	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

7.1.8.2 Net Effects

7.1.8.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CGL, CUM, and CVC lands as these communities contain limited habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

The vegetation clearing will result in the loss of edge trees within several WOD and SW communities adjacent to the existing rail corridor which are part of the Robinson Creek, Bruce Creek and Tributary of Rouge River corridors. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD and SW communities including wildlife or wildlife habitat. The vegetation removals within the MA community may result in a net loss of vegetation along the perimeter the MA within the existing ROW. However, this area does not contain suitable amphibian habitat. Since specialized habitat within the wetland will not be impacted and the current ecological function of the wetland area will be maintained, there are no net adverse effects.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

7.1.8.2.2 Aquatic

There are no net adverse effects on Rouge River, Bruce Creek (main branch), Robinson Creek, Eckardt Creek, Tributary of Bruce Creek, and Unnamed Tributary of Rouge River as there are no anticipated footprint impacts.

7.1.8.2.3 Species at Risk

There are no footprint impacts for Chimney Swift or Barn Swallow and therefore no net adverse effects. While there are footprint impacts to the WOD and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. No net adverse effects are anticipated to result to Snapping Turtle or their habitat as the MA areas to be impacted do not contain specialized habitat. Net effects to Butternut will be determined during Detailed Design. Net effects on habitat for Redside Dace, as defined under the ESA, 2007 will be addressed in consultation with the MNRF during Detailed Design.

7.1.8.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CUM, CVC, CVI, CVR, CGL, MA, SW and WOD lands are identified in **Table 7-13**. No vegetation clearing within the TRCA Regulated Area within the CUM, CVC, CGL, SW, and WOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CVR and MA communities are required outside of the ROW.

7.1.9 OCS & Bridges: Section SV-5 – Markham Station to Mount Joy Station

7.1.9.1 Potential Effects and Mitigation Measures

7.1.9.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment SV-5 are presented in **Table 7-14**. As depicted in mapping provided in Appendix A2 the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Green Land (CGL), Deciduous Thicket (THD), and Cultural Meadow (CUM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, the areas are highly urban, and they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CGL, THD and CUM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

There is no vegetation clearing required within the Marsh (MA) community and therefore no footprint impacts.

Table 7-14: Summary of Vegetation Removal Areas within ELC Communities SV-5*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.057	0.011	0.068	Minor
Transportation and Utilities (CVI)	2.561	0.015	2.576	Minor
Residential (CVR)	0.242	0	0.242	Fair
Green Land (CGL)	0.049	0	0.049	Minor
Cultural Meadow (CUM)	0.038	0	0.038	Minor
Marsh (MA)	0	0	0	N/A
Deciduous Thicket (THD)	0.077	0	0.077	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx’s property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.

- **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
- **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
- **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

There are no bridges requiring modifications and therefore, no impacts.

7.1.9.1.2 Aquatic

There is one watercourse within the corridor segment: Mt. Joy Creek**.** The watercourse corridor is identified as Valley/Stream Corridor and are part of the City of Markham Natural Heritage Network. This crossing is located on the division line between SV-5 and SV-6. Mt. Joy Creek is conveyed under the corridor by a culvert therefore no footprint impacts to the culvert or watercourse are anticipated to result from the installation of OCS within the existing corridor above the culvert. To mitigate the potential indirect impacts to the watercourse, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

7.1.9.1.3 Species at Risk

Butternuts have a low potential of occurrence in the CVR, CGL, and THD communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented..

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. Given the low potential of occurrence of Chimney Swift and Bank Swallow there are no anticipated footprint impacts to these species or their habitat. While the Red-headed Woodpecker has a moderate potential of occurrence in the CVR, CGL and THD communities, this species is generally tolerant of disturbance and individual tree removals within the CVR, CGL and THD are not anticipated to have an impact on this species.

Snapping Turtle have a moderate potential of occurrence within the OA and MA; however, there are no footprint impacts to these areas.

7.1.9.1.4 Designated Areas

Footprint impacts to CUM, CVC, CVI, CGL, THD and CVR lands within TRCA Regulated Areas are identified in **Table 7-15**. Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 7-15: Summary of Vegetation Removal Areas within Designated Areas SV-5*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area within TRCA Regulation Limit (ha)	
Commercial and Institutional (CVC)	0.023	0	0.023	Minor
Transportation and Utilities (CVI)	1.523	0	1.523	Minor
Green Land (CGL)	0.044	0	0.044	Minor
Residential (CVR)	0.086	0	0.086	Fair
Cultural Meadow (CUM)	0.038	0	0.038	Minor
Marsh (MA)	0	0	0	N/A
Deciduous Thicket (THD)	0.077	0	0.077	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

7.1.9.2 Net Effects

7.1.9.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVR, CUM, CGL, THD and CVC lands as these communities contain limited habitat for wildlife. There is no vegetation clearing required within the MA communities and therefore no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

7.1.9.2.2 Aquatic

There are no net adverse effects on Mt. Joy Creek as there are no anticipated footprint impacts.

7.1.9.2.3 Species at Risk

There are no footprint impacts for Barn Swallow, Chimney Swift, Bank Swallow, or Snapping Turtle. While there are footprint impacts to the CVR, CGL and THD communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Net effects to Butternut will be determined during Detail Design.

7.1.9.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CUM, CVC, CVI, CGL, THD and CVR lands are identified in **Table 7-15**. No vegetation clearing within the TRCA Regulated area is required within any of these communities outside of the Metrolinx owned ROW.

7.1.10 OCS & Bridges: Section SV-6 – Mount Joy Station to Stouffville Station

7.1.10.1 Potential Effects and Mitigation Measures

7.1.10.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment SV-6 are presented in **Table 7-16**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Constructed (CV), Agriculture (AG), Deciduous Thicket (THD), and Cultural Meadow (CUM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CV, AG,THD and CUM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required along the edges of the Deciduous Woodland (WOD), Deciduous Forest (FOD) and Swamp (SW) communities associated with Little Rouge Creek, which provide habitat for wildlife and act as movement corridors. Portions of these WOD communities have been identified as Woodlands by the City of Markham. Due to the natural attributes of these communities, ecological impacts to these areas are considered moderate. Other Deciduous Woodland (WOD) communities, located mainly adjacent to the rail corridor, and surrounded by AG or CVR provide only non-specialized habitat for wildlife which result in low potential ecological impacts. Vegetation clearing within the WOD, FOD and SW communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the WOD, FOD and SW communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required within the Shallow Marsh (MAS) community associated with Little Rouge Creek. An amphibian survey was conducted during the 2016 field season to determine potential for amphibian breeding habitat. No Species at Risk were observed; however, two species, American Toad and Spring Peeper, were recorded within the MAS community outside of the vegetation removal zone. In addition, vegetation clearing within the Marsh (MA) communities adjacent to Little Rouge Creek will be required. Vegetation clearing within the MAS and MA is only required within the existing Metrolinx ROW. No specialized amphibian habitat will be impacted as the MAS and MA areas adjacent to the corridor are not conducive to breeding or hibernation areas. As such, ecological impacts to these areas are low. Due to the minimal canopy cover in the MAS and MA communities, the extent of tree removals in these areas is minor. Mitigation for the MAS and MA communities includes compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the MAS and SW areas should occur to buffer the adjacent wetlands.

Table 7-16: Summary of Vegetation Removal Areas within ELC Communities SV-6*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.168	0	0.168	Minor
Transportation and Utilities (CVI)	7.777	0.034	7.811	Minor
Residential (CVR)	0.279	0	0.279	Fair
Constructed (CV)	0.110	0	0.110	Minor
Deciduous Woodland (WOD)	0.038	0	0.038	Extensive
Cultural Meadow (CUM)	1.637	0.007	1.644	Minor
Deciduous Thicket (THD)	0.268	0.008	0.276	Minor
Marsh (MA)	0.112	0.001	0.113	Minor
Shallow Marsh (MAS)	0.020	0	0.020	Minor
Agriculture (AG)	0.280	0.001	0.281	Minor
Swamp (SW)	0.406	0	0.406	Extensive
Deciduous Forest (FOD)	0.216	0	0.216	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

There are no bridges requiring modifications and therefore, no impacts.

7.1.10.1.2 Aquatic

There are two watercourses within the corridor segment: Mt. Joy Creek (same crossing as SV-5) and Little Rouge Creek (two crossings). The watercourse corridor associated with Little Rouge Creek is also classified as a Valleyland/Steam Corridor and is part of the City of Markham Natural Heritage Network. No bridge modifications are required on the Little Rouge Creek Bridge (44.70), and therefore there are no footprint impacts to Little Rouge Creek. Similarly, no adverse effects to Little Rouge Creek are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. Mt. Joy Creek and an additional crossing of Little Rouge River are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

7.1.10.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CVR communities and moderate potential within the WOD, THD, and FOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented. In addition, as this area is within Rouge National Urban Park (RNUP), any works that may affect Butternut outside Metrolinx's ROW within RNUP are also subject to the Species at Risk Act and a permit from Parks Canada may be required.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Little Rouge River Bridge (Uxbridge Sub Mile 44.70) was surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at this site. As there are no bridge modifications are required at this bridge structure and no evidence of Barn Swallow nesting was found, there are no anticipated impacts. Given the low potential of occurrence of Chimney Swift and Bank Swallow there are no anticipated footprint impacts to these species or their habitat. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD, FOD, SW and CVR communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD, SW and FOD or individual tree removals within the CVR is not anticipated to have an impact on this species. There is moderate potential for Wood Thrush and Eastern Wood Pewee within the WOD communities; however, these species are associated with interior forest habitat which will not be impacted. Bobolink and Eastern Meadowlark have a high potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species.

Snapping Turtle has a moderate potential of occurrence within the Open Water (OA), Shallow Marsh (MAS) and Marsh (MA) communities. There are no footprint impacts to the OA areas. The MAS and MA areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD, SW, and FOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

Regulated habitat for Redside Dace was identified within Little Rouge Creek. No footprint impacts to this watercourse will occur. The regulation for Redside Dace under the ESA, 2007 includes the meander belt width plus thirty (30) metres, therefore further consultation with the MNRF during Detailed Design will be required for any work that occurs within the regulated area, especially as it relates to sediment and erosion control measures associated with construction or site disturbance activities. Footprint impacts within Redside Dace regulated areas should be minimized to the greatest extent possible. In addition, as this area is within Rouge National Urban Park (RNUP), any works that may affect Redside Dace are also subject to the Species at Risk Act and a permit from Parks Canada may be required.

7.1.10.1.4 Designated Areas

Footprint impacts to AG, CUM, CV, CVC, CVI, CVR, MA, MAS, SW, THD, FOD, and WOD lands within TRCA Regulated Areas are identified in **Table 7-17**.

Footprint impacts will occur within several different sub-designations under the Oak Ridges Moraine Conservation Plan. Within the Countryside Areas, CVI, CV, CUM, THD, MA and AG communities will be impacted. Countryside Areas provide a rural transition and buffer between Natural Core Areas and Natural Linkage Areas. Impacts to the CVI, CVR and FOD communities will occur within the Settlement Areas. Settlement areas contain previously developed lands. The majority of these areas of impact occur adjacent to the rail corridor within lands that have been previously modified and anthropogenically influenced. However, vegetation clearing within all lands protected by the Oak Ridge Moraines Conservation Plan should be minimized to the extent possible, especially within natural vegetation communities including MA and FOD.

There are footprint impacts associated with CVI, CVR, CV, WOD, CUM, THD, MA, MAS, AG, SW and FOD communities which are within lands identified as Protected Countryside under the Greenbelt Plan. The Greenbelt Plan acknowledges that lands within Protected Countryside have been culturally modified; however, within these areas vegetation removals should be minimized to the extent possible.

Footprint impacts will also occur within the CVI, CVR, CUM, THD, MA, AG, and SW communities within the boundaries of Rouge National Urban Park. The majority of these impacts are within the existing Metrolinx ROW which contains previously disturbed lands. However, vegetation removal areas within Rouge

National Urban Park should be minimized to the extent possible. Impacts to these vegetation communities have been identified in **Table 7-17**.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 7-17: Summary of Vegetation Removal Areas within Designated Areas SV-6*

ELC Community	TRCA Regulation Limit			Rouge National Urban Park			Oak Ridges Moraine Settlement Areas			Oak Ridges Moraine Countryside Areas			Greenbelt Protected Countryside			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0	0.054	0.054	0	0	0	0	0	0	0	0	0	0	0	0	Minor
Transportation and Utilities (CVI)	4.155	0.021	4.176	2.272	0.021	2.293	1.341	0.012	1.353	1.205	0.021	1.226	3.102	0	3.102	Minor
Residential (CVR)	0.033	0	0.033	0.016	0	0.016	0.237	0	0.237	0	0	0	0.025	0	0.025	Fair
Constructed (CV)	0.022	0	0.022	0	0	0	0	0	0	2.546	0.033	2.579	0.028	0	0.028	Minor
Deciduous Woodland (WOD)	0.006	0	0.006	0	0	0	0	0	0	0	0	0	0.038	0	0.038	Extensive
Cultural Meadow (CUM)	0.678	0.002	0.680	0.518	0.002	0.521	0	0	0	1.197	0.002	1.199	0.450	0	0.450	Minor
Deciduous Thicket (THD)	0.007	0.212	0.219	0.001	0.007	0.008	0	0		0.001	0.007	0.008	0.100	0	0.100	Minor
Marsh (MA)	0.112	0.001	0.113	0.086	0.001	0.087	0	0	0	0.015	0	0.015	0.088	0.001	0.089	Minor
Shallow Marsh (MAS)	0.020	0	0.020	0	0	0	0	0	0	0	0	0	0.020	0	0.020	Minor
Agriculture (AG)	0.104	0	0.104	0.123	0.001	0.124	0	0	0	0.109	0.001	0.110	0.172	0	0.172	Minor
Swamp (SW)	0.390	0	0.390	0.119	0	0.119	0	0	0	0	0	0	0.232	0	0.232	Minor
Deciduous Forest (FOD)	0.054	0	0.054	0	0	0	0.184	0	0.184	0	0	0	0.032	0	0.032	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

7.1.10.2 Net Effects

7.1.10.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CV, CUM, AG, THD and CVR lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD, FOD, and SW communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD, FOD or SW communities including wildlife or wildlife habitat. The vegetation removals within the MAS and MA communities may result in a net loss of vegetation along the perimeter the MAS and MA. However, these area do not contain suitable amphibian habitat. Since specialized habitat within the wetlands will not be impacted and the current ecological function of the wetland areas will be maintained, there are no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

7.1.10.2.2 Aquatic

There are no net adverse effects on Little Rouge Creek, Mt. Joy Creek or the additional crossing of Little Rouge Creek as there are no anticipated footprint impacts.

7.1.10.2.3 Species at Risk

There are no footprint impacts for Snapping Turtle, Chimney Swift, Barn Swallow, or Bank Swallow. While there are footprint impacts to the WOD, FOD and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. While there are impacts to the WOD and FOD communities, there are no impacts to the preferred interior habitat for Wood Thrush and Eastern Wood Pewee and therefore no net adverse effects. The loss of vegetation directly adjacent to the rail corridor within the AG communities will have no net adverse effect on Eastern Meadowlark and Bobolink as the loss of habitat in these areas is negligible in relation to the amount of available high quality adjacent habitat. Net effects to Butternut will be determined during Detailed Design. Net effects on habitat for Redside Dace, as defined under the ESA, 2007 will be addressed in consultation with the MNRF during Detailed Design.

7.1.10.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with CUM, CV, CVC, CVI, CVR, AG, MAS, SW, THD, MA, FOD and WOD lands are identified in **Table 7-17**. No vegetation clearing within the TRCA Regulated Area within the CV, CVR, AG, MAS, SW, FOD, and WOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVC, CVI, CUM, THD, and MA communities are required outside of the ROW.

Net effects within the Oak Ridges Moraine Conservation Plan Countryside Areas (CVI, CV, CUM, THD, MA, and AG) and Settlement Areas (CVI, CVR, and FOD), in addition to the Protected Countryside Areas under the Greenbelt Plan (CVI, CVR, CV, WOD, CUM, THD, MA, MAS, AG, FOD, and SW) are identified in **Table 7-17.** No vegetation clearing within the Oak Ridges Moraine Countryside Area within the MA communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CV, CUM, THD, and AG communities are required outside of the ROW. No vegetation clearing within the Oak Ridges Moraine Settlement areas within the CVR and FOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI communities are required outside of the ROW. No vegetation clearing within the Greenbelt Protected Countryside Areas within the CVI, CVR, CV, WOD, CUM, THD, MAS, AG, SW, and FOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the MA communities are required outside of the ROW.

Within Rouge National Urban Park (RNUP), CVI, CVR, CUM, THD, MA, SW, and AG lands will be impacted. No vegetation clearing within the RNUP within the CVR or SW communities will occur outside of the existing Metrolinx owned ROW, and only minor removals within the CVI, CUM, THD, MA, and AG communities are required outside of the ROW. However, the impacted areas within CVI, CVR, AG, THD and CUM communities' are within culturally influenced non-natural communities. The impacts to the MA communities outside of the Metrolinx owned ROW represents 0.001 ha of 7915.08ha of the Rouge National Urban Park. For any vegetation clearing required within RNUP outside of the existing Metrolinx owned ROW, notification and coordination with Parks Canada Resource Conservation staff will be undertaken.

7.1.11 OCS & Bridges: Section SV-7 – Stouffville Station to Lincolnville Station

7.1.11.1 Potential Effects and Mitigation Measures

7.1.11.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment SV-7 are presented in **Table 7-18.** As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Agriculture (AG), Green Land (CGL) and Cultural Meadow (CUM) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, AG, CGL, and CUM communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required along the edges of the Deciduous Woodland (WOD) and Deciduous Forest (FOD) communities within Stouffville Conservation Area and associated with Stouffville Creek corridor. Vegetation clearing will also be required within the FOD communities associated with the Stouffville Marsh Evaluated Wetland. Due to the natural attributes of these communities, ecological impacts to these areas are considered moderate. Vegetation clearing within the WOD and FOD communities will result in a loss of vegetation along the edge of these natural vegetation communities. The high amount of canopy cover in the WOD and FOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. There is no vegetation clearing required within the Marsh (MA) community and therefore no anticipated impacts.

Table 7-18: Summary of Vegetation Removal Areas within ELC Communities SV-7*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.040	0	0.040	Minor
Transportation and Utilities (CVI)	2.874	2.051	4.925	Minor
Residential (CVR)	0.081	0	0.081	Fair
Green Land (CGL)	0.043	0	0.043	Minor
Deciduous Forest (FOD)	0.445	0.011	0.456	Extensive
Deciduous Woodland (WOD)	0.051	0	0.051	Extensive
Cultural Meadow (CUM)	0.531	0.051	0.582	Minor
Agriculture (AG)	0.144	0	0.144	Minor
Marsh (MA)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g. reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

There are no bridges requiring modifications and therefore, no impacts.

7.1.11.1.2 Aquatic

There is one watercourse within the corridor segment: Stouffville Creek. Stouffville Creek is conveyed under the corridor by a culvert therefore no footprint impacts to the culvert or watercourse are anticipated to result from the installation of OCS within the existing corridor above the culvert. To mitigate the potential indirect impacts to the watercourse, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

7.1.11.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CVR and CGL communities and moderate potential within the WOD and FOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. While the Red-headed Woodpecker has a low potential of occurrence in the CVR and CGL and a moderate potential of occurrence in the WOD and, FOD communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD and FOD or individual tree removals within the CVR or CGL is not anticipated to have an impact on this species. There is moderate potential for Hooded Warbler, Canada Warbler, Wood Thrush and Eastern Wood Pewee in the FOD; however, these species are associated with interior forest habitat which will not be impacted. Bobolink and Eastern Meadowlark have a high potential of occurrence within the AG communities. However, the suitability of the AG lands directly adjacent to the rail corridor is poor and not likely utilized by these species.

There is a moderate potential for Snapping Turtle in the OA and within the adjacent Stouffville Marsh outside of the corridor segment. There are no footprint impacts to the OA within the Stouffville Marsh areas.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the FOD and WOD communities. Further studies during Detail Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

7.1.11.1.4 Designated Areas

Footprint impacts to CUM, CVC, CVI, CVR, CGL, FOD, and WOD lands within TRCA Regulated Areas are identified in **Table 7-19**.

Impacts to the CUM, CVI, CVR, CGL, FOD, and WOD communities are also within Stouffville Conservation Area. Small areas of FOD and CVI are also part of the Stouffville Marsh Evaluated Wetland.

Footprint impacts to the CVC, CVI, CVR, CGL, FOD, WOD, CUM, and AG communities will occur within Settlement Areas under the Oak Ridges Moraine Conservation Plan. Settlement areas contain previously developed lands. The majority of these areas of impact occur adjacent to the rail corridor within lands that have been previously modified and anthropogenically influenced. However, vegetation clearing within all lands protected by the Oak Ridge Moraines Conservation Plan should be minimized to the extent possible, especially within natural vegetation communities including WOD and FOD.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 7-19: Summary of Vegetation Removal Areas within Designated Areas SV-7*

ELC Community	TRCA Regulation Limit			Stouffville Conservation Area			Stouffville Marsh Evaluated Wetland			Oak Ridges Moraine Settlement Areas			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.003	0	0.003	0	0	0	0	0	0	0.041	0	0.041	Minor
Transportation and Utilities (CVI)	1.529	0.001	1.530	2.874	2.052	4.926	0.043	0	0.043	2.874	2.052	4.926	Minor
Residential (CVR)	0.067	0	0.067	0.081	0	0.081	0	0	0	0.081	0	0.081	Fair
Green Lands (CGL)	0.043	0	0.043	0.043	0	0.043	0	0	0	0.043	0	0.043	Minor
Deciduous Forest (FOD)	0.421	0.011	0.432	0.445	0.011	0.456	0.131	0.002	0.133	0.445	0.011	0.456	Extensive
Deciduous Woodland (WOD)	0.051	0	0.051	0.051	0	0.051	0	0	0	0.051	0	0.051	Extensive
Cultural Meadow (CUM)	0.136	0	0.136	0.244	0	0.244	0	0	0	0.531	0.051	0.582	Minor
Agriculture (AG)	0	0	0	0	0	0	0	0	0	0.144	0	0.144	Minor
Marsh (MA)	0	0	0	0	0	0	0	0	0	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

7.1.11.2 Net Effects

7.1.11.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CUM, CGL, AG, and CVR lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD and FOD communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the FOD or WOD communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no net adverse effects.

7.1.11.2.2 Aquatic

There are no net adverse effects on Stouffville Creek as there are no anticipated footprint impacts.

7.1.11.2.3 Species at Risk

There are no footprint impacts for Snapping Turtle or Barn Swallow. While there are footprint impacts to the WOD, FOD, CGL, and CVR communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. While there are impacts to the FOD communities, there are no impacts to the preferred interior habitat for Wood Thrush, Eastern Wood Pewee, Canada Warbler or Hooded Warbler and therefore no net adverse effects. The loss of vegetation directly adjacent to the rail corridor within the AG communities will have no net adverse effect on Eastern Meadowlark and Bobolink as the loss of poor quality habitat in these areas is negligible in relation to the amount of available high quality adjacent habitat. Net effects to Butternut will be determined during Detailed Design.

7.1.11.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas (CUM, CVC, CVI, CVR, WOD, and FOD), Stouffville Conservation Area (CUM, CVI, CVR, CGL, FOD, and WOD), and Stouffville Marsh Evaluated Wetland (FOD and CVI) lands are identified in **Table 7-19**. No vegetation clearing within the TRCA Regulated Areas within the CVC, CVR, CGL, WOD, or CUM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI and FOD communities are required outside of the ROW. No vegetation clearing within the Stouffville Conservation Area within the CVR, CGL, WOD, or CUM communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI and FOD communities are required outside of the ROW. No vegetation clearing within the Stouffville Marsh Evaluated Wetland within the CVI communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the FOD communities are required outside of the ROW.

Net effects within the Oak Ridges Moraine Conservation Plan Settlement Areas within the CVI, CVC, CVR, FOD, WOD, CGL, CUM and AG) are identified in **Table 7-19.** No vegetation clearing within the Oak Ridges Moraine Settlement Areas within the CVC, CVR, CGL, WOD or AG communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, FOD and CUM communities are required outside of the ROW.

7.2 Preliminary Environmental Site Assessment

Please refer to Appendix B for a description of the methodology followed for Environmental Site Assessment work. Additional details can be found in the Preliminary Environmental Site Assessment Report contained in Appendix B.

7.2.1 Scarborough Tap Location

7.2.1.1 Potential Effects and Mitigation Measures

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

7.2.1.2 Net Effects

No net adverse effects are anticipated.

7.2.2 Scarborough TPS

7.2.2.1 Potential Effects and Mitigation Measures

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

7.2.2.2 Net Effects

No net adverse effects are anticipated.

7.2.3 Scarborough 25kV Feeder Route (STV Corridor)

Refer to Section 7.2.6 below. The Scarborough 25kV feeder wires will be positioned on top of the OCS infrastructure along the STV corridor.

7.2.4 Unionville PS

Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill of unknown quality across the Site.
- On-Site and off-Site Industrial Land use/hazardous waste generation; and,
- A hydro substation with the potential for PCB storage is present on the approximate center of the Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

- In addition the following future work is recommended:
- Complete a Phase I Environmental Site Assessment if the property is to be acquired;
- Complete a Limited Subsurface Investigation to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses; and,
- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

7.2.4.1 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

7.2.5 Lincolnville PS

7.2.5.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown composition may be present across the Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment as required to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses.

7.2.5.2 Net Effects

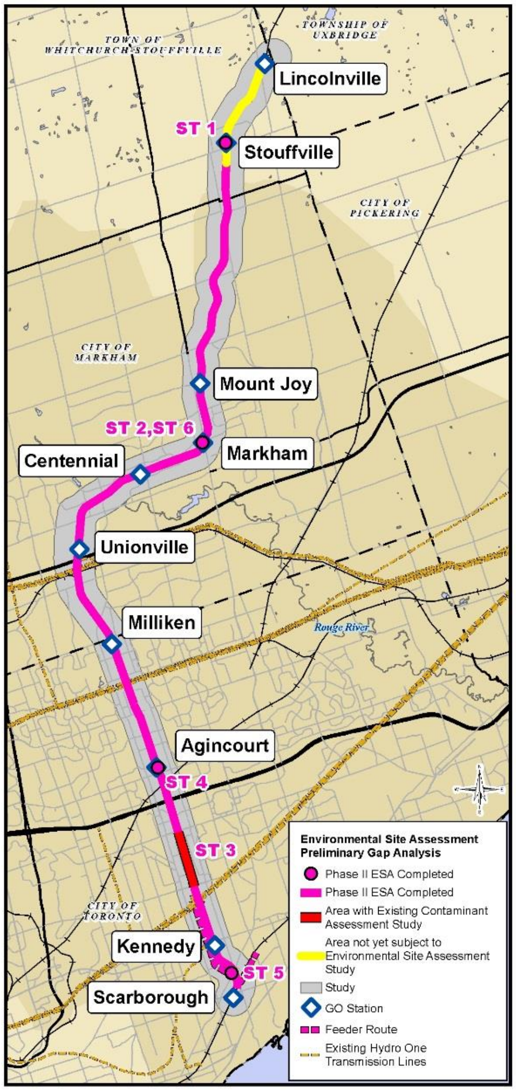
Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

7.2.6 OCS & Bridges: Stouffville Corridor

7.2.6.1 Potential Effects and Mitigation Measures

The scope of the study undertaken as part of the GO Rail Network Electrification TPAP was limited to a gap analysis review of previous Environmental Site Assessment work within the OCS Impact Zones along the corridors. Based on the available background reports reviewed, most of the Stouffville corridor has been the subject of Phase I and II ESAs (see **Figure 7-10**). A short segment extending north from the Stouffville GO Station to Lincolnville has not been assessed, being approximately 3.7 km long. An additional gap is the segment of line south from Unionville Station to Denison St. which may not have been included in the Phase II Environmental Site Assessment.

Figure 7-10 Stouffville Corridor Gap Analysis Map



Mitigation Measures

Implement the mitigation measures and/or carry out further study as documented in the applicable Stouffville studies listed in **Table 7-20**.

Table 7-20 Phase I/II or Other Contaminated Site Related Document Reviewed - Stouffville Corridor

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
AiMS 2009	Environmental Inspection and Testing Services 237-241 Main Street North, Markham, Ontario	Pine Valley Enterprises Inc.	AIMS Environmental	1-Jun-09	AR138-09	Stouffville	Parking lot at 237 Main Street North, Markham ON	Remediation
CG&S 1999	Canadian National Railways Phase I Environmental Site Assessment Uxbridge Subdivision Final Report	Canadian National Railways	CG&S CH2M Gore & Storrie Limited	Nov-99		Stouffville	32 km long CN Rail corridor from Midlands Avenue to Stouffville Station	Phase I
Envirocure 2009	Phase II Environmental Site Assessment, 9577 Highway 48, Markham, Ontario	Go Transit	Envirocure Environmental Consultants	27-Mar-09	E09-730	Stouffville	Mt. Joy GO Station parking lot expansion at 9577 Main Street North Markham	Phase II
Golder 1993a	Attached to Letter from James Dick Construction Re: Assinck Limited Property, 9577 Highway 48, Markham, Ontario : Phase I Environmental Site Assessment Assinck Bros Limited, 9577 Highway 48 Markham Ontario	Assinck Bros Limited	Golder Associates	Feb-93	931-1503	Stouffville	Mt. Joy GO Station parking lot expansion at 9577 Main Street North Markham	Phase I
Golder 1993b	Attached to Letter from James Dick	Assinck Bros Limited	Golder Associates	May-93	931-1546	Stouffville	Mt. Joy GO Station parking lot	Phase II

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
	Construction Re: Assinck Limited Property, 9577 Highway 48, Markham, Ontario : Limited Subsurface Site Assessment Assinck Bros. Site 9577 Highway 48 Markham, Ontario						expansion at 9577 Main Street North Markham	
Golder 1993c	Attached to Letter from James Dick Construction Re: Assinck Limited Property, 9577 Highway 48, Markham, Ontario: Removal of Contaminated Soil Former Assinck Bros. Limited Property 9577 Highway 48, Markham, Ontario	Assinck Bros Limited	Golder Associates	Sep-93	931-1546A	Stouffville	Mt. Joy GO Station parking lot expansion at 9577 Main Street North Markham	Remediation
Peto MacCallum 2001	Phase II Environmental Site Assessment Uxbridge Subdivision Stouffville to Scarborough, Ontario for Go Transit	Go Transit	Peto MacCallum Ltd. Consulting Engineers	Apr-01	00TX010	Stouffville	32 km long CN Rail corridor from Midlands Avenue to Stouffville Station	Phase II
PGL 2007	Phase II Environmental Site Assessment 47 Dowry Street, Toronto, Ontario	Go Transit	Pottinger Gaherty Environmental	Sep-07	2290-08.01	Stouffville	47 Dowry Street, Agincourt GO Station parking lot expansion	Phase I

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
			Consultants Ltd.					
Shaheen & Peaker 2006	Letter Report Environmental Soil Testing Centennial Go Station Parking Structure, Markham, Ontario	Earth Tech Canada Inc.	Shaheen & Peaker Consulting Engineers	16-Jun-06	SPN1111	Stouffville	Centennial GO Station Parking Structure, Markham	Phase II
Soil Engineers 2013a	Letter Report Chemical Analysis of Soil Samples Proposed New Platform Extension for Markham Go Station 214 Main Street Markham North City of Markham	Metrolinx	Soil Engineers Ltd.	7-Jan-13	1211-S176E	Stouffville	West platform at Markham GO Station, 214 Main Street North	Phase II
SPL 2010	Letter Report Chemical Characterization of Soil, Go Transit West Parking Lot Expansion 9577 Main Street North, Markham, ON	R.J. Burnside & Associates	SPL Beatty, A Division of SPL Consultants Limited	8-Apr-10	524-1001	Stouffville	Mt. Joy GO Station parking lot expansion at 9577 Main Street North Markham	Phase II
Stantec 2013	Letter Report Limited Environmental Subsurface Investigation 92 Schell Street, Stouffville, Ontario	Go, a Division of Metrolinx	Stantec	13-Mar-14	160622074	Stouffville	92 Schell Street Parking lot expansion at Stouffville GO Station.	Phase I
Stantec 2014	DRAFT Phase I Environmental Site Assessment Part of 47	Go, a Division of Metrolinx	Stantec	22-Oct-13	160622074	Stouffville	92 Schell Street Parking lot expansion at	Phase II

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
	Edward Street and 92 Schell Street, Stouffville, Ontario						Stouffville GO Station.	
Terrapex 2003a	Phase I Environmental Site Assessment 13190 York Durham Town Line, Whitchurch-Stouffville, Ontario	Go Transit	Terrapex Environmental Ltd.	Jul-03	CT923.0	Stouffville	13190 York Durham Town Line; adjacent Lincolnville proposed Paralleling Station	Phase I
Terrapex 2003b	Phase I Environmental Site Assessment Bethesda Side Road and 10th Line, Whitchurch-Stouffville, Ontario	Go Transit	Terrapex Environmental Ltd.	Jul-03	CT924.0	Stouffville	Lincolnville GO station and Proposed Paralleling Station.	Phase I

Further work is recommended along the Stouffville corridor to assess/characterize potential soil and/or groundwater contamination and develop appropriate mitigation measures. As a result, additional Environmental Site Assessment studies including Phase I ESAs, Phase II ESAs, etc. will be carried out by Metrolinx as required along the corridors/OCS Impact Zone during the Detailed Design phase. Should these further assessments confirm the presence of subsurface contamination at these sites, recommendations for mitigation will be developed and implemented as appropriate which may include but are not limited to:

- Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site;
- Undertake remediation and/or implementation of management measures to address contaminated soils and/or groundwater during construction and long term operations and maintenance. Management measures will be carried out in accordance with applicable environmental legislation.

Furthermore, the mitigation measures as outlined in Section 9.2 will be adhered to and implemented during Detailed Design and construction.

7.2.6.2 Net Effects

Based on the implementation of the mitigation measures outlined above, no net adverse effects are anticipated.

7.3 Cultural Heritage

Please refer to Appendix C2 for a description of the methodology followed for assessment of cultural heritage impacts. Additional details can be found in the Cultural Heritage Impact Assessment Report contained in Appendix C2.

7.3.1 Scarborough Tap Location

There are no heritage properties identified at the Scarborough Tap Location. There are no further concerns from a cultural heritage perspective.

7.3.1.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

7.3.1.2 Net Effects

No net effects will be experienced as a result of this undertaking.

7.3.2 Scarborough TPS & 25kV Feeder Route

There are no heritage properties identified at the Scarborough TPS and Feeder Route. There are no further concerns from a cultural heritage perspective.

7.3.2.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

7.3.2.2 Net Effects

No net effects will be experienced as a result of this undertaking.

7.3.3 Unionville PS

There are no heritage properties identified at the Unionville PS. There are no further concerns from a cultural heritage perspective.

7.3.3.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

7.3.3.2 Net Effects

No net effects will be experienced as a result of this undertaking.

7.3.4 Lincolnville PS

There are no heritage properties identified at the Lincolnville PS. There are no further concerns from a cultural heritage perspective.

7.3.4.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

7.3.4.2 Net Effects

No net effects will be experienced as a result of this undertaking.

7.3.5 OCS & Bridges: Section SV-1 – Scarborough Junction to Agincourt Station

There are no heritage properties identified in the Section SV-1 study area. There are no further concerns from a cultural heritage perspective.

7.3.5.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

7.3.5.2 Net Effects

No net effects will be experienced as a result of this undertaking.

7.3.6 OCS & Bridges: Section SV-2 – Agincourt Station to Milliken Station

The cultural heritage resources within this section include:

- Proposed Agincourt HCD (SV-2-1)

A summary of impacts and mitigation measures is provided in **Table 7-21** and feature mapping of resources is provided in **Appendix C2**.

7.3.6.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 7-21 Summary of SV-2 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Proposed Agincourt HCD SV-2-1 (Potential protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the proposed Agincourt HCD were identified as a result of OCS infrastructure.	N/A	N/A

7.3.6.2 Net Effects

No net effects will be experienced as a result of this undertaking.

7.3.7 OCS & Bridges: Section SV-3 – Milliken Station to Unionville Station

The cultural heritage resources within this section include:

- Thomas Rivis House (SV-3-1)
- Hagerman Schoolhouse (SV-3-2)

A summary of impacts and mitigation measures is provided in **Table 7-22** and feature mapping of resources is provided in **Appendix C2**.

7.3.7.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 7-22 Summary of SV-3 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Thomas Rivis House SV-3-1 (Protected property adjacent to the rail corridor and to Unionville GO Station)	No impacts to the heritage attributes associated with the Thomas Rivis House were identified as a result of OCS infrastructure.	N/A	N/A
Hagerman Schoolhouse SV-3-2 (Protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the Hagerman Schoolhouse were identified as a result of OCS infrastructure.	N/A	N/A

7.3.7.2 Net Effects

No net effects will be experienced as a result of this undertaking.

7.3.8 OCS & Bridges: Section SV-4 – Unionville Station to Markham Station

The cultural heritage resources within this section include:

- James Eckardt House (SV-4-1)
- Unionville Heritage Conservation District (SV-4-2)
- Former Unionville Train Station (SV-4-3)

A summary of impacts and mitigation measures is provided in **Table 7-23** and feature mapping of resources is provided in **Appendix C2**.

7.3.8.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 7-23 Summary of SV-4 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
James Eckardt House SV-4-1 (Protected Property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the James Eckardt House at 137 Main Street, Unionville, were identified as a result of OCS infrastructure.	N/A	N/A
Unionville HCD SV-4-2 (Protected property adjacent to the rail corridor)	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan. In particular, policies on streetscape, vegetation and open spaces.	Potential disruption of setting and removal of trees and vegetation to either side of the corridor	Consultation with heritage staff at the City of Markham to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW and to determine if a heritage permit is required.
Former Unionville Train Station (property also includes the Stiver Mill Complex) SV-4-3 (Protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the Former Unionville Train Station were identified as a result of OCS infrastructure.	N/A	N/A

7.3.8.2 Net Effects

Potential disruption to the Unionville HCD would be minimized through consultation with heritage staff at the City of Markham to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW and to determine if a heritage permit is required.

7.3.9 OCS & Bridges: Section SV-5 – Markham Station to Mount Joy Station

The cultural heritage resources within this section include:

- Markham GO Station (SV-5-1)
- Markham Village Heritage Conservation District (SV-5-2)

A summary of impacts and mitigation measures is provided in **Table 7-24** and feature mapping of resources is provided in **Appendix C2**.

7.3.9.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 7-24 Summary of SV-5 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Markham GO Station SV-5-1 (CHP)	Installation of OCS attachments	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was undertaken (as part of Electrification TPAP) and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and the City of Markham
Markham Village HCD SV-5-2 (Adjacent Protected Property to Markham GO Station)	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, proposed infrastructure improvements may be subject to policies identified in the HCD Plan. In particular, policies on streetscape, vegetation and open spaces.	Potential disruption of setting and removal of trees and vegetation to either side of the corridor	Consultation with heritage staff at the City of Markham to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW and to determine if a heritage permit is required. It should be noted that further more detailed tree inventories will be undertaken along all rail corridors during Detailed Design to quantify in further detail tree/vegetation removal requirements; this will include preparation of an arborist (as required) assessment, delineation of tree protection zones, etc.

See **Figure 7-11** for a visual representation of this CHR.

Figure 7-11: Markham GO Station

7.3.9.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Markham GO Station will be minimized by carrying out a HIA. The HIA will identify potential impacts and recommend appropriate mitigation measures for heritage attributes to be incorporated into the final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the City of Markham.

Potential disruption to the Markham Village HCD would be minimized through consultation with heritage staff at the City of Markham to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW and to determine if a heritage permit is required. It should be noted that further more detailed tree inventories will be undertaken along all rail corridors during Detailed Design to quantify in further detail tree/vegetation removal requirements; this will include preparation of an arborist (as required) assessment, delineation of tree protection zones, etc.

7.3.10 OCS & Bridges: Section SV-6 – Mount Joy Station to Stouffville Station

The cultural heritage resources within this section include:

- Rouge National Urban Park (SV-6-1)

A summary of impacts and mitigation measures is provided in **Table 7-25** and feature mapping of resources is provided in the Cultural Heritage Impact Assessment Report contained in **Appendix C** of the EPR.

7.3.10.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 7-25 Summary of SV-6 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Rouge National Urban Park SV-6-1 (Adjacent Protected Property to Stouffville and Lakeshore East rail corridors)	No direct impacts to the heritage attributes associated with RNUP were identified as a result of OCS infrastructure. However, given that the railway corridor passes through the park, proposed infrastructure improvements may be subject to policies identified in the park management plan. In particular, policies on viewsheds and vegetation.	Potential disruption of setting and removal of trees and vegetation to either side of the corridor. Potential impacts on viewsheds.	• During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible around the Rouge Beach/Marsh area along the LSE Corridor and along the Stouffville Corridor. • The extent of vegetation removal will be confirmed during Detailed Design. For the purposes of the TPAP, the project team has taken a conservative approach. Further consultation and coordination for any proposed tree/vegetation removals beyond the ROW will be undertaken as the project's design progresses.

7.3.10.2 Net Effects

Potential disruption to the Rouge National Urban Park would be minimized through consultation with management staff at Rouge National Urban Park to review the proposed plans for OCS related infrastructure within the Metrolinx-owned rail ROW. During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible around the Rouge Beach/Marsh area along the LSE Corridor and along the Stouffville Corridor. The extent of vegetation removal will be confirmed during Detailed Design. For the purposes of the TPAP, the project team has taken a conservative approach. Further consultation and coordination for any proposed tree/vegetation removals beyond the ROW will be undertaken as the project's design progresses.

7.3.11 OCS & Bridges: Section SV-7 – Stouffville Station to Lincolnville Station

There are no heritage properties identified in the Section SV-7 study area. There are no further concerns from a cultural heritage perspective.

7.3.11.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

7.3.11.2 Net Effects

No net effects will be experienced as a result of this undertaking.

7.4 Archaeology

A Stage 1 Archaeological Assessment was undertaken for the GO Rail Network Electrification Project. A summary of the findings and recommendations for the Stouffville Corridor can be found in the sections below. Refer to **Appendix D2** for complete details.

7.4.1 Scarborough Tap/TPS Location and 25 kV Feeder Route

A property inspection of the proposed facility site for the Scarborough Tap/TPS Location was conducted by Robert Pihl (P057), ASI.

A property inspection of the feeder route between the Scarborough Tap/TPS Location and Scarborough SWS (LSE corridor) was conducted by Robert Pihl (P057), ASI on July 13, 2016. The corridor was examined from public access points (crossings).

The proposed Scarborough Tap/TPS Location is located adjacent to the study corridor and consists of flat, grass-covered, vacant lands within and adjacent to a hydro station and several ROWs; while the lands are open to the public, they are not parks. Disturbance appears to be relatively minimal but will need to be reviewed by further archaeological assessment.

The Scarborough Feeder Route includes active GO Railway lines and existing bridges, and corridor lands have been previously disturbed by past railway construction.

7.4.1.1 Potential Effects and Mitigation Measures

Portions of the Scarborough Tap/TPs location have the potential to create disturbance to potential Indigenous and Euro-Canadian archaeological resources. Mitigation Measures include conducting a Stage 2 Archaeological Assessment of the portion of the Tap/TPS site with archaeological potential.

Archaeological potential has been removed for the Scarborough Feeder Route. As such, no further Archaeological Assessment is recommended.

7.4.1.2 Net Effects

Net effects associated with the Scarborough Tap/TPS site will be determined upon further assessment. No net effects will be experienced as a result of this undertaking in association with the installation of the Scarborough Feeder Route.

7.4.2 Unionville PS

A property inspection of the proposed Unionville PS site was conducted by Robert Pihl (P057), ASI on May 11 and June 1, 2016.

The proposed Unionville PS is located in the northwest corner of a large property bounded on the east by Kennedy Avenue, the north by the Unionville GO Station and parking lot and 407 ETR, the west by the Stouffville GO Rail line and the south by the CNR Rail line. An archaeological assessment for the Highway 407 corridor was conducted in the 1990s, and that portion of the site study area was not re-examined. South of the 407 ETR are lands that are mostly in active agricultural use. There is also a hydro station and ROWs within the site, several areas of active construction, and areas of scrub vegetation. Further archaeological fieldwork will be necessary to assess the site potential of the cropland and other areas of possible disturbance.

7.4.2.1 Potential Effects and Mitigation Measures

Portions of the Unionville PS site have the potential to create disturbance to potential Indigenous and Euro-Canadian archaeological resources. Mitigation Measures include conducting a Stage 2 Archaeological Assessment of the portion of the PS site with archaeological potential.

7.4.2.2 Net Effects

Net effects associated with the PS site will be determined upon further assessment.

7.4.3 Lincolnville PS

A property inspection of the proposed Lincolnville PS site was conducted by Robert Pihl (P057), ASI on May 11, 2016. The site is located at the northern terminus of the study corridor.

The proposed Lincolnville PS site is located within the station property on vacant, grass-covered land between the station buildings and parking lot. The land is relatively flat and appears to have been disturbed by grading and landscaping during construction.

7.4.3.1 Potential Effects and Mitigation Measures

Portions of the Lincolnville PS site have the potential to create disturbance to potential Indigenous and Euro-Canadian archaeological resources. Mitigation Measures include conducting a Stage 2 Archaeological Assessment of the portion of the PS site with archaeological potential.

7.4.3.2 Net Effects

Net effects associated with the Lincolnville PS will be determined upon further assessment.

7.4.4 OCS & Bridges: Stouffville Corridor

The OCS footprint for the Stouffville study corridor includes active GO Railway lines and existing bridges. A property inspection of the study corridor was conducted by Robert Pihl (P057), ASI on May 11, 2016.

Access points for the property inspection consisted of road crossings at grade or bridges, or at one of the many GO station platforms along the way. Each location was photo-documented in one or both directions as deemed appropriate (Refer to **Appendix D2**).

7.4.4.1 Potential Effects and Mitigation Measures

OCS Footprint

The Stage 1 Archaeological Assessment determined that the entire OCS footprint consists of an active GO Rail corridor which has been severely disturbed by previous rail construction, often by filling or down-cutting the landscape to produce an appropriate grade for the train and then by installing a raised bed for the steel rail. As such, no further archaeological assessment is recommended in this zone.

Bridge Modifications

For pedestrian bridges along the Stouffville corridor that will require modifications to accommodate the addition of a protective bridge barrier, the Stage 1 Archaeological Assessment confirmed that the existing footprint of these bridges within the GO rail ROW/7 metre zone is within an active railway line on disturbed lands, therefore no further Archaeological Assessment is recommended.

If during detailed, potential impacts to areas that extend outside the 7 metre OCS/Vegetation Removal zone are identified, a review will be undertaken of potential disturbance to Indigenous and Euro-Canadian archaeological resources for these areas. As part of this review, further archaeological assessment work will be identified and undertaken for any areas anticipated to be impacted outside the 7 metre OCS/Vegetation Removal zone, such as Stage 1 Archaeological Assessment.

7.4.4.2 Net Effects

No net effects will be experienced as a result of the installation of the OCS. If during detailed, potential impacts to areas that extend outside the 7 metre OCS/Vegetation Removal zone are identified, a review will be undertaken of potential disturbance to Indigenous and Euro-Canadian archaeological resources for these areas. As part of this review, further archaeological assessment work will be identified and undertaken for any areas anticipated to be impacted outside the 7 metre OCS/Vegetation Removal zone, such as Stage 1 Archaeological Assessment.

7.5 Land Use

Please refer to Appendix E2 for a description of the methodology followed for assessment of land use impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in Appendix E2.

7.5.1 Scarborough Tap Location

7.5.1.1 Potential Effects and Mitigation Measures

The proposed Scarborough Tap location is currently located in the City of Toronto in open space / hydro corridor, and is on both sides of the rail corridor. The western part of the Tap location is surrounded by the rail corridor, a transformer station, hydro corridor/open space, and Jack Goodlad Park. There are also residential areas in the vicinity of the site, to the east and southeast of the site. The eastern part is surrounded by the rail corridor, Arsandco Park, and hydro corridor/open space, with residential properties immediately to the south. Given the site's existing use as a hydro corridor, surrounding uses that are generally utility, and residential/recreational uses that are already adjacent to hydro corridor/a transformer station, this facility is consistent with existing and adjacent uses. The site is zoned under Scarborough's Former General Zoning By-law 24982. Given the existing hydro corridor and transformer station at the site, the Tap location is likely a compatible land use with the existing zoning for the property and no adverse effects on land use are anticipated.

Mitigation Measures

The Tap is located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Toronto will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners regarding the use of this property and will reach an agreement prior to the commencement of construction activities.

7.5.1.2 Net Effects

The Tap location is not anticipated to negatively affect future development within this zoning context, and no negative net effects to land use are anticipated.

7.5.2 Scarborough TPS & 25 kV Feeder Route

7.5.2.1 Potential Effects and Mitigation Measures

The proposed Scarborough TPS location is currently located in the City of Toronto in open space and an existing transformer station. There are also residential areas immediately to the north and west of the site, with hydro corridor / open space and institutional uses to the south/southwest. Given the site's existing use as a hydro corridor, surrounding uses that are generally institutional/utility, and residential uses that are already adjacent to the transformer station, this facility is consistent with existing and adjacent uses.

The 25 kV Feeder route will run along the Stouffville and Lakeshore East rail corridors from the Scarborough TPS to the Scarborough SWS. From the Scarborough TPS to the Kennedy GO Station, land use consists of a hydro transmission corridor to the west of the rail corridor and low rise residential to the east. South of the Kennedy GO Station is characterized by parking lots, open spaces, Corvette Park, and varying densities of residential. As this connection is proposed to consist of an aerial connection along the existing rail corridor, there are no expected footprint impacts to adjacent land uses.

Mitigation Measures
The TPS and feeder are located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Toronto will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. Metrolinx is currently in discussions with the landowners regarding the use of this property and will reach an agreement prior to the commencement of construction activities.

7.5.2.2 Net Effects

The TPS and Feeder is not anticipated to negatively affect future development within the present zoning context, and therefore no negative net effects to land use are expected.

7.5.3 Unionville PS

7.5.3.1 Potential Effects and Mitigation Measures

The proposed Unionville PS site is currently located in the City of Markham, on property which is mainly open space / vacant lot with highways and roads, and includes some of the Unionville GO Station parking lot as well as a hydro substation. Surrounding land uses include parking lots, vacant land, and commercial buildings. The facility is considered consistent with existing and adjacent land uses given their general commercial / transportation nature or that they are vacant lots. The site is zoned primarily *Agriculture (A1) and Rural Residential (RR4)*. Permitted uses in *A1* include those necessary for or ancillary to agricultural operation, such as a single residential property or light industrial uses. Permitted uses in *RR4* include clusters of residential buildings and commercial zones that recognize existing commercial activities in the Countryside area not covered by the agricultural zone.

The Unionville PS site is partially located within the Markham Centre Secondary Plan lands, which seeks to promote a vibrant mixed use environment that is characterized by high-density residential use and a range of commercial uses, which may not be compatible with the Unionville PS. The proposed changes to Viva's Blue route, which involve an extension of the existing bus Rapidway to the Unionville GO Station, will not intersect the Unionville PS lands. As a result, the Unionville PS is not expected to have any conflicts with this project.

Mitigation Measures
The PS is located in an area with a potential land use and zoning conflict. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Markam will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. The lands are owned by the Provincial Crown. Metrolinx is currently working with Provincial Agencies with regards to this property and will reach an agreement prior to the commencement of construction activities.

7.5.3.2 Net Effects

The PS is not anticipated to negatively affect future development within the present zoning context, and therefore no negative net effects to land use are expected.

7.5.4 Lincolnville PS

7.5.4.1 Potential Effects and Mitigation Measures

The proposed Lincolnville PS site is currently located in the Town of Whitchurch-Stouffville in an area of open space, rail corridor, and the GO Transit Lincolnville Rail and Bus Facility. The site is surrounded by rail corridor infrastructure, parking lots, and open space, as well as agricultural fields to the east and west. The facility is considered consistent with the existing and adjacent land uses given their transportation / commercial nature. The site is zoned *Institutional (I)*, which neither permits nor precludes public utilities.

The Lincolnville PS site is also included in the Community of Stouffville Secondary Plan. The purpose of this plan is to maintain the “small town” character of the area while meeting growth targets and remaining environmentally conscious of surrounding resources. Given the primary land uses that currently characterize the site (layover yard, parking lot, GO Transit Lincolnville Rail and Bus Facility), it is unlikely that the presence of a PS will affect this planned development.

Mitigation Measures
The PS is located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the Town of Whitchurch-Stouffville will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. This site is currently owned by Metrolinx.

7.5.4.2 Net Effects

The PS is not anticipated to negatively affect future development within the present zoning context, and therefore no negative net effects to land use are expected.

7.5.5 OCS & Bridges: Section SV-1 – Scarborough Junction to Agincourt Station

7.5.5.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the 14 structures within SV-1 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

Seven structures (Eglinton Ave Bridge, Lawrence Ave Bridge, Mooregate Ave/Tara Ave Pedestrian Bridge, Ellesmere Rd. Bridge, CP Bellville Sub Bridge, West Highland Creek Bridge and HWY 401 Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with these modifications. A full listing of the bridges within the Stouffville Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures
No mitigation measures are required.

7.5.5.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along SV-1. There are no anticipated net effects from the replacement and modifications of bridges within SV-1.

7.5.6 OCS & Bridges: Section SV-2 – Agincourt Station to Milliken Station

7.5.6.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

There are no structures within this section.

Mitigation Measures
No mitigation measures are required.

7.5.6.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along SV-2. There are no anticipated net effects associated with bridges within SV-2.

7.5.7 OCS & Bridges: Section SV-3 – Milliken Station to Unionville Station

7.5.7.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the four structures within SV-3 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification). All four bridges (Hwy 407E Bridge, Hwy 407W Bridge, CN York Sub Bridge, and 14th Ave Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with these modifications. A full listing of the bridges within the Stouffville Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

7.5.7.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along SV-3. There are no anticipated net effects from the modifications of bridges within SV-3.

7.5.8 OCS & Bridges: Section SV-4–Unionville Station to Markham Station

7.5.8.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the four structures within SV-4 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification). Two structures require OCS attachments in order to accommodate electrification infrastructure (Enterprise Drive Bridge and Bruce Creek Bridge). A full listing of the bridges within the Stouffville Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

7.5.8.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along SV-4. There are no anticipated net effects from the modifications of bridges within SV-4.

7.5.9 OCS & Bridges: Section SV-5 –Markham Station to Mount Joy Station

7.5.9.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

There is only one structure within SV-5 and it is not expected to have a vertical clearance issue (i.e., do not meet the minimum clearance requirement for electrification). It also does not require bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure. A full listing of the bridges within the Stouffville Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

7.5.9.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along SV-5.There are no anticipated net effects associated with bridges within SV-5.

7.5.10 OCS & Bridges: Section SV-6 –Mount Joy Station to Stouffville Station

7.5.10.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity and therefore no mitigations are required.

Bridges

There are no bridges within this section which have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification). A full listing of the bridges within the Stouffville Corridor is provided in Section 3 of Volume 1 of the EPR.

7.5.10.2 Net Effects

There are no expected net effects resulting from the construction of OCS infrastructure along SV-6. There are no anticipated net effects associated with bridges within SV-6.

7.5.11 OCS & Bridges: Section SV-7 –Stouffville Station to Lincolnville Station

7.5.11.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

There are no structures within this section.

Mitigation Measures

No mitigation measures are required.

7.5.11.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along SV-7. There are no anticipated net effects associated with bridges within SV-7.

7.6 Socio-Economic

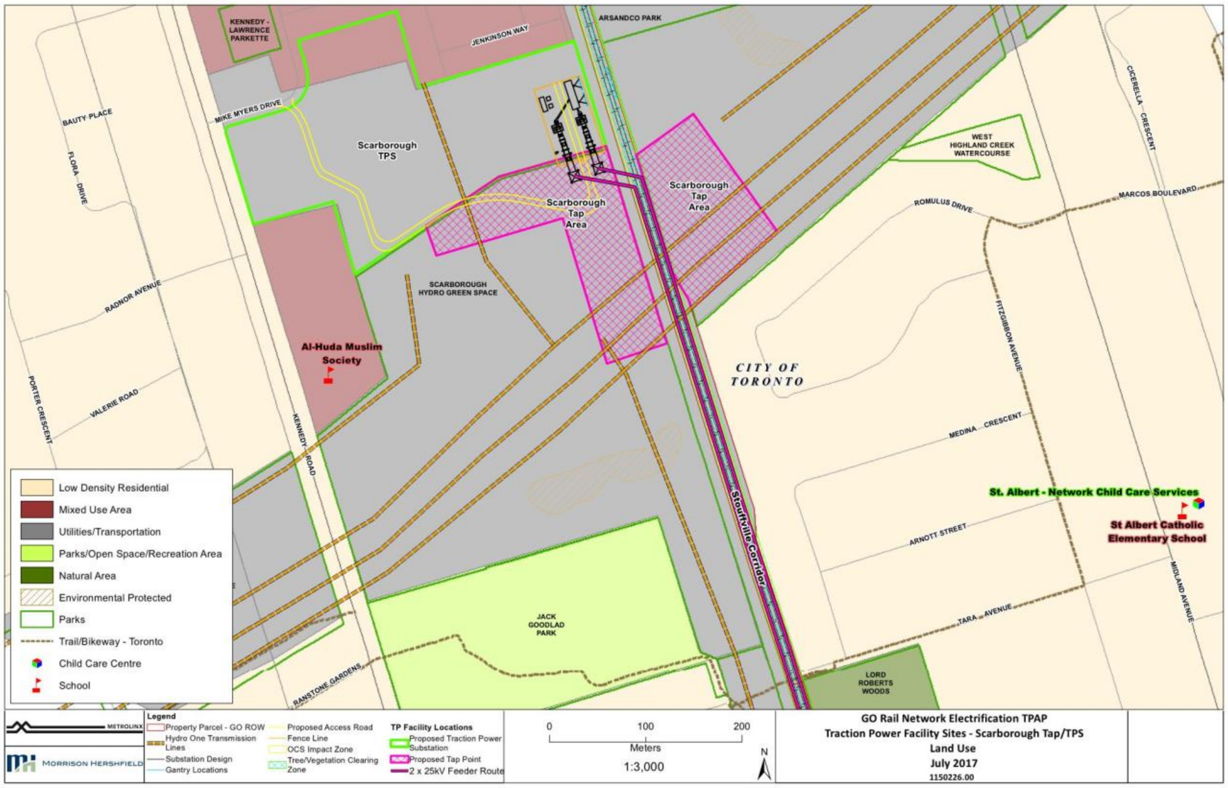
Please refer to Appendix E2 for a description of the methodology followed for assessment of socio-economic impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in Appendix E2.

7.6.1 Scarborough Tap & TPS Location

7.6.1.1 Potential Effects and Mitigation Measures

The closest sensitive facilities are approximately 500 metres away from the Tap and TPS, and therefore there will be no footprint impacts to sensitive facilities as shown in **Figure 7-12**.

Figure 7-12 - Sensitive Facilities in the vicinity of Scarborough Tap & TPS



Other potential effects on the socio-economic environment associated with the Stouffville Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 7.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 7.8 and 7.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 7.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 7.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures

Ensure that the mitigation recommendations outlined in the respective reports listed above for the Stouffville corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

7.6.1.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

7.6.2 Scarborough 25kV Feeder

7.6.2.1 Potential Effects and Mitigation Measures

There are over seven sensitive facilities within 500 metres of the 25 kV Feeder route, the closest being approximately 20 metres from the rail corridor. With the feeder running above the existing rail corridor, there will be no footprint effects to sensitive facilities. Therefore there will be no footprint effects to sensitive facilities as shown in **Figure 7-13** and **Figure 7-15**.

Figure 7-13 - Sensitive Facilities in the vicinity of Scarborough Feeder Route 1

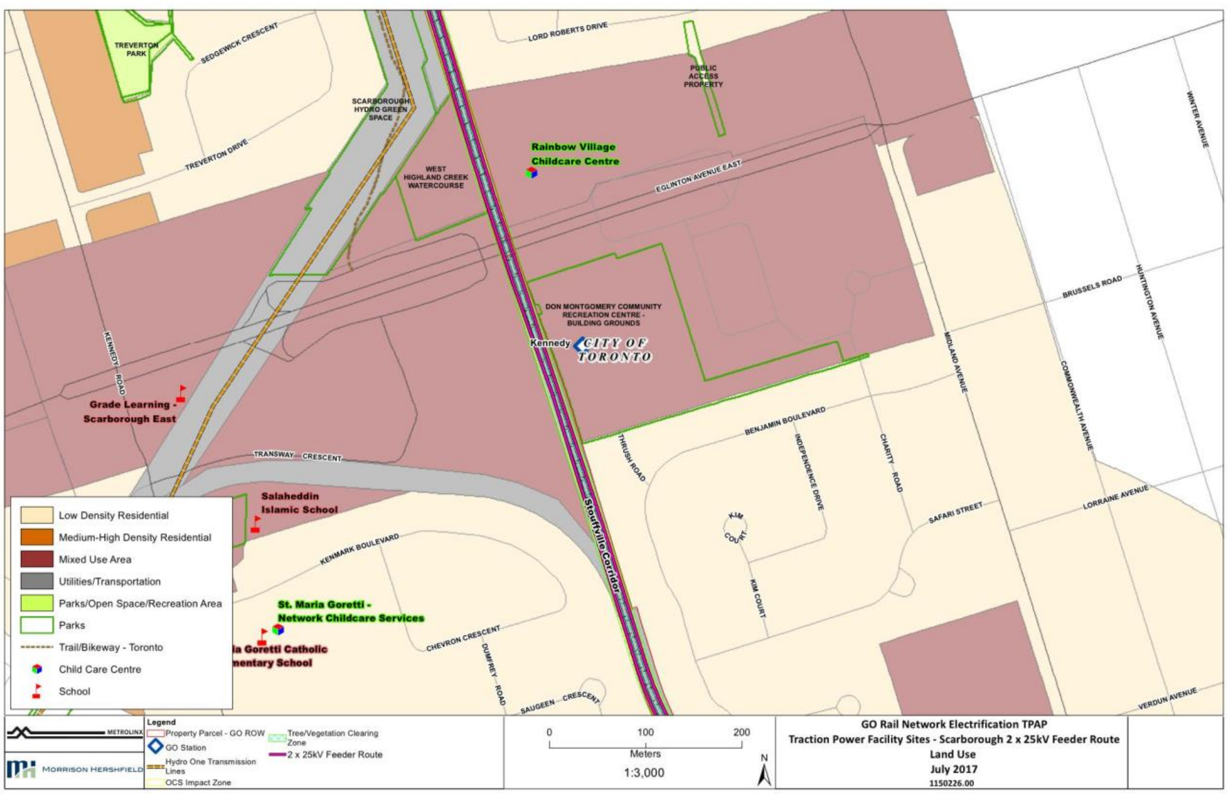
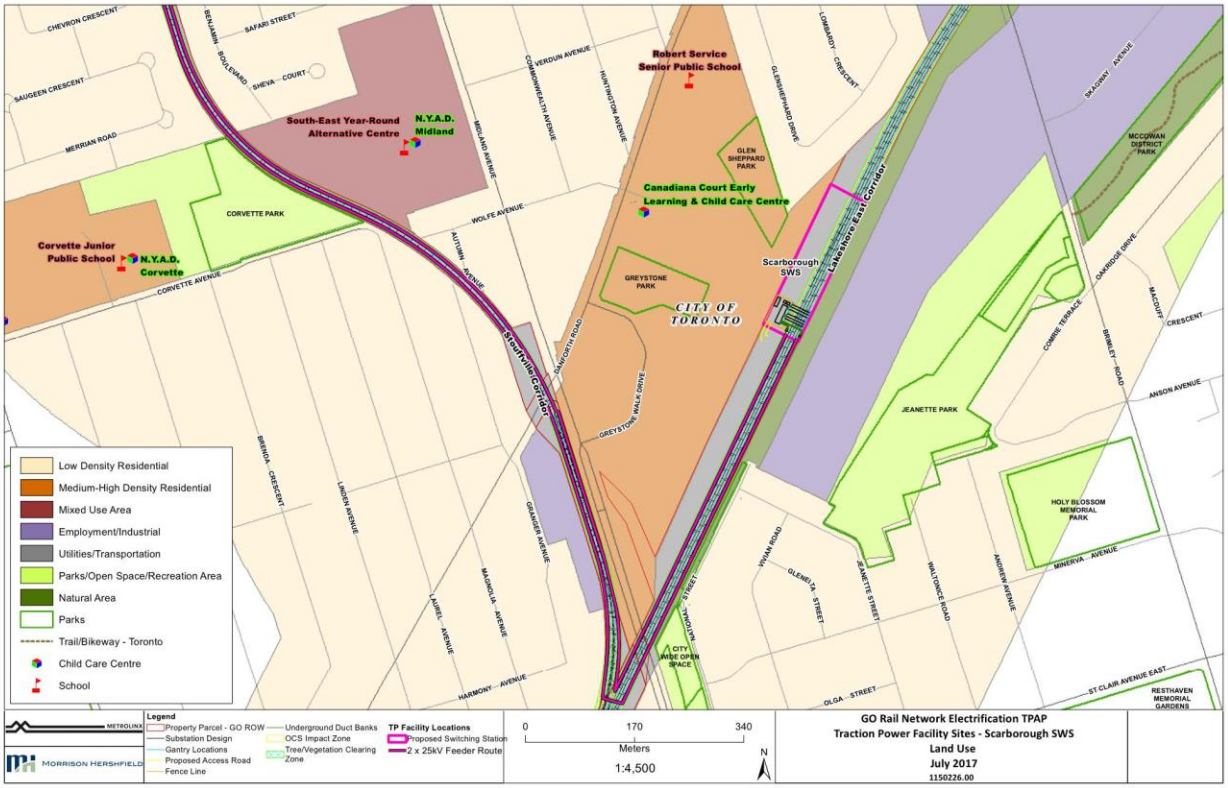


Figure 7-14 - Sensitive Facilities in the vicinity of Scarborough Feeder Route 2

Figure 7-15 Sensitive Facilities in the vicinity of Scarborough Feeder Route 3



Other potential effects on the socio-economic environment associated with the Stouffville Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 7.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 7.8 and 7.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 7.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 7.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

The Gatineau Hydro Corridor Trail is located in the vicinity of this feeder route. The Gatineau Hydro Corridor Trail runs adjacent to the rail corridor from north of Kennedy GO Station to Jack Goodlad Park.

There are no anticipated adverse effects on this recreational amenity due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required City of Toronto will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Stouffville corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

7.6.2.2 Net Effects

Net effects to sensitive facilities and recreational amenities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

7.6.3 Unionville PS

7.6.3.1 Potential Effects and Mitigation Measures

The closest sensitive facility is approximately 420 metres away on the other side of the rail corridor, so it would not be affected by the PS's footprint.

Other potential effects on the socio-economic environment associated with the Stouffville Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 7.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 7.8 and 7.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 7.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 7.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures

Ensure that the mitigation recommendations outlined in the respective reports listed above for the Stouffville corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

7.6.3.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

7.6.4 Lincolnville PS

7.6.4.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed Lincolnville PS location and therefore there will be no footprint effects to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Stouffville Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 7.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 7.8 and 7.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 7.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 7.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the Stouffville corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

7.6.4.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

7.6.5 OCS & Bridges: Section SV-1 – SV-7 – Scarborough Junction to Lincolnville Station

7.6.5.1 Potential Effects and Mitigation Measures

There are four sensitive facilities (three child care centres and one school) within the vicinity of SV-1, SV-4 and SV-5 as shown in **Table 7-26**. The closest facility is approximately 20 metres from the OCS impact zone, and therefore there will be no footprint effects to the sensitive facility.

Table 7-26 Sensitive Facilities within the vicinity of the SV-1, SV-4 - SV-5

Corridor Segment	Type	Name	Address	Distance from 5 metre OCS Impact Zone
SV-1	Child Care Centre	Rainbow Village Childcare Centre	2460 Eglinton Ave E, Toronto	40 metres
SV-1	Child Care Centre	Heart Beatz Child Care	141 Village Green Sq, Toronto	25 metres
SV-4	School	Bill Crothers Secondary School	44 Main St, Unionville	60 metres
SV-5	Child Care Centre	Little Readers Academy	9275 Hwy 48, Markham	20 metres

Other potential effects on the socio-economic environment associated with the Stouffville Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 7.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 7.8 and 7.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 7.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 7.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

There are a number of existing and proposed recreational amenities (parks and trails) within the vicinity of the Stouffville rail corridor, including a number of enhancement proposals within the northern segment of the Rouge National Urban Park. There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required Parks Canada and the relevant municipalities will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities. For more information on recreational amenities please see the Land Use and Socio-Economic Report contained in Appendix E.

Mitigation Measures

Ensure that the mitigation recommendations outlined in the respective reports listed above for the Stouffville corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

7.6.5.2 Net Effects

Net effects to sensitive facilities and recreational amenities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

7.7 Air Quality

Please refer to Appendix F2 for a description of the methodology followed for assessment of air quality impacts. Additional details can be found in the Air Quality Impact Assessment Report contained in Appendix F2.

Electrification of the GO Rail Network will result in the reduction of diesel emissions (due to electric powered trains) which will have a benefit to local air quality near the rail corridors. The increased electricity generation will generate some pollutants through the combustion of fossil fuels, but overall the total air emissions will be lower as a result of the electrification. Similarly, the distribution of electricity via the Traction Power Facilities (and ancillary components such as gantries) and 25kV feeder routes does not produce air pollutants and therefore no impacts are anticipated and no mitigation measures are required. As such, no impacts are anticipated and no mitigation measures are required. As there will be a net benefit to air quality, post-construction monitoring is not necessary.

Further details related to the air quality assessment undertaken as part of the TPAP have been included in **Section 9.7**

7.8 Noise

Recognizing that electrification of the GO network is a component of the over-arching Regional Express Rail plan, a comprehensive noise study was undertaken to examine the noise effects of the conversion to increased electric service[24] as part of the GO Rail Network Electrification TPAP.

The objective of the Noise study was to assess the effects on noise levels due to the conversion from existing/present day (2015) diesel-based GO service levels (referred to as the Future No-Build scenario) to the Electric (2025) GO RER electric-based service levels (referred to as the Future Build Scenario), and to subsequently determine whether mitigation measures may be required to address adverse noise effects. The scope of the study examined noise effects due to electric RER GO service along the rail corridors as well as noise effects related to the proposed Tap locations and Traction Power Facilities.

[24] *The electric RER scenario will entail a mixed diesel and electric fleet.*

It is noted that numerous (i.e., thousands of) receptors were included in the noise model and considered as part of the analysis; however in order to present the results in a comprehensible way for purposes of reporting, representative receptors were chosen to demonstrate the general conditions and sound levels modelled in the area.

In order to carry out this detailed noise modeling exercise, several assumptions were established. Some of the key assumptions were as follows (note - this is not an exhaustive list, please refer to **Appendix G – Noise and Vibration Modelling Reports**):

- Present day 2015 diesel based GO service was modelled as the 'base case'. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Future (2025) electric based GO RER service levels were modelled as the 'future case'. It should be noted that the 2025 scenario includes a mixed GO fleet of diesel and electric trains. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Freight traffic was included/considered in the modelling. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports.**
- Data was gathered on existing noise barriers as well as planned noise barriers along the rail corridors and were included/considered in the modelling. Planned barriers were defined as: noise barriers that were identified/proposed as part of previously completed Metrolinx/GO Transit Environmental Assessment/TPAP studies. While it is recognized that not all of these barriers have been implemented at the time the assessment was completed, they were included/considered in the modelling. It should be noted these 'planned barriers' were not evaluated for technical feasibility.
- The scope of the study did not include a comprehensive analysis of the technical, operational, economical, or administrative feasibility of implementing noise mitigation measures. Rather, a preliminary assessment of technical feasibility was completed.
- Noise sources associated with GO diesel and/or GO electric rail activity include:
  - Moving trains (applicable to all trains);
  - Idling trains at each station (applicable to all trains);
  - Road crossings signals (applicable to all trains);
  - Crossovers and Switches (applicable to all trains);
  - Wheel squeal (applicable to all trains); and
  - Pantograph (applicable to electric trains only).

A complete list of all assumptions applied can be found in the Appendix G – Noise and Vibration Modelling Reports

Future/Committed Land Use

As per the 1995 MOEE / GO Transit Protocol, noise and vibration impacts are evaluated at lands which have been committed for (future) sensitive land uses. Committed uses beyond existing developments include: approved site plans, approved condominium plans or draft approved plans of subdivision. As part of carrying out the noise/vibration modelling work, this data was requested from the municipalities located within the Electrification TPAP study area. It should be noted that the only data that was available/provided was from the City of Toronto for approved building permits for new residential uses, therefore this data was reviewed and included in the assessment. Modelling was completed for all receptors identified through review of this data; results are presented for selected representative receptors.

For those sections of the corridor outside of the City of Toronto, a screening level assessment was conducted based on the limited detail provided in the available data on planned developments provided for municipalities other than the City of Toronto. The screening level assessment was designed to flag potential planned areas of development that may experience Adjusted Noise Impacts of greater than 5 dB based on the limited information available. This assessment was completed for the Electric RER scenario only and does not include the investigation of barriers within these areas. Notwithstanding this, the reports contained in EPR Appendix G include figures showing flagged potential planned areas of (future) development that were provided by their respective municipalities. Metrolinx will use this information for consideration of noise mitigation for new planned developments (if approved by the relevant municipalities) during the detail design stage as appropriate.

7.8.1 Credible Worst Case Scenario

The credible worst-case scenario is based on established service goals upon which the minimum infrastructure needs were determined. Increase to the service levels would require additional infrastructure due to operational and safety considerations. Current rail regulations are principally governed by Transport Canada and the US Federal Rail Administration; while Metrolinx, CN and CP are the principal sources of operational policies, standards, and rules. Other contributors to rail policy are the American Railway Engineering and Maintenance of Way Association (AREMA) and the American Public Transportation Association (APTA). Collectively, these regulators and associations set limits on how railways are designed, operated and maintained. Therefore the proposed infrastructure and service levels represent a credible worst-case scenario.

7.8.2 Ambient Sound Levels

7.8.2.1 Along the Rail Corridors

According to the MOEE/GO Protocol, ambient noise is the sound existing at a receptor in the absence of all noise from the GO Transit rail project. Ambient noise can be used as a component of the sound level objective, in combination with the sound level from any existing rail activity. The ambient levels are primarily due to noise from local road traffic and surrounding industry.

Ambient noise from road traffic and other background noise sources including industry was assumed to be negligible compared to existing rail traffic noise at most receptors near the rail corridor, and not a significant factor in determining the desirable sound level objective. Therefore, ambient noise was not assessed.

7.8.2.2 At Traction Power Facilities

The sound level objective for traction power facilities is the higher of the exclusion limit values for L_{EQ} (1-hr) in NPC-300 or the minimum background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the traction power facilities. Therefore, the exclusion limits were adopted as the desired sound level objectives.

7.8.2.3 At Layover Sites

The sound level objectives for layover sites are the higher of the exclusion limits for L_{EQ} (1-hr) in the MOEE/GO Protocol or the minimum 1-hr L_{EQ} background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the layover sites. Therefore, the exclusion limits were adopted as the desired sound level objectives.

7.8.3 Rail Activity Sound Levels

7.8.3.1 CADNA/A MODELLING

The MOEE/GO Protocol stipulates the use of a model known as Sound from Trains Environmental Analysis Method (STEAM) for predicting rail traffic noise levels. STEAM was developed by the MOECC (MOECC, 1990). The present study deviated from this guidance in that the rail traffic noise levels were modelled using the "Federal Noise and Vibration Impact Assessment" (FTA Protocol) (FTA, 2006) incorporated in Cadna/A. Cadna/A allows for the modelling of complex railway schemes including curves, parallel and intervening tracks which cannot be easily assessed using STEAM. Cadna/A is software that includes the implementation of the FTA noise propagation algorithms and as well as aspects of ISO 9613 algorithms (ISO 1994, ISO 1996).

The existing, Diesel RER and Electric RER noise levels were modelled for the entire Study Area. Results at each discrete receptor were used to establish the adjusted noise impact of the Diesel RER scenario relative to the existing scenario, as well as that of the Electric RER scenario relative to the existing scenario.

As per the FTA Protocol, the diesel trains and electric trains were modelled with a noise source height of 2.4 metres (8 ft) and 0.6 metres (2ft), respectively. The noise from a diesel train is dominated by the engine (located at approximately 2.4 metres above the rail) with a lesser contribution from the wheels (located at approximately 0.6 metres above the rail). The noise from an electric train, on the other hand, is dominated by wheel noise (emitted approximately 0.6 metres above the rail), since the electric engine is relatively quiet.

Topography was included in the Cadna/A model to take into consideration the elevation differences of the railway, receptors and the intervening terrain. The topographical features were assumed to be the same in the existing and future scenarios. High-resolution (i.e., 5 m) topographical information was obtained from public databases (Ministry of Natural Resources and Forestry, 2016).

"Retained" Noise Barriers

The diesel and electric locomotives were defined using the FTA standards implemented into Cadna/A. At the time of the original noise assessment, the electric locomotive train type was defined mathematically within Cadna/A with a "K" constant[25] that differed from the "K" constant defined in the FTA model. Metrolinx presented the results of the preliminary noise modelling for electric RER service at a series of public consultations throughout the TPAP.

Following the original assessment, an option within Cadna/A to use the "K" constant which corresponds to the FTA model was created by Datakustik, the developers of the Cadna/A software. Re-assessment using this updated Cadna/A option showed that a limited number of areas where mitigation was previously identified using the preliminary noise modelling no longer achieves an increase of 5 dB or more with the updated Cadna/A noise modelling. This was a result of the correction to the noise modelling input that more accurately reflects the quieter nature of electrified locomotives. Metrolinx believes these supplemental areas should still be included for consideration of noise mitigation. As a result, the locations of these particular mitigation barriers are identified as "retained mitigation barriers" throughout **EPR Appendix G**, and in the mapping provided in **EPR Appendix S**. Refer to the orange coloured lines/symbols shown on the Stouffville Corridor **EPR Appendix S** maps.

7.8.4 Traction Power Facilities – Predicted Noise Impacts

Generally, the traction power substations are comprised of two power transformers and a control / switchgear room and the paralleling stations and switching stations are comprised of two autotransformers and a control / switchgear room.

The sound power level generated by a typical 10 MVA transformer, estimated at approximately 87 dBA (Metrolinx, 2014), was used as an estimate for the power transformers at the traction power substations and the autotransformers at the switching stations. The MOECC requires that a 5 dB tonal penalty be applied to sources exhibiting a humming characteristic. As transformers are known to exhibit tonal characteristics, the 5 dB penalty was applied to all the transformers.

The noise impacts from the traction power facilities were evaluated at nearby receptors and are summarized in **Table 7-27**. The figures contained in **Appendix S** show the receptors for each Traction

[25] The "K" constant is un unnamed parameter in the FTA calculations, which describes the locomotive type (i.e., passenger diesel, electric, DMU, etc.)

Power Facility. The predicted noise impacts from the traction power facilities at nearby receptors were below the MOECC applicable exclusion limits, with exception of:

- One representative receptor (R11): the nighttime predicted noise impacts of the Scarborough Tap/TPS at the façade of the nearby representative receptor are 46 dBA, which is above the 45 dBA nighttime exclusion limit.

Evaluation of more accurate sound levels for transformers and, if necessary, mitigation measures such as low noise fans or barriers should be investigated for the Scarborough Tap/TPS location during Detailed Design.

Table 7-27 Noise Impacts – Stouffville Traction Power Facilities

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit (dBA)	Compliance with Performance Limit (Yes/No)
R07	Scarborough TPS	Plane of Window	Daytime\Evening	12	Class 1	50	Yes
			Nighttime	12		45	Yes
		Outdoor Area	Daytime\Evening	10		50	Yes
R08a		Plane of Window	Daytime\Evening	22	Class 1	50	Yes
			Nighttime	22		45	Yes
		Outdoor Area	Daytime\Evening	16		50	Yes
R08b		Plane of Window	Daytime\Evening	27	Class 1	50	Yes
			Nighttime	27		45	Yes
		Outdoor Area	Daytime\Evening	24		50	Yes
R09a		Plane of Window	Daytime\Evening	16	Class 1	50	Yes
			Nighttime	16		45	Yes
		Outdoor Area	Daytime\Evening	14		50	Yes
R09b		Plane of Window	Daytime\Evening	26	Class 1	50	Yes
			Nighttime	26		45	Yes
		Outdoor Area	Daytime\Evening	24		50	Yes
R10a		Plane of Window	Daytime\Evening	29	Class 1	50	Yes
			Nighttime	29		45	Yes
		Outdoor Area	Daytime\Evening	28		50	Yes
R10b		Plane of Window	Daytime\Evening	32	Class 1	50	Yes
			Nighttime	32		45	Yes
		Outdoor Area	Daytime\Evening	27		50	Yes
R11		Plane of Window	Daytime\Evening	46	Class 1	50	Yes
			Nighttime	46		45	No

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Daytime\Evening	45		50	Yes
R12		Plane of Window	Daytime\Evening	35	Class 1	50	Yes
			Nighttime	35		45	Yes
		Outdoor Area	Daytime\Evening	33		50	Yes
R28	Unionville PS	Plane of Window	Daytime\Evening	13	Class 1	50	Yes
			Nighttime	13		45	Yes
		Outdoor Area	Daytime\Evening	12		50	Yes
R29		Plane of Window	Daytime\Evening	16	Class 1	50	Yes
			Nighttime	16		45	Yes
		Outdoor Area	Daytime\Evening	15		50	Yes
R30		Plane of Window	Daytime\Evening	16	Class 1	50	Yes
			Nighttime	16		45	Yes
		Outdoor Area	Daytime\Evening	14		50	Yes
R31		Plane of Window	Daytime\Evening	14	Class 1	50	Yes
			Nighttime	14		45	Yes
		Outdoor Area	Daytime\Evening	13		50	Yes
R32		Plane of Window	Daytime\Evening	13	Class 1	50	Yes
			Nighttime	13		45	Yes
		Outdoor Area	Daytime\Evening	12		50	Yes
R33		Plane of Window	Daytime\Evening	13	Class 1	50	Yes
			Nighttime	13		45	Yes
		Outdoor Area	Daytime\Evening	11		50	Yes
R34		Plane of Window	Daytime\Evening	12	Class 1	50	Yes
			Nighttime	12		45	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Daytime\Evening	10		50	Yes
R67	Lincolnville PS	Plane of Window	Daytime\Evening	19	Class 1	50	Yes
			Nighttime	19		45	Yes
		Outdoor Area	Daytime\Evening	17		50	Yes
R68		Plane of Window	Daytime	29	Class 3	45	Yes
			Evening/Nighttime	29		40	Yes
		Outdoor Area	Daytime	27		45	Yes
			Evening	27		40	Yes
R69		Plane of Window	Daytime	39	Class 3	45	Yes
			Evening/Nighttime	39		40	Yes
		Outdoor Area	Daytime	38		45	Yes
			Evening	38		40	Yes

Notes:
[1] *Daytime occurs from 0700-1900h. Evening occurs from 1900h-2300h. Nighttime occurs from 2300-0700h.*

7.8.5 Noise Impacts from Layover Sites

The noise impacts from the Lincolnville Layover site were evaluated at nearby receptors and are summarised in **Table 7-28**

The predicted noise impacts from the layover sites at nearby receptors were below the MOEE/GO Protocol applicable exclusion limit of 55 dBA. Therefore, no mitigation measures were recommended for this facility.

Table 7-28 Noise Impacts of the Electric RER Scenario – Stouffville Layover Sites

Receptor ID	Existing					Electric RER			
	Layover Facility	Evaluation Location	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit [1] (dBA)	Compliance with Performance Limit (Yes/No)	Layover Facility	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit[1] (dBA)	Compliance with Performance Limit (Yes/No)
R67	Lincolnville Layover	Outdoor Area	33	55	Yes	Lincolnville Layover	34	55	Yes
		Façade	36	55	Yes		37	55	Yes
R68		Outdoor Area	43	55	Yes		43	55	Yes
		Façade	45	55	Yes		46	55	Yes
R69		Outdoor Area	53	55	Yes		53	55	Yes
		Façade	55	55	Yes		55	55	Yes

Notes:
[1] The LEQ is evaluated for any 1-hour period.

7.8.6 Stouffville Corridor - Adjusted Noise Impact of the Electric RER Scenario

The following section summarizes the results of the noise modelling analysis for the Stouffville corridor. The Adjusted Noise Impact between Existing and Electric RER noise levels for Stouffville is summarised in **Table 7-29.**

Impact ratings for the evaluated 87 receptors listed in the table can be summarised as follows:

- 59 daytime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 19 daytime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB);
- 9 daytime Adjusted Noise Impacts were deemed to be Significant (i.e., greater than 5 dB increase).
- 32 nighttime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 12 nighttime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB);
- 32 nighttime Adjusted Noise Impacts were deemed to be Significant (i.e., between 5 and 9.99 dB increase); and
- 11 nighttime Adjusted Noise Impacts were deemed to be Very Significant (i.e., greater than 10 dB increase)

Mitigation measures were investigated for all points of receptors with a Significant or Very Significant Adjusted Noise Impact (i.e., 5 dB increase or greater) in accordance with the MOEE/GO Protocol. The daytime Adjusted Noise Impacts were predicted to be Significant for 9 receptors and the nighttime Adjusted Noise Impacts were predicted to be Significant or Very Significant for 43 receptors.

Table 7-29: Adjusted Noise Impacts of the Electric RER Scenario in Comparison to Existing GO Service – Stouffville Corridor

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R01	Daytime	50.0	56.1	55.0	1.1	Insignificant	No	No
	Nighttime	41.2	52.6	50.0	2.6	Insignificant	No	
R02a	Daytime	50.5	56.4	55.0	1.4	Insignificant	No	No
	Nighttime	42.2	53.0	50.0	3.0	Noticeable	No	
R02b	Daytime	56.4	57.5	56.4	1.1	Insignificant	No	No
	Nighttime	47.8	54.2	50.0	4.2	Noticeable	No	
R03	Daytime	51.9	54.4	55.0	-0.6	Insignificant	No	No
	Nighttime	43.9	51.0	50.0	1.0	Insignificant	No	
R04	Daytime	52.8	50.6	55.0	-4.4	Insignificant	No	No
	Nighttime	42.5	47.6	50.0	-2.4	Insignificant	No	
R05	Daytime	51.1	55.3	55.0	0.3	Insignificant	No	No [4]
	Nighttime	41.8	52.1	50.0	2.1	Insignificant	No	
R06	Daytime	53.2	50.0	55.0	-5.0	Insignificant	No	No
	Nighttime	49.9	49.9	50.0	-0.1	Insignificant	No	
R07	Daytime	51.9	48.9	55.0	-6.1	Insignificant	No	No
	Nighttime	50.0	50.7	50.0	0.7	Insignificant	No	
R08a	Daytime	52.8	54.9	55.0	-0.1	Insignificant	No	No
	Nighttime	40.1	51.5	50.0	1.5	Insignificant	No	
R08b	Daytime	49.7	55.0	55.0	0.0	Insignificant	No	No
	Nighttime	40.7	52.1	50.0	2.1	Insignificant	No	
R09a	Daytime	51.8	47.9	55.0	-7.1	Insignificant	No	No
	Nighttime	43.0	45.8	50.0	-4.2	Insignificant	No	
R09b	Daytime	51.2	57.1	55.0	2.1	Insignificant	No	No
	Nighttime	42.9	53.6	50.0	3.6	Noticeable	No	
R10a	Daytime	51.1	56.6	55.0	1.6	Insignificant	No	No
	Nighttime	45.1	53.9	50.0	3.9	Noticeable	No	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R10b	Daytime	49.4	50.3	55.0	-4.7	Insignificant	No	No
	Nighttime	44.4	48.4	50.0	-1.6	Insignificant	No	
R11	Daytime	53.2	60.0	55.0	5.0	Significant	Yes	Yes
	Nighttime	44.0	56.4	50.0	6.4	Significant	Yes	
R12	Daytime	50.1	53.9	55.0	-1.1	Insignificant	No	No
	Nighttime	42.1	53.8	50.0	3.8	Noticeable	No	
R13	Daytime	51.9	59.1	55.0	4.1	Noticeable	No	Yes
	Nighttime	42.5	55.6	50.0	5.6	Significant	Yes	
R14	Daytime	45.8	47.8	55.0	-7.2	Insignificant	No	No
	Nighttime	40.2	46.2	50.0	-3.8	Insignificant	No	
R15	Daytime	42.5	48.0	55.0	-7.0	Insignificant	No	No
	Nighttime	35.3	44.4	50.0	-5.6	Insignificant	No	
R16	Daytime	55.2	59.4	55.2	4.2	Noticeable	No	Yes
	Nighttime	47.0	56.1	50.0	6.1	Significant	Yes	
R17	Daytime	58.5	55.4	58.5	-3.1	Insignificant	No	No
	Nighttime	50.9	51.9	50.9	1.0	Insignificant	No	
R18	Daytime	45.0	43.8	55.0	-11.2	Insignificant	No	No
	Nighttime	37.3	41.3	50.0	-8.7	Insignificant	No	
R19	Daytime	43.3	46.5	55.0	-8.5	Insignificant	No	No
	Nighttime	35.5	43.9	50.0	-6.1	Insignificant	No	
R20	Daytime	43.9	45.6	55.0	-9.4	Insignificant	No	No
	Nighttime	36.9	42.4	50.0	-7.6	Insignificant	No	
R21a	Daytime	53.6	57.0	55.0	2.0	Insignificant	No	No
	Nighttime	42.0	53.3	50.0	3.3	Noticeable	No	
R21b	Daytime	48.3	51.9	55.0	-3.1	Insignificant	No	No
	Nighttime	39.0	48.2	50.0	-1.8	Insignificant	No	
R22	Daytime	45.9	50.0	55.0	-5.0	Insignificant	No	No
	Nighttime	35.4	46.6	50.0	-3.4	Insignificant	No	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R23	Daytime	56.3	51.8	56.3	-4.5	Insignificant	No	No
	Nighttime	44.0	49.0	50.0	-1.0	Insignificant	No	
R24	Daytime	55.5	48.9	55.5	-6.6	Insignificant	No	No
	Nighttime	41.9	45.9	50.0	-4.1	Insignificant	No	
R25	Daytime	62.1	66.1	62.1	4.0	Noticeable	No	Yes
	Nighttime	54.5	62.9	54.5	8.4	Significant	Yes	
R26	Daytime	65.9	74.0	65.9	8.1	Significant	Yes	Yes
	Nighttime	50.3	70.8	50.3	20.5	Very Significant	Yes	
R27a	Daytime	51.1	59.1	55.0	4.1	Noticeable	No	Yes
	Nighttime	40.9	56.5	50.0	6.5	Significant	Yes	
R27b	Daytime	55.6	64.9	55.6	9.3	Significant	Yes	Yes
	Nighttime	57.2	70.1	57.2	12.9	Very Significant	Yes	
R28	Daytime	53.3	61.7	55.0	6.7	Significant	Yes	Yes
	Nighttime	45.4	60.9	50.0	10.9	Very Significant	Yes	
R29	Daytime	52.7	61.9	55.0	6.9	Significant	Yes	Yes
	Nighttime	53.5	65.6	53.5	12.1	Very Significant	Yes	
R30	Daytime	64.5	69.1	64.5	4.6	Noticeable	No	Yes
	Nighttime	53.2	65.8	53.2	12.6	Very Significant	Yes	
R31	Daytime	70.6	75.4	70.6	4.8	Noticeable	No	Yes
	Nighttime	62.9	71.7	62.9	8.8	Significant	Yes	
R32	Daytime	60.1	64.9	60.1	4.8	Noticeable	No	Yes
	Nighttime	52.0	61.3	52.0	9.3	Significant	Yes	
R33	Daytime	67.8	72.7	67.8	4.9	Noticeable	No	Yes
	Nighttime	60.8	69.0	60.8	8.2	Significant	Yes	
R34	Daytime	64.6	69.6	64.6	5.0	Significant	Yes	Yes
	Nighttime	59.8	65.6	59.8	5.8	Significant	Yes	
R35a	Daytime	64.0	69.0	64.0	5.0	Significant	Yes	Yes
	Nighttime	59.5	64.9	59.5	5.4	Significant	Yes	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R35b	Daytime	67.9	72.4	67.9	4.5	Noticeable	No	Yes
	Nighttime	56.6	68.9	56.6	12.3	Very Significant	Yes	
R36	Daytime	63.5	68.5	63.5	5.0	Significant	Yes	Yes
	Nighttime	59.3	64.3	59.3	5.0	Significant	Yes	
R37	Daytime	63.0	68.2	63.0	5.2	Significant	Yes	Yes
	Nighttime	60.4	65.3	60.4	4.9	Noticeable	No	
R38	Daytime	53.4	55.9	55.0	0.9	Insignificant	No	No
	Nighttime	50.2	54.2	50.2	4.0	Noticeable	No	
R39a	Daytime	44.6	44.0	55.0	-11.0	Insignificant	No	No
	Nighttime	50.2	49.3	50.2	-0.9	Insignificant	No	
R39b	Daytime	64.2	67.2	64.2	3.0	Noticeable	No	Yes
	Nighttime	53.2	64.4	53.2	11.2	Very Significant	Yes	
R40a	Daytime	62.8	67.6	62.8	4.8	Noticeable	No	Yes
	Nighttime	58.7	63.9	58.7	5.2	Significant	Yes	
R40b	Daytime	60.1	64.8	60.1	4.7	Noticeable	No	Yes
	Nighttime	54.8	60.8	54.8	6.0	Significant	Yes	
R40c	Daytime	62.3	62.6	62.3	0.3	Insignificant	No	Yes
	Nighttime	52.0	57.9	52.0	5.9	Significant	Yes	
R40d	Daytime	61.1	60.7	61.1	-0.4	Insignificant	No	No
	Nighttime	55.5	56.6	55.5	1.1	Insignificant	No	
R41	Daytime	46.9	46.5	55.0	-8.5	Insignificant	No	No
	Nighttime	42.8	45.5	50.0	-4.5	Insignificant	No	
R42a	Daytime	55.1	52.4	55.1	-2.7	Insignificant	No	No
	Nighttime	50.5	51.5	50.5	1.0	Insignificant	No	
R42b	Daytime	58.5	60.8	58.5	2.3	Insignificant	No	Yes
	Nighttime	51.3	57.7	51.3	6.4	Significant	Yes	
R43	Daytime	61.4	65.8	61.4	4.4	Noticeable	No	Yes
	Nighttime	51.6	62.5	51.6	10.9	Very Significant	Yes	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R44	Daytime	65.1	69.6	65.1	4.5	Noticeable	No	Yes
	Nighttime	55.5	66.2	55.5	10.7	Very Significant	Yes	
R45	Daytime	62.7	66.8	62.7	4.1	Noticeable	No	Yes
	Nighttime	57.2	62.9	57.2	5.7	Significant	Yes	
R46	Daytime	58.8	61.7	58.8	2.9	Insignificant	No	Yes
	Nighttime	56.3	62.7	56.3	6.4	Significant	Yes	
R47a	Daytime	64.0	68.7	64.0	4.7	Noticeable	No	Yes
	Nighttime	59.5	65.6	59.5	6.1	Significant	Yes	
R47b	Daytime	55.5	56.5	55.5	1.0	Insignificant	No	No
	Nighttime	46.5	54.0	50.0	4.0	Noticeable	No	
R47c	Daytime	62.4	66.4	62.4	4.0	Noticeable	No	Yes
	Nighttime	47.6	63.6	50.0	13.6	Very Significant	Yes	
R48a	Daytime	66.4	71.2	66.4	4.8	Noticeable	No	Yes
	Nighttime	62.0	68.0	62.0	6.0	Significant	Yes	
R48b	Daytime	56.9	58.4	56.9	1.5	Insignificant	No	Yes
	Nighttime	49.4	55.3	50.0	5.3	Significant	Yes	
R49	Daytime	67.4	71.4	67.4	4.0	Noticeable	No	Yes
	Nighttime	50.3	68.4	50.3	18.1	Very Significant	Yes	
R50	Daytime	50.8	51.9	55.0	-3.1	Insignificant	No	No
	Nighttime	44.1	50.1	50.0	0.1	Insignificant	No	
R51	Daytime	60.2	58.5	60.2	-1.7	Insignificant	No	Yes
	Nighttime	50.9	57.0	50.9	6.1	Significant	Yes	
R52	Daytime	63.0	63.0	63.0	0.0	Insignificant	No	Yes
	Nighttime	55.6	61.7	55.6	6.1	Significant	Yes	
R53	Daytime	62.5	62.6	62.5	0.1	Insignificant	No	Yes
	Nighttime	55.4	61.3	55.4	5.9	Significant	Yes	
R54	Daytime	62.0	61.9	62.0	-0.1	Insignificant	No	Yes
	Nighttime	51.5	60.4	51.5	8.9	Significant	Yes	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R55	Daytime	51.4	49.7	55.0	-5.3	Insignificant	No	No
	Nighttime	42.6	48.5	50.0	-1.5	Insignificant	No	
R56	Daytime	59.7	59.9	59.7	0.2	Insignificant	No	Yes
	Nighttime	53.1	58.7	53.1	5.6	Significant	Yes	
R57a	Daytime	65.0	65.1	65.0	0.1	Insignificant	No	Yes
	Nighttime	56.7	63.9	56.7	7.2	Significant	Yes	
R57b	Daytime	62.3	61.8	62.3	-0.5	Insignificant	No	Yes
	Nighttime	51.0	60.4	51.0	9.4	Significant	Yes	
R58a	Daytime	57.7	55.9	57.7	-1.8	Insignificant	No	No
	Nighttime	51.4	55.3	51.4	3.9	Noticeable	No	
R58b	Daytime	63.1	62.6	63.1	-0.5	Insignificant	No	Yes
	Nighttime	51.7	61.2	51.7	9.5	Significant	Yes	
R59	Daytime	61.5	61.7	61.5	0.2	Insignificant	No	No
	Nighttime	57.5	61.0	57.5	3.5	Noticeable	No	
R60	Daytime	62.1	62.3	62.1	0.2	Insignificant	No	No
	Nighttime	57.5	61.0	57.5	3.5	Noticeable	No	
R61	Daytime	60.4	58.1	60.4	-2.3	Insignificant	No	Yes
	Nighttime	51.2	56.5	51.2	5.3	Significant	Yes	
R62	Daytime	60.5	58.3	60.5	-2.2	Insignificant	No	Yes
	Nighttime	51.0	56.7	51.0	5.7	Significant	Yes	
R63	Daytime	61.6	61.4	61.6	-0.2	Insignificant	No	Yes
	Nighttime	50.5	60.0	50.5	9.5	Significant	Yes	
R64a	Daytime	65.5	65.4	65.5	-0.1	Insignificant	No	Yes
	Nighttime	54.4	63.9	54.4	9.5	Significant	Yes	
R64b	Daytime	56.0	51.9	56.0	-4.1	Insignificant	No	No
	Nighttime	49.6	50.9	50.0	0.9	Insignificant	No	
R65	Daytime	51.2	47.2	55.0	-7.8	Insignificant	No	No
	Nighttime	42.8	46.1	50.0	-3.9	Insignificant	No	

Receptor ID	Period [1]	Predicted Project Noise Levels (dBA) [1]		Objective (dBA) [2]	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [3]	Investigate Mitigation?
		Existing	Electric RER					
R66	Daytime	52.6	49.4	55.0	-5.6	Insignificant	No	No
	Nighttime	45.1	48.2	50.0	-1.8	Insignificant	No	
R67	Daytime	51.7	46.0	55.0	-9.0	Insignificant	No	No
	Nighttime	42.2	45.8	50.0	-4.2	Insignificant	No	
R68	Daytime	53.4	43.8	55.0	-11.2	Insignificant	No	No
	Nighttime	47.6	42.5	50.0	-7.5	Insignificant	No	
R69	Daytime	49.4	36.0	55.0	-19.0	Insignificant	No	No
	Nighttime	42.3	36.0	50.0	-14.0	Insignificant	No	

Notes:
[1] The LEQ (Day) is evaluated for a 16-hour period (i.e., from 0700h to 2300h) and the LEQ (Night) is evaluated for an 8 hour period (i.e., from 2300h to 0700h).
[2] The objective is the higher of the ambient sound level, combined with the existing rail activity, or 55 dBA (Daytime) / 50 dBA (Night-time).
[3] The potential to mitigate is considered when a significant (or greater) impact is predicted. This is equivalent to an increase of 5 dB or greater, per the MOEE / GO Protocol for Noise and Vibration Assessments. An adjusted noise impact greater than 5 dB requires the investigation of mitigation.
[4] Mitigation not investigated as existing/planned 5 metre barrier currently in place.

7.8.7 Retained Noise Barriers

The noise barriers that were recommended as a result of the *original assessment* were retained as part of the proposed mitigation. Refer to the orange coloured lines/symbols shown on the Stouffville Corridor **EPR Appendix S** maps. The original assessment is defined as the previously completed noise assessment reflecting the electric locomotive train type defined mathematically within Cadna/A with a "K" constant that differed from the "K" constant defined in the FTA mode as described above.

7.8.8 Approach to Investigation of Mitigation - Operational Noise

Based on the Adjusted Noise Impacts resulting from a project, an investigation of noise mitigation measures is required. MOEE/GO Protocol includes the following mitigation guidance:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering, economic and administrative feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

For the purposes of this study, it was assumed that noise mitigation would be limited to locations within the GO Transit right-of-way, and to be considered feasible, the mitigation measures should achieve at least a 5 dB reduction in noise at the first row of affected receptors. The ID numbers of the barriers correspond to the ID numbers of the representative first row receptors.

If the Adjusted Noise Impact at a receptor is deemed significant during the daytime period, technical feasibility of a noise barrier was evaluated based on the noise reduction achieved during the daytime period only. Similarly, if the Adjusted Noise Impact at a receptor was deemed significant during nighttime period, technical feasibility of a noise barrier is evaluated based on the noise reduction achieved during the nighttime period only. If the Adjusted Noise Impacts at a receptor were deemed significant during both the daytime and nighttime periods and noise reduction resulting from a noise barrier is at least 5 dB in either the daytime or nighttime period, the noise barrier was deemed technically feasible.

Noise barriers can be formed of earthen berms, engineered noise walls, or some combination of the two. Where earthen berms are used, side slopes of 3:1 should be used for drainage and erosion control and right-of-way maintenance. Where noise walls are to be used, they should be free of gaps and cracks, and have a minimum surface density (mass per unit of face area) of 20 kg/m^2 (4 lb. per sq. ft.). It is preferable that barriers are sound absorptive at least on the railway side, and this is mandatory in situations where parallel barriers (e.g., barriers on both sides of a railway) are proposed.

GO Transit will use barriers with a height of 5 metres for all new or replacement noise barriers. Higher noise barriers require specially engineered footings, which may not be technically and/or economically feasible to implement. The investigation of mitigation was limited to noise barriers with heights of 5 metres.

During detailed design, each location identified as a technically feasible noise mitigation location along each rail corridor will be further reviewed to determine the administrative, operational, economic and technical feasibility and to further define what type of mitigation will be implemented.

7.8.9 Stouffville Corridor - Investigation of Mitigation

The technically feasible and non-technically feasible noise barriers are shown in **Appendix S.** Of the 51 barriers investigated for the Electric RER scenario, 33 are considered technically feasible, as they achieve at least a 5 dB reduction in sound levels at nearby receptors. For details regarding length of barrier, side of rail ROW, approximate number of receptors shielded by barrier, etc. please refer to **Appendix G - Noise and Vibration Assessment Report.**

For all locations where there will be a change in noise levels of 5dB or more and where noise barrier locations deemed either technically and non-technically feasible (as part of the study carried out for the TPAP), Metrolinx will undertake more detailed analysis during Detailed Design to assess technical, economic, administrative and operational feasibility as per the MOECC Protocol to finalize the type and locations of noise mitigation along the rail corridors. In addition, Metrolinx will investigate other forms of noise mitigation such as train technology, rail dampeners etc. during Detailed Design to assess feasibility. The MOEE/GO Protocol provides the following mitigation guidance with respect to noise mitigation measures:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering and economic feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

Metrolinx will continue to consult with the public during Detailed Design with respect to further assessment and implementation of noise mitigation along the rail corridors.

7.9 Vibration

The MOEE/GO Protocol outlines desired objectives for vibration levels from GO Transit projects. The requirement to investigate vibration mitigation focuses on the change between the existing vibration levels and the future vibration levels. Change in vibration levels may occur under the following circumstances: change in track alignment, addition of track, and change/addition of special track work (such as switches).

It should be noted that vibration impacts are associated with the characteristics of individual trains (especially the weight of the locomotive) and are not related to the increased rail traffic associated with future RER service.

Vibration effects were predicted in accordance with the methods of the United States Department of Transportation - Federal Transit Administration (FTA, 2006). Vibration levels were expressed in terms of root-mean-square (RMS) velocity in the vertical direction, which is the dominant axis for vibration generated from mobile sources such as trains and most closely correlated with human annoyance and perceptibility. The relative change between existing and future vibration levels is presented as a percentage. For further details ad supporting information please refer to Appendix G - Noise and Vibration Assessment Report.

7.9.1 Applicable Criteria

The desirable objective of the MOEE/GO Protocol is that the RMS velocity of vibration produced by the future GO Transit operations at a sensitive receptor should not exceed:

- 0.14 mm/s; or
- The existing vibration levels where existing operations already produce vibration that exceeds 0.14 mm/s.

Furthermore, the MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the RMS velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

The FTA vibration level predictions were calibrated by measuring existing vibration levels at a small selection of locations in the vicinity of the GO network. The measurements informed the selection of appropriate adjustment factors. The adjustment factors in the FTA vibration calculations account for:

- Vehicle speed;
- Track type and track conditions;
- Type of locomotive power; and
- Condition of wheels (i.e., wheel wear).

The intent of the MOEE/GO protocol’s impact assessment is to evaluate change in vibration between the pre-project and post-project scenarios. One method (i.e. modelling) was chosen to evaluate both scenarios to ensure consistency. Comparing existing measured vibration levels to future modelled vibration levels inherently introduces an additional source of uncertainty into the impact assessment. For this reason, the assessment evaluates modelled existing vibration levels against modelled future vibration levels, as opposed to measured existing vibration levels against modelled future vibration level. At the detailed design stage, verification measurements of existing conditions at receptors where the greatest effect is expected and a reasonable number of additional receptors will be conducted to validate FTA vibration calculations.

A literature review was conducted to compare the gross weight of a diesel MP40 locomotive and an electric locomotive with a similar horsepower rating. It was determined that the difference in locomotive weight was not significant enough to have an impact on the vibration levels; therefore, a single set of predicted vibration levels applies to both diesel trains and electric trains.

7.9.2 Stouffville Corridor - Vibration Impacts Electric RER Scenario

Within the Stouffville Corridor, it was identified that receptors R06, R09 and R14, near proposed new switches, and receptors R22 and R24, near proposed new track, were the closest receptors to a change in the track configuration that could affect vibration levels; therefore, the vibration assessment focused on these five receptors.

The predicted existing and future vibration levels and change in vibration levels for a GO train pass-by and a freight train pass-by are presented in **Table 7-30.**

For both GO train traffic and freight train traffic passing over a new switch, the increase in predicted vibrations levels is in excess of the 25% increase threshold for R06, R09 and R14. The exceedance of the objective at these three receptors is caused by the nearby (i.e., less than 40 metres away from the receptors) addition of a special trackwork rail component (i.e., switch). Mitigation such as ballast mats, under sleeper pads or resilient fixation should be investigated for all receptors with similar conditions (i.e., 40 metre distance to proposed special trackwork). The approximate locations of trackwork and switches requiring mitigation are presented in **Appendix S**. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage.

Neither, the existing and future vibration levels for GO Train or freight train traffic at the receptor near the addition of track, such as R22 and R24, exceed the MOEE/GO Protocol objective of 0.14 mm/s or existing vibration levels; and therefore, mitigation was not investigated.

Table 7-30 Vibration Impact Assessment Results of the Electric RER Scenario – Stouffville Rail Corridor

Train Type Assessed	Receptor	Speed Over Track (km/h)	Special Trackwork Present?		Distance to Closest Track		Predicted Vibration Level		Objective (mm/s)	% Above Objective (%)	Mitigation Required? [1]
			Existing	Future	Existing (m)	Future (m)	Existing (mm/s) r.m.s.	Future (mm/s) r.m.s			
GO Train	R06	64	No	Yes	28	28	0.050	0.298	0.14	113%	Yes
Freight Train		40					0.340	2.020	0.340	494%	Yes
GO Train	R09b	64	No	Yes	35	30	0.039	0.277	0.14	98%	Yes
Freight Train		40					0.256	1.858	0.256	624%	Yes
GO Train	R14	64	No	Yes	40	40	0.034	0.201	0.14	44%	Yes
Freight Train		40					0.215	1.278	0.215	494%	Yes
GO Train	R22	80	No	No	30	25	0.058	0.071	0.14	-49%	No
Freight Train		40					0.313	0.396	0.313	27%	Yes
GO Train	R24	80	No	No	45	40	0.037	0.042	0.14	n/a	No
Freight Train		40					0.186	0.215	0.186	16%	No

Notes
[1] The MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the vibration velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels). The future vibration levels do not exceed the objective, therefore no mitigation is required.

7.10 Visual

Please refer to Section **3.10** for a description of the methodology followed for assessment of visual impacts. Additional details can be found in the Visual Impact Assessment Report contained in Appendix H2.

7.10.1 Scarborough Tap Location

7.10.1.1 Potential Effects and Mitigation Measures

The Scarborough Tap location is in a major electric transmission corridor on both the east and west sides of the railroad. On the west side of the rail corridor the site has negligible visual impacts as it is not close to any residential or other sensitive development, and therefore it would require no mitigation. The portion of the site on the east side of the rail corridor backs up to a residential subdivision. There would be a low visual impact for homes overlooking the Tap facility. This effect could be mitigated by the introduction of an evergreen vegetative screen along the property line of the houses. Refer to **Figure 4-21** for photographs of typical Tap infrastructure.

7.10.1.2 Net Effects

There will be negligible net visual effects on the west side, but low net visual effects east of the railroad.

7.10.2 Scarborough TPS and 25 kV Feeder Route

7.10.2.1 Potential Effects and Mitigation Measures

The Scarborough TPS location is immediately north of the portion of the Tap site on the west side of the Stouffville rail corridor between existing Hydro One electrical equipment and the rail corridor. The TPS site is located north of Jack Goodlad Park. The site will be clearly visible to users of Jack Goodlad Park and to the homes north of the site in a residential subdivision along Jenkinson Way. These homes and park already have views of existing electrical equipment adjacent to the site, however there will be a visual impact from the addition of the TPS. This impact will be mitigated by the introduction of visual screening along the rear property line of the affected houses. In addition, during Detailed Design, further review will be undertaken in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible. Refer to

Figure 4-22 for a photograph of a typical Traction Power Substation (TPS).Net Effects

Adverse net visual effects at the Scarborough TPS will be minimized through implementation of screening measures. There will be negligible net visual effects associated with the Scarborough 25 kV Feeder Route.

7.10.3 Unionville PS

7.10.3.1 Potential Effects and Mitigation Measures

The Unionville PS is located immediately south of Highway 407 and east of the railroad. Highway 407 crosses over the railroad on a bridge with a concrete safety barrier along the side of the roadway. The PS will not be visible from the highway. The site is within a major electric transmission line corridor and surrounded by vacant land or other electrical infrastructure with access from an existing private access road. There will be negligible visual impacts and no mitigation measures are required. Refer to **Figure 5-5** for a photograph of a typical Paralleling Station (PS).

7.10.3.2 Net Effects

There will be no anticipated net visual effects.

7.10.4 Lincolnville PS

7.10.4.1 Potential Effects and Mitigation Measures

The Lincolnville PS is located on a vacant parcel of land at the Lincolnville GO Station. The parcel is behind the GO Lincolnville Rail and Bus facility. The site is visible from the station access road. People driving into the station will be looking at the facility before the road bends to the left to access the parking. The site appears to be a place for parking lot expansion in the future. There will be a visual impact for people driving to the station from the north. The visual impact can be partially mitigated by planting an evergreen screen along the station access driveway. However, the facility could be relocated approximately 30 metres farther north into the corner of the property. Relocating the facility would move it away from the direct view of people arriving at the station and would leave a larger parcel available for future parking lot expansion. Refer to **Figure 5-5** for a photograph of a typical Paralleling Station (PS).

7.10.4.2 Net Effects

Net visual effects will be negligible if the recommendations above are followed.

7.10.5 OCS & Bridges: Section SV-1 – Scarborough Junction to Agincourt Station

7.10.5.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section SV-1 is a complex area with a wide range of different land uses abutting the rail corridor. Immediately north of Scarborough Junction, the corridor passes through a residential area where rear yards of homes back up to the tracks. These houses are mostly more than 8 metres from the railroad and are classified as having a potential low to moderate visual impact. However, there are several places where single family homes are located less than 8 metres from the railroad and are therefore classified as potential high visual impact due to the closeness of the vegetative clearing and installation of OCS infrastructure to the back yards and rear windows of these homes. In addition, there are two parks that abut the railroad. Corevette Park consists of active recreational fields and is not regarded as sensitive, while the Collingwood Park has adequate existing vegetative screening. These areas are classified as having a potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

North of Lawrence Road is an almost entirely industrial area which is classified negligible visual impact requiring no mitigation measures. There are a few short stretches of single-family residential development where homes are more than 20 metres from the railroad and are classified as having a potential low visual impact. There is also one area where high-rise residential structures are within 30 metres of the railroad, but are built on parking podiums so have no windows looking out directly on OCS infrastructure and is therefore classified as having a potential low visual impact.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Kennedy GO Station is the only station within this section and is classified as having a potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on the east and west sides of the railroad adjacent to most residential properties between Scarborough Junction and Lawrence Road, as well as on the west side south of Ellesmere Road and on the east side adjacent to high rise residential development north of Highway 401, south of Sheppard Avenue and at Agincourt Station. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are six bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

Five of the bridges are roadway bridges. The bridge over Highway 401 has no sidewalks and is classified as having a potential low visual impact. The remaining four roadway bridges all have sidewalks on both sides with long views of the adjacent environs, but the views are not regarded as scenic and these bridges are therefore also classified as having a potential low visual impact. The bridge over the CP Bellville Sub railroad corridor will require bridge barriers however anticipated visual impacts are negligible.

There is also one pedestrian bridge at Mooregate Avenue/Tara Avenue, which is recommended for modification as part of this project. It is noted that this bridge is part of the Pan Am Path cycle route and the associated north facing view is of particular importance (as noted by the City of Toronto); as a result consideration will be given to preserving this view to the extent possible during detailed design of the new bridge. Pedestrian bridges will require protective barriers on both sides and are classified as potential moderate visual impact. Pedestrian bridges should be designed to allow views to and from people walking across the bridge to avoid a claustrophobic tunnel effect and maintain a safe environment.

Therefore, there are potential low to moderate visual impacts from the installation of protective barriers on these bridge structures (See **Table 7-31**).

Table 7-31 Summary of Bridges - Section SV-1

Corridor	Map No. (See Appenix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
SV-1	E-2	Eglinton Avenue (#370)	Bridge	No	Yes *Low Visual Impact*
SV-1	E-3	Mooregate Avenue/Tara Avenue (#601)	Pedestrian Bridge	No. Preferred solution to address impacts due to attachment of protective barrier: Modify pedestrian bridge.	Yes *Moderate Visual Impact*

Corridor	Map No. (See Appenix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
SV-1	E-3	Lawrence Avenue East (#094)	Bridge	No	Yes *Low Visual Impact*
SV-1	E-5	Ellesmere Road (#098)	Bridge	No	Yes *Low Visual Impact*
SV-1	E-6	Hwy 401 (#37-0215)	Bridge	No	Yes *Low Visual Impact*
SV-1	E-6	CP Bellville Sub	Rail Bridge	No	Yes *Negligible Visual Impact*

In addition, there are eight rail overpasses in this section. The Sheppard Avenue overpass is at the Agincourt GO Station in a residential area, however itis classified as having a potential negligible visual impact. The other overpasses cross either railroads or streams and are classified as having negligible visual impact, with the exception of West Highland Creek structure which is classified as having a low visual impact (see **Table 7-32**).Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Table 7-32 Summary of Rail Overpasses - Section SV-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
SV-1	E-2	Pedestrian Underpass at Kennedy Road RT Station	Rail Overpass	N/A	No *Negligible Visual Impact*
SV-1	E-3	Pedestrian Underpass at Lawrence Avenue RT Station	Rail Overpass	N/A	No *Negligible Visual Impact*
SV-1	E-5	Pedestrian Underpass at Ellesmere Road RT Station	Rail Overpass	N/A	No *Negligible Visual Impact*
SV-1	E-5	TTC RT	Rail Overpass	N/A	No *Negligible Visual Impact*
SV-1	E-5	West Highland Creek	Rail Overpass	N/A	No *Negligible Visual Impact*
SV-1	E-5	West Highland Creek	Rail Overpass	N/A	No *Negligible Visual Impact*

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
SV-1	E-6	West Highland Creek	Rail Overpass	N/A	Yes *LowVisual Impact*
SV-1	E-7	Sheppard Avenue E	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where additional attention to placement and design of OCS infrastructure will result in negligible visual impact on the surrounding area. Among these areas, Kennedy GO Station and the high-rise residential buildings near it are the most important features requiring additional focus on design consideration.

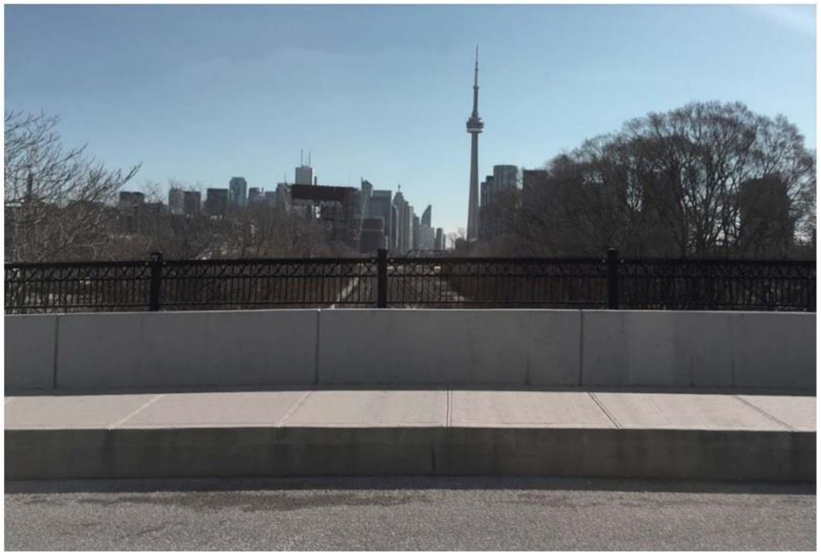
As part of detailed design, Metrolinx's Design Excellence Committee will be engaged to review possible design treatments/option for enhancing the aesthetics of bridge barriers where feasible/required. It is anticipated that the basis of the protection barrier will be a post and panel (solid-faced) design with customizable panels toward suiting visual preferences (in consultation with the applicable bridge owners as appropriate), such as:

- Multilane, restricted access highways and non-visually sensitive locations;
- Visually sensitive locations;
- Structures of heritage value or sensitivity.

An example of a bridge barrier in a visually sensitive location has been provided in **Figure 7-16**. Additional design option examples have been provided in **Figure 7-17** and **Figure 7-18.** It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

Figure 7-16: Example Of Bridge Barrier In A Visually Sensitive Location

Before



After

Figure 7-17: Illustrative Bridge Barrier Design Options (Examples)

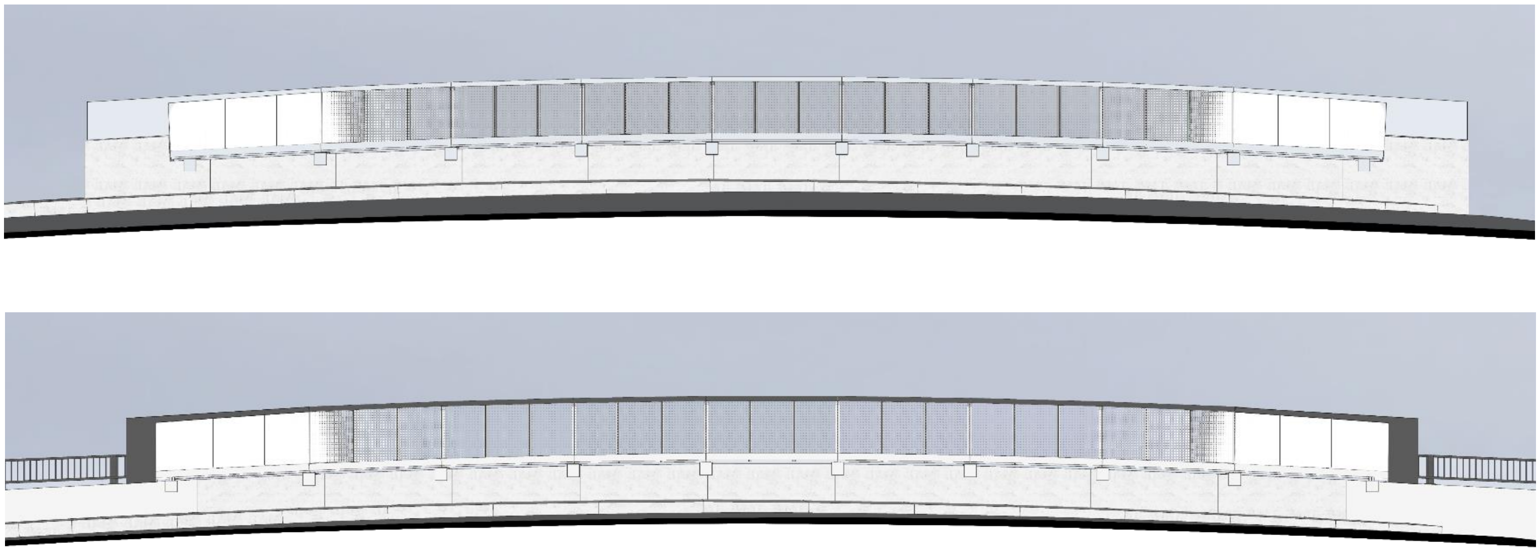


Figure 7-18: Bridge Barrier Design Option Example (Glass Back View)

7.10.5.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along SV-1 such as residential areas will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low. In areas where homes are less than 8 metres from the railroad, OCS infrastructure will be very visible to those homes, therefore, residual visual effects are considered moderate in these areas.

GO Stations

Residual visual effects due to OCS installation within the Kennedy GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

7.10.6 OCS & Bridges: Section SV-2 – Agincourt Station to Milliken Station

7.10.6.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section SV-2 is divided into two distinct areas. The southernmost area is all residential with single-family homes backing onto the railroad on both sides of the tracks. Most of these houses are more than 8 metres from the railroad, and are classified as having a potential low to moderate visual impact. However, a few homes are located less than 8 metres from the railroad and are therefore classified as potential high visual impact due to the closeness of the vegetative clearing and installation of OCS infrastructure to the back yards and rear windows of these homes. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

The area north of Finch Avenue to Milliken GO Station is entirely industrial and is classified as having negligible visual impact and will require no mitigation measures.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are two stations classified as having a potential low visual impact – Agincourt and Milliken GO Stations – within this section. Both stations are only accessed from the west side where parking lots are located. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There are no noise barriers within this section.

Mitigation Recommendations:
No mitigation required.

Bridges/Rail Overpasses

There are no bridges or overpasses within this section.

Mitigation Recommendations:
No mitigation required.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Agincourt and Milliken GO Stations are the most important features requiring careful design consideration.

7.10.6.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along SV such as the residential areas south of Finch Avenue will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low. In areas where homes are less than 8 metres from the railroad the OCS infrastructure will still be very visible to those homes, therefore, residual visual effects are considered moderate in these areas.

GO Stations

Residual visual effects due to OCS installation within the Agincourt and Milliken GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

There are no noise barriers within this section.

Bridges/Rail Overpasses

There are no bridges of any type in this section.

7.10.7 OCS & Bridges: Section SV-3 – Milliken Station to Unionville Station

7.10.7.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section SV-3 is mostly industrial development, which is classified as having negligible visual impact and will require no mitigation measures. Milliken Mills Park is within the industrial area and consists of active ball fields. It is also classified as negligible visual impact. However, there are areas of single-family residential development where the homes back up to the rail corridor. These houses are more than 20 metres from the railroad and are classified as having a potential low visual impact.

In addition, within this section is the proposed new mixed use and residential community of Milliken Center bounded by Steeles Road, Dennison Street, Kennedy Road, the railroad and Old Kennedy Road. The Stouffville corridor passes through the Milliken Center site. The redevelopment of this area provides an opportunity to limit the visual impact of OCS infrastructure by the introduction of landscaped berms and by the placement of new buildings within the redevelopment. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

The only station in this section is Unionville GO Station, immediately north of Highway 407, which is only accessed from the east and is classified as having a potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on the east and west sides of the railroad adjacent to all residential development in this section. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:

During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are four bridges (i.e., rail under road, rail or pedestrian walkway) in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

Highway 407 crosses over the railroad on two bridges. Although there are no sidewalks, protective barriers will be required. The 14th Avenue Bridge has sidewalks and will also require protective barriers. These bridges are classified as having a potential low visual impact. The bridge over the CN York Sub railroad will require a protective barrier and is classified as having a negligible visual impact (see **Table 7-33**).

Table 7-33 Summary of Bridges - Section SV-3

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
SV-3	E-12	14th Avenue	Bridge	No	Yes *Low Visual Impact*
SV-3	E-12	CN York Sub (Over Uxbridge Sub)	Bridge	No	Yes *Negligible Visual Impact*
SV-3	E-12	Hwy 407 West	Bridge	No	Yes *Low Visual Impact*
SV-3	E-12	Hwy 407 East	Bridge	No	Yes *Low Visual Impact*

There are no overpasses in this section.

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

Refer to Section 7.10.5 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

Parallel Barriers

A parallel barrier will be required at several locations where there are walls with and without fences and a depressed corridor (see Map E-11 of the Visual Impact Assessment Report contained in Appendix H of the EPR) to protect pedestrians from possible accidental contact with live parts of the OCS. These barriers will be a minimum of 2 metres in height and will be solid material. These barriers are typically short in length and will result in negligible visual impact.

Mitigation Recommendations:
None required.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Unionville GO Station is the most important feature requiring careful design consideration.

7.10.7.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along SV-3 such as the residential areas will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Unionville GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no rail overpasses in this section. Residual visual effects due to modifications to bridges will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

Parallel Barriers

Residual visual effects will be negligible due to the relatively small area affected by the barriers.

7.10.8 OCS & Bridges: Section SV-4 – Unionville Station to Markham Station

7.10.8.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section SV-4 is a mix of industrial development, which is classified as negligible visual impact requiring no mitigation measures. Areas of single-family residential development exist where the homes back up to the rail corridor. These houses are more than 8 metres from the railroad and are classified as having a potential low to moderate visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

There are two important areas within this section. The first, in Unionville, is the site of the original train station on Main Street. With an at-grade crossing adjacent to the old station building, Main Street is the gateway to the scenic Unionville town center and Unionville Heritage Conservation District. The Stiver Mill Cultural Center is also adjacent to the historic train station. This area has considerable visual integrity and is classified as having a potential high visual impact.

The second is an area which includes several parks: Bruce's Creek Park, Denby Valley and Quantztown Park, located along the railroad in this section. Quantztown Park in particular has an attractive lake with a trail around it, however existing vegetation will help protect views of future OCS infrastructure. These areas are classified as having a potential low visual impact.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Centennial GO Station is the only station within this section. This is located behind a commercial building and has a large parking garage along the tracks so views of the railroad for passengers walking from the parking lots are limited and the station is classified as having a potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on both sides of the railroad adjacent to most residential properties within this section. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are no bridges which pass over the railroad in this section. However, there are five rail overpasses. One crosses over Enterprise Drive, a local industrial access road. This bridge is classified as having low visual impacts.

The other four overpasses are water crossings. Two of these water crossings are in parks where they are visible to park users and the other two are not easily visible. Only two these structures require OCS attachments and are therefore classified as having low visual impact (see **Table 7-34**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Table 7-34 Summary of Rail Overpasses - Section SV-4

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
SV-4	E-13	Enterprise Drive	Rail Overpass	N/A	Yes *LowVisual Impact*
SV-4	E-13	Rouge River	Rail Overpass	N/A	No *Negligible Visual Impact* *Negligible Visual Impact*
SV-4	E-14	Bruce Creek	Rail Overpass	N/A	Yes *Low Visual Impact*
SV-4	E-15	Robinson Creek	Rail Overpass	N/A	No *Negligible Visual Impact*
SV-4	E-16	Little Rouge River	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are several areas where carefully placed and designed OCS infrastructure will minimize visual impact on the surrounding area. Among these areas, Unionville Main Street gateway is the most important feature requiring careful design consideration.

7.10.8.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along SV-4 including the Unionville Main Street area and Quantztown Park will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Centennial GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

7.10.9 OCS & Bridges: Section SV-5 – Markham Station to Mount Joy Station

7.10.9.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

South of 16th Avenue, Section SV-5 is primarily single-family residential development with homes backing up to the railroad. These houses are more than 20 metres from the railroad, and are classified as having a potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

North of 16th Avenue, there is industrial development on the west of the tracks and open space and a community center on the east side. Both these areas are classified as having negligible visual impact and will require no mitigation measures.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are two stations – Markham and Mount Joy – within this section. Both stations have parking lots abutting the tracks, Markham on both sides and Mount Joy on the west side. Markham Station is within the Markham Village Heritage Conservation District. These stations are classified as having a potential low visual impact. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

Noise barriers are proposed on both sides of the railroad adjacent to most residential properties in this section. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:

During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are no bridges of any type in this section.

Mitigation Recommendations:

No mitigation required.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Markham and Mount Joy GO Stations are the most important features requiring careful design consideration.

7.10.9.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along SV-5 such as the residential areas south of 16th Avenue will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Markham and Mount Joy GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no bridges of any type in this section.

7.10.10 OCS & Bridges: Section SV-6 – Mount Joy Station to Stouffville Station

7.10.10.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

There are several areas of single family development in this section including close to Mount Joy GO Station and at the northern end where the railroad enters the town of Whitchurch-Stouffville. These houses are more than 8 metres from the railroad, and are classified as having a potential low to moderate visual impact.

This section also passes through the Rouge National Urban Park. The Rouge National Urban Park covers almost 80 sq kms of important natural, cultural and agricultural landscapes and is Canada's first national urban park. It is home to over 1,700 species of plants and animals and contains some of the last remaining working farms in the Greater Toronto Area. As such it is highly sensitive to any change in the visual environment and is therefore classified as having potential high visual impact from OCS.

The rest of the section is mostly farmland. Where there are open agricultural fields, the rail corridor and the future OCS infrastructure are within the viewshed, but the potential for this to affect many people's visual environment is small since few people will be within that viewshed. Therefore these areas are also classified as negligible impact with no requirement for mitigation.

Mitigation Recommendations:

- The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

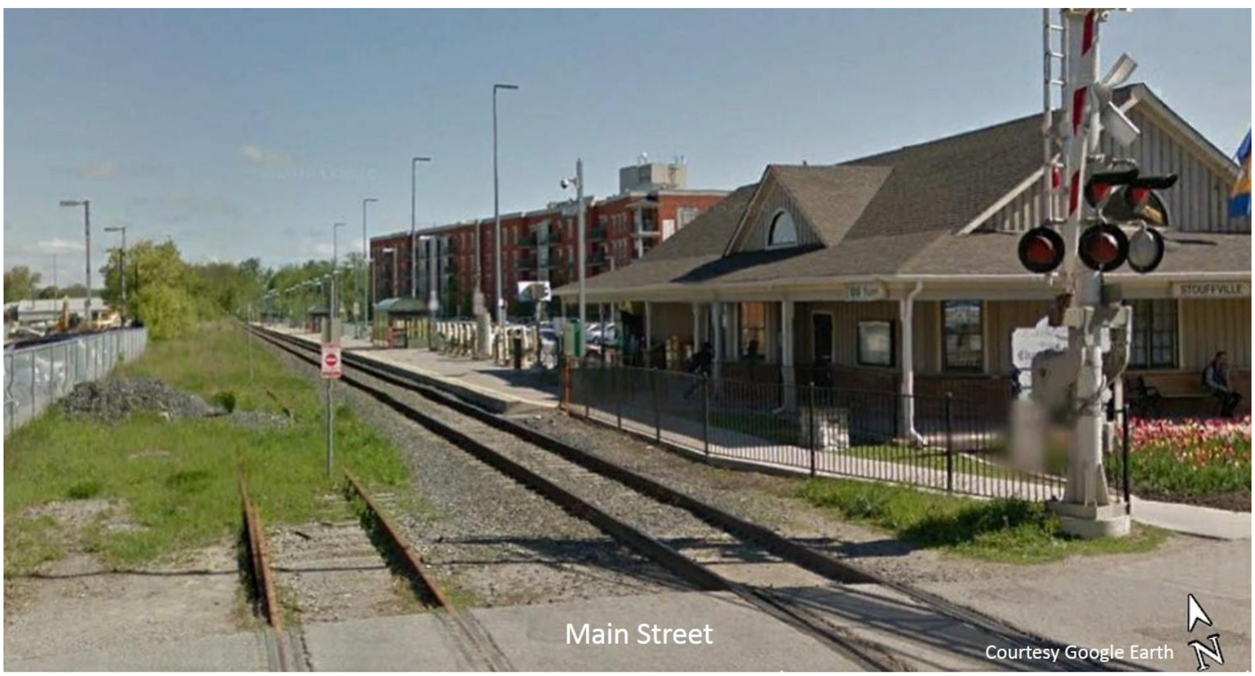
GO Stations

Stouffville GO Station, the only station within this section, is located in the downtown area of Stouffville, and has a small parking lot on either side of the railroad. In addition, a new high-rise residential building is immediately adjacent to the east side parking lot. The station is classified moderate impact since it is situated in a downtown area that has visual integrity. Both passengers arriving at the station and standing on the platform, as well as people walking in the downtown area, will have close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Figure 7-19 Current View of Stouffville GO Station



Proposed Noise Barriers

Noise barriers are proposed on the east side of the railroad adjacent to a new residential subdivision south of Major McKenzie Drive and on both sides of the railroad in Stouffville where there are residential properties. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are no bridges of any type in this section.

Mitigation Recommendations:
No mitigation required.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Stouffville GO Station is the most important feature requiring careful design consideration.

7.10.10.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along SV-6 such as the residential areas close to Mount Joy GO Station and in the Town of Stouffville will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low. Residual visual impacts to Rouge National Urban Park are considered high due to the sensitive nature of the environment.

GO Stations

Residual visual effects due to OCS installation within the Stouffville GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered moderate.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

There are no bridges of any type in this section.

7.10.11 OCS & Bridges: Section SV-7 – Stouffville Station to Lincolnville Station

7.10.11.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section SV-7 is mostly farmland but there are some residential areas in Stouffville and close to the Lincolnville GO Station where homes are more than 20 metres from the railroad that are classified as having a potential low visual impact. The railroad abuts the Stouffville Conservation Area. Parts of this area are heavily wooded adjacent to the tracks and are therefore classified as negligible visual impact. Where there are more open areas these are classified as having potential low visual impacts. Where there are open agricultural fields, the rail corridor and the future OCS infrastructure are within the viewshed, but the potential for this to affect many people's visual environment is small since few people will be within that viewshed. Therefore these areas are also classified as negligible impact with no requirement for mitigation.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

The only station within this section is Lincolnville GO Station, which is the terminal station and where trains are stored overnight. The station is classified as having a potential low visual impact as it is located in an area with no visual interest. However, passengers arriving at the station and standing on the platform have to cross several electrified tracks in the storage yard to access the parking lot and will have close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There are no noise barriers within this section.

Mitigation Recommendations:
No mitigation required.

Bridges/Rail Overpasses

There are no bridges of any kind within this section.

Mitigation Recommendations:
No mitigation required.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Lincolnville GO Station is the most important feature requiring careful design consideration.

7.10.11.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along SV-7 such as the residential areas in Stouffville and close to the Lincolnville GO Station will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Lincolnville GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

There are no noise barriers within this section.

Bridges/Rail Overpasses

There are no bridges of any kind within this section.

7.11 Utilities

A Utilities Impact Assessment study was completed as part of the TPAP to carry out preliminary identification of existing utilities within the study area and to identify possible utility conflicts between these utilities and the planned electrification infrastructure. Conflicts were characterized under the following three categories:

1. **Spatial Conflicts**

Spatial conflicts occur where OCS structures and foundations occupy the same physical space as overhead or buried utilities. Spatial conflicts can also occur where utilities attached to bridges occupy the same space as proposed bridge barriers or bridge barrier fixing points. Overhead transmission, distribution, and communication lines are identified as potential spatial conflicts if they are located within the OCS impact zone and have a vertical clearance from top of rail of less than 10.7 metres. Buried utilities running parallel to the rail corridor within the OCS impact zone are identified as potential spatial conflicts, irrespective of depth.

2. **Electrical Zone of Influence Conflicts**

"Influence" describes the unintended effect of electrified OCS wires on adjacent infrastructure and includes the induction of current (counteracted by grounding and bonding) and electromagnetic interference (EMI). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the Overhead Contact Line Zone (OCLZ) (see **Figure 7-20**). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the OCLZ. Because vertical spatial clearance requirements (10.7 metres) are more conservative than those shown in **Figure 7-20**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

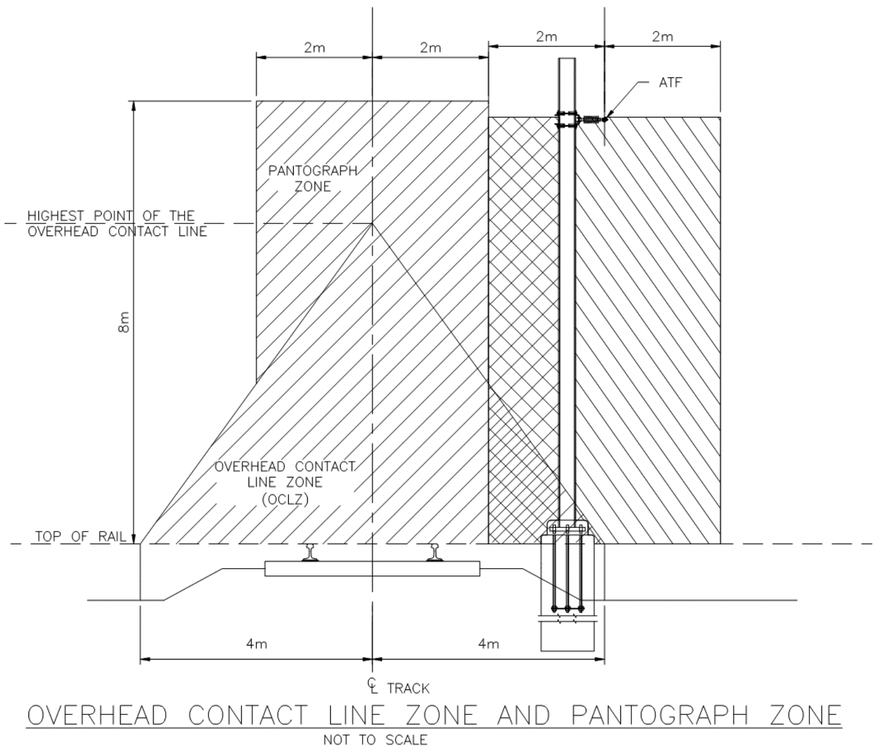
Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements (5.0 metres from centerline of track as captured in the OCS impact zone) are more conservative than the OCLZ clearance requirements (4.0 metres from centerline of track as shown in **Figure 7-20**) those shown in **Figure 7-20**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

Infrastructure that is considered an electrical zone of influence conflict is also a spatial conflict. The resolution for a spatial conflict (usually relocation) will also remove the utility from the electrical zone of influence and thus grounding and bonding will not be required. Existing utilities in the rail corridor outside of the electrical zone of influence may be grounded and bonded at the request of the owner but it is not a requirement for Electrification as the effects of stray current are anticipated to be minimal. Future utilities in the rail corridor outside of the electrical zone of influence should be grounded and bonded at installation.

With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.

Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

Figure 7-20 Overhead Contact Line Zone



3. Electrical Clearance Conflicts

Electrical clearance is defined as the minimum distance between live components and grounded structures or rolling stock. Electrical clearance conflicts occur where the minimum required vertical (see **Table 7-35**) or parallel (see) clearances are not met. Electrical clearance does not apply to buried utilities.

Table 7-35 Vertical Electrical Clearance Requirements - Utilities

Nominal Phase to Phase Voltage Rating	Min. Vertical Clearance Between Wires Crossing Each Other (m)	Min. Distance Above OCS (m) for Max. Wire Sag (Measured From Track)
>0 ≥ 150kV	5.0	15.7
>150kV ≥ 250kV	6.5	17.2
250kV	8.0	18.7

Table 7-36 Lateral Electrical Clearance Requirements - Utilities

Nominal Phase to Phase Voltage Rating	Minimum Distance (m)
>0 ≥ 150kV	5.2
>150kV ≥ 250kV	6.7
250kV	8.2

Additional details on the methodology followed for assessment of utilities impacts can be found in the Utilities Impact Assessment Report contained in Appendix I2.

7.11.1 Scarborough Tap Location

7.11.1.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-37 Scarborough TPS and Tap Location Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Conduit	Unknown	Metallic	Mike Myers Dr
Bell	Buried	Conduit	Unknown	Plastic	Jenkinson Way
City of Toronto	Buried	Storm	Unknown	Unknown	Kennedy Rd
City of Toronto	Buried	Water	300mm	Metallic	Kennedy Rd
City of Toronto	Buried	Water	200mm	Plastic	Mike Myers Dr
Hydro One	Buried	Electrical	Unknown	Metallic	Kiriakou St
Hydro One	Overhead	Electrical	230kV	Metallic	Kennedy Rd
Hydro One	Overhead	Electrical	230kV	Metallic	Tracks
Hydro One	Overhead	Electrical	230kV	Metallic	Rail
Hydro One	Overhead	Electrical	230kV	Metallic	Kennedy Rd
Hydro One	Overhead	Electrical	230kV	Metallic	Kennedy Rd
Hydro One	Buried	Electrical	Unknown	Metallic	Jenkinson Way
Hydro One	Buried	Electrical	Unknown	Metallic	Jenkinson Way
Toronto Hydro	Buried	Electrical	Unknown	Metallic	Jenkinson Way
Toronto Hydro	Overhead	Electrical	27.6 kV	Metallic	Jenkinson Way

Owner	Utility Class	Description	Size	Material	Nearest Street
Toronto Hydro	Overhead	Electrical	27.6 kV	Metallic	Jenkinson Way
Toronto Hydro	Buried	Electrical	Duct banks	Reinforced Concrete	Jenkinson Way
Unknown	Buried	Storm	Unknown	Reinforced Concrete	Jenkinson Way

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

7.11.1.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.2 Scarborough 25kV Feeder Route

7.11.2.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in the area are:

Table 7-38 Scarborough 25kV Feeder Route Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
8.83		Bell	Buried	Cable	buried cable	Metallic	National St
8.84	8.90	Toronto Hydro	Buried	Duct Bank	Unknown	Reinforced Concrete	Midland Ave
8.86	8.88	Rogers	Buried	Conduit	Unknown	Metallic	Midland Ave
8.88	8.90	Bell	Buried	Conduit	60D	Metallic	Midland Ave
8.89	8.94	Toronto Hydro	Overhead	Electrical	27.6/16kV	Metallic	Midland Ave
8.90		Bell	Buried	Conduit	1 duct + buried cable	Metallic	Midland Ave
9.00	9.10	Toronto Hydro	Buried	Duct Bank	Unknown	Reinforced Concrete	Midland Ave
9.07	9.08	Bell	Buried	Conduit	16D	Plastic	Midland Ave
9.08	9.09	Bell	Buried	Conduit	18 ducts	Metallic	Midland Ave
9.09	9.11	Bell	Buried	Conduit	6 ducts	Metallic	Danforth Rd
9.09		Bell	Buried	Cable	Unknown	Plastic	Danforth Rd
9.09		Bell	Buried	Conduit	10D	Plastic	Midland Ave
9.10		Rogers	Buried	Conduit	Unknown	Metallic	Danforth Rd

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
9.10	9.11	Bell	Buried	Conduit	6 ducts	Metallic	Midland Ave
9.10	9.11	Bell	Buried	Conduit	1 duct	Metallic	Danforth Rd
9.10		Toronto Hydro	Overhead	Electrical	27.6/16kV + 120/240V	Metallic	Danforth Rd
9.12		Bell	Buried	Conduit	4 ducts	Metallic	Danforth Rd
9.14		Rogers	Buried	Conduit	Unknown	Metallic	Midland Ave
9.25	9.25	Toronto Hydro	Overhead	Electrical	27.6/16kV	Metallic	Granger Ave
9.26	9.26	Toronto Hydro	Buried	Electrical	Unknown	Unknown	Granger Ave
9.34	9.34	Toronto Hydro	Buried	Electrical	Unknown	Unknown	Corvette Ave
9.54	9.57	Bell	Buried	Cable	buried cable	Metallic	Benjamin Blvd and Saugeen Cres
9.56		Toronto Hydro	Buried	Electrical	120/240V	Metallic	Benjamin Blvd and Saugeen Cres
9.77	9.86	Bell	Buried	Cable	buried cable	Metallic	Benjamin Blvd
9.82	9.85	Toronto Hydro	Buried	Duct Bank	Unknown	Reinforced Concrete	Eglinton Ave E
9.87	9.88	Toronto Hydro	Buried	Duct Bank	2W1H	Reinforced Concrete	Eglinton Ave E
9.87		Bell	Buried	Conduit	1 duct	Metallic	Eglinton Ave E
9.88		Bell	Buried	Cable	Unknown	Plastic	Eglinton Ave E
9.88		Bell	Buried	Conduit	Unknown	Plastic	Eglinton Ave E
9.88		Toronto Hydro	Overhead	Electrical	27.6/16kV	Metallic	Eglinton Ave E
9.89		Toronto Hydro	On Bridge	Electrical	Unknown	Metallic	Eglinton Ave E
9.91		Toronto Hydro	On Bridge	Electrical	Unknown	Metallic	Eglinton Ave E
10.02	10.77	Toronto Hydro	Buried	Duct Bank	Unknown	Reinforced Concrete	Treverton Dr
10.03		Bell	Buried	Conduit	2 ducts + 3 ducts	Metallic	Lord Roberts Dr
10.04	10.75	Hydro One	Overhead	Electrical	230kV	Metallic	Treverton Dr
10.76		Hydro One	Overhead	Electrical	230kV	Metallic	Romulus Dr
58.89	58.79	Unknown	OH – Parallel to ROW	Electrical	Unknown	Metallic	Medina Cres.
58.92		Unknown	Buried – Crossing ROW	Ditch Culvert	Unknown	Other	Treverton Drive

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
59.39		Enbridge Gas	Buried – Crossing ROW	Gas	8"	Metallic	Eglinton Ave E
59.39		City of Toronto	Buried – Crossing ROW	Water	24"	Metallic	Kennedy GO Station
59.39		TTC	Buried – Crossing ROW	Conduit	Unknown	Plastic	Kennedy GO Station
59.45		Unknown	Buried – Crossing ROW	Ditch Culvert	300mm	Other	Eglingont Ave
59.57	59.57	Unknown	Buried – Parallel to ROW	Ditch Culvert	300mm	Other	Benjamin Blvd
59.58		Unknown	Buried – Crossing ROW	Ditch Culvert	Unknown	Other	Chevron Cres
59.62		Unknown	Buried – Crossing ROW	Ditch Culvert	Unknown	Other	Chevron Cres
59.83	59.75	Unknown	OH – Parallel to ROW	Electrical	Unknown	Metallic	Saugeen Crescent to Chevron Crescent
59.91	59.91	Unknown	Buried – Parallel to ROW	Ditch Culvert	300mm	Other	Danforth Rd
60.02		City of Toronto	Buried – Crossing ROW	Storm	12"	Reinforced Concrete	Danforth Rd
60.02		City of Toronto	Buried – Crossing ROW	Sewer	10"	Reinforced Concrete	Danforth Rd
60.15		City of Toronto	Buried – Crossing ROW	Storm	1800mm	Reinforced Concrete	Danforth Rd
60.16		City of Toronto	Buried – Crossing ROW	Sewer	350mm	Concrete (Unreinforced)	Danforth Rd
60.17		City of Toronto	Buried – Crossing ROW	Water	250mm	Metallic	Danforth Rd

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street
60.17		Unknown	OH – Crossing ROW	Cable	Unknown	Unknown	Danforth Rd
60.17		Enbridge Gas	Buried – Crossing ROW	Gas	2"	Metallic	Danforth Rd
60.17	60.15	Unknown	Buried – Parallel to ROW	Ditch Culvert	600mm	Other	Danforth Rd
60.18		Cogeco Data	Buried – Crossing ROW	Conduit	Unknown	Plastic	Danforth Rd
60.24	60.24	Unknown	Buried – Parallel to ROW	Ditch Culvert	600mm	Other	Danforth Rd
60.27	60.26	Unknown	Buried – Parallel to ROW	Ditch Culvert	600mm	Other	Danforth Rd
60.29	60.29	Unknown	Buried – Parallel to ROW	Ditch Culvert	600mm	Other	Danforth Rd
60.55	52.31	Telus	Buried – Parallel to ROW	Duct Bank	288F	Metallic	Midland Ave to Kennedy Rd
324.89		City of Toronto	Buried – Crossing ROW	Water	400mm	Reinforced Concrete	Midland Ave
324.89	14.33	Rogers	OH – Crossing ROW	Conduit	Unknown	Metallic	Midland Ave
324.89		City of Toronto	Buried – Crossing ROW	Water	900mm	Metallic	Midland Ave
324.96		Bell	OH – Crossing ROW	Conduit	Unknown	Metallic	Midland Ave
330.95	323.29	Allstream	Buried – Parallel to ROW	Conduit	Unknown	Plastic	

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

7.11.2.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.3 Scarborough TPS

7.11.3.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in the area are:

Table 7-39: Scarborough TPS Location Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Conduit	Unknown	Metallic	Mike Myers Dr
Bell	Buried	Conduit	Unknown	Plastic	Jenkinson Way
City of Toronto	Buried	Storm	Unknown	Unknown	Kennedy Rd
City of Toronto	Buried	Water	300mm	Metallic	Kennedy Rd
City of Toronto	Buried	Water	200mm	Plastic	Mike Myers Dr
Hydro One	Buried	Electrical	Unknown	Metallic	Kiriakou St
Hydro One	Overhead	Electrical	230kV	Metallic	Kennedy Rd
Hydro One	Overhead	Electrical	230kV	Metallic	Tracks
Hydro One	Overhead	Electrical	230kV	Metallic	Rail
Hydro One	Overhead	Electrical	230kV	Metallic	Kennedy Rd
Hydro One	Overhead	Electrical	230kV	Metallic	Kennedy Rd
Hydro One	Buried	Electrical	Unknown	Metallic	Jenkinson Way
Hydro One	Buried	Electrical	Unknown	Metallic	Jenkinson Way
Toronto Hydro	Buried	Electrical	Unknown	Metallic	Jenkinson Way
Toronto Hydro	Overhead	Electrical	27.6 kV	Metallic	Jenkinson Way
Toronto Hydro	Overhead	Electrical	27.6 kV	Metallic	Jenkinson Way
Toronto Hydro	Buried	Electrical	Duct banks	Reinforced Concrete	Jenkinson Way
Unknown	Buried	Storm	Unknown	Reinforced Concrete	Jenkinson Way

Using the criteria set out in Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

7.11.3.2 Net Effects

Once the engineering mitigation solutions have been implemented, there are no further impacts to utilities in this location.

7.11.4 Unionville PS

7.11.4.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-40 Unionville PS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Overhead	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Bell	Buried	Conduit	Unknown	Metallic	Kennedy Rd
City of Markham	Buried	Storm	450mm	Concrete (Unreinforced)	Kennedy Rd
City of Markham	Buried	Storm	250mm	Unknown	Kennedy Rd
City of Markham	Buried	Sewer	375mm	Plastic	Kennedy Rd
City of Markham	Buried	Water	400mm	Metallic	Kennedy Rd
City of Markham	Buried	Storm	375mm	Unknown	Kennedy Rd
City of Markham	Buried	Storm	300mm	Unknown	Kennedy Rd

Owner	Utility Class	Description	Size	Material	Nearest Street
City of Markham	Buried	Storm	300mm	Unknown	Kennedy Rd
City of Markham	Buried	Storm	700mm	Concrete (Unreinforced)	Kennedy Rd
City of Markham	Buried	Storm	750mm	Concrete (Unreinforced)	Kennedy Rd
City of Markham	Buried	Storm	800mm	Concrete (Unreinforced)	Kennedy Rd
City of Markham	Buried	Storm	900mm	Concrete (Unreinforced)	Kennedy Rd
Hydro One	Overhead	Electrical	500kV	Unknown	Kennedy Rd, Birchmount Rd, Express Toll Route
Hydro One	Buried	Electrical	230kV	Metallic	Kennedy Rd
Hydro One	Overhead	Electrical	230kV	Metallic	Rail
Hydro One	Buried	Electrical	Unknown	Metallic	HWY 407
Hydro One	Buried	Electrical	Unknown	Metallic	HWY 407
Powerstream	Overhead	Electrical	27.6kV	Metallic	HWY 407
Powerstream	Overhead	Electrical	27.6kV	Metallic	HWY 407
Rogers	Buried	Conduit	Unknown	Metallic	Duffield Dr, Kennedy Rd
Rogers	Buried	Conduit	Unknown	Metallic	Duffield Dr, Kennedy Rd
Rogers	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Rogers	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Rogers	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Rogers	Overhead	Conduit	Unknown	Metallic	Kennedy Rd
Rogers	Overhead	Conduit	Unknown	Metallic	Kennedy Rd
Rogers	Overhead	Conduit	Unknown	Metallic	Kennedy Rd, Yucca Blvd., Main St. Unionville
Telus	Buried	Conduit	Unknown	Metallic	Kennedy Rd
Unknown	Buried	Ditch Culvert	700 mm	Other	HWY 407
Unknown	Buried	Ditch Culvert	600 mm	Other	HWY 407
York Region	Overhead	Electrical	unknown	Metallic	YMCA Blvd, Helen Ave
York Region	Buried	Water	1500mm	Reinforced Concrete	Kennedy Rd
York Region	Buried	Storm	200mm	Unknown	Kennedy Rd

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

7.11.4.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.5 Lincolnville PS

7.11.5.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-41 Lincolnville PS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Bell	Overhead	Conduit	Unknown	Metallic	York/Durham Line
Unknown	Overhead	Electrical	Unknown	Metallic	York/Durham Line

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

7.11.5.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.6 OCS & Bridges: Section SV-1 – Scarborough Junction to Agincourt Station

7.11.6.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-42 Section SV-1 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
60.56	52.31	Telus	Buried - Parallel to ROW	Duct Bank	288F	Metallic	Midland Ave to Kennedy Rd	Y	N	N
60.29	60.29	Unknown	Buried - Parallel to ROW	Ditch Culvert	600mm	Other	South of Danforth Rd	Y	N	N
60.27	60.26	Unknown	Buried - Parallel to ROW	Ditch Culvert	600mm	Other	South of Danforth Rd	Y	N	N
60.24	60.24	Unknown	Buried - Parallel to ROW	Ditch Culvert	600mm	Other	South of Danforth Rd	Y	N	N
60.19	60.15	Bell	Buried - Parallel to ROW	Duct Bank	1 - 18 ducts	Concrete (Unreinforced)	Danforth Rd	Y	N	N
60.17	60.15	Unknown	Buried - Parallel to ROW	Ditch Culvert	600mm	Other	Danforth Rd	Y	N	N
60.17		Unknown	OH - Crossing ROW	Cable	Unknown	Unknown	Danforth Rd	Y	N	N
60.17		Toronto Hydro	OH - Crossing ROW	Electrical	120V, 4.16kV, 27.6kV	Metallic	Danforth Rd	Y	Y	N
59.91	59.91	Unknown	Buried - Parallel to ROW	Ditch Culvert	300mm	Other	Corvette Ave	Y	N	N
59.83	59.75	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Saugeen Crescent to Chevron Crescent	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
59.57	59.57	Unknown	Buried - Parallel to ROW	Ditch Culvert	300mm	Other	Chevron Cres	Y	N	N
59.39		Toronto Hydro	Buried - Crossing ROW	Duct Bank	600V	Reinforced Concrete	Eglinton Ave E	Y	N	N
59.39		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV/16kV	Metallic	Eglinton Ave E	Y	Y	N
59.39		TTC	Buried - Crossing ROW	Conduit	Unknown	Plastic	Eglinton Ave E	Y	N	N
59.39		Enbridge Gas	Buried - Crossing ROW	Gas	8"	Metallic	Eglinton Ave E	Y	N	N
59.38		Toronto Hydro	On Bridge	Duct Bank	120V	Metallic	Eglinton Ave E	Y	N	N
59.36		Toronto Hydro	On Bridge	Duct Bank	120V	Metallic	Eglinton Ave E	Y	N	N
58.89	58.79	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Medina Cres.	N	Y	N
58.67		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	Romulus Dr	N	Y	N
58.65		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	Romulus Dr	N	Y	N
58.63		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	North of Romulus Dr	N	Y	N
58.37		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	South of Lawrence Ave E	Y	Y	Y
58.33		Rogers	OH - Crossing ROW	Cable	862ct/264ct/168ct	Metallic	Lawrence Ave E	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
58.32		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	South of Lawrence Ave E	Y	Y	Y
58.16		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV/4.16kV	Metallic	Lawrence Ave E	Y	Y	Y
58.16		Cogeco Data	OH - Crossing ROW	Cable	288ct, 48ct	Plastic	Lawrence Ave E	Y	Y	Y
58.16		City of Toronto	Buried - Crossing ROW	Water	750mm	Plastic	Lawrence Ave E	Y	N	N
58.15		Toronto Hydro	On Bridge	Duct Bank	120V/240V	Metallic	Lawrence Ave E	Y	Y	Y
58.14		Bell	Buried - Crossing ROW	Duct Bank	11 ducts	Concrete (Unreinforced)	Lawrence Ave E	Y	N	N
58.13		Toronto Hydro	On Bridge	Duct Bank	120V/240V	Metallic	Lawrence Ave E	Y	Y	Y
58.12		City of Toronto	Buried - Crossing ROW	Water	300mm	Plastic	Lawrence Ave E	Y	N	N
58.12		Bell	Buried - Crossing ROW	Duct Bank	43 ducts	Concrete (Unreinforced)	Lawrence Ave E	Y	N	N
58.12	58.06	Bell	Buried - Parallel to ROW	Cable	Cable	Other	Lawrence Ave E	Y	N	N
57.60	57.57	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	North of Wickware Gate	N	Y	N
57.26	57.23	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	South of Ellesmere Rd	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
57.16	57.14	Unknown	Buried - Parallel to ROW	Ditch Culvert	750mm	Other	South of Ellesmere Rd	Y	N	N
57.03		Toronto Hydro	OH - Crossing ROW	Electrical	4.16kV, 27.6kV	Metallic	Ellesmere Rd	Y	Y	N
57.03		Rogers	OH - Crossing ROW	Cable	Unknown	Metallic	Ellesmere Rd	Y	Y	N
56.98		Toronto Hydro	On Bridge	Duct Bank	120V/240V	Metallic	Ellesmere Rd	Y	Y	Y
56.96		Toronto Hydro	On Bridge	Duct Bank	120V/240V	Metallic	Ellesmere Rd	Y	Y	Y
56.95		Bell	Buried - Crossing ROW	Conduit	1 conduit	Plastic	Ellesmere Rd	Y	N	N
56.69		Toronto Hydro	OH - Crossing ROW	Electrical	120V, 4.16kV, 27.6kV	Metallic	Progress Ave	Y	Y	Y
56.34		Allstream	On Bridge	Conduit	Unknown	Plastic	Hwy 401	Y	N	Y
56.00		Hydro One	OH - Crossing ROW	Electrical	27.6kV	Metallic	CP Belleville Sub	Y	Y	Y
56.00		Rogers	OH - Crossing ROW	Cable	Unknown	Metallic	CP Belleville Sub	Y	Y	Y
55.90	55.87	Unknown	Buried - Parallel to ROW	Ditch Culvert	450mm	Other	North of CP Belleville Sub	Y	N	N
55.68	55.67	Unknown	Buried - Parallel to ROW	Ditch Culvert	500mm	Other	Sheppard Ave E	Y	N	N

Mitigation/Avoidance Measures

- Further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Spatial and electrical conflicts will be mitigated by the removal, relocation, reconfiguration or burial of overhead utilities. Further consultation and coordination with affected utility companies will need to be undertaken during Detailed Design to confirm conflicts and to establish the preferred mitigation approach. In some cases, primarily relating to those utilities attached to bridges, further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Electrical zone of influence conflicts will be resolved by installing appropriate grounding and bonding measures to counteract electromagnetic interference (EMI). Because vertical spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- With regard to existing buried utilities, notification shall be provided to the third party of the anticipated AC electrification of the rail ROW.
- With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.
- Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

7.11.6.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.7 OCS & Bridges: Section SV-2 – Agincourt Station to Milliken Station

7.11.7.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-43 Section SV-2 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
55.43	55.41	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	120V/240V	Reinforced Concrete	Marilyn Ave	Y	N	N
55.42	55.41	Unknown	Buried - Parallel to ROW	Ditch Culvert	200mm	Other	Marilyn Ave	Y	N	N
55.15	55.14	Toronto Hydro	Buried - Parallel to ROW	Electrical	Unknown		Havendale Rd	Y	N	N
55.14	55.12	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	120V/240V	Reinforced Concrete	Havendale Rd	Y	N	N
55.14	55.14	City of Toronto	Buried - Parallel to ROW	Ditch culvert	300mm	Unknown	Havendale Rd	Y	N	N
54.41	54.38	Unknown	Buried - Parallel to ROW	Ditch Culvert	500mm	Other	Finch Ave E	Y	N	N
54.38		Toronto Hydro	OH - Crossing ROW	Electrical	13.8kV, 27.6kV	Metallic	Finch Ave E	Y	Y	N
54.38		Rogers	OH - Crossing ROW	Cable	Unknown	Metallic	Finch Ave E	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
53.79		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	South of McNicoll Ave	Y	Y	N
53.79		Toronto Hydro	OH - Crossing ROW	Electrical	Unknown	Metallic	South of McNicoll Ave	Y	Y	Y
53.79		Cogeco Data	OH - Crossing ROW	Conduit	24ct	Plastic	South of McNicoll Ave	Y	Y	Y
53.78		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	South of McNicoll Ave	N	Y	N
53.76		Hydro One	OH - Crossing ROW	Electrical	0kV	Metallic	South of McNicoll Ave	N	Y	N
53.73		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	South of McNicoll Ave	N	Y	N
53.72		Toronto Hydro	OH - Crossing ROW	Electrical	120V/240V, 27.6kV	Metallic	South of McNicoll Ave	Y	Y	
53.71		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	South of McNicoll Ave	N	Y	N
53.70		Enbridge Pipelines	Buried - Crossing ROW	Oil	914mm	Metallic Encasing	South of McNicoll Ave	Y	N	N
53.67		Trans-Northern	Buried - Crossing ROW	Oil	250mm	Metallic Encasing	South of McNicoll Ave	Y	N	N
53.60	53.58	Unknown	Buried - Parallel to ROW	Ditch Culvert	900mm	Other	McNicoll Ave	Y	N	N
53.48	53.43	Unknown	Buried - Parallel to ROW	Ditch Culvert	450mm	Other	North of McNicoll Ave	Y	N	N
53.13		Toronto Hydro	OH - Crossing ROW	Electrical	120V/240V, 27.6kV	Metallic	Passmore Ave	Y	Y	Y

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **7.11.6.1** also apply to SV-2.

7.11.7.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.8 OCS & Bridges: Section SV-3 – Milliken Station to Unionville Station

7.11.8.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-44 Section SV-3 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
52.79		Toronto Hydro	OH - Crossing ROW	Electrical	120V/240V, 27.6kV	Metallic	Steeles Ave E	Y	Y	N
52.79		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	Steeles Ave E	Y	Y	N
52.76	52.70	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Steeles Ave E	Y	Y	N
52.61	52.60	Bell	Buried - Parallel to ROW	Cable	Cable	Other	Sourth of Sunrise Dr	Y	N	N
52.47	52.45	Bell	Buried - Parallel to ROW	Cable	Cable	Other	Comely Way	Y	N	N
52.44		PowerStream	OH - Crossing ROW	Electrical	16kV	Metallic	Kennedy Rd North of Steeles	Y	Y	N
52.35	52.31	Unknown	Buried - Parallel to ROW	Ditch Culvert	500mm	Other	Kennedy Rd North of Steeles	Y	N	N
52.34	52.31	Unknown	Buried - Parallel to ROW	Ditch Culvert	600mm	Other	Kennedy Rd North of Steeles	Y	N	N
52.31	51.20	Telus	Buried - Parallel to ROW	Duct Bank	2x288F	Metallic	Kennedy Rd to CN Hagerman Sub	Y	N	N
52.17	52.16	Unknown	Buried - Parallel to ROW	Ditch Culvert	900mm	Other	Gorvette Rd	Y	N	N
51.93	51.92	Unknown	Buried - Parallel to ROW	Ditch Culvert	500mm	Other	Denison St	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
51.46		Rogers	OH - Crossing ROW	Cable	Unknown	Plastic	14th Ave	Y	Y	Y
51.21		City of Markham	Buried - Crossing ROW	Storm	3048mm	Metallic Encasing	CN Hagerman Sub	Y	N	N
51.20		Telus	Buried - Crossing ROW	Duct Bank	288F	Metallic	CN Hagerman Sub	Y	N	N
51.18		Rogers	Buried - Crossing ROW	Conduit	Unknown	Plastic	CN Hagerman Sub	Y	N	N
51.17		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	South of Hwy 407	N	Y	N
51.14		Hydro One	OH - Crossing ROW	Electrical	500kV	Metallic	South of Hwy 407	N	Y	N
51.10		Hydro One	OH - Crossing ROW	Electrical	500kV	Metallic	South of Hwy 407	N	Y	N
51.05	51.05	Unknown	Buried - Parallel to ROW	Ditch Culvert	700mm	Other	South of Hwy 407	Y	N	N
51.05	51.03	Unknown	Buried - Parallel to ROW	Ditch Culvert	600mm	Other	South of Hwy 407	Y	N	N
51.04		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	South of Hwy 407	Y	Y	N
51.04		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	South of Hwy 407	Y	Y	N
51.04		Rogers	OH - Crossing ROW	Conduit	Unknown	Plastic	South of Hwy 407	Y	Y	N
51.04		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	South of Hwy 407	Y	Y	N
50.98	50.98	Unknown	Buried - Parallel to ROW	Ditch Culvert	700mm	Other	South of Hwy 407	Y	N	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **7.11.6.1** also apply to SV-3.

7.11.8.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.9 OCS & Bridges: Section SV-4 – Unionville Station to Markham Station

7.11.9.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-45 Section SV-4 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
50.12		Rogers	OH - Crossing ROW	Cable	Unknown	Plastic	Hwy 7	Y	Y	N
50.12		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	Hwy 7	Y	Y	N
50.12		York Region	OH - Crossing ROW	Cable	400W	HPS light	Hwy 7	Y	Y	N
50.09	50.03	Rogers	OH - Parallel to ROW	Cable	Unknown	Metallic	Highway 7 to Pavillion St	Y	Y	N
50.09	50.02	PowerStream	OH - Parallel to ROW	Electrical	16.0kV	Metallic	Hwy 7 to Pavillion St	N	Y	N
50.09	50.02	Unknown	Buried - Parallel to ROW	Ditch Culvert	400mm	Metallic	Hwy 7 to Pavillion St	Y	N	N
50.05		Rogers	Buried - Crossing ROW	Conduit	Unknown	Plastic	Pavillion St	Y	Y	Y
50.05		PowerStream	OH - Crossing ROW	Electrical	16.0kV	Metallic	Pavillion St	Y	Y	Y
49.92	49.92	Unknown	Buried - Parallel to ROW	Ditch Culvert	450mm	Metallic	Eureka St	Y	N	N
48.39	48.39	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	McCowan Rd	Y	Y	N
48.36		City of Markham	OH - Crossing ROW	Cable	72-525-2ES	LED Light	McCowan Rd	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
48.36		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	McCowan Rd	Y	Y	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **7.11.6.1** also apply to SV-4.

7.11.9.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.10 OCS & Bridges: Section SV-5 – Markham Station to Mount Joy Station

7.11.10.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-46 Section SV-5 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
46.93		Bell	OH - Crossing ROW	Conduit	Unknown	Plastic	Main St Markham N	Y	Y	N
46.93		City of Markham	OH - Crossing ROW	Cable	200W	HPS light	Main St Markham N	Y	Y	N
46.93		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	Main St Markham N	Y	Y	N
46.30		City of Markham	OH - Crossing ROW	Cable	LRL-NXT	LED Light	16th Ave	Y	Y	N
46.30		Rogers	OH - Crossing ROW	Cable	Unknown	Plastic	16th Ave	Y	Y	N
46.30		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	16th Ave	Y	Y	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **7.11.6.1** also apply to SV-5.

7.11.10.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.11 OCS & Bridges: Section SV-6 – Mount Joy Station to Stouffville Station

7.11.11.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-47 Section SV-6 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
45.67		Bell	Hardware	Electrical	Unknown	Plastic	Bur Oak Ave	Y	Y	N
44.95		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	Major Mackenzie Dr E	Y	Y	N
43.59	43.58	Unknown	Buried - Parallel to ROW	Ditch Culvert	300mm	Other	South of Elgin Mills Rd E	Y	N	N
43.47		Bell	OH - Crossing ROW	Cable	Unknown	Plastic	Elgin Mills Rd E	Y	Y	N
43.47		City of Markham	OH - Crossing ROW	Cable	RVS-110W64LED4K-LE2	LED Light	Elgin Mills Rd E	Y	Y	N
43.47		PowerStream	OH - Crossing ROW	Electrical	16.0kV	Metallic	Elgin Mills Rd E	Y	Y	N
43.45	43.45	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Elgin Mills Rd E	Y	N	N
43.23	43.23	Unknown	Buried - Parallel to ROW	Ditch Culvert	750mm	Other	North of Elgin Mills Rd E	Y	N	N
43.23	43.23	Unknown	Buried - Parallel to ROW	Ditch Culvert	900mm	Other	North of Elgin Mills Rd E	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
42.84		TransCanada	Buried - Crossing ROW	Oil	610mm, 510mm	Metallic	South of 9th Line	Y	N	N
42.37		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	9th line	Y	Y	N
42.17	42.16	Unknown	Buried - Parallel to ROW	Ditch Culvert	500mm	Other	North of 9th Line	Y	N	N
42.02		PowerStream	OH - Crossing ROW	Electrical	27.6kV	Metallic	19th Ave	Y	Y	N
41.72	41.69	Unknown	Buried - Parallel to ROW	Ditch Culvert	2400x900mm	Other	Reeves Way Blvd	Y	N	N
41.70	41.68	Town of Whitchurch-Stouffville	Buried - Parallel to ROW	Ditch Culvert	600mm	Metallic	Reeves Way Blvd	Y	N	N
41.10	41.10	Unknown	Buried - Parallel to ROW	Ditch Culvert	500mm	Other	North of Hoover Park Dr	Y	N	N
41.10	41.09	Unknown	Buried - Parallel to ROW	Ditch Culvert	450mm	Other	North of Hoover Park Dr	Y	N	N
40.86		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	Sunset Blvd	Y	Y	N
40.83	40.69	Town of Whitchurch-Stouffville	Buried - Parallel to ROW	Water	6"	Reinforced Concrete	Sunset Blvd to Main St Whitchurch-Stouffville	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
40.80	40.71	Unknown	OH - Parallel to ROW	Cable	Unknown	Cable	Sunset Blvd to Main St Whitchurch-Stouffville	Y	Y	N
40.69		Rogers	OH - Crossing ROW	Cable	Unknown	Plastic	Main St Whitchurch-Stouffville	Y	Y	N
40.69		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	Main St Whitchurch-Stouffville	Y	Y	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **7.11.6.1** also apply to SV-6.

7.11.11.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.11.12 OCS & Bridges: Section SV-7 – Stouffville Station to Lincolnville Station

7.11.12.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 7-48 Section SV-7 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
40.47	40.27	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	North of Schell St to South of Millard St	Y	Y	Y
40.27		Hydro One	OH - Crossing ROW	Electrical	11kV	Metallic	Millard St	N	Y	N
40.25	40.23	Unknown	Buried - Parallel to ROW	Ditch Culvert	500mm	Other	Millard St	Y	N	N
38.94		Rogers	OH - Crossing ROW	Cable	Unknown	Plastic	Bethesda Side Rd	Y	Y	N
38.94		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Bethesda Side Rd	Y	Y	N
38.93	38.92	Unknown	Buried - Parallel to ROW	Ditch Culvert	Unknown	Other	Bethesda Side Rd	Y	N	N
38.91		Rogers	OH - Crossing ROW	Cable	Unknown	Metallic	Bethesda Side Rd	Y	Y	N
38.91		Hydro One	OH - Crossing ROW	Electrical	Unknown	Metallic	Bethesda Side Rd	Y	Y	N
		Hydro One	Hardware	Electrical	Unknown	Metallic	Bethesda Side Rd	Y	N	N
38.89	38.87	Town of Whitchurch-Stouffville	Buried - Parallel to ROW	Ditch Culvert	750mm	Metallic	Bethesda Side Rd	Y	N	N
38.88	38.85	Bell	Buried - Parallel to ROW	Cable	Cable	Other	Bethesda Side Rd	Y	N	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **7.11.6.1** also apply to SV-7.

7.11.12.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

7.12 EMI & EMF

This section provides a summary of the key potential EMI/EMF effects, mitigation measures, and (resultant) net effects. The impact assessment was carried out using the baseline conditions data summarized in the EMI/EMF Baseline Conditions Report which entailed a survey of existing EMI/EMF conditions throughout the study area including along the rail corridors, feeder routes and at Taps/TPF locations (see **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report**).

Please refer to Appendix J2 for a description of the methodology followed for assessment of EMI/EMF impacts. Additional details can be found in the Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Impact Assessment Report contained in Appendix J2.

The primary effects assessed with regard to electromagnetic compatibility (EMC) relate to human exposure, i.e., Extremely Low Frequency (ELF) Electromagnetic Fields (EMF).

With regard to Electromagnetic Interference (EMI), the primary concern is adverse effects on electronics.

7.12.1 Conservative 10 mG Reassessment Value

As part of carrying out the EMI/EMF Impact Assessment for the TPAP, a conservative value of 10.0 mG magnetic field strength was established as the threshold for which a measured location along the rail corridors or at Taps/TPFs would trigger the recommendation for re-assessing/confirming baseline EMF and EMI measurements during the next phase of the project and before operation commences. This value was based upon the values summarized in **Table 7-49**, which presents information found in *NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power*. Additional supporting technical information may be found in EN 62233:2008, *Measurement Methods for EMF of Household Appliances and Similar Apparatus with Regard to Human Exposure.*

Table 7-49. Typical Magnetic Field Strengths

Electrical Appliances in Home or Office	Magnetic Field Strength
Dishwasher	30 mG (at 30 cm)
Vacuum Cleaner	200 mG (at 30 cm)
Hair Dryer	70 mG (at 30 cm)
Electric Shaver	100 mG (at 30 cm)

Electrical Appliances in Home or Office	Magnetic Field Strength
Video Display	6 mG (at 30 cm)
Other Environmental Sources	
Electric Power Distribution/Subtransmission Lines[26] (4 to 24 kV)	
Within Right-of-Way	10 to 70 mG
Edge of Right-of-Way	N/A
High-Voltage Transmission Lines[27] (115 kV to 500 kV)	
Within Right-of-Way	30 to 87 mG (at 1 metre height above ground)
Edge of Right-of-Way	7 to 29 mG (at 1 metre height above ground)

7.12.2 Stouffville Rail Corridor

7.12.2.1 Potential Effects and Mitigation Measures – General

- Radio Frequency EMI from the control system(s) leading to improper operation of electronics on-board the train or in the surrounding neighbourhood.
- Radiated Magnetic Fields and Time-Varying EMFs leading to damage to belongings, i.e., magnetic media, of passengers.
- Induced Current in metallic wires, rail transit tracks, metallic fences, underground communication cables, gas pipelines, and track circuits in neighbouring rail properties leading to contact burns or shocks, or communication errors.
- ELF EMF from the power system(s) leading to effects on workers, passengers, or residents.

Mitigation Measures - General

- Implementation of an *EMC Control Plan*, the objective of which is to is to facilitate and confirm formal qualification of the electrification system and all its components with respect to the required EMC standards. The components of the *EMC Control Plan* will include but are not limited to:
  - o Characterizes potential EMI sources and hazards to transit/rail operations;
  - o Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed);
  - o Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed

[26] As per NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power, these values “can vary considerably depending on the current carried by the line.”
[27] Ibid. “During peak loads (about 1% of the time), magnetic fields are about twice as strong as the mean levels” quoted here.

location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.);
  - Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B *EMF Modeling and Measurement Tools*.;
  - Includes (or references) a safety analysis and failure analysis of the transit system;
  - Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a key input to the detailed, post-electrification EMI scans taken at each TPF and compared to levels shown in EN 50121.)
  - Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions;
  - Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.).
- Baseline EMF and EMI measurements before and after system construction and operation.
- Use of ATF power systems.
- Design and installation of the electrification system and all of its components using industry-standard practices, including:
  - Good electrical grounds;
  - Proper shielding;
  - Physical separation, including burial to proper depths; and,
  - The installation of filters, capacitors, and inductors.

7.12.2.2 Net Effects – General

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

7.12.2.3 Potential Effects and Mitigation Measures – Specific Commitments (Stouffville)

- ELF EMF at higher-than-background levels was found in certain areas along the Stouffville corridor.
- No EMI signals measured for Stouffville emanated from unknown sources.

- Areas requiring special attention in relation to re-assessment of background EMI/EMF levels, as summarized in Table 7-50.

Table 7-50 EMI/EMF Commitments – Specific Locations Along Stouffville Rail Corridor

Location	Commitment
Scarborough TPS, Scarborough Unionville, and Lincolnville Traction Power Facilities	Re-Assessment of Background EMI
Scarborough TPS, Unionville, and Lincolnville Traction Power Facilities	Full Characterization of EMI Profile, using Frequencies Identified in EMC Control Plan and Corresponding Harmonics as per EN 50121.
Scarborough TPS, Unionville, and Lincolnville Traction Power Facilities, and Scarborough Tap Location	Confirmation/Re-Assessment of ELF EMF

Specific Mitigation Measures – Stouffville

As per **Table 7-50**:

- Confirmation/Re-assessment of ELF EMF levels post-electrification, particularly at location(s) where higher-than-background ELF EMF was measured during baseline surveys.
- Re-assessment of EMI levels post-electrification, specifically at a selection of EMI sensitive locations identified during baseline surveys.

7.12.2.4 Net Effects

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

7.13 Stormwater Management

A Preliminary Stormwater Management Assessment (see **Appendix K – Preliminary Stormwater Management Report** for additional detail) was undertaken at each Tap/TPF site as part of the TPAP to: determine existing and proposed drainage features/patterns, carry out a preliminary flow analysis, establish proposed drainage patterns once the Taps/TPFs are implemented, and to carry out a preliminary assessment of the development impact on drainage (including recommendations for mitigation measures as required). As this preliminary assessment was based on conceptual design information, a more detailed review and SWM analysis will need to be carried out as part of the Detailed Design phase once final design is prepared and additional information (e.g., survey results) is available for each Tap/TPF site.

Please refer to Appendix K for a description of the methodology followed for assessment of stormwater management impacts. Additional details can be found in the Preliminary Stormwater Management Report contained in Appendix K.

With respect to track lowering, it is noted that no adverse impacts to watercourses are anticipated based on the conceptual design developed as part of the TPAP. Similarly, with respect to drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to track lowering activities (or other electrification infrastructure proposed along the corridors) based on the preliminary analysis undertaken as part of the conceptual design work. Notwithstanding this, if environmental impacts are subsequently identified as part of Detailed Design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction.

7.13.1 Scarborough TPS/Tap Location

The proposed site is a tributary to the Southwest Highland Creek and is located within the jurisdiction of TRCA regulated area. The site should be investigated further, for flood elevations, flood proofing and cut and fill balance within the flood plain, during the Detailed Design phase.

The existing drainage pattern and drainage features for the study area are shown on **Figure 7-21**. The total TPF Assessment Area is approximately 7 ha. The portion of the parcel affected by the development resulting by the construction of future building and gravel pad, for the placement of electrical equipment, will be approximately 0.42 ha. Future access road outside this area will be approximately 0.19 ha. In the subsequent sections of this report only the area affected by the development, including future access road (total of 0.61 ha), is considered for the discussion and the analysis.

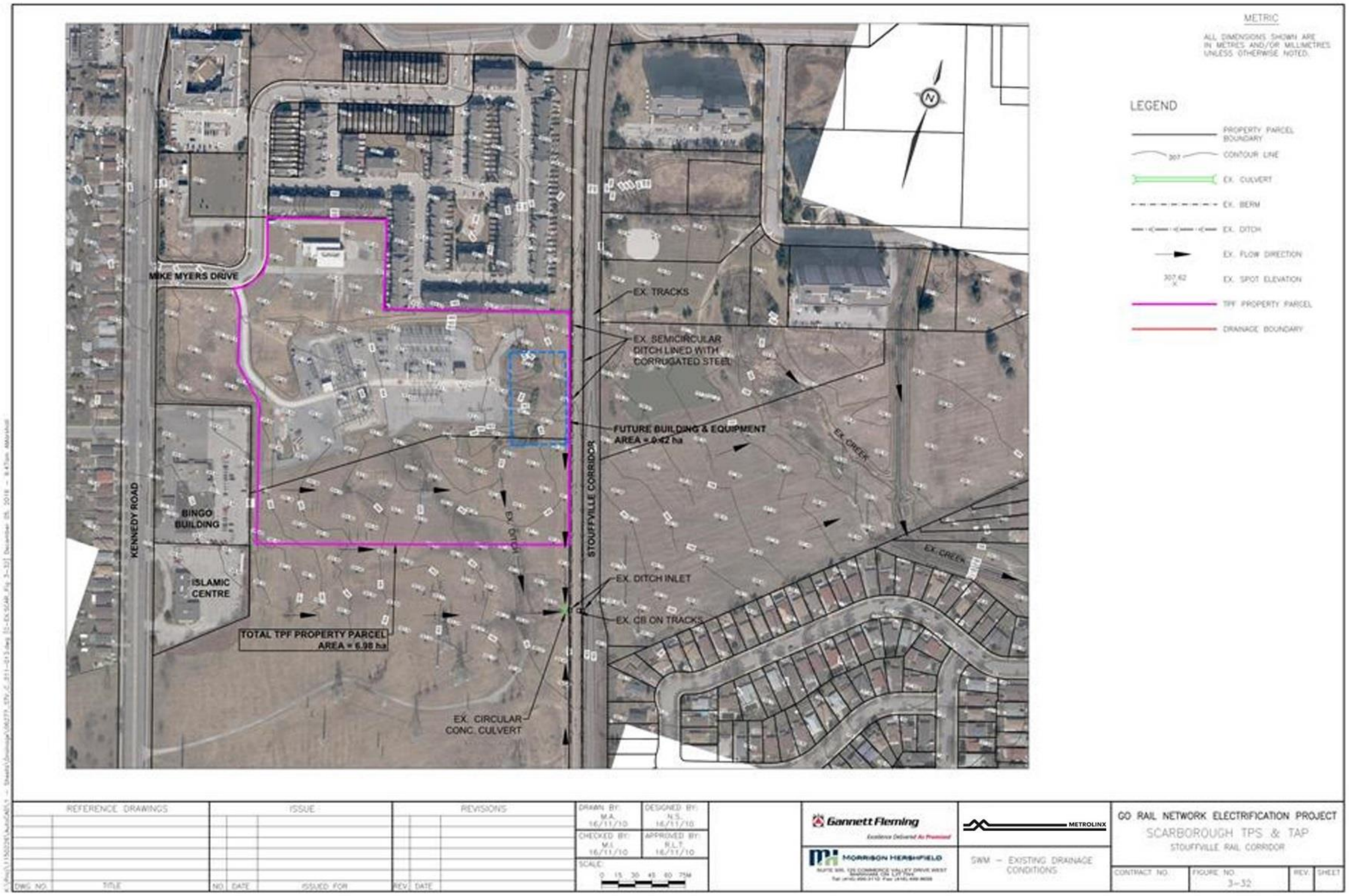
Drainage features near the site include a semicircular ditch, lined with corrugated steel, along both sides of the rail corridor. The ditch flows from north to south direction. Another vegetated ditch starts close to North West corner of the development area, runs approximately 150 metres in the field area to the south direction and then crosses the rail corridor via a culvert. Runoff from the steel lined ditch combines with the runoff from this ditch at this point and flows towards the southwest highland creek through an underground pipe system. Municipal data would be obtained at Detailed Design phase to verify this statement.

Hydro One provided Metrolinx with a copy of the Certificate of Approval from Ontario Ministry of Environment and Energy dated June 7, 1995. This document mentions that the Scarborough Transformer Station has a transformer spill containment facility that eventually discharges “via the station storm drainage system to the drainage ditch adjacent to the CNR/TTC railway line.” Metrolinx requested Hydro One to provide drawings and information regarding the station storm drainage system to identify any potential conflicts with the proposed TPF site. Coordination between Hydro One and Metrolinx regarding this issue should be undertaken at the Detailed Design phase to determine if TPF site modifications are required.

The stormwater drainage outlets for the site mentioned above are for both the minor and the major storm runoff. As the external flow contribution to the existing watercourse, ditches and culverts, and the capacities of the conveyance systems are not known, it cannot be determined that these outlets are sufficient and adequate for the runoff from the site to discharge at the existing locations. This will be further investigated at the Detailed Design phase.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

Figure 7-21 – Scarborough Tap/TPS Existing Drainage Conditions



7.13.1.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 7-21**. The site under existing condition is undeveloped land with no impervious area. A runoff coefficient, 'C' of 0.2 is estimated for the site area of 0.61 ha.

The proposed Scarborough Tap/TPS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be asphalt. The approximate foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.42 ha and for the access road it will be approximately 0.19 ha at the location shown on **Figure 7-22.** The runoff coefficient for the granular surface is estimated 0.8 while for the building and access road it is estimated to be 0.9. The composite runoff coefficient for the whole site area of 0.61 ha, after development, will be approximately 0.84.

The proposed development areas and their location shown on **Figure 7-22** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

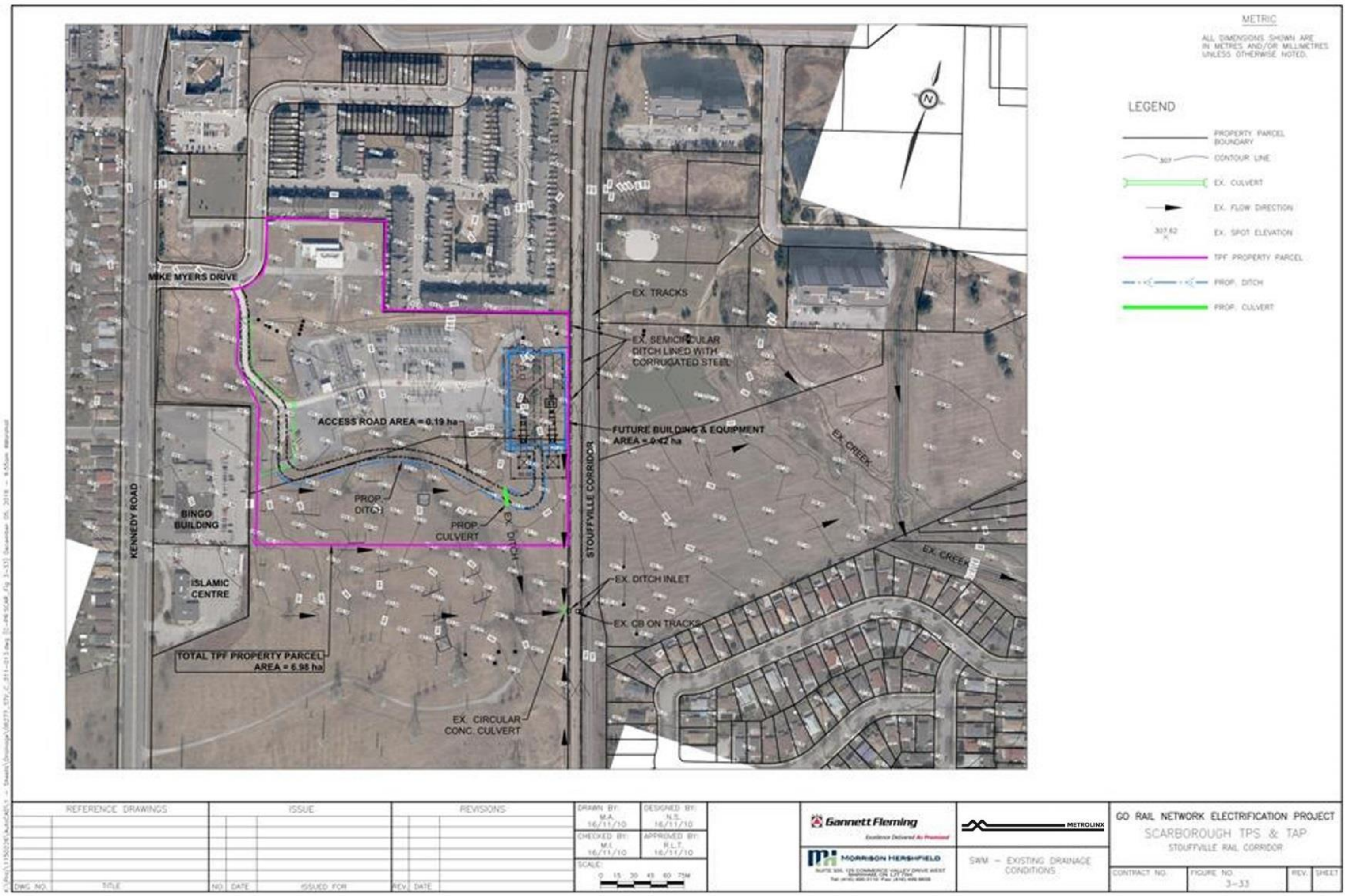
The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 7-51**.

Table 7-51: Scarborough Tap/TPS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area	Runoff Coefficient	Area Type	Drainage Area	Runoff Coefficient
Undeveloped	0.61	0.2	Building	0.03	0.9
			*Access Road	0.19	0.9
			Gravel	0.39	0.8
Total/Composite	**0.61**	**0.2 OR 0% Impervious**		**0.61**	**0.84 OR 91 % Impervious**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Figure 7-22 – Scarborough Tap/TPS Proposed Drainage Conditions



Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. It can be seen in **Table 7-51** that there is 91 % increase in impervious area and the development will cause some increase in the stormwater runoff.

Flows were computed for the 2 year to 100 year storm event using City of Toronto IDF Curves from Wet Weather Guidelines. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 10 minutes was used in the flow computations

A more refined flow analysis for the site drainage would be required at Detailed Design phase.

Runoff computations and the Parameters used for the computations and City of Toronto IDF curve data are presented in **Appendix K**. Results are summarized below in **Table 7-52**.

Table 7-52 Scarborough Tap/TPS - Existing and Proposed Development Flows

Storm event	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.005	0.045	0.040
2yr	0.030	0.125	0.095
5yr	0.045	0.187	0.142
10yr	0.055	0.230	0.175
25yr	0.071	0.295	0.225
50yr	0.091	0.361	0.270
100yr	0.106	0.403	0.297

7.13.1.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Scarborough Tap/TPS will result in 91 % increase in impervious area. However the total site area is small (less than 2 ha) and the impervious area is even smaller. Based on this preliminary assessment, the increase in flows resulting from the construction of the Scarborough Tap/TPS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City of Toronto / TRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the perimeter ditch can be converted to a bio-swale. The bio-swale can be used for quantity control as well.

It is anticipated that the quantity and quality control targets will be achieved by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be provided at Detailed Design phase.

7.13.1.3 Recommendations

For flood-proofing of sites, the facilities will be built 0.3m above the floodplain Fill below the flood line will need to be compensated with a cut volume for the cut-fill balance. Whether the site can accommodate compensating cut or not is to be finalized during the Detailed Design phase.

External drainage onto and off the site require determination at Detailed Design phase.

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Scarborough Tap/TPS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing drainage system downstream and its flow capacity is not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures at the site runoff outfalls.

7.13.2 Unionville PS

The existing drainage pattern for the study area is shown on **Figure 7-23**. The total TPF Assessmen Area is approximately 18.9 ha and consists of an existing transformer station, access road to the transformer station, and hydro corridor. Most of the land area is undeveloped. The portion of the property parcel affected by the construction of future access road, building and gravel pad, for the placement of electrical equipment will be approximately 1.45 ha as shown on the figure.

In general, the property parcel drains overland to north and west directions towards existing ditches along Stouffville Rail Corridor and Highway 407.

The overland flow from the proposed TPF site area is discharging to an existing 600mm diameter CSP cross-track culvert, south of the railway underpass at Hwy 407. The runoff travels via ditch along the south side of Highway 407 and it is most likely conveyed north via culvert(s) under Highway 407 to discharge to a branch of Rouge River.

Based on the information extracted from Ontario Soil Survey Report No. 19 by Regional Municipality of York, the soil type for the TPF Assessment Area is generally Sandy Loam (see **Appendix K)**. Detailed geotechnical investigations will be done at Detailed Design phase to precisely determine the soil type.

For the existing condition, based on the soil type and land use, the runoff coefficient, 'C' is estimated at 0.25.

The stormwater drainage outlets mentioned above for the site are for both the minor and the major storm runoff. As the external flow contribution to the existing ditches and culverts, and the capacity of the conveyance system is not known, it cannot be determined that these outlets are sufficient and adequate for the runoff from the site to discharge at the existing locations. This will be further investigated at the Detailed Design phase.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

7.13.2.1 Hydrologic Analysis

Drainage Areas

The drainage area boundaries, with runoff coefficients, for the existing condition are shown on **Figure 7-18.** The site under existing condition is an undeveloped land. A runoff coefficient, 'C' of 0.25 is estimated for the site area of 1.45 ha.

The proposed development of Unionville PS will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be either asphalt or gravel. The rest of the site will be revegetated. The approximate foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.13 ha and for the access road it will be approximately 0.08 ha at the location shown on **Figure 7-24.** The runoff coefficient for the granular surface is estimated at 0.8 while for the building and access road it is estimated at 0.9. Runoff coefficient for the rest of the area is estimated at 0.25. The composite runoff coefficient for the whole site area of 1.45 ha, after development, will be approximately 0.34.

Figure 7-24 is based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

Figure 7-23 – Unionville PS Existing Drainage Conditions

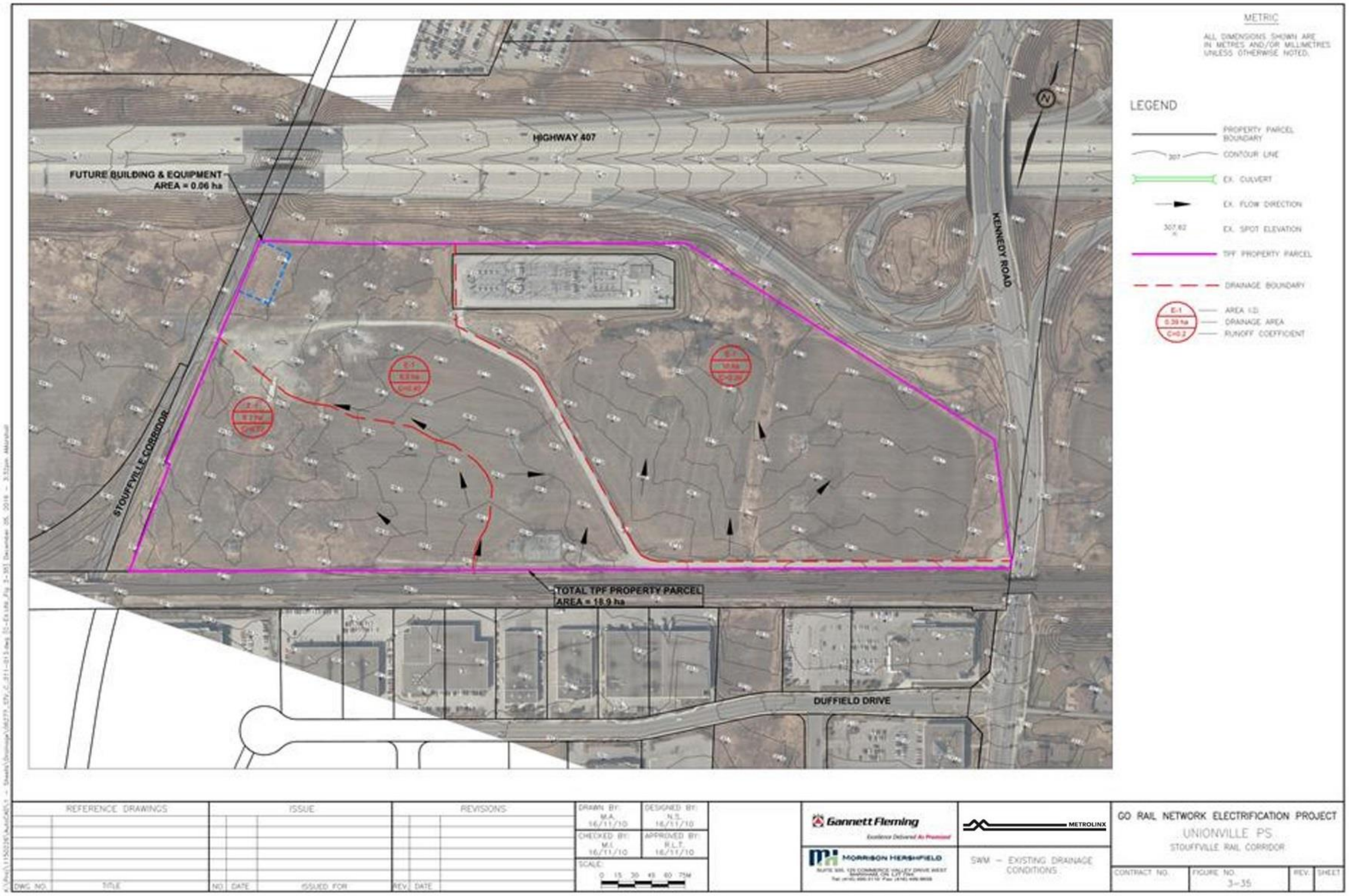
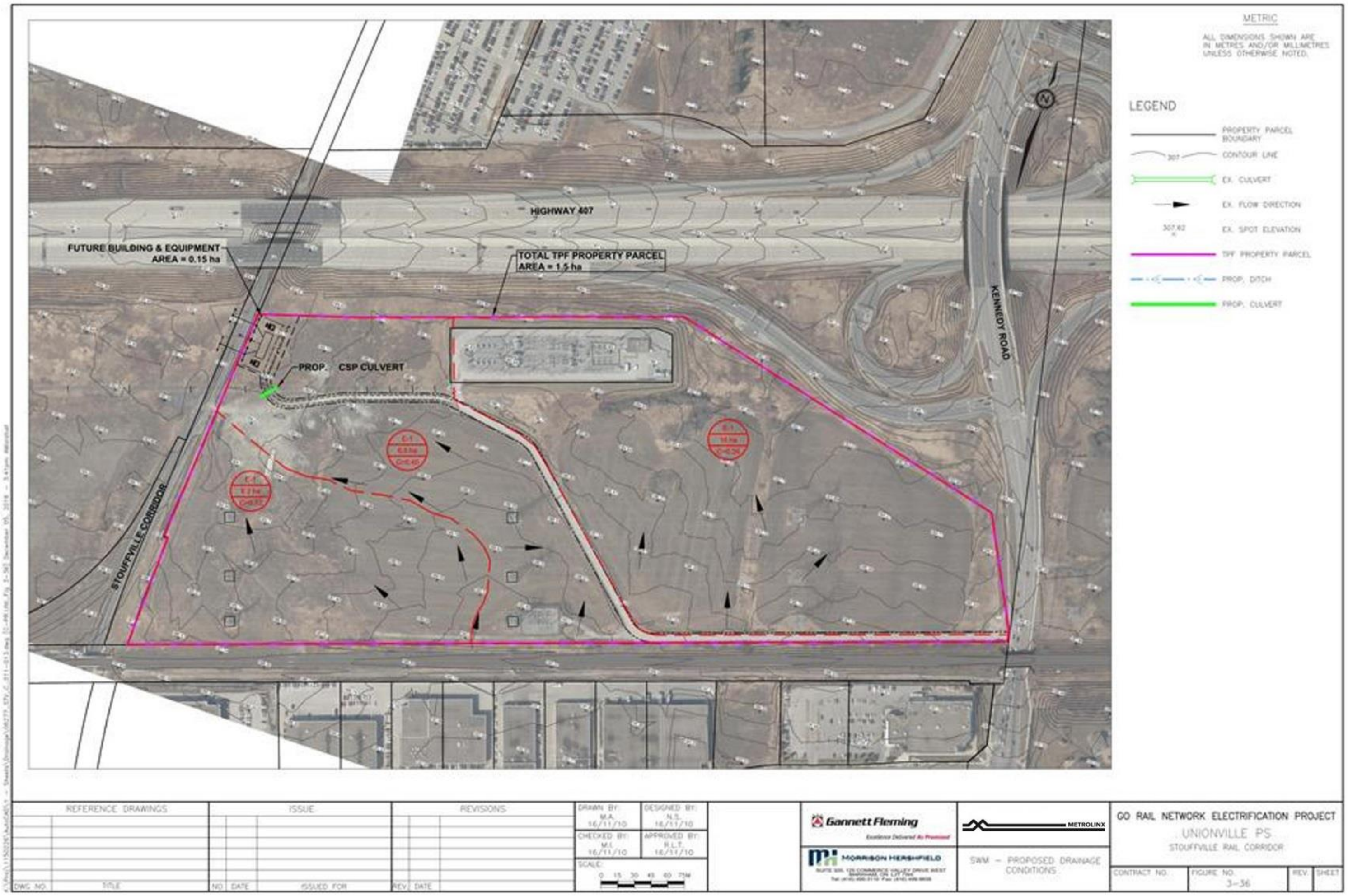


Figure 7-24 – Unionville PS Proposed Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are presented below in **Table 7-53.**

Table 7-53 Unionville PS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped	1.45	0.25	Building	0.02	0.9
			*Access Road	0.08	0.9
			Granular Surface	0.11	0.8
			Undeveloped	1.24	0.25
Total/Composite	**1.45**	**0.25 or 7% Impervious**		**1.45**	**0.34 or 20 % Impervious**

Flow Analysis

Rational formula was utilized to determine the pre and the post development flows from the site area. Flows were computed for 2 year to 100 year storm event using City of Markham IDF curves. Runoff computations and the Parameters used for the computations are presented in **Appendix K**. Results are summarized below in **Table 7-54.**

Table 7-54 Unionville PS - Pre and Post Development Flows

Storm event	Exis. Flow m^3/s	Proposed Dev Flow m^3/s	Flow Increase m^3/s
25mm	0.017	0.028	0.011
2yr	0.069	0.093	0.024
5yr	0.112	0.151	0.039
10yr	0.136	0.183	0.047
25yr	0.178	0.240	0.062
50yr	0.214	0.288	0.074
100yr	0.251	0.338	0.087

7.13.2.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Unionville PS will result in 13 % increase in impervious area. However, the total site area is small (1.45 ha) and the impervious area is even smaller. It can be seen in **Table 7-53.** The increase in flows resulting from the construction of the Unionville PS is not substantial, therefore, extensive measures for the quantity, quality or water balance will not be required

A perimeter ditch is proposed around the building and equipment area, and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City of Markham/ TRCA

Criteria of onsite infiltration for water balance/erosion control, a portion of the ditch can be converted to a bio-swale. The bio-swale can be used for quantity and quality control as well. The proposed perimeter ditch will flow in south west direction to existing culverts which will convey runoff to the west side of the rail corridor as discussed previously in this report.

It is anticipated that the quantity and quality control criteria will be met by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be required at Detailed Design phase.

7.13.2.3 Recommendations

External drainage onto and off the site require determination at Detailed Design phase. From the hydrological analysis and the consequent discussion presented in this section of the report, it is concluded that the construction of the Unionville PS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

7.13.3 Lincolnville PS

The proposed site is a tributary to the Duffins Creek and is located within the jurisdiction of TRCA regulated area. The site should be investigated further, for flood elevations, floodplaining and cut and fill balance within the flood plain, during the Detailed Design phase.

The existing drainage pattern for the study area is shown on **Figure 7-25.** The total TPF Assessment Area is approximately 2.6 ha and consists of an existing office building for the GO Station, Road and parking area and a portion of the Rail Corridor. The building and the parking area drains through a storm sewer system to a watercourse south of the building after quality treatment by an OGS, as indicated on the **Figure 7-25**. The Rail Corridor area drains to ditches on the east and the west side of the corridor.

The portion of the site area affected by the development is approximately 0.72 ha and is marked as Area E-1 and E-2 on **Figure 7-25**. Area E-1 drains west to an existing ditch along the rail corridor, located on the east side of the rail corridor. The ditch flows to the north and discharges to a watercourse at the north end of the Area E-1. The receiving watercourse from this point flows in the south direction. A Concrete Arch Culvert crosses the GO Station entrance road to convey the runoff from north to south. The watercourse crosses Bethesda Side Road, via a culvert, near the intersection of the York Durham line and Bethesda Side Road and discharges to a branch of Duffins Creek.

The runoff from the Area E-2 drains to a ditch, south of the area, between the GO Station parking area and the development area. This ditch flows from west to the east direction and crosses the GO Station Entrance Road via a 300 mm diameter CSP culvert. The runoff from this point continues flowing south towards the culvert across Bethesda Side Road, mentioned above, to discharge to a branch of Duffins Creek.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

7.13.3.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 7-25**. The site under existing condition is an undeveloped land. A runoff coefficient, 'C' of 0.2 is estimated for the site area of 0.72ha.

The proposed development of Lincolnville PS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be either asphalt or gravel. The rest of the site will be revegetated.

For the proposed condition, in general, the drainage pattern will remain the same as under existing condition. However, the construction of the Paralleling Station will result in some change in the impervious area and the diversion of the runoff towards the south ditch, flowing to the west under existing condition. The drainage area boundaries, with runoff coefficients, for the proposed condition are shown on **Figure 7-26**.

The proposed development areas and their locations shown on **Figure 7-26** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

Figure 7-25 – Lincolnville PS Existing Drainage Conditions

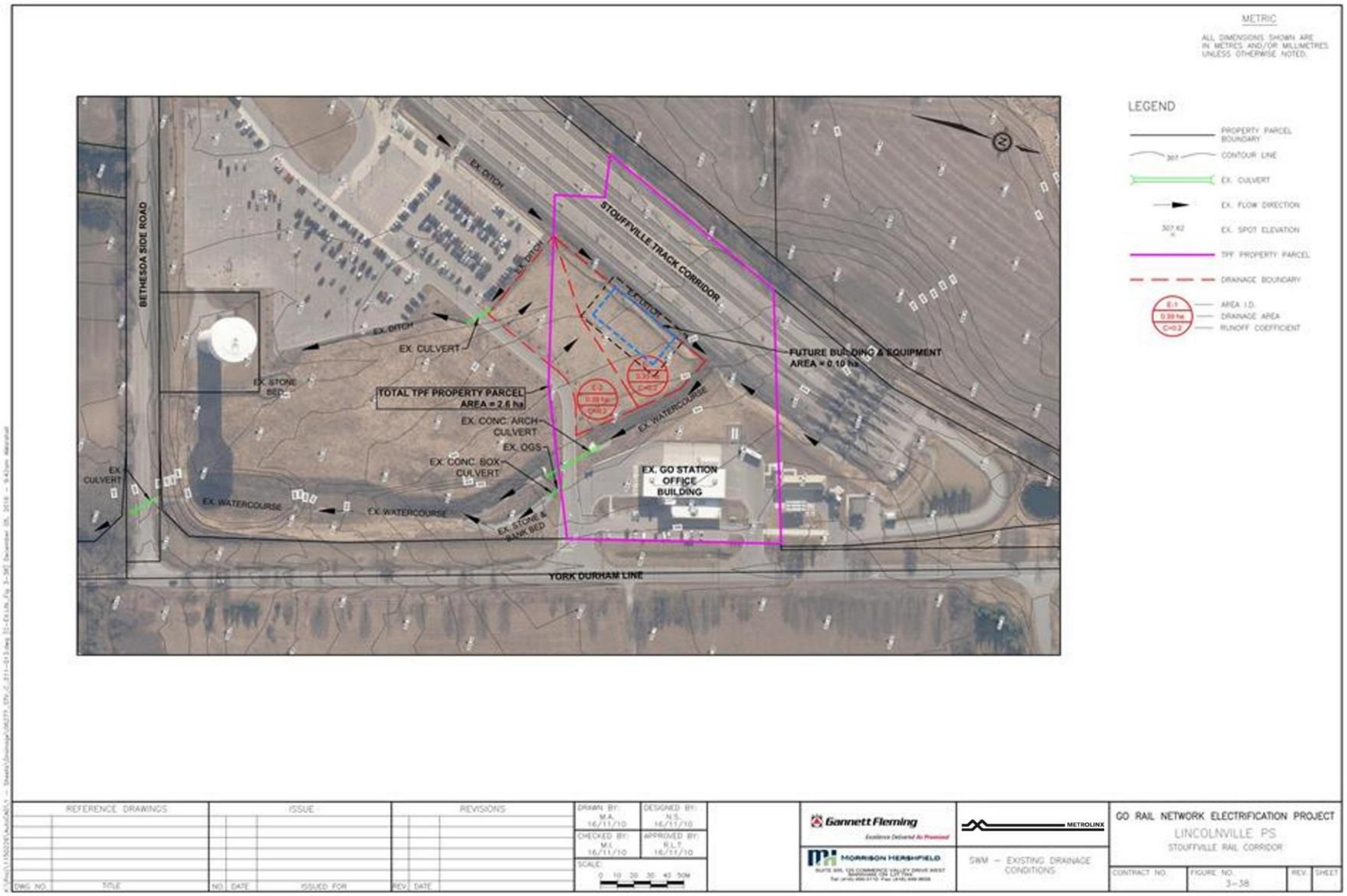
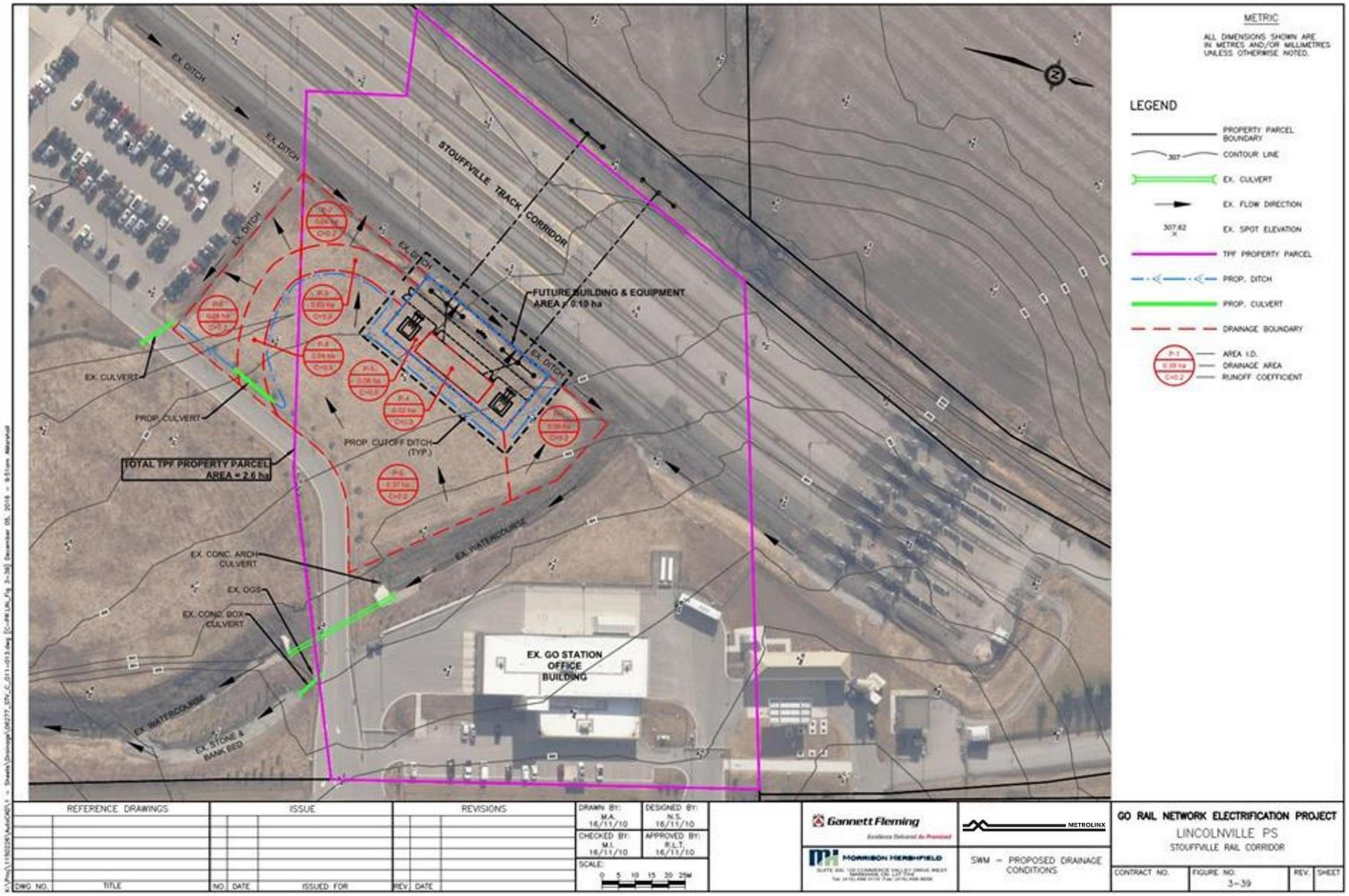


Figure 7-26 – Lincolnville PS Proposed Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are presented below in **Table 7-55**.

Table 7-55 Lincolnville PS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area ID	Drainage Area (ha)	Runoff Coefficient	Area ID	Drainage Area (ha)	Runoff Coefficient
Draining to West Ditch					
E-1 (Undeveloped)	0.33	0.2	P-1 (Undeveloped)	0.06	0.2
			P-2 (Undeveloped)	0.04	0.2
			*P-3 (Access Rd)	0.03	0.9
			P-4 (Building)	0.02	0.9
			P-5 (Granular)	0.08	0.8
Total/Composite	**0.33**	**0.2 OR 0% Imperviousness**		**0.23**	**0.56 OR 52% Imperviousness**
Draining to South Ditch					
E-2 (Undeveloped)	0.39	0.2	P-6 (Undeveloped)	0.37	0.2
			P-7(Undeveloped)	0.08	0.2
			*P-8 (Access Rd)	0.04	0.9
Total/Composite	**0.39**	**0.2 OR 0% Imperviousness**		**0.49**	**0.26 OR 8% Imperviousness**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. It can be seen in **Table 7-55** that there is 52% increase in imperviousness for the Area E-1 and 8% increase in imperviousness for the Area E-2 and the development will cause some increase in the stormwater runoff.

Flows were computed for the 2 year to 100 year storm event using MTO rainfall data. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003)

Runoff computations and the Parameters used for the computations and MTO rainfall data are presented in **Appendix K**. Results are summarized below in **Table 7-56.**

Table 7-56 Lincolnville PS - Pre and Post Development Flows

Storm event	Area Draining to West			Area Draining to South		
	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.003	0.011	0.008	0.003	0.006	0.003
2yr	0.013	0.026	0.013	0.016	0.025	0.010
5yr	0.018	0.035	0.017	0.021	0.034	0.013
10yr	0.021	0.041	0.020	0.025	0.040	0.015
25yr	0.027	0.053	0.026	0.032	0.052	0.020
50yr	0.033	0.064	0.031	0.039	0.063	0.024
100yr	0.038	0.074	0.036	0.045	0.072	0.027

7.13.3.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Lincolnville PS will result in 52 % increase in imperviousness for the area draining to the west (E-1) and 8 % increase in imperviousness for the area draining to the south (E-2). However the total site area is small (less than 2 ha) and the impervious area is even smaller. Based on this preliminary assessment, the increase in flows resulting from the construction of the Lincolnville PS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City of Toronto / TRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the perimeter ditch can be converted to a bio-swale. The bio-swale can be used for quantity control as well.

It is anticipated that the quantity and quality control targets will be achieved by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be provided at Detailed Design phase.

7.13.3.3 Recommendations

For flood-proofing of sites, the facilities will be built 0.3m above the floodplain. Fill below the flood line will need to be compensated with a cut volume for the cut-fill balance. Whether the site can accommodate compensating cut or not is to be finalized during the Detailed Design phase.

External drainage onto and off the site require determination at Detailed Design phase.

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Lincolnville PS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed and existing vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

7.14 Groundwater and Wells

Please refer to Appendix V for a description of the methodology followed for assessment of groundwater impacts. Additional details can be found in the Groundwater Impact Assessment Report contained in Appendix V.

7.14.1 Scarborough Tap

7.14.1.1 Potential Effects and Mitigation Measures

There was one (1) industrial/commercial supply well and one (1) supply well of unknown type identified within 500 metres of the Scarborough Tap. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There is one (1) waterbody, Southwest Highland Creek, located within 500 metres of the Tap location.

The subsurface footprint of the Scarborough Tap structure foundations and duct banks is relatively small and shallow (i.e., up to 10 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Southwest Highland Creek. Therefore, no mitigation measures are recommended.

7.14.1.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.2 Scarborough TPS

7.14.2.1 Potential Effects and Mitigation Measures

There was one (1) industrial/commercial supply well and one (1) supply well of unknown type identified within 500 metres of the Scarborough traction power station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There is one (1) waterbody, Southwest Highland Creek, located within 500 metres of the traction power station.

The subsurface footprint of the Scarborough traction power station grounding grid, gantry foundations, duct banks and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Southwest Highland Creek. Therefore, no mitigation measures are recommended.

7.14.2.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.3 Scarborough 25kV Feeder Route

7.14.3.1 Potential Effects and Mitigation Measures

There was one (1) industrial/commercial supply well and one (1) supply well of unknown type identified within 500 metres of the Scarborough 25kV feeder route. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There are two (2) waterbodies, Taylor Creek and Southwest Highland Creek, located within 500 metres of the 25kV feeder route.

The feeder route will run via aerial cables mounted on top of the proposed OCS from the Scarborough TPS to the point where the Stouffville corridor converges with the Lakeshore East Corridor. The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Taylor Creek and Southwest Highland Creek. Therefore, no mitigation measures are recommended.

7.14.3.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.4 Unionville PS

7.14.4.1 Potential Effects and Mitigation Measures

There were 24 domestic supply wells, three (3) agricultural supply wells and two (2) industrial/ commercial supply wells identified within 500 metres of the Unionville paralleling station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. Of the identified wells, one (1) domestic supply well is shown as being located within the property boundaries of the PS. It should be confirmed that this well is not present, or, if present, it should be decommissioned in accordance with Ontario Regulation 903 prior to commencement of any construction activities.

There is one (1) waterbody, Rouge River, located within 500 metres of the paralleling station.

The subsurface footprint of the Unionville paralleling station grounding grid, gantry foundations, duct banks and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Rouge River. Therefore, no mitigation measures are recommended.

7.14.4.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.5 Lincolnville PS

7.14.5.1 Potential Effects and Mitigation Measures

There were 19 Domestic supply wells, two (2) agricultural supply wells and two (2) industrial/commercial supply wells identified within 500 metres of the Lincolnville paralleling station. This section is characterized by a primarily rural setting with likely private water well use. There is one (1) waterbody, Tributary of West Duffins Creek, located within 500 metres of the paralleling station.

The subsurface footprint of the Lincolnville paralleling station grounding grid, gantry foundations, duct banks and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Tributary of West Duffins Creek. Therefore, no mitigation measures are recommended.

7.14.5.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.6 OCS & Bridges: Section SV-1 – Scarborough Junction to Agincourt Station

7.14.6.1 Potential Effects and Mitigation Measures

There were one (1) domestic supply well, six (6) industrial/commercial supply wells and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells is likely negligible. There are two (2) waterbodies, Massey Creek and Southwest Highland Creek, located within 500 metres of the rail corridor.

There are seven (7) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at Eglinton Avenue, Lawrence Avenue East, Ellesmere Road, Highway 401, CP Bellville Sub, and West Highland Creek. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.
- Pedestrian bridge replacement at Moorgate Avenue/Tara Avenue. A detailed assessment of any potential groundwater/well impacts will be completed as part of a separate EA Addendum process as outlined in the GO Rail Network Electrification EPR.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Massey Creek and Southwest Highland Creek. Therefore, no mitigation measures are recommended.

7.14.6.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.7 OCS & Bridges: Section SV-2 – Agincourt Station to Milliken Station

7.14.7.1 Potential Effects and Mitigation Measures

There were eight (8) domestic supply wells, two (2) agricultural supply wells, three (3) industrial/commercial supply wells and two (2) supply wells of unknown type identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells is likely negligible. There are two (2) waterbodies, West Highland Creek and East Highland Creek located within 500 metres of the rail corridor.

There are no bridge modifications in this section of the rail corridor.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including West Highland Creek and East Highland Creek. Therefore, no mitigation measures are recommended.

7.14.7.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.8 OCS & Bridges: Section SV-3 – Milliken Station to Unionville Station

7.14.8.1 Potential Effects and Mitigation Measures

There were 25 domestic supply wells, two (2) agricultural supply wells, five (5) industrial/commercial supply wells and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. However, this section is characterized by an urban setting and the use of private water wells is likely negligible. There is one (1) waterbody, Rouge River, located within 500 metres of the rail corridor.

There are five (5) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at 14th Avenue, CN York Sub, Highway 407 West, Highway 407 East, and Enterprise Drive. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Rouge River. Therefore, no mitigation measures are recommended.

7.14.8.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.9 OCS & Bridges: Section SV-4 – Unionville Station to Markham Station

7.14.9.1 Potential Effects and Mitigation Measures

There were 85 domestic supply wells, six (6) agricultural supply wells, 16 industrial/commercial supply wells and two (2) municipal supply wells identified within 500 metres of the rail corridor in this section. However, this section is characterized by an urban setting and the use of private water wells is likely negligible. There are five (5) waterbodies, Robinson Creek, unnamed tributary of the Rouge River, Eckardt Creek, Bruce Creek and Rouge River located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation of OCS wires at Bruce Creek. This modification will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Robinson Creek, unnamed tributary of the Rouge River, Eckardt Creek, Bruce Creek and Rouge River. Therefore, no mitigation measures are recommended.

7.14.9.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.10 OCS & Bridges: Section SV-5 – Markham Station to Mount Joy Station

7.14.10.1 Potential Effects and Mitigation Measures

There were five (5) domestic supply wells, one (1) agricultural supply well and six (6) industrial/commercial supply wells identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells is likely negligible. There is one (1) waterbody, Mount Joy Creek, located within 500 metres of the rail corridor.

There are no bridge modifications in this section of the rail corridor.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Mount Joy Creek. Therefore, no mitigation measures are recommended.

7.14.10.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.11 OCS & Bridges: Section SV-6 – Mount Joy Station to Stouffville Station

7.14.11.1 Potential Effects and Mitigation Measures

There were 39 domestic supply wells, one (1) agricultural supply well and two (2) industrial/commercial supply wells identified within 500 metres of the rail corridor in this section. The section is characterized by a mixed urban and rural setting with possible private water well use. There are four (4) waterbodies, Mount Joy Creek, Greensborough Wetland Complex, Little Rouge Creek and Stouffville Creek, located within 500 metres of the rail corridor.

There are no bridge modifications in this section of the rail corridor.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Mount Joy Creek, Greensborough Wetland Complex, Little Rouge Creek and Stouffville Creek. Therefore, no mitigation measures are recommended.

7.14.11.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

7.14.12 OCS & Bridges: Section SV-7 – Stouffville Station to Lincolnville Station

7.14.12.1 Potential Effects and Mitigation Measures

There were 47 domestic supply wells, three (3) agricultural supply wells, four (4) industrial/commercial supply wells and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. This section is characterized by a mixed urban and rural setting with possible private water well use. There are three (3) waterbodies, unnamed tributary of the West Duffins Creek, Stouffville Marsh and Stouffville Creek, located within 500 metres of the rail corridor.

There are no bridge modifications in this section of the rail corridor.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including the unnamed tributary of the West Duffins Creek, Stouffville Marsh and Stouffville Creek. Therefore, no mitigation measures are recommended.

7.14.12.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8 Impact Assessment - Lakeshore East Corridor

8.1 Natural Environment

Vegetation Clearing Zone

As described in Volume 1, a Vegetation Clearing Zone is required in order to provide safe electrical clearances to any existing vegetation along the rail corridors. The Vegetation Clearing Zone entails vegetation removals within the 5m OCS Impact Zone plus an additional 2 metre offset area on either side of the OCS components. As a result, the total clearing area is defined as 7 metres measured from the centerline of the outermost tracks to be electrified on either side of each rail corridor. The 7 metre zone is considered a maximum removal zone; during Detailed Design, the 7 metre zone may be reduced in certain areas where/if possible based on the final OCS design.

As part of the TPAP, the following approach was taken to assess potential ecological impacts associated with the required vegetation removal for the Electrification Project. There were two components to the analysis:

1. Identification of ecological impacts related to vegetation removals, and
2. Characterization of the extent of tree removals.

Approach/Methodology for Assessing Ecological Impacts

To classify potential ecological impacts due to vegetation removal, they were categorized as either: ***negligible, low, moderate, or high*** based on the rationale outlined below. Using Geographic Information Systems (GIS) technology, Ecological Land Classification (ELC) communities along the corridors/feeder routes were mapped (via aerial photo interpretation as part of the baseline conditions phase), and the areas (in hectares [ha]) of potential vegetation removal (including trees) were calculated for each type of ELC community within a given corridor segment. It should be noted that the assessment did not entail field surveys or ground truthing to delineate impact areas within the vegetation clearing zone. However field investigations were undertaken along corridor sections identified within the *GO Rail Network Electrification TPAP - Natural Environmental Baseline Conditions Report* (Future/Work & Commitments section) to assess habitat suitability within various ELC communities to be affected.

In order to further characterize tree removals specifically, the extent of tree removals within each ELC community was categorized as ***minor, fair, or extensive*** based on the canopy cover within each respective ELC community (see **Table 8-1** below).

- Where canopy cover is minimal (<10%) or limited (10-20%), the extent of removals is considered ***minor.***
- For areas with intermediate (20-70%) canopy cover, the extent of tree removals is considered ***fair.***

- For communities with high (>70%) canopy cover, tree removals are anticipated to be ***extensive.***

Table 8-1: Extent of Tree Removals

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Agriculture (AG)	AG communities include intensive and non-intensive farming. Intensive practices includes cultivated field producing crops (e.g. corn and wheat) and specialty agricultural crops (e.g. orchards, and nurseries). Non-intensive fields are dominated with herbaceous vegetation and grasses primarily used for pasture and grazing areas. Treed areas may be located along the perimeter of AG communities. AG communities contain minimal (<10%) canopy cover	Minor	Vegetation removals within AG lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Commercial and Institutional (CVC)	CVC communities contain constructed areas, including businesses, light industry, heavy industry, educational and health buildings, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Constructed (CV)	CV communities contain constructed areas, including light and heavy industry, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CVC communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVC lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Transportation and Utility (CVI)	CVI communities include roads, highways, right of ways, railways, airports, and sewage treatment facilities, and are dominated by non-native grasses and herbaceous species common to disturbed habitat. CVI communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CVI lands are considered to have negligible ecological impact since the affected areas provide limited to no habitat for wildlife.
Residential (CVR)	CVR communities include low to high residential housing, rural property,	Fair	Vegetation removals with CVR lands are considered to

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	single family homes, and trailer parks, and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. Due to the presence of treed areas along the boundary between the CVI and CVR communities, the canopy cover within the impacted areas is considered intermediate (20-70%).		have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Green Land (CGL)	CGL communities are composed of open areas such as parks, golf courses, playing fields, picnic areas, and cemeteries, and are primarily dominated by non-native grass species (Kentucky Blue Grass), as well as herbaceous species common to disturbed habitat. CGL communities contain varying levels of canopy cover from minimal (<10%) to limited (10-20%) dependent on the community.	Minor	Vegetation removals with CGL communities are considered to have a low ecological impact since these communities provide limited to no habitat for wildlife.
Cultural Meadow (CUM)	CUM communities result from, or are maintained by, cultural or anthropogenic-based disturbances and are primarily dominated by non-native grasses and herbaceous species common to disturbed habitat. CUM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with CUM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Red Pine Coniferous Plantation (CUP)	CUP communities greater than 75% coniferous tree composition. CUP communities generally contain high (>70%) canopy cover.	N/A	Vegetation removals within CUP communities are considered to have low ecological impact.
Cultural Woodland (CUW)	CUW communities are culturally influenced and contain high (>70%) canopy cover.	Extensive	Vegetation removals within CUW communities have low ecological impacts.
Treed Agriculture (TAG)	TAG communities include coniferous, deciduous and mixed plantations, treed pastures and fencerows. TAG communities contain TAG communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the TAG communities are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Deciduous Thicket (THD)	THD communities contain some shrub and tree cover. The communities are culturally influenced and dominated by non-native and invasive species. THD communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within the THD communities are considered to have low ecological impact as the areas affected provide limited wildlife habitat.
Deciduous Forest (FOD)	FOD communities contain are dominated by deciduous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Forest (FOM)	FOM communities contain >60% tree cover and dominated by a mix of deciduous and coniferous tree species. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. FOM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within FOM communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Marsh (MA)	MA communities are dominated by emergent hydorphytic macrophytes with some tree and shrub cover. MA communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MA communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Meadow Marsh (MAM)	MAM communities represent areas that experience seasonal flooding, and	Minor	Vegetation removals within the MAM communities

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	contain species that are less tolerant of prolonged flooding. MAS communities contain minimal (<10%) canopy cover.		have varying levels of ecological impacts, ranging from low to moderate and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, and wildlife habitat suitability.
Shallow Marsh (MAS)	MAS communities are restricted to facultative and obligate wetland plants. MAS communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals within MAS communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Meadow (MEM)	MEM communities contain a mix of grass-like and broadleaf species and include non-native and invasive species. MEM communities contain minimal (<10%) canopy cover.	Minor	Vegetation removals with MEM lands are considered to have low ecological impact since the affected areas provide limited to no habitat for wildlife.
Open Shoreline (SHO)	SHO communities are associated with and adjacent to permanent or ephemeral water and subject to active shoreline processes. Vegetation cover varies from patchy to barren to more closed and treed. SHO communities contain minimal (<10%) to limited (10-20%) canopy cover.	Minor	Vegetation removals within SHO communities result in a moderate ecological impact and as they contain specialized habitat for wildlife.
Open Water (OA)	OA communities include watercourses, rivers, streams, and ponds.	N/A	There are no footprint impacts associated with OA communities as all OCS components will be attached to bridge structures and no vegetation removals are required in these areas.

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
Swamp (SW)	SW communities contain tree or shrub cover with variable flooding regimes and areas with standing water. SW communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within SW communities have varying levels of ecological impacts, ranging from moderate to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Swamp (SWM)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWM communities contain tree both deciduous and coniferous composition. SWM communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals with SWM lands are considered to have moderate ecological impact since the affected areas provide habitat for wildlife and act as movement corridors.
Deciduous Swamp (SWD)	SWM communities contain deciduous and coniferous tree cover with variable flooding regimes and areas with standing water. SWD communities contain deciduous content. SWD communities generally contain high (>70%) canopy cover.	Extensive	There are no anticipated impacts to this community.
Deciduous Woodland (WOD)	WOD communities contain semi-closed tree cover and are dominated by mid-aged deciduous trees. Species located along the forest edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOD communities generally contain high (>70%) canopy cover.	Extensive	Vegetation removals within WOD communities have varying levels of ecological impacts, ranging from low to high and are dependent on several factors including: composition and structure, size, connection with wildlife corridors, wildlife habitat suitability, and/or location within a Designated Area.
Mixed Woodland (WOM)	WOM communities contain semi-closed tree cover and are dominated by mid-aged deciduous and coniferous trees. Species located along the forest	Extensive	Vegetation removals within the WOM community is considered to have moderate ecological impact

ELC Community	Description of ELC and Vegetation/Canopy Cover	Extent of Tree Removals based on Canopy Cover (Minor, Fair, Extensive)	Potential Ecological Impact Category (Negligible, Low, Moderate, High)
	edge, and primarily located within the vegetation removal areas, are commonly composed of regenerative and non-native species. WOM communities generally contain high (>70%) canopy cover.		since the affected areas provide habitat for wildlife and act as movement corridors.

Additional details can be found in the Natural Environment Impact Assessment Report contained in Appendix A2.

8.1.1 East Rail Maintenance Facility Tap Location

8.1.1.1 Potential Effects and Mitigation Measures

8.1.1.1.1 Terrestrial

The proposed Tap Point will include two structures with an approximate footprint of $10m^2$ and up to 30m tall and include a 25kV feeder route to facilitate tapping the Hydro One transmission line.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for the East Rail Maintenance Facility Tap Location are presented in . As depicted in the footprint impacts associated with the Tap location is located within Constructed (CV) and Meadow Marsh (MAM) lands. The CV community does not contain any natural features or habitat for wildlife. The underground duct banks associated with the Tap location are within the Meadow Marsh (MAM) community and vegetation removals will be required. The MAM community is composed of Narrow-leaved Cattail and Phragmites. Due to the minimal/limited canopy cover within the MAM community, the extent of tree removals is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.   There are no footprint impacts within the Cultural Meadow (CUM) or Transportation and Utility (CVI) lands associated with the Tap.

An amphibian survey was conducted during the 2016 field season to identify species present within the MAM community. Two (2) American Toads were recorded calling during the survey. Due to the small and isolation from movement corridors or adjacent habitat, the MAM does not support a large amphibian breeding population. Based on the size of the Tap footprint compared to the overall MAM community, the ecological impact is considered low.

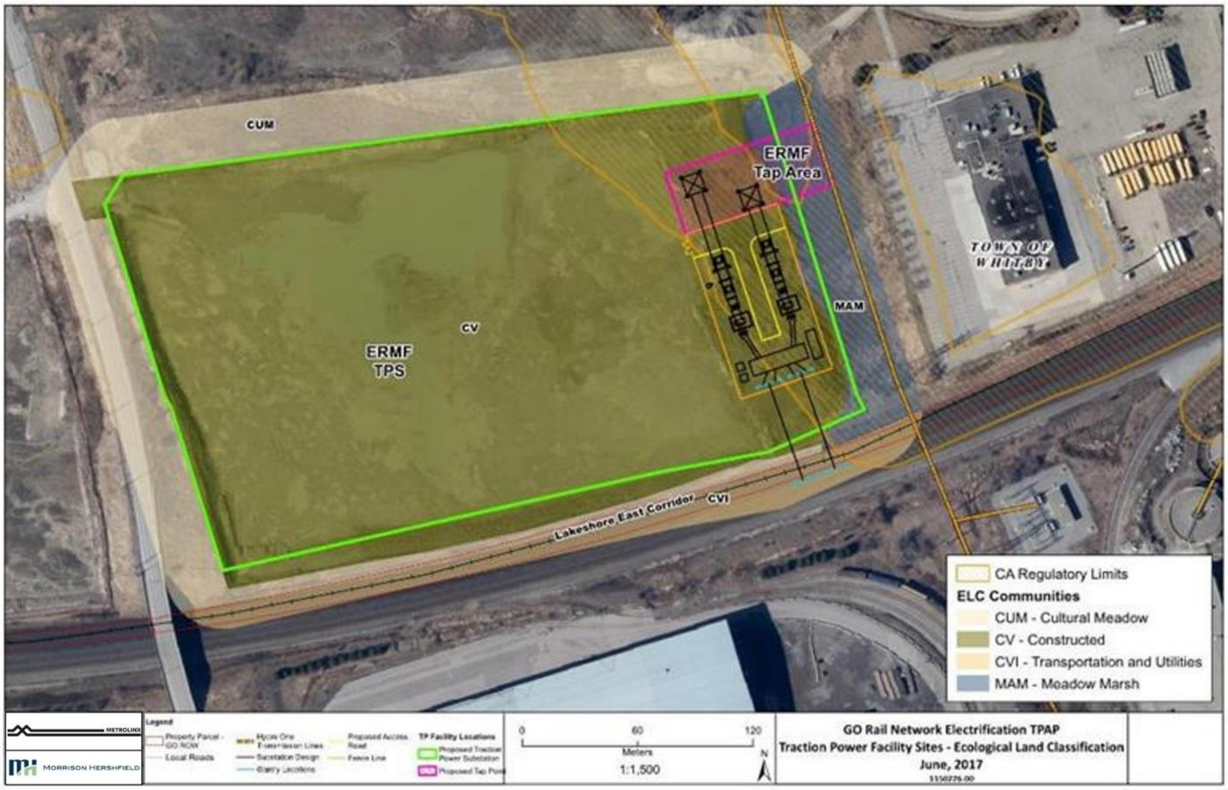
Table 8-2: Summary of Vegetation Removal Areas within ELC Communities – ERMF Tap*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0	N/A
Constructed (CV)	0.172	Minor
Meadow Marsh (MAM)	0.098	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 8-1: Existing Conditions - East Rail Maintenance Facility Tap/TPS

Figure 8-2: Footprint Impacts Ecological Land Classification - East Rail Maintenance Facility Tap/TPS



Mitigation Measures

Hydro One must maintain specific clearances between lines and trees/vegetation to prevent tree caused outages and electrocutions and therefore any trees removed from the TAP location will not be replaced. However, consideration for plantings that are compatible with transmission lines may be considered. The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

8.1.1.1.2 Aquatic

There are no aquatic features within the Tap property parcel, and therefore no aquatic footprint impacts.

8.1.1.1.3 Species at Risk

There is a low potential for Snapping Turtle within the MAM community. No Snapping Turtles were observed during the field investigation, and given the low potential of occurrence, there are no anticipated impacts to this species. Bank Swallows nests were observed within the existing ERMF construction zone at the northwestern corner of the CV community near Hopkins Street. There is high potential for this species to temporarily occur / nest within non-vegetated soil stockpiles within the Tap facility during site disturbance/construction activities.

8.1.1.1.4 Designated Areas

Footprint impacts to CV and MAM lands within CLOCA Regulated Areas will require vegetation clearing. Impacts to these vegetation communities have been identified in . Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-3: Summary of Vegetation Removal Areas within Designated Areas – ERMF Tap*

ELC Community	Area within CLOCA Regulation Limit (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0	N/A
Construction (CV)	0.158	Minor
Meadow Marsh (MAM)	0.027	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

8.1.1.2 Net Effects

8.1.1.2.1 Terrestrial

As the footprint of the Tap facility within CV lands do not contain any natural features there are no net adverse effects on the natural environment. The footprint impact within the MAM community associated with the underground duct banks will result in a temporary loss of vegetation. The MAM limited amphibian breeding habitat and will not impact the current ecological function of the wetland, resulting in no net adverse effects. Footprint impacts within the MAM should be limited to areas required for underground duct banks. However, physical separation (use of silt fencing) between the footprint impact/vegetation removal zone associated with other Tap components should occur to buffer the adjacent wetland.

8.1.1.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the Tap property parcel.

8.1.1.2.3 Species at Risk

There are no anticipated footprint effects to Snapping Turtle, and therefore no net adverse effects.

The recently disturbed areas within the CV community associated with existing construction activities for the construction of the ERMF provide opportunity for Bank Swallow to nest within the site. No nests were observed within the Tap footprint; however, construction activities may provide temporary favourable nesting conditions for this species.

8.1.1.2.4 Designated Areas

Net effects relating to footprint impacts within CLOCA Regulated Areas within CV and MAM lands are identified in .

8.1.2 East Rail Maintenance Facility TPS

8.1.2.1 Potential Effects and Mitigation Measures

8.1.2.1.1 Terrestrial

The approximate footprint dimension of the TPS facility is 75m x 50m and will contain ancillary components associated with the TPF including gantries and access road.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for the East Rail Maintenance Facility TPS are presented in . As depicted in the footprint impacts associated with the TPS facility, gantries, and access road are mainly within Constructed (CV) lands and a very limited portion within the Meadow Marsh (MAM). There are no natural features within the CV community or habitat for wildlife. The MAM community is composed of Common Cattail and Phragmites. Due to the minimal/limited canopy cover within the MAM community, the extent of tree removals is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. There are no footprint impacts within the Cultural Meadow (CUM) communities.

The gantries are located within the Transportation and Utilities (CVI) lands have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

An amphibian survey was conducted during the 2016 field season to identify species present within the MAM community. Two (2) American Toads were recorded calling during the survey. Due to the small and isolation from movement corridors or adjacent habitat, the MAM does not support a large amphibian breeding population. However, due to the limited TPS footprint on the MAM, the ecological impact is low.

Table 8-4: Summary of Vegetation Removal Areas within ELC Communities – ERMF TPS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Constructed (CV)	0.449	Minor
Meadow Marsh (MAM)	0.001	Minor
Cultural Meadow (CUM)	0	N/A
Transportation and Utilities (CVI)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

8.1.2.1.2 Aquatic

There are no aquatic features within the TPS property parcel, and therefore no aquatic footprint impacts.

8.1.2.1.3 Species at Risk

There is a low potential for Snapping Turtle within the MAM community. No Snapping Turtles were observed during the field investigation, and given the low potential of occurrence, there are no anticipated impacts to this species. Bank Swallows nests were observed within the existing ERMF construction zone at the northwestern corner of the CV community near Hopkins Street. There is high potential for this species to temporarily occur / nest within non-vegetated soil stockpiles within the TPS facility during site disturbance/construction activities.

8.1.2.1.4 Designated Areas

Footprint impacts to CV lands identified in are within CLOCA Regulated Areas and will require vegetation clearing.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-5: Summary of Vegetation Removal Areas within Designated Areas – ERMF TPS*

ELC Community	Area within CLOCA Regulation Limit (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Constructed (CV)	0.357	Minor
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0	N/A
Meadow Marsh (MAM)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

8.1.2.2 Net Effects

8.1.2.2.1 Terrestrial

As the footprint of the TPS facility within CV lands does not contain any natural features, there are no net adverse effects on the natural environment. The footprint impact within the MAM community will result in a temporary loss of vegetation. The MAM limited amphibian breeding habitat and will not impact the current ecological function of the wetland, resulting in no net adverse effects. Footprint impacts within the MAM should be limited to areas required for underground duct banks. However, physical separation (use of silt fencing) between the footprint impact/vegetation removal zone associated with other TPS components should occur to buffer the adjacent wetland.

8.1.2.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the TPS property parcel.

8.1.2.2.3 Species at Risk

There are no anticipated footprint effects to Snapping Turtle, and therefore no net adverse effects. The recently disturbed areas within the CV community associated with existing construction activities for the construction of the ERMF provide opportunity for Bank Swallow to nest within the site. No nests were observed within the Tap footprint; however, construction activities may provide temporary favourable nesting conditions for this species.

8.1.2.2.4 Designated Areas

Net effects relating to footprint impacts within CLOCA Regulated Areas within CV lands are identified in **Table 8-5**.

8.1.3 Scarborough SWS & 25kV Feeder Route

8.1.3.1 Potential Effects and Mitigation Measures

8.1.3.1.1 Terrestrial

The approximate footprint dimension of the SWS facility is 22 metres x 55 metres and will contain ancillary components associated with the TPF including gantries, access road, and 25kV aerial feeder route.

The 25kV Feeder Route includes the installation of two aerial 2x25kV feeders on top of independent single pole OCS structures (approximately 13 metres in height, and 65 metres apart). The Scarborough feeder route will commence at the Scarborough SWS and will run west along the Lakeshore East corridor to the point where the Lakeshore East corridor converges with the Stouffville corridor.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Scarborough SWS are presented in **Table 8-6**. As depicted in **Figure 8-4** the footprint impacts associated with the SWS facility, underground duct banks, and access road are mainly Transportation and Institutional (CVI), and Residential (CVR) communities. The gantry locations are within Transportation and Utilities (CVI) lands where no natural features are present. Vegetation removals will be required within the footprint for the SWS facility and associated components. The majority of the vegetation to be removed is composed of non-native and invasive vegetation associated with edge habitat and disturbed areas, including Manitoba Maple, Trembling Aspen, Large Tooth Aspen, and Dog Strangling Vine. The CVR and CVI communities do not contain any specialized habitat for wildlife and the impacts associated with the SWS location are considered low from an ecological perspective. Due to the intermediate canopy cover within the CVR, the extent of tree removals is fair. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. No vegetation clearing within the Green Land (CGL) or Commercial and Institutional (CVC) communities are anticipated, and therefore there are no footprint impacts within these ELC communities.

The footprint impacts associated with the 25kV Feeder Route, from Scarborough SWS west to Stouffville rail corridor, are located entirely within Transportation and Utilities (CVI) lands. The 25 kV Feeder Route is entirely within the Lakeshore East OCS/Vegetation Removal Zone and is assessed in the corridor calculations provided in **Section 8.1.8** below.

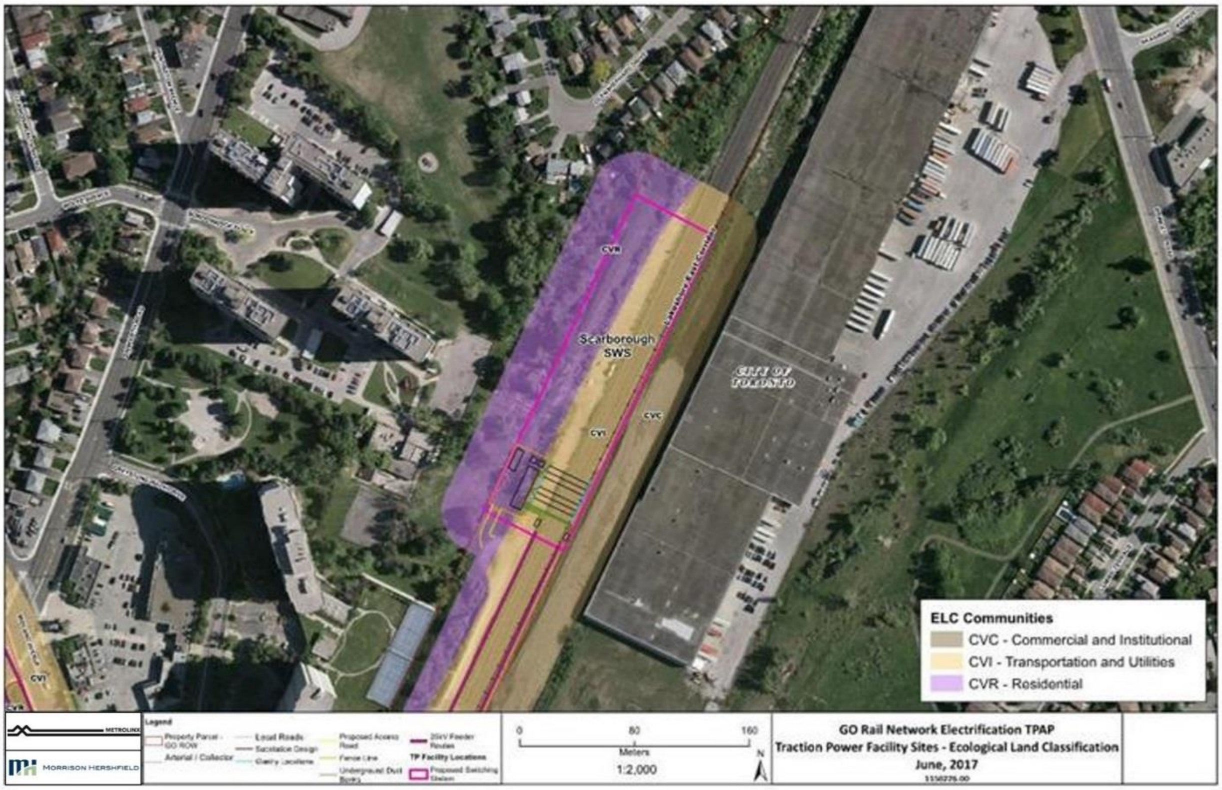
Table 8-6: Summary of Vegetation Removal Areas within ELC Communities – Scarborough SWS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals(based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0	N/A
Transportation and Utilities (CVI)	0.040	Minor
Residential (CVR)	0.113	Minor
Green Land (CGL)	0	N/A

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 8-3: Existing Conditions - Scarborough SWS

Figure 8-4: Footprint Impacts Ecological Land Classification - Scarborough SWS



Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

8.1.3.1.2 Aquatic

There are no aquatic features within the SWS property parcel or 25kV Feeder Route, and therefore no aquatic footprint impacts.

8.1.3.1.3 Species at Risk

There are no Species at Risk or Species at Risk habitat identified within the SWS property parcel or 25kV Feeder Route and therefore no footprint impacts.

8.1.3.1.4 Designated Areas

There are no Designated Areas within the SWS property parcel or 25kV Feeder Route, and therefore no footprint impacts.

8.1.3.2 Net Effects

8.1.3.2.1 Terrestrial

There are no net adverse effects to the CVC or CVR communities as there are no anticipated impacts to these areas. There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the SWS location as the CVR and CVI communities do not provide significant habitat for wildlife.

8.1.3.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the SWS property parcel or 25kV Feeder Route

8.1.3.2.3 Species at Risk

There are no net adverse effects to Species at Risk or Species at Risk habitat within the SWS property parcel or 25kV Feeder Route as there are no footprint impacts.

8.1.3.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the SWS property parcel or 25kV Feeder Route as there are no footprint impacts.

8.1.4 Durham SWS

8.1.4.1 Potential Effects and Mitigation Measures

8.1.4.1.1 Terrestrial

The approximate footprint dimension of the SWS facility is 22 metres x 55 metres and will contain ancillary components associated with the TPF including gantries, access road and underground duct banks.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Durham SWS are presented in **Table 8-7**. As depicted in **Figure 8-6** the footprint impacts associated with SWS facility, access road and portion of the gantries are mainly located within the Commercial and Institutional (CVC), with a small area of the proposed access road located within the Green Land (CGL) community. Additionally, a small area of the gantries is located within the Transportation and Utilities (CVI) and Cultural Meadow (CUM) communities and impacts are within the Lakeshore East OCS (LSE-6)/Vegetation Removal Zone and is assessed in the corridor calculations. Vegetation removals will be required within the CVC and CGL communities. The majority of the vegetation to be removed within the CVC community is composed of non-native and invasive species commonly associated with edge habitat and disturbed areas, including Trembling Aspen, Dog Strangling Vine, and Common Buckthorn. The CGL land is comprised of manicured lawn. There is limited habitat for wildlife within the CVC area and no wildlife habitat within the CGL community. The impacts associated with the SWS location are considered low from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CGL, the extent of tree removals is minor and the overall loss of vegetation in these communities is negligible. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. There are no impacts to the Cultural Meadow (CUM) community.

The gantries and underground duct banks are located within the Transportation and Utilities (CVI) and Cultural Meadow (CUM) communities and have been included in the OCS/Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

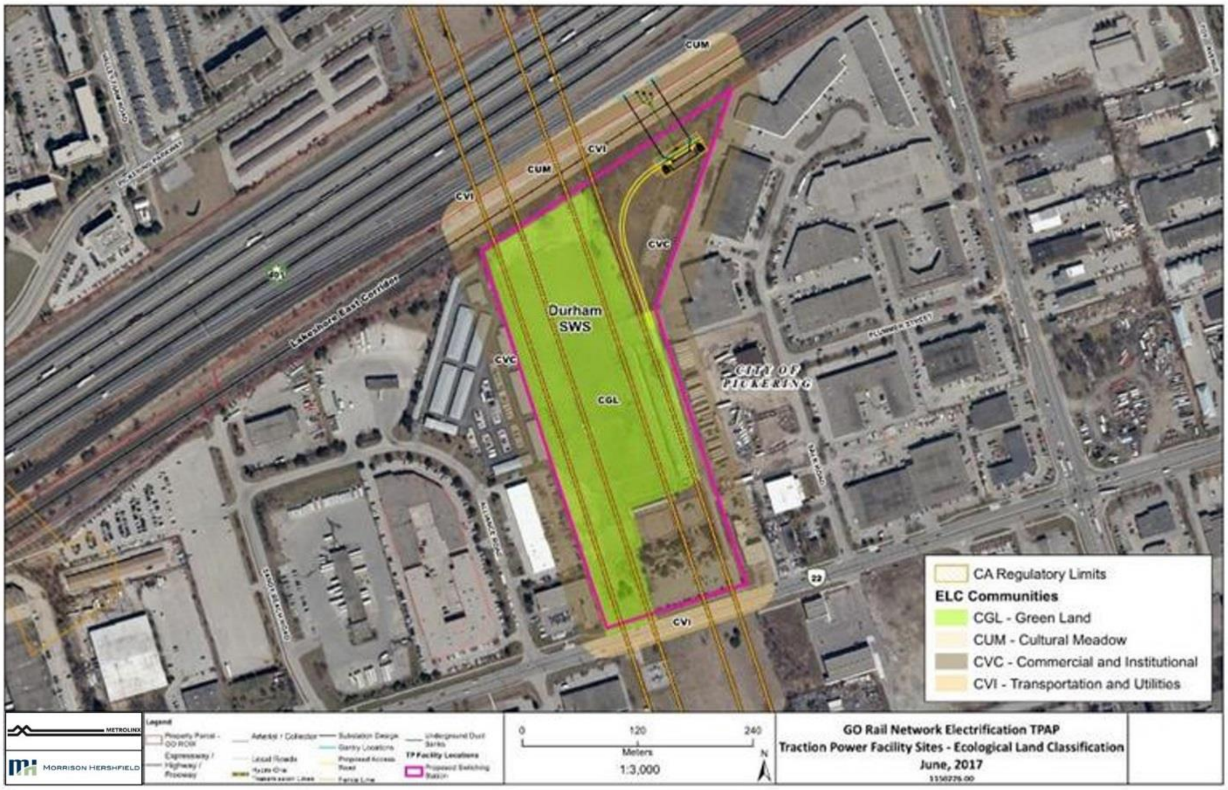
Table 8-7: Summary of Vegetation Removal Areas within ELC Communities – Durham SWS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.179	Minor
Transportation and Utilities (CVI)	0	N/A
Cultural Meadow (CUM)	0	N/A
Green Land (CGL)	0.007	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 8-5: Existing Conditions - Durham SWS

Figure 8-6: Footprint Impacts Ecological Land Classification - Durham SWS



Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

8.1.4.1.2 Aquatic

There are no aquatic features within the SWS property parcel and therefore no aquatic footprint impacts.

8.1.4.1.3 Species at Risk

There is a low potential for Butternut within the CVC community. No Butternuts were observed during field investigations, therefore there are no impacts to this species.

8.1.4.1.4 Designated Areas

There are no Designated Areas within the SWS property parcel, and therefore no footprint impacts.

8.1.4.2 Net Effects

8.1.4.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the SWS facility and associated components as the CVC and CGL communities do not provide any specialized habitat for wildlife.

8.1.4.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the SWS property parcel.

8.1.4.2.3 Species at Risk

There are no net adverse effects to Species at Risk. There are no footprint impacts to Butternuts, and therefore no net adverse effects.

8.1.4.2.4 Designated Areas

There are no net adverse effects to Designated Areas within the SWS property parcel as there are no footprint impacts.

8.1.5 Don Yard PS

8.1.5.1 Potential Effects and Mitigation Measures

8.1.5.1.1 Terrestrial

The approximate footprint dimension of the PS facility is 22 metres x 47 metres and will contain ancillary components associated with the TPF including gantries, access road and underground duct banks.

Impacts Related to TPF Vegetation Clearing

Vegetation removal areas for Don Yard PS are presented in **Table 8-8**. As depicted in **Figure 8-7** the footprint impacts associated with PS facility, access road, underground duct banks, and gantries are located within Commercial and Institutional (CVC) and Transportation and Utility (CVI) lands. The CVI community contains minimal vegetation cover and primarily composed of non-native and invasive herbaceous species common to disturbed areas, including Wild Carrot, Virginia Creeper, and Bird's Foot Trefoil. The majority of the vegetation to be removed is within CVC community which is primarily composed of native tree species, including Crack Willow, Silver Maple, Sugar Maple, and Staghorn Sumac. Due to the minimal/limited canopy cover within the CVC and CVI communities, the extent of tree removals is minor and the overall loss of vegetation is negligible. There is limited habitat for wildlife and the impacts associated with the PS location are considered low from an ecological perspective. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

The gantries and underground duct banks are located within the Transportation and Utilities (CVI) lands have been included in the TPF Vegetation Clearing calculations and will not result in any footprint impacts to the natural environment.

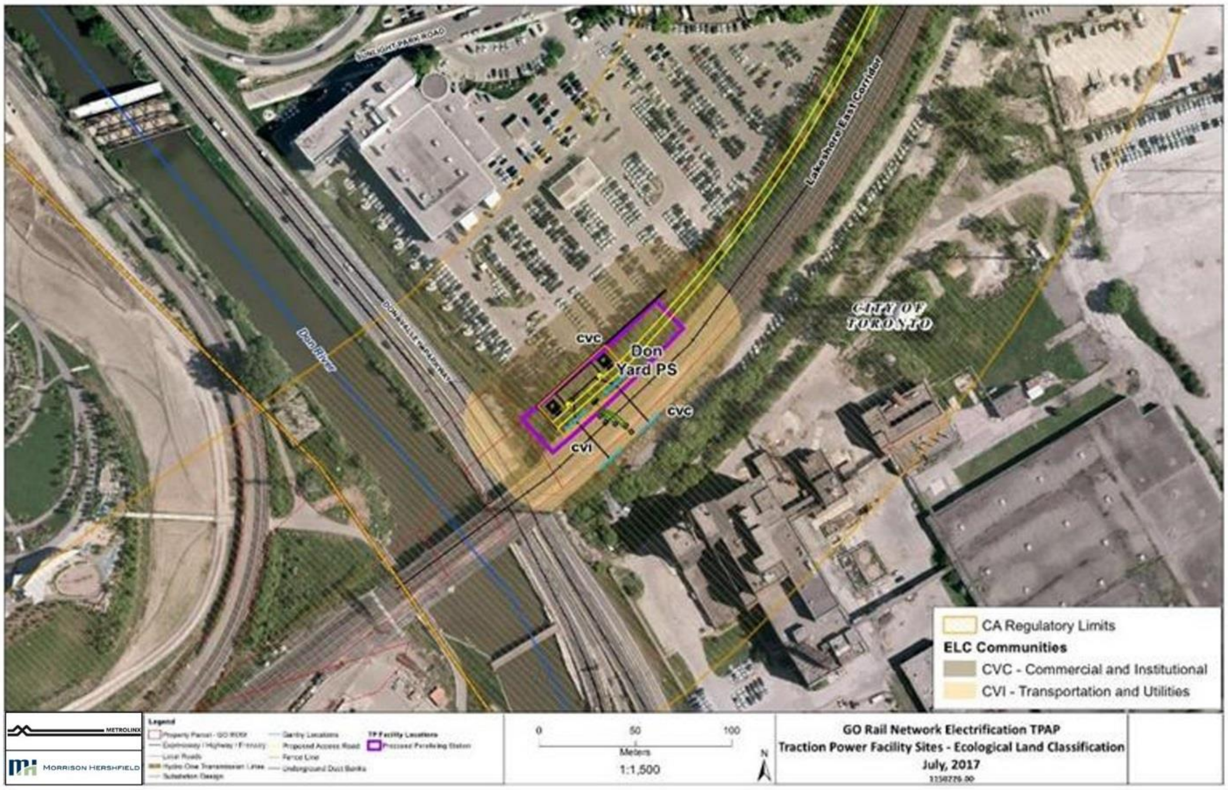
Table 8-8: Summary of Vegetation Removal Areas within ELC Communities – Don Yard PS*

ELC Community	Total Vegetation Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.208	Minor
Transportation and Utilities (CVI)	0.009	Minor

**areas are approximations for discussion purposes only and not based on surveyed data*

Figure 8-7: Existing Conditions - Don Yard PS

Figure 8-8: Footprint Impacts Ecological Land Classification - Don Yard PS



Mitigation Measures

Due to the negligible impacts associated with vegetation/tree clearing, limited mitigation is required. The following mitigation measure, which is common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Compliance with the Migratory Birds Convention Act (MBCA).

8.1.5.1.2 Aquatic

There are no aquatic features within the PS property parcel and therefore no aquatic footprint impacts.

8.1.5.1.3 Species at Risk

Ten (10) suspected hybrid Butternut trees were observed within the CVC community. Further assessment (e.g. purity testing of Butternut) should be conducted during Detailed Design to determine if registration under the ESA is required.

8.1.5.1.4 Designated Areas

Footprint impacts to CVC and CVI lands within Toronto and Region (TRCA) Regulated Areas will require vegetation clearing and are identified in **Table 8-9.** Metrolinx is establishing a Vegetation Compensation

Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-9: Summary of Vegetation Removal Areas within Designated Areas – Don Yard PS*

ELC Community	Area within TRCA Regulation Limit (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.208	Minor
Transportation and Utilities (CVI)	0.009	Minor

8.1.5.2 Net Effects

8.1.5.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with the loss of vegetation within the footprint of the PS facility and associated components as the CVI and CVC lands contain limited habitat for wildlife.

8.1.5.2.2 Aquatic

There are no net adverse effects as there are no watercourses within the PS property parcel.

8.1.5.2.3 Species at Risk

There are no anticipated net adverse effects as the Butternuts present on site are considered hybrids. However, this will be confirmed following further testing of the trees during Detailed Design.

8.1.5.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas within CVI and CVC lands are identified in **Table 8-9**.

8.1.6 OCS & Bridges: Section LSE-1 – Don Yard Layover to Danforth Station

8.1.6.1 Potential Effects and Mitigation Measures

8.1.6.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSE-1 are presented in **Table 8-10**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal

canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities mainly Residential (CVR) and Commercial and Institutional (CVC), and a small area of Green Land (CGL) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) communities will result in a loss of vegetation along the edge of these natural vegetation communities. The WOD communities within the corridor segment are located mainly adjacent to the rail corridor and CVR communities. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. These areas provide only non-specialized habitat for wildlife which result in low potential ecological impacts. The high amount of canopy cover in the WOD communities will result in extensive tree removals within this community are extensive. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 8-10: Summary of Vegetation Removal Areas within ELC Communities LSE-1*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area (ha)	Extent of Tree Removals(based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.957	0.178	1.135	Minor
Transportation and Utilities (CVI)	10.764	0.292	11.057	Minor
Residential (CVR)	2.186	0.073	2.259	Fair
Green Land (CGL)	0.628	0	0.628	Minor
Deciduous Woodland (WOD)	0.530	0	0.530	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Don River (Kingston Sub Mile 332.15)
- Don Valley Parkway (Kingston Sub Mile 332.13)
- Eastern Avenue (Kingston Sub Mile 331.89)
- Carlaw Avenue (Kingston Sub Mile 331.12)
- Gerrard Street East (Kingston Sub Mile 331.09)
- Main Street (Kingston Sub Mile 328.64)

Bridges where the preferred alternative to address issues related attachment of protective barriers is bridge replacement or bridge modification include:

- Pape Avenue Pedestrian Bridge (Kingston Sub Mile 330.96) – modify pedestrian bridge

Bridges below the Absolute Minimum vertical clearance (6937 mm) will require additional modifications and/or solutions, to accommodate electrification, including unique engineering designs, lowering tracks, raising the bridge, bridge replacement or improving the quality of maintenance to reduce the track maintenance allowance (TMA). Bridges under the Absolute Minimum vertical clearance include:

- Main Street (Kingston Sub Mile 328.64) – reduce track maintenance allowance (TMA)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

8.1.6.1.2 Aquatic

There is one watercourse within the corridor segment, the Don River. Bridge modifications will occur within the existing Lakeshore East route/corridor on the existing Don River and Don Valley Parkway Bridge (Kingston Sub Mile 332.15). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Don River or fish and fish habitat. Similarly, no adverse effects to Don River are anticipated to result from the installation of OCS structures as they are located within the existing Metrolinx rail corridor ROW away from the watercourses. To mitigate the potential indirect impacts to the watercourse, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

8.1.6.1.3 Species at Risk

Given the low potential of occurrence of Bank Swallow, Snapping Turtle, and Blanding's Turtle there are no anticipated footprint impacts to these species or their habitat.

Butternuts have a low potential for occurrence within the CGL, CVC and CVR communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Don River and Don Valley Parkway Bridge (Kingston Sub Mile 332.15) was surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at this site. Modifications to this bridge (OCS wire attachments) are anticipated. A follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. There is moderate potential for Acadian Flycatcher within the WOD communities; however, this species is associated with interior forest habitat which is not present within this woodland. The Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to the species or its habitat. While the Red-headed Woodpecker has a moderate potential of occurrence in the CGL and WOD communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

8.1.6.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CGL, and WOD areas within Toronto and Region Conservation Authority (TRCA) are identified in **Table 8-11**. There are no footprint impacts to the Williamson Park ESA (City of Toronto)..

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-11: Summary of Vegetation Removal Areas within Designated Areas LSE-1*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0.090	0.112	0.203	Minor
Transportation and Utilities (CVI)	1.605	0.255	1.860	Minor
Residential (CVR)	0.316	0	0.316	Fair
Green Land (CGL)	0.006	0	0.006	Minor
Deciduous Woodland (WOD)	0.197	0	0.197	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

8.1.6.2 Net Effects

8.1.6.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, and CGL lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD communities adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net effects.

8.1.6.2.2 Aquatic

There are no net adverse effects on Don River as there are no anticipated footprint impacts.

8.1.6.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Bank Swallow, Barn Swallow, Chimney Swift, Snapping Turtle or Blanding's Turtle. While there are impacts to the WOD communities, no interior habitat is present and there are no net adverse effects to Acadian Flycatcher. While there are footprint impacts to the CGL and WOD communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detailed Design.

8.1.6.2.4 Designated Areas

There are no net effects to the Williamson Park ESA (City of Toronto) as there are no footprint impacts. Net effects relating to footprint impacts within TRCA Regulated Areas associated with areas within CVI, CVC, CVR, CGL, and WOD lands are identified in **Table 8-11**. There are no net adverse effects to the Williamson Park ESA, as there are no footprint impacts. No vegetation clearing within the TRCA Regulated Area within the CVR, CGL or WOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI and CVC communities are required outside of the ROW.

8.1.7 OCS & Bridges: Section LSE-2 – Danforth Station to Scarborough Station

8.1.7.1 Potential Effects and Mitigation Measures

8.1.7.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSE-2 are presented in **Table 8-12**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Green Land (CGL), Cultural Meadow (CUM), and Commercial and Institutional (CVC) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, CUM and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) communities will result in a loss of vegetation along the edge of this natural vegetation community. The WOD communities within the corridor segment are located mainly adjacent to the rail corridor and CVR communities. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. These areas provide only non-specialized habitat for wildlife which result in low potential ecological impacts. The high amount of canopy cover in the WOD community will result in extensive tree removals within this community. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 8-12: Summary of Vegetation Removal Areas within ELC Communities LSE-2*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	2.335	0.165	2.499	Minor
Transportation and Utilities (CVI)	10.106	0.252	10.358	Minor
Residential (CVR)	1.405	0.221	1.626	Fair
Green Land (CGL)	0.114	0.002	0.116	Minor
Deciduous Woodland (WOD)	0.229	0	0.229	Extensive
Cultural Meadow (CUM)	0.0002	0	0.0002	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a “category” approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx’s property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.

- **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
- **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
- **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Danforth Avenue (Kingston Sub Mile 327.01)
- Birchmount Road (Kingston Sub Mile 326.50)
- Woodrow Avenue Pedestrian (Kingston Sub Mile 326.15)
- Kennedy Road (Kingston Sub Mile 325.76)

Bridges below the Absolute Minimum vertical clearance (6937 mm) will require additional modifications and/or solutions, to accommodate electrification, including unique engineering designs, lowering tracks, raising the bridge, bridge replacement or improving the quality of maintenance to reduce the track maintenance allowance (TMA). Bridges under the Absolute Minimum vertical clearance include:

- Birchmount Road (Kingston Sub Mile 326.50) – reduce track maintenance allowance (TMA) and restrict freight

Bridges where the preferred alternative to address issues related to attachment of protective barriers is bridge modification include:

- Woodrow Avenue Pedestrian (Kingston Sub Mile 326.15)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

8.1.7.1.2 Aquatic

There are no aquatic features within this corridor segment, and therefore no aquatic footprint impacts.

8.1.7.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL, CVC and CVR communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to the species or its habitat. While the Red-headed Woodpecker has a moderate potential of occurrence in the CGL and WOD communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

8.1.7.1.4 Designated Areas

There are no footprint impacts to ELC communities within TRCA Regulated Areas within this corridor section (See **Table 8-13**).

Table 8-13: Summary of Vegetation Removal Areas within Designated Areas LSE-2*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within TRCA Regulation Limit (ha)	
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	0	0	0	N/A
Residential (CVR)	0	0	0	N/A
Green Land (CGL)	0	0	0	N/A
Deciduous Woodland (WOD)	0	0	0	N/A
Cultural Meadow (CUM)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

8.1.7.2 Net Effects

8.1.7.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CVR, CUM and CGL lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD community including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protcol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net effects.

8.1.7.2.2 Aquatic

There are no net adverse effects as there are no watercourses within this corridor segment.

8.1.7.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift or Barn Swallow. While there are footprint impacts to the CGL and WOD communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated.. Net effects to Butternut will be determined during Detailed Design.

8.1.7.2.4 Designated Areas

There are no net adverse effects to TRCA Regulated areas as there are no anticipated footprint impacts.

8.1.8 OCS & Bridges: Section LSE-3 – Scarborough Station to Guildwood Station

8.1.8.1 Potential Effects and Mitigation Measures

8.1.8.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSE-3 are presented in **Table 8-14**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), and Green Land (CGL) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) communities will result in a loss of vegetation along the edge of these natural vegetation communities. However, the vegetation clearing within the WOD is only required within the existing Metrolinx ROW. The WOD communities within the corridor segment are located mainly adjacent to the rail corridor and CGL communities. These areas provide only non-specialized habitat for wildlife which result in low potential ecological impacts. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Table 8-14: Summary of Vegetation Removal Areas within ELC Communities LSE-3*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	1.476	0.266	1.741	Minor
Transportation and Utilities (CVI)	12.975	0.370	13.345	Minor
Residential (CVR)	2.149	0.135	2.284	Fair
Green Land (CGL)	0.976	0.029	1.004	Minor
Deciduous Woodland (WOD)	0.229	0	0.229	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category"

approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.

- **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
- **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
  - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
  - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
  - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
  - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
  - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- St. Clair Avenue (Kingston Sub Mile 325.20)
- Midland Avenue (Kingston Sub Mile 324.97)
- Eglinton Avenue (Kingston Sub Mile 323.19)
- Markham Road (Kingston Sub Mile 322.51)
- Kingston Road (Kingston Sub Mile 321.45)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

8.1.8.1.2 Aquatic

There is one watercourse within the corridor segment, West Highland Creek. However, the watercourse does not cross the rail corridor and therefore no footprint impacts are anticipated. To mitigate the potential indirect impacts to the watercourse, appropriate sediment and erosion controls will be implemented, and necessary precautions will be taken to prevent spills and the release of hazardous materials.

8.1.8.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL, CVC and CVR communities and moderate potential within the WOD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

While Barn Swallows have a moderate potential for occurrence on bridges over Open Water (OA), there are no impacts to bridges over water within this corridor segment. Therefore, there are no anticipated impacts to Barn Swallows. There is high potential for Eastern Wood Pewee within the WOD communities; however, this species is associated with interior forest habitat which is not present within this woodland. The Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to the species or its habitat. While the Red-headed Woodpecker has a moderate potential of occurrence in the CGL and WOD communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CGL is not anticipated to have an impact on this species.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

Given the low potential of occurrence of Snapping Turtle, Northern Map Turtle and Blanding's Turtle and lack of impacts to Open Water (0A) there are no anticipated footprint impacts to these species or their habitat.

8.1.8.1.4 Designated Areas

Footprint impacts to CVI, CVR, CGL, and WOD areas within Toronto and Region Conservation Authority (TRCA) are identified in **Table 8-15**. Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-15: Summary of Vegetation Removal Areas within Designated Areas LSE-3*

ELC Community	TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within TRCA Regulation Limit (ha)	
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	0.691	0	0.691	Minor
Residential (CVR)	0.043	0	0.043	Fair
Green Land (CGL)	0.100	0	0.100	Minor
Deciduous Woodland (WOD)	0.207	0	0.207	Extensive

**areas are approximate for discussion purposes only and not based on surveyed data*

8.1.8.2 Net Effects

8.1.8.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CGL, and CVR lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor, residential properties, and a golf course. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD community including wildlife or wildlife habitat. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net effects.

8.1.8.2.2 Aquatic

There are no net adverse effects to fish and fish habitat anticipated to occur at West Highland Creek.

8.1.8.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Barn Swallow, Chimney Swift, Snapping Turtle, Northern Map Turtle or Blanding's Turtle. While there are impacts to the WOD communities, there are no impacts to Eastern Wood Pewee since no interior habitat is present and therefore no net adverse effects. While there are footprint impacts to the CGL and WOD communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detailed Design.

8.1.8.2.4 Designated Areas

Net effects to relating to footprint impacts within TRCA Regulated Areas associated with areas within CVI, CVC, CVR, CGL, and WOD lands are identified in **Table 8-15**.

8.1.9 OCS & Bridges: Section LSE-4 – Guildwood Station to Rouge Hill Station

8.1.9.1 Potential Effects and Mitigation Measures

8.1.9.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSE-4 are presented in **Table 8-16**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities including Residential (CVR), Commercial and Institutional (CVC), Deciduous Thicket (THD), Cultural Meadow (CUM), and Green Land (CGL) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CVC, THD, CUM and CGL communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) and Swamp (SW) communities will result in a loss of vegetation along the edge of these natural vegetation communities. Several of the WOD communities within the corridor segment are located mainly adjacent to the rail corridor and CVR communities. These areas provide only non-specialized habitat for wildlife which result in low potential ecological impacts. A small portion of Deciduous Woodland (WOD) community is within the East Point Bluffs Environmentally Significant Area (ESA). Impacts to this woodland are considered high due to its classification as environmentally significant. The high amount of canopy cover in the WOD communities will result in extensive tree removals within these communities. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required within a small area of Open Shoreline (SHO) community along Lake Ontario. However, the vegetation clearing within the SHO is only required within the existing Metrolinx ROW. Due to the culturally influenced state of the shoreline vegetation, ecological impacts to these areas are considered low. Due to minimal canopy cover in the SHO community, the extent of tree removals in this community are considered minor. Mitigation for the SHO includes compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing with the as area of Shallow Marsh (MAS) community associated with the Highland Creek Wetland Complex PSW and Marsh (MA) community within the East Point Bluffs ANSI will not impact any specialized amphibian habitat as the areas adjacent to the corridor are not conducive to breeding or hibernation areas. The vegetation clearing within the MAS and MA is only required within the existing Metrolinx ROW. Ecological impacts to these areas are considered moderate due to the association with the PSWand ANSI. Due to the minimal canopy cover in the MAS and MA communities, the extent of tree removals in these areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below. In addition, physical separation (use of silt fencing) between the limit of the vegetation removal zone and the MAS and MA areas should occur to buffer the adjacent wetlands.

Table 8-16: Summary of Vegetation Removal Areas within ELC Communities LSE-4*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	1.694	0.420	1.699	Minor
Transportation and Utilities (CVI)	9.433	0.420	9.854	Minor
Residential (CVR)	1.618	0.117	1.735	Fair
Green Land (CGL)	2.351	0.715	3.066	Minor
Deciduous Woodland (WOD)	0.929	0.050	0.980	Extensive
Shallow Marsh (MAS)	0.019	0	0.019	Minor
Marsh (MA)	0.055	0	0.055	Minor
Open Shoreline (SHO)	0.008	0	0.008	Minor

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Deciduous Thicket (THD)	1.433	0.073	1.506	Minor
Swamp (SW)	0.048	0	0.048	Minor
Cultural Meadow (CUM)	0.015	0.003	0.019	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.

- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Highland Creek Bridge (Kingston Sub Mile 318.50)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

8.1.9.1.2 Aquatic

There is one watercourse within the corridor segment, Highland Creek. Bridge modifications will occur within the existing route/corridor on the existing Highland Creek Bridge (Kingston Sub Mile 318.50). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Highland Creek or fish/fish habitat. Similarly, no adverse effects to this watercourse are anticipated to result from the installation of OCS structures are they are located within the existing corridor ROW away from the watercourse. To mitigate the potential indirect impacts to the watercourse, appropriate sediment and erosion controls will be implemented, and necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

8.1.9.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL, CVC and CVR communities and moderate potential within the WOD and THD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Highland Creek Bridge (Kingston Sub Mile 318.50) was surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at this site and there are no anticipated impacts. A follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. Given the low potential of occurrence of Least Bittern, Bank Swallow, Bobolink, and Eastern Meadowlark there are no anticipated footprint impacts to this species or its habitat. There is a high potential for Eastern Wood-Peewee and moderate potential Acadian Flycatcher within the WOD within the corridor segment. However, these species are associated with interior forest habitat which is not present within these woodlands. There is moderate potential of occurrence of Black Tern within OA and MAS communities. There are no footprint impacts to OA areas and this species is utilizes large open marsh areas and the MAS directly adjacent to the rail corridor provides low quality habitat, and it is unlikely this species would be present within the impacted areas. The Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to the species or its habitat. While the Red-headed Woodpecker has a moderate potential of occurrence in the CGL, THD and WOD communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the THD and CGL is not anticipated to have an impact on this species.

Snapping Turtle, Blanding’s Turtle and Northern Map Turtle have a moderate potential of occurrence within the Open Water (OA) and MAS areas. There are no footprint impacts to OA areas and the MAS areas directly adjacent to the rail corridor are of low quality and no direct breeding or overwintering habitat will be impacted.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the SW and WOD communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

8.1.9.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CUM, CGL, WOD, THD, SHO, SW and MAS areas within Toronto and Region Conservation Authority (TRCA) are identified in **Table 8-17**.

There are footprint impacts to CVI,THD, and WOD lands within the East Point Bluffs ESA (City of Toronto) and CVI, WOD, THD and MA communities within East Point Bluffs ANSI as identified in **Table 8-17**. Vegetation clearing within areas that are part of the East Point Bluffs ESA and East Point Bluffs ANSI, particularly within the WOD and MA, should be minimized to the extent possible. The majority of these areas of impact occur within or adjacent to the rail corridor within lands that have been previously modified and anthropogenically influenced.

There are no footprint impacts within Highland Creek Wetland Complex PSW, Stephenson’s Swamp ESA (City of Toronto) or Petticoat Creek Conservation Area.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-17: Summary of Vegetation Removal Areas within Designated Areas LSE-4*

ELC Community	TRCA Regulation Limit			East Point ESA (City of Toronto)			East Point Bluffs ANSI			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within TRCA Regulation Limit (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within East Point ESA (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within East Point Bluffs ANSI (ha)	
Commercial and Institutional (CVC)	0.095	0	0.095	0	0	0	0	0	0	Minor
Transportation and Utilities (CVI)	2.563	0.005	2.568	9.433	0	9.433	0.067	0	0.067	Minor
Residential (CVR)	0.380	0	0.380	0	0	0	0	0	0	Fair
Cultural Meadow (CUM)	0.004	0	0.004	0	0	0	0	0	0	Minor
Green Land (CGL)	1.761	0.156	1.917	0	0	0	0	0	0	Minor
Deciduous Woodland (WOD)	0.334	0.049	0.383	0.186	0	0.186	0.168	0	0.168	Extensive
Deciduous Thicket (THD)	0.238	0.044	0.283	0.469	0	0.469	0.620	0	0.620	Minor
Shallow Marsh (MAS)	0.019	0	0.019	0	0	0	0	0	0	Minor
Marsh (MA)	0	0	0	0	0	0	0.055	0	0.055	Minor
Swamp (SW)	0.011	0	0.011	0	0	0	0	0	0	Extensive
Open Shoreline (SHO)	0.008	0	0.008	0	0	0	0	0	0	Minor

**areas are approximate for discussion purposes only and not based on surveyed data*

8.1.9.2 Net Effects

8.1.9.2.1 Terrestrial

There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CGL, THD, CUM and CVR lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD and SW communities adjacent to the existing rail corridor and CVR communities. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD and SW communities including wildlife or wildlife habitat. The vegetation removals within the MAS and MA communities may result in a net loss of vegetation along the perimeter the MAS and MA within the existing ROW. However, this area does not contain suitable amphibian habitat. Since specialized habitat within the wetland will not be impacted and the current ecological function of the wetland area will be maintained, there are no net adverse effects. The vegetation clearing will result in loss vegetation within the SHO community adjacent to the existing rail corridor within the existing ROW, which has been previously disturbed and a small amount of vegetation removal is not expected to have any significant effects to the ecological features or function associated with the SHO community, resulting in no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net effects.

8.1.9.2.2 Aquatic

There are no net adverse effects on Highland Creek as there are no anticipated footprint impacts.

8.1.9.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Chimney Swift, Barn Swallow, Bank Swallow, Black Tern, Eastern Meadowlark, Bobolink, or Least Bittern. While there are impacts to the WOD communities, there are no impacts to the preferred interior habitat for Eastern Wood Pewee or Acadian Flycatcher and therefore no net adverse effects. While there are footprint impacts to the CGL, THD, and WOD communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. No net adverse effects are expected to result to Snapping Turtle, Blanding's Turtle and Northern Map Turtle or their habitat as there are no footprint impacts within the OA and the MAS areas to be impacted do not contain specialized habitat. Net effects to Butternut will be determined during Detailed Design

8.1.9.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with areas within CVI, CVC, CVR, CUM, CGL, WOD, THD, SHO, SW, and MAS lands are identified in **Table 8-17**. No vegetation clearing within the TRCA Regulated Area within the CVC, CVR, CUM, MAS, MA, SW, and SHO communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVI, CGL, WOD and THD communities are required outside of the ROW.

There are no net adverse effects to the Highland Creek Wetland Complex PSW, Stephenson's Swamp ESA (City of Toronto), or Petticoat Creek Conservation Area as there are no footprint impacts. Footprint impacts within CVI, and THD communities within the East Point Bluffs ESA occur within culturally influenced non-natural communities. Within the East Point Bluffs ESA (City of Toronto), areas of WOD will also be impacted; however, all impacts are within the existing Metrolinx owned ROW. Footprint impacts to the CVI, WOD, THD, and MA communities within the East Point Bluffs ANSI will occur; however no vegetation clearing is required outside of the Metrolinx owned ROW. The net effects to these communities are identified in **Table 8-17**.

8.1.10 OCS & Bridges: Section LSE-5 – Rouge Hill Station to Pickering Station

8.1.10.1 Potential Effects and Mitigation Measures

8.1.10.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSE-5 are presented in **Table 8-18**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities, mainly Green Lands (CGL) and Cultural Meadows (CUM) with small areas of Commercial and Institutional (CVC), Residential (CVR), Deciduous Thicket (THD) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CGL, CUM, CVC, and THD communities, the extent of tree removals in these areas is minor. The extent of tree removals in the CVR is considered fair due to the intermediate tree cover. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing within the Deciduous Woodland (WOD) associated with Petticoat Creek will result in a loss of vegetation along the edge of this natural vegetation community which provides habitat for wildlife and acts as a movement corridor. Due to the natural attributes of the woodland community and the watercourse corridor habitat, ecological impacts to these areas are considered moderate. The high amount of canopy cover in the WOD community will result in extensive tree removals within this community. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

Vegetation clearing will be required within a small area of Open Shoreline (SHO) community along Lake Ontario. However, the vegetation clearing within the SHO is only required within the existing Metrolinx ROW. Due to the culturally influenced state of the shoreline vegetation, ecological impacts to these areas are considered low. Due to minimal canopy cover in the SHO community, the extent of tree removals in this community are considered minor. Mitigation for the SHO includes compliance with the general mitigation measures for vegetation/tree clearing identified below.

There is no vegetation clearing required within the Marsh (MA) and Swamp (SW) communities and therefore no footprint impacts.

Table 8-18: Summary of Vegetation Removal Areas within ELC Communities LSE-5*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0.550	0.013	0.563	Minor
Transportation and Utilities (CVI)	9.772	0.013	9.785	Minor
Residential (CVR)	0.679	0.039	0.718	Fair
Green Land (CGL)	3.337	0.482	3.819	Minor
Deciduous Woodland (WOD)	0.307	0	0.307	Extensive
Cultural Meadow (CUM)	1.920	0.008	1.928	Minor
Marsh (MA)	0	0	0	N/A
Open Shoreline (SHO)	0.011	0	0.011	Minor
Deciduous Thicket (THD)	0.514	0	0.514	Minor
Swamp (SW)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Rouge River (Kingston Sub Mile 316.10)
- Granite Court (Kingston Sub Mile 314.95)
- Whites Road (Kingston Sub Mile 314.76)
- York Sub (GO Sub Mile 0.35)
- Liverpool Road (GO Sub Mile 0.84)

Bridges below the Absolute Minimum vertical clearance (6937 mm) will require additional modifications and/or solutions, to accommodate electrification, including unique engineering designs, lowering tracks, raising the bridge, bridge replacement or improving the quality of maintenance to reduce the track maintenance allowance (TMA). Bridges under the Absolute Minimum vertical clearance include:

- Granite Court (Kingston Sub Mile 314.95) – reduce track maintenance allowance (TMA)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

8.1.10.1.2 Aquatic

There are five watercourses within the corridor segment: Rouge River, Petticoat Creek, Amberlea Creek (two crossings), Dunbarton Creek, and Pine Creek. These are all identified as Stream Valleys according to the City of Pickering. Bridge modifications will occur within the existing Lakeshore East route/corridor on the existing Rouge River Bridge (Kingston Sub Mile 316.10). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Rouge River or fish/fish habitat. Similarly, no adverse effects to Rouge River are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. Petticoat Creek, Amberlea Creek (two crossings), Dunbarton Creek, and Pine Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

8.1.10.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL, CVC and CVR communities and moderate potential within the WOD and THD. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented. In addition, as this area is within Rouge National Urban Park (RNUP), any works that may affect Butternut outside Metrolinx's ROW within RNUP are also subject to the Species at Risk Act and a permit from Parks Canada may be required.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Rouge River Bridge (Kingston Sub Mile 316.10) was surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at this site. Modifications to this bridge (OCS wire attachments) are anticipated. A follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. There is high potential for Bank Swallow within OA and SHO communities. A large Bank Swallow colony has been confirmed within bluffs at approximately (Kingston Sub Mile 316.9) as part of the Metrolinx Lakeshore East (LSE) Guildwood to Pickering Expansion project (AECOM, 2016). There are impacts to the SHO areas; however, the Bank Swallow colony is located approximately 30m south of the edge of the vegetation clearing zone and no direct impacts are anticipated. To avoid any indirect impacts to this species, mitigation measures as identified as part of the AECOM (2016) Bank Swallow study will be implemented. There is a high potential for Eastern Wood-Peewee and moderate potential Acadian Flycatcher within the WOD within the corridor segment. However, however, these species are associated with interior forest habitat which is not present within these woodlands. There is high potential of occurrence for Least Bittern and moderate potential of occurrence of Black Tern within OA, SHO and MA communities. There are no footprint impacts to OA or MA areas and only minor impacts to the SHO within the existing Metrolinx ROW. The Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to the species or its habitat. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD, THD and CGL communities, this species is generally tolerant of disturbance and small amount of woodland edge within the WOD or individual tree removals within the CGL and THD is not anticipated to have an impact on this species.

Blanding's Turtle, Snapping Turtle, and Northern Map Turtle have a high potential of occurrence within the Open Water (OA), and MA areas. However, there no footprint impacts within the MA or OA.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD and SW communities. Further studies during Detailed Design may be required (in consultation with the MNRF) to determine potential impacts to bat species. However, the level of tolerance of these species to the disturbance caused by the project is anticipated to be high as only minor impacts to woodland edges have been identified.

Habitat for American Eel and regulated recovery habitat for Redside Dace was identified within Rouge River. No footprint impacts to this watercourse will occur. The regulation for Redside Dace under the ESA, 2007 includes the meander belt width plus thirty (30) metres, therefore further consultation with the MNRF during Detailed Design will be required for any work that occurs within the regulated area, especially as it relates to sediment and erosion control measures associated with construction or site disturbance activities. Footprint impacts within Redside Dace regulated areas should be minimized to the greatest extent possible. Eastern Pondmussel has also been identified as having critical habitat within the Rouge River on the north side of the corridor. However, as there are no in-water works identified for Rouge River, no impacts to Eastern Pondmussel are anticipated.

8.1.10.1.4 Designated Areas

Footprint impacts to CVI, CVC, CVR, CGL, CUM, WOD, and SHO areas within Toronto and Region Conservation Authority (TRCA) are identified in **Table 8-19**.

There are no footprint impacts within the Frenchman's Bay Coastal Wetland Complex PSW and ANSI, Rouge River Marshes Wetland Complex PSW, Rouge Lakeshore Swale ESA (City of Pickering), or Frenchman's Bay ESA (City of Pickering). There are footprint impacts to CVI and CGL lands within the Petticoat Creek Conservation Area; the CVI, CVR, CGL, and SHO lands within Rouge Marsh ESA (City of Toronto); CVI, CVR, and CGL lands within the Rouge River Valley ANSI; CVI, CGL, and WOD lands within Petticoat Creek Forest ESA (City of Pickering); CGL lands within East Point Bluffs ANSI; and CVI, CGL, and SHO lands within Rouge National Urban Park as identified in **Table 8-19**. Most of these areas of impact occur adjacent to anthropogenically influenced land uses associated with the rail corridor. All impacts within the boundaries of Rouge National Urban Park are within the Metrolinx ROW. However, vegetation clearing within areas that are part of the Petticoat Creek Conservation Area, Rouge Marsh ESA, Rouge River Valley ANSI, Petticoat Creek Forest ESA, East Point Bluffs ANSI, and Rouge National Urban Park should be minimized to the extent possible, particularly within the natural areas including WOD and SHO communities.

There are footprint impacts associated with CVI, CVR, CGL and SHO communities which are within lands identified as Protected Countryside under the Greenbelt Plan. The Greenbelt Plan acknowledges that lands within Protected Countryside have been culturally modified; however, within these areas vegetation removals should be minimized to the extent possible.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-19: Summary of Vegetation Removal Areas within Designated Areas LSE-5*

ELC Community	TRCA Regulation Limit			Petticoat Creek Conservation Area			Rouge Marsh ESA (City of Toronto)			East Point Bluffs ANSI			Rouge River Valley ANSI			Petticoat Creek Forest ESA – City of Pickering			Area within Rouge National Urban Park			Area within Greenbelt Protected Countryside			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within Rouge National Urban Park Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within Greenbelt Protected Countryside Area (ha)	
Commercial and Institutional (CVC)	0.004	0	0.004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Minor
Transportation and Utilities (CVI)	2.426	0	2.426	9.771	0	9.771	9.771	0	9.771	0	0	0	0.112	0	0.112	0.134	0	0.134	0.526	0	0.526	0.857	0	0.857	Minor
Residential (CVR)	0.057	0.001	0.058			0	0.499	0	0.499	0	0	0	0.050	0	0.050	0	0	0	0	0	0	0.183	0	0.183	Fair
Green Land (CGL)	1.347	0.037	1.347	0.534	0.016	0.550	2.059	0	2.059	0	0.005	0.005	0.072	0	0.072	0.073	0.001	0.074	0.694	0	0.694	1.012	0.006	1.019	Minor
Deciduous Woodland (WOD)	0.227	0	0.227	0	0	0	0	0	0	0	0	0	0	0	0	0.072	0	0.072	0	0	0	0	0	0	Extensive
Cultural Meadow (CUM)	0.379	0	0.379	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Minor
Marsh (MA)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Open Shoreline (SHO)	0.011	0	0.011	0	0	0	0.011	0	0.011	0	0	0	0	0	0	0	0	0	0.011	0	0.011	0.011	0	0.011	Minor
Deciduous Thicket (THD)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Swamp (SW)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	N/A

8.1.10.2 Net Effects

8.1.10.2.1 Terrestrial

There is no vegetation clearing required within the SW and MA communities and therefore no net adverse effects. There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI, CVC, CGL, CUM, CVR and THD lands as these communities contain limited habitat for wildlife. The vegetation clearing will result in the loss of edge trees within the WOD community adjacent to the existing rail corridor within the natural vegetation community present within the Petticoat Creek corridor. However, a small amount of woodland edge removal is not anticipated to have any significant effects to the ecological features or function associated with the WOD communities including wildlife or wildlife habitat. The vegetation clearing will result in loss vegetation within the SHO community adjacent to the existing rail corridor, which has been previously disturbed and a small amount of vegetation removal is not expected to have any significant effects to the ecological features or function associated with the SHO community, resulting in no net adverse effects. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net effects.

8.1.10.2.2 Aquatic

There are no net adverse effects on Rouge River, Petticoat Creek, Amberlea Creek, Dunbarton Creek, and Pine Creek as there are no anticipated footprint impacts.

8.1.10.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Bank Swallow, Barn Swallow, Black Tern, Chimney Swift, Least Bittern, Snapping Turtle, Blanding's Turtle, Northern Map Turtle, Eastern Pondmussel, or American Eel. There are no direct impacts to Bank Swallows and mitigation measures will ensure no indirect impacts. Therefore, there are no net adverse effects anticipated for this species. Consultation with MNRF will be required at the time of construction and a Letter of Advice from MNRF may be necessary. While there are impacts to the WOD communities, there are no impacts to the preferred interior habitat for Eastern Wood Pewee or Acadian Flycatcher and therefore no net adverse effects. While there are footprint impacts to the WOD, THD and CGL communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. Similarly, due to the level of tolerance of bat SAR to minor removals along the woodland edge, there are no net adverse effects anticipated for these species. Net effects to Butternut will be determined during Detailed Design. Net effects on habitat for Redside Dace, as defined under the ESA, 2007 will be addressed in consultation with the MNRF during Detailed Design.

8.1.10.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with areas within CVI, CVC, CVR, CGL, CUM, WOD, and SHO lands are identified in **Table 8-19.** No vegetation clearing within the TRCA Regulated Area within the CVC, CVI, WOD, CUM, or SHO communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CVR and CGL communities are required outside of the ROW.

There are no net adverse effects to the Frenchman's Bay Coastal Wetland Complex PSW and ANSI, Rouge River Marshes Wetland Complex PSW, Frenchman's Bay ESA (City of Pickering), or Rouge Lakeshore Swale (City of Pickering) as there are no footprint impacts. Within the Rouge River Valley ANSI, areas of CGL, CVR and CVI will be impacted. No vegetation clearing within the Rouge River Valley ANSI is required within any of these communities outside of the Metrolinx owned ROW. There will also be impacted areas within CVI, CVR, CGL, and SHO lands within the Rouge Marsh ESA (TRCA). No vegetation clearing within Rouge Marsh ESA is required outside the existing Metrolinx ROW. Within East Point Bluffs ANSI, small areas of CGL will be impacted however no vegetation clearing within East Point Bluffs ANSI is required outside the existing Metrolinx ROW. Within Rouge National Urban Park (RNUP), CVI, CGL, and SHO lands will be impacted. No vegetation clearing within the RNUP is required within any of these communities outside of the Metrolinx owned ROW. For any vegetation clearing required within RNUP outside of the existing Metrolinx owned ROW, notification and coordination with Parks Canada Resource Conservation staff will be undertaken. There will also be impacted areas within the Petticoat Creek Forest ESA (City of Pickering) within the CVI, CGL and WOD communities. No vegetation clearing within the Petticoat Creek Forest ESA within the CVI and WOD communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CGL communities are required outside of the ROW. Within Petticoat Creek Conservation Area, CGL and CVI lands will be impacted. No vegetation clearing within the Petticoat Creek Conservation Area within the CVI communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CGL communities are required outside of the ROW.

Net effects to the Protected Countryside Areas under the Greenbelt Plan within the CVI, CVR, CGL, and SHO lands are identified in **.** No vegetation clearing within the Protected Countryside Areas within the CVI, CVR, and SHO communities will occur outside of the existing Metrolinx owned ROW and only minor removals within the CGL communities are required outside of the ROW.

8.1.11 OCS & Bridges: Section LSE-6 – Pickering Station to Ajax Station

8.1.11.1 Potential Effects and Mitigation Measures

8.1.11.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSE-6 are presented in **Table 8-20**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing

Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within Cultural Meadow (CUM) areas will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CUM communities, the extent of tree removals in these areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

There is no vegetation clearing required within the Commercial and Institutional (CVC), Green Land (CGL), Deciduous Woodland (WOD), Deciduous Thicket (THD), Marsh (MA), Meadow Marsh (MAM), or Agriculture (AG) communities and therefore no footprint impacts.

Table 8-20: Summary of Vegetation Removal Areas within ELC Communities LSE-6*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	6.838	0	6.838	Minor
Green Land (CGL)	0	0	0	N/A
Deciduous Woodland (WOD)	0	0	0	N/A
Cultural Meadow (CUM)	3.660	0	3.660	Minor
Marsh (MA)	0	0	0	N/A
Meadow Marsh (MAM)	0	0	0	N/A
Agriculture (AG)	0	0	0	N/A
Deciduous Thicket (THD)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Church Street (GO Sub Mile 3.00)
- Duffins Creek (GO Sub Mile 3.00)
- Brock Road (GO Sub Mile 1.92)
- GO Station Pickering North Pedestrian Bridge (GO Sub Mile 1.09)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

8.1.11.1.2 Aquatic

The corridor segment contains three watercourses: Kronso Creek, Duffins Creek and Millers Creek. Bridge modifications will occur within the existing Lakeshore East route/corridor on the existing Duffins Creek Bridge (GO Sub Mile 3.00). Since the bridge modifications will occur on the existing bridge and not in or adjacent to the water, there are no anticipated footprint impacts to Duffins Creek or fish/fish habitat. Similarly, no adverse effects to Duffins Creek are anticipated to result from the installation of OCS structures as they are located within the existing Metrolinx rail corridor ROW away from the watercourses. Kronso Creek and Millers Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials, and debris protection will be installed on bridges undergoing modifications.

8.1.11.1.3 Species at Risk

Butternuts have a low potential for occurrence within the CGL and CVC communities and moderate potential within the WOD; however, there are no footprint impacts anticipated to the CGL, CVC, or WOD communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Duffins Creek Bridge (GO Sub Mile 3.00) was surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at this site. Modifications to this bridge (OCS wire attachments) are anticipated. A follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work. Should Barn Swallow nests be found at that time, consultation with the MNRF will be required to determine appropriate mitigation for this species. This will likely include Notice of Activity Registration under the ESA, 2007 and associated Mitigation and Monitoring plan to be implemented. Given the low potential of occurrence of Acadian Flycatcher, Black Tern, Bobolink, Eastern Wood-Peewee, Eastern Meadowlark and Common Nighthawk there are no anticipated footprint impacts to these species or their habitat. The Chimney Swift has a moderate potential of occurrence in the CVC communities, however since Chimney Swift are found within chimney structures that are part of the CVC, there are no anticipated footprint impacts to the species or its habitat. There is moderate potential for Least Bittern within OA and MA communities, however there are no footprint impacts anticipated to OA and MA areas. While the Red-headed Woodpecker has a moderate potential of occurrence in the WOD and CGL communities no impacts to these communities are anticipated.

While Snapping Turtle, Blanding's Turtle and Northern Map Turtle have a moderate potential of occurrence within the OA and MA, there are no footprint impacts to these areas.

8.1.11.1.4 Designated Areas

Footprint impacts to CVI and CUM areas within Toronto and Region Conservation Authority (TRCA) are identified in **Table 8-21**.

There are no footprint impacts within the Lower Duffins Creek Wetland Complex PSW, Duffins Creek Coastal Marsh Candidate Life Science ANSI, or Duffin Marsh ESA (City of Pickering).

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-21: Summary of Vegetation Removal Areas within Designated Areas LSE-6*

ELC Community	Area within TRCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	1.955	0	1.955	Minor
Green Land (CGL)	0	0	0	N/A
Deciduous Woodland (WOD)	0	0	0	N/A
Cultural Meadow (CUM)	1.242	0	1.242	Minor
Marsh (MA)	0	0	0	/N/A
Meadow Marsh (MAM)	0	0	0	N/A
Agriculture (AG)	0	0	0	N/A
Deciduous Thicket (THD)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

8.1.11.2 Net Effects

8.1.11.2.1 Terrestrial

There is no vegetation clearing required within the CVC, CGL, WOD, MA, MAM, THD, and AG communities and therefore no net adverse effects. There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI and CUM lands as these communities contain limited habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net effects.

8.1.11.2.2 Aquatic

There are no net adverse effects on Duffins Creek, Kronso Creek and Millers Creek as there are no anticipated footprint impacts.

8.1.11.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts forBarn Swallow, Chimney Swift, Black Tern, Acadian Flycatcher, Bobolink, Eastern Wood-Peewee, Eastern Meadowlark, Common Nighthawk, Least Bittern, Red-headed Woodpecker, Snapping Turtle, Blanding's Turtle or Northern Map Turtle. Net effects to Butternut will be determined during Detailed Design.

8.1.11.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA Regulated Areas associated with areas within CVI and CUM lands are identified in **Table 8-21**. No vegetation clearing within the TRCA Regulated area is required within these communities outside of the Metrolinx owned ROW. There are no adverse net effects to the Duffins Creek Wetland Complex PSW, Duffins Creek Coastal Marsh Candidate Life Science ANSI, or Duffin Marsh ESA (City of Pickering), as there are no footprint impacts.

8.1.12 OCS & Bridges: Section LSE-7 – Ajax Station to Whitby Station

8.1.12.1 Potential Effects and Mitigation Measures

8.1.12.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSE-7 are presented in **Table 8-22**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within Cultural Meadow (CUM) areas will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CUM communities, the extent of tree removals in these areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

There is no vegetation clearing required within the Commercial and Institutional (CVC), Residential (CVR), Deciduous Thicket (THD), Deciduous Forest (FOD), Deciduous Woodland (WOD), Swamp (SW), Deciduous Swamp (SWD) and Agriculture (AG) communities and therefore no footprint impacts.

Table 8-22: Summary of Vegetation Removal Areas within ELC Communities LSE-7*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0	0	0	N/A
Transportation and Utilities (CVI)	13.770	0.106	13.876	Minor
Residential (CVR)	0	0	0	N/A
Deciduous Forest (FOD)	0	0	0	N/A
Deciduous Swamp (SWD)	0	0	0	N/A
Cultural Meadow (CUM)	4.533	1.747	6.279	Minor
Agriculture (AG)	0	0	0	N/A
Deciduous Thicket (THD)	0	0	0	N/A
Swamp (SW)	0	0	0	N/A
Deciduous Woodland (WOD)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures
The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
    - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
    - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
    - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
        - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
        - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
        - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
        - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
        - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and
- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Lakeridge Road (GO Sub Mile 6.60)
- Harwood Avenue South (GO Sub Mile 4.52)
- Henry Street (GO Sub Mile 8.72)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

8.1.12.1.2 Aquatic

There are five watercourses present within the corridor segment: Tributary of Carruthers Creek, Carruthers Creek, Kinsale Creek (two crossings), Lynde Creek, and Tributary of Lynde Creek. No bridge modifications are required on Carruthers Creek Bridge (GO Sub Mile 5.52) and Lynde Creek Bridge (GO Sub Mile 7.62), and therefore there are no footprint impacts to Carruthers Creek and Lynde Creek. Similarly, no adverse effects to Carruthers Creek and Lynde Creek are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. Tributary of Carruthers Creek, Kinsale Creek (two crossings) and Tributary of Lynde Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses, appropriate sediment and erosion controls will be implemented and necessary precautions will be taken to prevent spills and the release of hazardous materials.

8.1.12.1.3 Species at Risk

Butternuts have a low potential for occurrence within CVC and CVR communities and moderate potential within the FOD, WOD and THD; however, there are no footprint impacts anticipated to these communities. The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Given the low potential of occurrence of Hooded Warbler there are no anticipated footprint impacts to this species or its habitat. Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Carruthers Creek Bridge (GO Sub Mile 5.52) and Lynde Creek Bridge (GO Sub Mile 7.62) were surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at Lynde Creek Bridge. One (1) active Barn Swallow nest was observed at Carruthers Creek Bridge. As there are no bridge modifications required at these bridge structures, there are no anticipated impacts. There is moderate potential for Red-headed Woodpecker within the FOD, WOD, THD, SW and SWD communities, a moderate potential for and Acadian Flycatcher within FOD communities, a high potential for Wood Thrush in the FOD and WOD communities, however no footprint impacts are anticipated within these areas. The Chimney Swift has a moderate potential of occurrence in the CVC communities, however since no impacts are anticipated within these areas, there are no footprint impacts to the species or its habitat. Within Agriculture (AG) communities there is high potential for Bobolink and Eastern Meadowlark, although no footprint impacts are anticipated within AG areas. While there is high potential of occurrence for Least Bittern and moderate potential for Black Tern within OA and SWD communities, there are no footprint impacts anticipated within OA and SWD areas.

While Snapping Turtle, Blanding's Turtle and Northern Map Turtle have a moderate potential of occurrence within the Open Water (OA) and SWD, there are no footprint impacts to these areas.

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-coloured Bat have a moderate potential to occur within the WOD, SW, SWD, and FOD communities. However, there are no impacts footprint impacts to these communities.

8.1.12.1.4 Designated Areas

Footprint impacts to CVI and CUM areas within Toronto and Region Conservation Authority (TRCA) and Central Lake Ontario Conservation Authority (CLOCA) are identified in **Table 8-23**.

There are no footprint impacts within the Carruthers Creek Wetland Complex PSW, Lynde Creek Coastal Wetland Complex PSW or Lynde Shores Coastal Wetlands Candidate Life Science ANSI. There are footprint impacts to CUM and CVI lands within Lynde Shores Conservation Area as identified in . Most of these areas of impact occur adjacent to anthropogenically influenced land uses associated with the rail corridor. Vegetation clearing within areas that are part of the Lynde Shores Conservation Area should be minimized to the extent possible.

There are footprint impacts associated with CVI and CUM communities which are within lands identified as Protected Countryside under the Greenbelt Plan. The Greenbelt Plan acknowledges that lands within Protected Countryside have been culturally modified; however, within these areas vegetation removals should be minimized to the extent possible.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-23: Summary of Vegetation Removal Areas within Designated Areas LSE-7*

ELC Community	TRCA Regulation Limit			CLOCA Regulation Limit			Lynde Shores Conservation Area			Greenbelt Protected Countryside			Extent of Tree Removals (basedon canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within Greenbelt Protected Countryside (ha)	
Commercial and Institutional (CVC)	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Transportation and Utilities (CVI)	0.710	0	0.710	5.460	0.100	5.560	13.581	0.106	13.687	3.460	0.104	3.564	Minor
Residential (CVR)	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Deciduous Forest (FOD)	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Deciduous Swamp (SWD)	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Cultural Meadow (CUM)	0.516	0	0.516	0.775	1.323	2.098	0.752	1.285	2.037	0.348	1.206	1.554	Minor
Agriculture (AG)	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Deciduous Thicket (THD)	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Swamp (SW)	0	0	0	0	0	0	0	0	0	0	0	0	N/A
Deciduous Woodland (WOD)	0	0	0	0	0	0	0	0	0	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

8.1.12.2 Net Effects

8.1.12.2.1 Terrestrial

There is no vegetation clearing required within the CVC, CVR, FOD, SWD, THD, SW, WOD and AG communities and therefore no net adverse effects. There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI and CUM lands as these communities contain limited habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net effects.

8.1.12.2.2 Aquatic

There are no net adverse effects on Carruthers Creek, Lynde Creek the Tributary of Carruthers Creek, Kinsale Creek and Tributary of Lynde Creek as there are no anticipated footprint impacts.

8.1.12.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Barn Swallow, Chimney Swift, Black Tern, Acadian Flycatcher, Bobolink, Eastern Meadowlark, Hooded Warbler, Least Bittern, Red-headed Woodpecker, Wood Thrush, Snapping Turtle, Blanding's Turtle, Northern Map Turtle, Eastern Small-footed Myotis, Tri-coloured Bat, Little Brown Myotis, or Northern Myotis. Net effects to Butternut will be determined during Detailed Design.

8.1.12.2.4 Designated Areas

Net effects relating to footprint impacts within TRCA and CLOCA Regulated Areas associated with areas within CVI and CUM lands are identified in **Table 8-23**. No vegetation clearing within the TRCA Regulated area is required within these communities outside of the Metrolinx owned ROW and only minor removals within the CLOCA Regulated Area are required within the CVI and CUM communities.

There are no net adverse effects to the Carruthers Creek Wetland Complex PSW, Lynde Creek Coastal Wetland Complex PSW or Lynde Shores Coastal Wetlands Candidate Life Science ANSI, as there are no footprint impacts. Footprint impacts within CVI and CUM communities within the Lynde Shores Conservation Area and Greenbelt Protected Countryside Areas occur within culturally influenced non-natural communities. Minor vegetation removals are required outside the Metrolinx ROW within the CVI and CUM communities. Net effects within the CVI and CUM lands within Protected Countryside Areas under the Greenbelt Plan are identified in **Table 8-23.**

8.1.13 OCS & Bridges: Section LSE-8 – Whitby Station to Oshawa Station

8.1.13.1 Potential Effects and Mitigation Measures

8.1.13.1.1 Terrestrial

Impacts Related to OCS/Vegetation Clearing

Vegetation removal areas for Segment LSE-8 are presented in **Table 8-24**. As depicted in mapping provided in **Appendix A2** the majority of the 7 metre vegetation removal zone is within the Transportation and Utility (CVI) lands and clearance zones will entail vegetation removals/clearing mainly within the existing Metrolinx owned rail corridor. The CVI lands that include the existing rail corridor are composed of a culturally influenced vegetation community dominated by non-native grasses and field herbs common to disturbed habitats with minimal successional trees. The footprint impacts are therefore considered negligible within the CVI lands. The extent of tree removals within the CVI is considered minor due minimal canopy cover. Mitigation for CVI areas include ensuring vegetation/tree removals follow the general mitigation measures for vegetation removal outlined below.

In addition, vegetation removals within several other ELC communities, mainly Constructed (CV) and Cultural Meadows (CUM) with small areas of Deciduous Thicket (THD) and Commercial and Institutional (CVC) will be required within the vegetation clearing zone. While vegetation removals are required within these areas, they provide limited habitat for wildlife. Therefore the removals within these areas are considered to be of low impact from an ecological perspective. Due to the minimal/limited canopy cover within the CV, CUM, THD and CVC communities, the extent of tree removals in these areas is minor. Mitigation for these areas include compliance with the general mitigation measures for vegetation/tree clearing identified below.

There is no vegetation clearing required within the Residential (CVR), Marsh (MA), Meadow Marsh (MAM), and Agriculture (AG) communities and therefore no footprint impacts.

Table 8-24: Summary of Vegetation Removal Areas within ELC Communities LSE-8*

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Commercial and Institutional (CVC)	0	0.013	0.013	Minor
Transportation and Utilities (CVI)	6.737	2.922	9.659	Minor
Residential (CVR)	0	0	0	N/A
Constructed (CV)	0.040	16.267	16.307	Minor
Deciduous Thicket (THD)	0.159	0.038	0.197	Minor
Cultural Meadow (CUM)	0.996	1.281	2.276	Minor
Marsh (MA)	0	0	0	N/A
Agriculture (AG)	0	0	0	N/A

ELC Community	Area within ROW (ha)	Area outside ROW (ha)	Total Area (ha)	Extent of Tree Removals (based on canopy cover within ELC community)
Meadow Marsh (MAM)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

Mitigation Measures

The following mitigation measures, which are common to all ELC communities, will be implemented to minimize/mitigate the potential impacts related to vegetation/tree removals:

- Preparation of **Vegetation Management Plans** during Detailed Design which will include:
  - **Detailed Tree Inventory** – Surveys as required to meet municipal permit requirements for trees not located on Metrolinx property. For trees within Metrolinx property, a "category" approach will be utilized which would not require detailed surveys. Targeted surveys for Species at Risk vegetation will be required to meet MNRF requirements.
  - **Tree Protection** – Detailed measures to protect retained adjacent trees. This will include tree protection zone limits, diagram of tree protection barrier type, tree protection measures, and construction storage and staging areas where information is available. Refer to Section 10.1 for detailed tree protection measures during construction.
  - **Vegetation Compensation Protocol** – Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.
    - **For Municipal/Private Trees:** Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal is to reduce administrative permitting burden for trees along long stretches of rail corridor.
    - **For Trees within Metrolinx Property:** Metrolinx is developing a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan.
    - **For Trees within Conservation Authority Lands:** For vegetation removals within conservation authority lands where required, applicable removal and restoration requirements will be followed.
    - **For Trees within Federal Lands:** For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed.
    - **Tree End Use:** Options for the end use of trees removed from Metrolinx property (e.g reuse/recycling options) will be developed.
- Metrolinx will make efforts to comply with the *Forestry Act* in relation to trees planted on the boundary between two lands (i.e., lands that are Metrolinx owned and lands that are not Metrolinx owned); and

- Compliance with the Migratory Birds Convention Act (MBCA)

Impacts Related to Bridge Modifications

Bridges identified to undergo modifications, including the installation of flash plates and/or wires and/or bridge barriers, include:

- Thickson Road (GO Sub Mile 10.67)
- Victoria Street (GO Sub Mile 9.31)
- Brock Street South (GO Sub Mile 9.00)
- GO Station Whitby Pedestrian Bridge (GO Sub Mile 8.87)

Mitigation measures include inspections of all impacted bridge structures for active nests prior to commencing work. All active nests of birds protected by the MBCA shall not be removed at any time. If inactive nests are removed from structures prior to the breeding bird window (April 1st to August 31st), the bridge structure will be netted or tarped to prevent the recurrence of nesting activity, the bridge should be monitored daily for any new nests.

8.1.13.1.2 Aquatic

There are four watercourses within the corridor segment: Pringle Creek, Tributary of Pringle Creek, Tributary of Corbett Creek, and Corbett Creek. No bridge modifications are required on Pringle Creek Bridge (GO Sub Mile 9.31) and Tributary of Corbett Creek Bridge (GO Sub Mile 10.65), and therefore there are no footprint impacts to Pringle Creek and Tributary of Corbett Creek. Similarly, no adverse effects to Pringle Creek and Tributary of Corbett Creek are anticipated to result from the installation of OCS structures as they are located within the existing corridor ROW away from the watercourses. Pringle Creek, Tributary of Pringle Creek, and Corbett Creek are conveyed under the corridor by culverts therefore no footprint impacts to the culverts or watercourses are anticipated to result from the installation of OCS within the existing corridor above the culverts. To mitigate the potential indirect impacts to the watercourses and appropriate sediment and erosion controls will be implemented, necessary precautions will be taken to prevent spills and the release of hazardous materials.

8.1.13.1.3 Species at Risk

Butternuts have a low potential for occurrence within CVC, THD and CVR communities. There are no footprint impacts anticipated to the CVR community. The presence/absence of Butternuts will be confirmed during detailed tree inventories of impacted areas during Detailed Design. A health assessment will be undertaken at that time for any pure butternuts. Should any Butternuts be found during Detailed Design, appropriate approval under the ESA, 2007 will be required. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.

Given the low potential of occurrence of Bank Swallow, Chimney Swift, Least Bittern and Black Tern there are no anticipated footprint impacts to these species or their habitat. Avian field investigations were conducted at bridge structures identified to provide suitable nesting habitat for Barn Swallows. The Pringle Creek Bridge (GO Sub Mile 9.31) and Unnamed Creek (Corbett Creek) Bridge (GO Sub Mile 10.65) were surveyed for active nests and individuals. No Barn Swallows nests or individuals were observed at these sites. As there are no bridge modifications required at these bridge structures and no evidence of Barn Swallow nesting was found, there are no anticipated impacts. While the Red-headed Woodpecker has a moderate potential of occurrence in the THD and CVR communities. There are no impacts to the CVR community, and due to this species general tolerant to disturbance, a small amount of edge vegetation removal within the THD is not anticipated to have an impact on this species.

While Snapping Turtle, Blanding's Turtle have a high potential and Northern Map Turtle have a moderate potential of occurrence within the Open Water (OA) and MA, there are no footprint impacts to these areas.

8.1.13.1.4 Designated Areas

Footprint impacts to CVI, CVC, CV, CUM and THD areas within Central Lake Ontario Conservation Authority (CLOCA) are identified in **Table 8-25**.

There are no footprint impacts within Whitby Harbour Wetland Complex PSW, Corbett Creek Coastal Wetland Complex PSW or Corbett Creek Coastal Marsh Candidate Life Science ANSI.

Metrolinx is establishing a Vegetation Compensation Protocol for Metrolinx Regional Express Rail (RER) projects and vegetation that is removed will be compensated for in accordance with the provisions of this protocol.

Table 8-25: Summary of Vegetation Removal Areas within Designated Areas LSE-8*

ELC Community	Area within CLOCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within CLOCA Regulation Limit (ha)	
Commercial and Institutional (CVC)	0	0.013	0.013	Minor
Transportation and Utilities (CVI)	2.656	1.572	4.229	Minor
Residential (CVR)	0	0	0	N/A
Constructed (CV)	0.040	5.270	5.310	Minor
Deciduous Thicket (THD)	0.072	0.110	0.182	Minor
Cultural Meadow (CUM)	0.553	0.324	0.877	Minor
Marsh (MA)	0	0	0	N/A
Agriculture (AG)	0	0	0	N/A

ELC Community	Area within CLOCA Regulation Limit			Extent of Tree Removals (based on canopy cover within ELC community)
	Area within ROW (ha)	Area outside ROW (ha)	Total Removal Area within CLOCA Regulation Limit (ha)	
Meadow Marsh (MAM)	0	0	0	N/A

**areas are approximate for discussion purposes only and not based on surveyed data*

8.1.13.2 Net Effects

8.1.13.2.1 Terrestrial

There is no vegetation clearing required within the CVR, MA, MAM and AG communities and therefore no net adverse effects. There are no net adverse effects to wildlife habitat associated with vegetation clearing within the CVI , CV, CUM, CVC, and THD lands as these communities contain limited habitat for wildlife. It is anticipated that vegetation losses will be offset as part of the Vegetation Compensation Protocol where required pending further discussions with relevant Conservation Authorities and municipalities.

Adherence to the mitigation measures outlined above will ensure that the nests of migratory birds and trees not identified for removal are protected resulting in no adverse net effects.

8.1.13.2.2 Aquatic

There are no net adverse effects on Pringle Creek, Tributary of Pringle Creek, Tributary of Corbett Creek and Corbett Creek as there are no anticipated footprint impacts.

8.1.13.2.3 Species at Risk

There are no net adverse effects on Species at Risk or their habitat. There are no footprint impacts for Bank Swallow, Barn Swallow, Chimney Swift, Least Bittern and Black Tern. While there are footprint impacts to the THD communities, the potential loss of habitat for Red-headed Woodpecker associated with tree removals is considered minor in relation to the amount of adjacent un-impacted habitat and no net adverse effects are anticipated. No net adverse effects are expected to result to Snapping Turtle, Blanding's Turtle and Northern Map Turtle or their habitat as the OA and MA will not be impacted. Net effects to Butternut will be determined during Detailed Design.

8.1.13.2.4 Designated Areas

Net effects relating to footprint impacts within CLOCA Regulated Areas within CVI, CVC, CV, CUM and THD lands are identified in **Table 8-25**. Minor removals are required within the CVI, CVC, CV, CUM and THD lands outside of the Metrolinx ROW. There are no net adverse effects to the Whitby Harbour Wetland Complex PSW, Corbett Creek Coastal Wetland Complex PSW or Corbett Creek Coastal Marsh Candidate Life Science ANSI, as there are no footprint impacts.

8.2 Preliminary Environmental Site Assessment

Please refer to Appendix B for a description of the methodology followed for Environmental Site Assessment work. Additional details can be found in the Preliminary Environmental Site Assessment Report contained in Appendix B.

8.2.1 East Rail Maintenance Facility Tap Location

8.2.1.1 Potential Effects and Mitigation Measures

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

8.2.1.2 Net Effects

No net adverse effects are anticipated.

8.2.2 East Rail Maintenance Facility TPS

8.2.2.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown composition may be present across the Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Phase I Environmental Site Assessment if the property is to be acquired.
- Complete a Limited Subsurface Investigation to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses.
- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

8.2.2.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

8.2.3 Scarborough 25kV Feeder Route (LSE Corridor)

Refer to Section 8.2.7 below. The Scarborough 25kV feeder wires will be positioned on top of the OCS infrastructure along the STV corridor.

8.2.4 Scarborough SWS

8.2.4.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown composition may be present across the Site

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;

- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Phase I Environmental Site Assessment if the property is to be acquired.
- Complete a Limited Subsurface Investigation to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses.
- Determine the need for additional subsurface investigation based on the findings of the Phase I Environmental Site Assessment if required. Additional PCAs/APECs identified during the Phase I Environmental Site Assessment will be investigated as part of a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment.

8.2.4.2 Net Effects

Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

8.2.5 Durham SWS

8.2.5.1 Potential Effects and Mitigation Measures

Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).

8.2.5.2 Net Effects

No net adverse effects are anticipated.

8.2.6 Don Yard PS

8.2.6.1 Potential Effects and Mitigation Measures

Based on the overview study work completed at the baseline data collection phase of the TPAP, the Areas of Potential Environmental Concern (APECs)/Potentially Contaminating Activities (PCAs) of concern were identified as follows:

- Potential fill materials of unknown composition may be present across the Site;
- The use of the Site as part of a former rail yard; and,
- The industrial operations to the north and south of the Site.

The implementation of the physical Electrification Project components/infrastructure is not expected to result in subsurface contamination at the sites. Although there may be some lubricants and/or fluids associated with construction vehicles and equipment, it is inferred that the equipment will be designed and operated to prevent leaks and thus the potential for contamination is unlikely. In the unlikely event that soil and/or groundwater contamination did occur, proposed mitigation options would include the following:

- Emergency Preparedness Plans will be developed and available at the site;
- Spill kits will be available on vehicles and in potential spill locations;
- Site personnel will be trained on spill management;
- Spills will be cleaned up as soon as possible and remediation activities will be conducted if necessary;
- Refuelling will be undertaken in designated locations; and,
- Each site will be equipped with spill containment and/or oil/water separator facilities.

If applicable, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

In addition the following future work is recommended:

- Complete a Limited Subsurface Investigation and/or Phase II Environmental Site Assessment as required to assess the presence and quality of fill and potential impacts resulting from adjacent/nearby land uses.

8.2.6.2 Net Effects

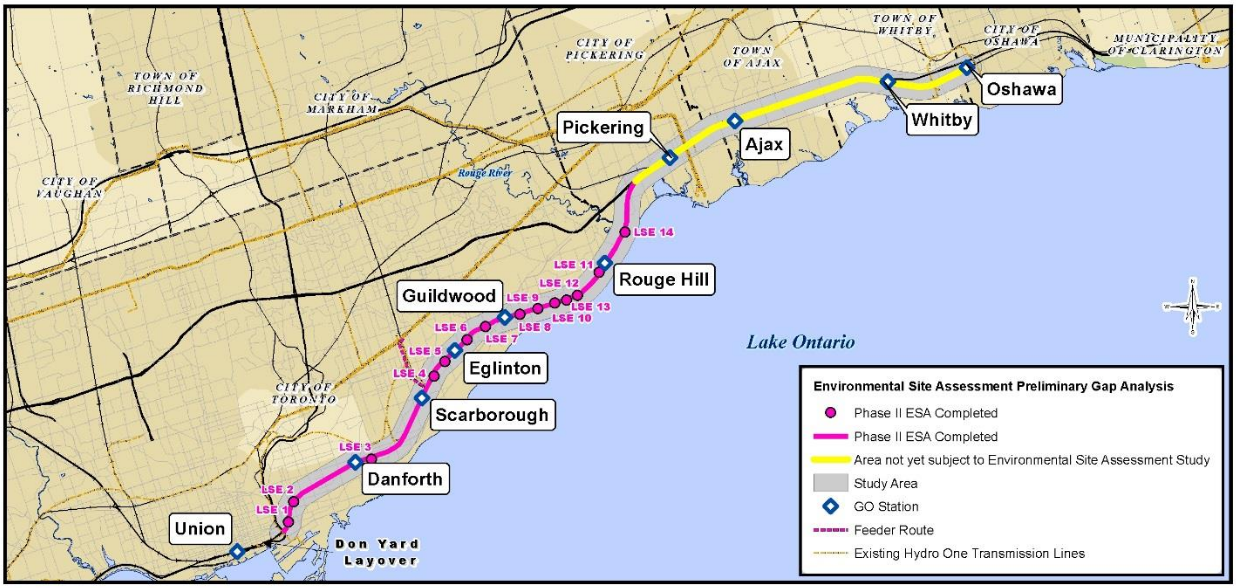
Based on completion of Environmental Site Assessment studies and implementation of mitigation and/or soil/groundwater remediation measures (as applicable) during Detailed Design and construction, no net adverse effects are anticipated.

8.2.7 OCS & Bridges: Section LSE Corridor

8.2.7.1 Potential Effects and Mitigation Measures

The scope of the study undertaken as part of the GO Rail Network Electrification TPAP was limited to a gap analysis review of previous Environmental Site Assessment work within the OCS Impact Zones along the corridors. Based on the available background reports reviewed, the Lakeshore East corridor has been the subject of Phase I and II ESAs from the Don River (western boundary of current study) to Frenchman's Bay (west of Liverpool Rd.) in Pickering. The corridor east of this point (including the proposed switching yard at Durham (near Brock Road) has not been assessed. Approximately 20 km of this corridor have not been subject to ESAs (see **Figure 8-9**).

Figure 8-9: Lakeshore East Corridor Gap Analysis Map



Mitigation Measures

Implement the mitigation measures and/or carry out further study as documented in the applicable Lakeshore East studies listed in **Table 8-26**.

Table 8-26: Phase I/II or Other Contaminated Site Related Documents Reviewed - Lakeshore East Corridor

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
Peto MacCallum 2015a	Letter Report Geoenvironmental Sampling and Chemical Testing Stockpiled Excess Soils, Eglinton GO Station 2995 Eglinton Avenue East, Scarborough, Ontario	Dufferin Construction Company	Peto MacCallum Ltd. Consulting Engineers	Apr-15	15TM152	LSE	Eglinton GO Station, 2995 Eglinton Avenue	Remediation
Peto MacCallum 2015b	Letter Report Geoenvironmental Sampling and Chemical Testing Excess Soils From Tunnel Excavation, Eglinton GO Station 2995 Eglinton Avenue East, Scarborough, Ontario	Dufferin Construction Company	Peto MacCallum Ltd. Consulting Engineers	Apr-15	15TM152	LSE	Eglinton GO Station, 2995 Eglinton Avenue	Remediation
PGL 2011	Phase I Environmental Site Investigation, 180 Westney Road South, Ajax, ON	Metrolinx	Pottinger Gaherty Environmental Consultants Ltd.	Aug-11	2290-22.01	LSE	180 Westney Road parking lot	Phase I
Soil Engineers 2009	Letter Report Results of Chemical Analyses of Soil Samples for Export Proposed North Lot Rehabilitation and New West Lot and Access Road Rouge Hill GO Station City of Toronto	Go Transit	Soil Engineers Ltd.	9-Jun-09	0903-S067E	LSE	Rouge Hill GO Station west parking lot. Port Union Road	Phase II

Reference	Report Title	Prepared For	Prepared By	Date	Project No.	Metrolinx Line	Study Location	Description of Study (Phase I or II Etc.)
Soil Engineers 2013b	Letter Report Chemical Analysis of Soil Samples Proposed Temporary Parking Lot Oshawa Go Station East of Thornton Road South and South of Bloor Street West, City of Oshawa, Ontario	GHD	Soil Engineers Ltd.	21-Jan-13	1212-S066E	LSE	Parking lot at Oshawa GO Station, outside of study area.	Phase II
Soil Engineers 2014	Letter Report Chemical Analysis of Soil Samples Proposed Kiss and Ride Lot Danforth Go Station & Dawes Road City of Toronto	Metrolinx	Soil Engineers Ltd.	5-Dec-14	1410-S029E	LSE	8 Dawes Road	Phase II
Soil Probe 2015	Letter Report Soil Chemical Analysis Proposed Asphalt Rehabilitation Works Ajax Go Station South Parking Lot 100 Westney Road South Ajax, Ontario	Harvie Construction Inc.	Soil Probe Geotechnical Engineering	23-Apr-15	2015-27427	LSE	Ajax GO Station Parking Lot	Phase II
SPL 2011a	Phase I Environmental Site Assessment Railway Corridor - DVP to Frenchman's Bay, Toronto to Pickering, Ontario	Metrolinx	SPL Beatty, A Divsion of SPL Consultants Limited	30-Jun-11	773-1001	LSE	Don River to Frenchman's Bay, Pickering. Study limited to ROW	Phase II
SPL 2011b	Phase II Environmental Site Assessment Railway Corridor - DVP to Frenchman's Bay, Toronto to Pickering, Ontario	Metrolinx	SPL Beatty, A Divsion of SPL Consultants Limited	30-Jun-11	773-1001	LSE	Don River to Frenchman's Bay, Pickering. Study includes 250m ea. side of ROW	

Further work is recommended along the Lakeshore East corridor to assess/characterize potential soil and/or groundwater contamination and develop appropriate mitigation measures. As a result, additional Environmental Site Assessment studies including Phase I ESAs, Phase II ESAs, etc. will be carried out by Metrolinx as required along the corridors/OCS Impact Zone during the Detailed Design phase. Should these further assessments confirm the presence of subsurface contamination at these sites, recommendations for mitigation will be developed and implemented as appropriate which may include but are not limited to:

- Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site;
- Undertake remediation and/or implementation of management measures to address contaminated soils and/or groundwater during construction and long term operations and maintenance. Management measures will be carried out in accordance with applicable environmental legislation.

Furthermore, the mitigation measures as outlined in **Section 9.2** will be adhered to and implemented during Detailed Design and construction.

8.2.7.2 Net Effects

Based on the implementation of the mitigation measures outlined above, no net adverse effects are anticipated.

8.3 Cultural Heritage

Please refer to **Appendix C2** for a description of the methodology followed for assessment of cultural heritage impacts. Additional details can be found in the Cultural Heritage Impact Assessment Report contained in **Appendix C2**.

8.3.1 East Rail Maintenance Facility Tap Location

There are no heritage properties identified at the East Rail Maintenance Facility Tap location. There are no further concerns from a cultural heritage perspective.

8.3.1.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

8.3.1.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.2 East Rail Maintenance Facility TPS

There are no heritage properties identified at the East Rail Maintenance Facility TPS. There are no further concerns from a cultural heritage perspective.

8.3.2.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

8.3.2.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.3 Scarborough SWS & 25kV Feeder Route

There are no heritage properties identified at the Scarborough SWS or along the Feeder Route. There are no further concerns from a cultural heritage perspective.

8.3.3.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

8.3.3.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.4 Durham SWS

There are no heritage properties identified at the Durham SWS. There are no further concerns from a cultural heritage perspective.

8.3.4.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

8.3.4.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.5 Don Yard PS

There are no heritage properties identified at the Don Yard PS. There are no further concerns from a cultural heritage perspective.

8.3.5.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

8.3.5.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.6 OCS & Bridges: Section LSE-1 – Don Yard Layover to Danforth Station

The cultural heritage resources within this section include:

- Carlaw Avenue Bridge (LSE-1-1)
- Gerrard Street East Bridge (LSE-1-2)
- Riverdale Heritage Conservation District (LSE-1-3)

A summary of impacts and mitigation measures is provided in **Table 8-27** and feature mapping of resources is provided in **Appendix C2**.

8.3.6.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 8-27: Summary of LSE-1 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Carlaw Avenue Bridge LSE-1-1 (CHP)	Installation of OCS wire attachments	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was undertaken (as part of a separate project) and it was determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and City of Toronto Heritage Preservation Services
Gerrard Street East Bridge LSE-1-2 (CHP)	Installation of OCS wire attachments	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was undertaken (as part of a separate project) and it was determined to be a Provincial HeritageProperty • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
			and City of Toronto Heritage Preservation Services
Riverdale HCD LSE-1-3 (Protected property adjacent to the rail corridor)	No impacts to the heritage attributes associated with the Riverdale HCD were identified as a result of OCS infrastructure.	N/A	N/A

See **Figure 8-10** through **Figure 8-11** for a visual representation of these CHRs.

Figure 8-10: Carlaw Avenue Bridge

Figure 8-11: Gerrard Avenue East Bridge

8.3.6.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Carlaw Avenue Bridge and Gerrard Avenue East Bridge will be minimized by carrying out a HIA. The HIA will identify potential impacts and recommend appropriate mitigation measures for heritage attributes to be incorporated into the final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the City of Toronto Heritage Preservation Services.

8.3.7 OCS & Bridges: Section LSE-2 – Danforth Station to Scarborough Station

There are no heritage properties identified in the Section LSE-2 study area. There are no further concerns from a cultural heritage perspective.

8.3.7.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

8.3.7.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.8 OCS & Bridges: Section LSE-3 – Scarborough Station to Guildwood Station

There are no heritage properties identified in the Section LSE-3 study area. There are no further concerns from a cultural heritage perspective.

8.3.8.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

8.3.8.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.9 OCS & Bridges: Section LSE-4 – Guildwood Station to Rouge Hill Station

The cultural heritage resource within this section includes:

- Highland Creek Bridge (LSE-4-1)
- Purvis Castle Log Cabin (LSE-4-2)

A summary of impacts and mitigation measures is provided in **Table 8-28** and feature mapping of resources is provided in **Appendix C2**.

8.3.9.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 8-28: Summary of LSE-4 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Highland Creek Bridge LSE-4-1 (PHP)	Possible attachment of OCS wires to the bridge	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was previously completed (as part of a separate Metrolinx TPAP) and determined to be a Provincial Heritage Property • Conduct a HIA to identify potential impacts and appropriate mitigation measures • The HIA will be undertaken as part of Detailed Design in consultation with MTCS and City of Toronto Heritage Preservation Services
Purvis Castle Log Cabin	No impacts to the heritage attributes associated with Purvis	N/A	N/A

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
LSE-4-2 (Protected property adjacent to the rail corridor)	Castle Log Cabin at 90 Morningside Drive in Scarborough were identified as a result of OCS infrastructure		

A copy of the Statement of Cultural Heritage Value for the Highland Creek Bridge can be found in **Appendix M**.

Figure 8-12: Highland Creek Bridge

8.3.9.2 Net Effects

Displacement and/or disruption to identified cultural heritage resources at the Highland Creek Bridge will be minimized by carrying out a HIA. the HIA will identify potential impacts and recommend appropriate mitigation measures for heritage attributes to be incorporated into the final design. The HIA will be carried out as part of Detailed Design and will be developed in consultation with MTCS and the City of Toronto Heritage Preservation Services.

8.3.10 OCS & Bridges: Section LSE-5 – Rouge Hill Station to Pickering Station

The cultural heritage resources within this section include:

- Rouge River Bridge (LSE-5-1)
- Petticoat Creek Culvert (LSE-5-2)
- Dunbarton Subway (LSE-5-3)
- Miller Memorial Tree (LSE 5-4)

It should be noted that the Rouge National Urban Park (SV-6-1) is also located within this section. Please refer to **Section 7.3.10** above for a discussion of potential effects and mitigation measures associated with the resource.

A summary of impacts and mitigation measures is provided in **Table 8-29** and feature mapping of resources is provided in **Appendix C2**.

8.3.10.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 8-29: Summary of LSE-5 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Rouge River Bridge LSE-5-1 (PHPPS)	Structure is over 60 metres, therefore OCS wires are to be attached to the bridge and installation of track portals are possible	Alteration: displacement of heritage attributes and/or disruption of setting	• A CHER was previously completed and a HIA is in progress (as part of a separate Metrolinx TPAP) • Bridge is being replaced with a new structure (as part of a separate Metrolinx TPAP), Minister consent for removal of bridge has been granted
Petticoat Creek Culvert LSE-5-2 (PHP)	No impacts to the property are expected as a result of alterations to the Metrolinx-owned rail ROW	N/A	N/A
Dunbarton Subway LSE-5-3 (PPHP)	No impacts to the property are expected as a result of alterations to the Metrolinx-owned rail ROW	N/A	N/A
Miller Memorial Tree	While outside the property takings for track and grading, the	Disruption/removal of a known memorial site	• The construction laydown site should be planned to avoid this memorial tree. The tree should be protected during the course

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
LSE-5-4 (Adjacent protected property to Rouge River Bridge)	tree may be impacted during the construction phase as the area may be used for a construction laydown site. It may also may be impacted if nearby trail is realigned through the area.		of construction by plywood tree protection hoarding, or equivalent barriers • The trail realignment should be planned to avoid this memorial trail.

Figure 8-13: Rouge River Bridge

8.3.10.2 Net Effects

No net effects to the Rouge River Bridge are anticipated as a result of Electrification as the bridge is being replaced with a new structure (as part of a separate Metrolinx TPAP) and Minister consent for the removal of the bridge has been granted.

8.3.11 OCS & Bridges: Section LSE-6 – Pickering Station to Ajax Station

There are no heritage properties identified in the Section LSE-6 study area. There are no further concerns from a cultural heritage perspective.

8.3.11.1 Potential Effects and Mitigation Measures

As no heritage properties were identified at this location, there will be no potential effects to cultural heritage resources and associated mitigation measures are not required.

8.3.11.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.12 OCS & Bridges: Section LSE-7 – Ajax Station to Whitby Station

The cultural heritage resources within this section include:

- Former Whitby Train Station (LSE-7-1)

A summary of impacts and mitigation measures is provided in **Table 8-30** and feature mapping of resources is provided in **Appendix C2**.

8.3.12.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 8-30: Summary of LSE-7 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Former Whitby Train Station LSE-7-1 (Adjacent Protected Property to the Henry Street Bridge)	No impacts to the heritage attributes associated with the old Whitby train station (Station Gallery) at 1450 Henry Street were identified as a result of alterations to the Henry Street Bridge or as a result of OCS infrastructure.	N/A	N/A

8.3.12.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.3.13 OCS & Bridges: Section LSE-8 – Whitby Station to Oshawa Station

The cultural heritage resources within this section include:

- Emanuel Sleep House (LSE-8-1)

A summary of impacts and mitigation measures is provided in **Table 8-31** and feature mapping of resources is provided in **Appendix C2**.

8.3.13.1 Potential Effects and Mitigation Measures

The following table summarizes the proposed impact to the heritage property, the potential effect, and mitigation measures.

Table 8-31: Summary of LSE-8 Potential Footprint Impacts and Mitigation Measures

CHR #	Project Activities	Potential Effect	Avoidance/Mitigation/Compensation Measures
Emanuel Sleep House LSE-8-1 (Protected property adjacent to the East Rail Yard Maintenance Facility)	No impacts to the heritage attributes associated with the Emanuel Sleep House at 601 Victoria Street were identified as a result of the East Rail Yard Maintenance Facility or OCS infrastructure.	N/A	N/A

8.3.13.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.4 Archaeology

A Stage 1 Archaeological Assessment was undertaken for the GO Rail Network Electrification Project. A summary of the findings and recommendations for the Lakeshore East Corridor can be found in the sections below. Refer to **Appendix D2** for complete details.

8.4.1 East Rail Maintenance Facility Tap Location and TPS

An archaeological assessment of the proposed EMRF Tap/TPS Location site was previously conducted (TMHC 2010). However, due to minor design changes a small land parcel has been added to the site for underground duct banks. Therefore an area along the eastern site periphery was inspected by Robert Pihl (P057), ASI on May 12, 2016.

The area for the underground duct bank is currently low-lying wetland. There is ongoing construction activity immediately to the west associated with the East Rail Maintenance Facility.

8.4.1.1 Potential Effects and Mitigation Measures

No potential effects are noted; a previous archaeological assessment of the property containing the ERMF Tap/TPS site has been completed and archaeological potential has therefore been removed. As such, no further archaeological assessment is recommended.

8.4.1.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.4.2 Scarborough SWS & 25kV Feeder Route

A property inspection of the proposed Scarborough SWS site was conducted by Robert Pihl (P057), ASI on June 9, 2016.

The proposed Scarborough SWS site is situated beside the OCS footprint and within the GO rail property limit along the LSE Corridor, which includes a long, narrow area where railway ties have been stockpiled. The site also features a substantial berm that parallels the storage area and separates (buffers) the rail corridor from residential lands behind. Both of these activities have heavily disturbed the SWS site.

A property inspection of the feeder route between the Scarborough Tap/TPS (STV Corridor) and Scarborough SWS was conducted by Robert Pihl (P057), ASI on July 13, 2016. The corridor was examined from public access points (crossings).

8.4.2.1 Potential Effects and Mitigation Measures

Archaeological potential has been removed from the SWS site. The proposed Scarborough Feeder Route has been severely disturbed by previous railway construction. Archaeological potential as been removed. As such, no further Archaeological Assessment is recommended.

8.4.2.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.4.3 Durham SWS

A property inspection of the proposed Durham SWS was conducted by Robert Pihl (P057), ASI on May 12. The proposed Durham SWS site consists of a commercial driving range and associated buildings that are situated within a hydro corridor as well as a parcel of vacant land. Land modification to construct the hydro ROW and driving range has likely disturbed the landscape although this will need to be confirmed with further assessment. Berms running the length of the driving range have been constructed. A gravel laneway runs the length of the driving range to the vacant land in back; this land has apparently been used for dumping debris, and there is a large, extant concrete pad, likely from a former building.

8.4.3.1 Potential Effects and Mitigation Measures

Portions of the Durham SWS site have the potential to create disturbance to potential Indigenous and Euro-Canadian archaeological resources. Mitigation Measures include conducting a Stage 2 Archaeological Assessment of the portion of the SWS site with archaeological potential.

8.4.3.2 Net Effects

Net effects associated with the Durham SWS will be determined upon further assessment.

8.4.4 Don Yard PS

The facility site is situated within a zone of historic waterfront development that significantly changed the original configuration of the original shoreline (see **Appendix D2** for further details). Archaeological assessments that encompass the facility site have been previously conducted (ASI 2008a, 2014d), and they determined that archaeological potential for original cribbing and wharf structures associated with this period is remote: they would be deeply buried by subsequent 20th century land-filling associated with rail line construction, if they survived at all. For the purposes of the facility development, archaeological potential has been removed.

8.4.4.1 Potential Effects and Mitigation Measures

Previous archaeological assessments encompassing the Don Yard PS site has been previously completed and archaeological potential has therefore been removed. As such, no further archaeological assessment is recommended.

8.4.4.2 Net Effects

No net effects will be experienced as a result of this undertaking.

8.4.5 OCS & Bridges: Lakeshore East Corridor

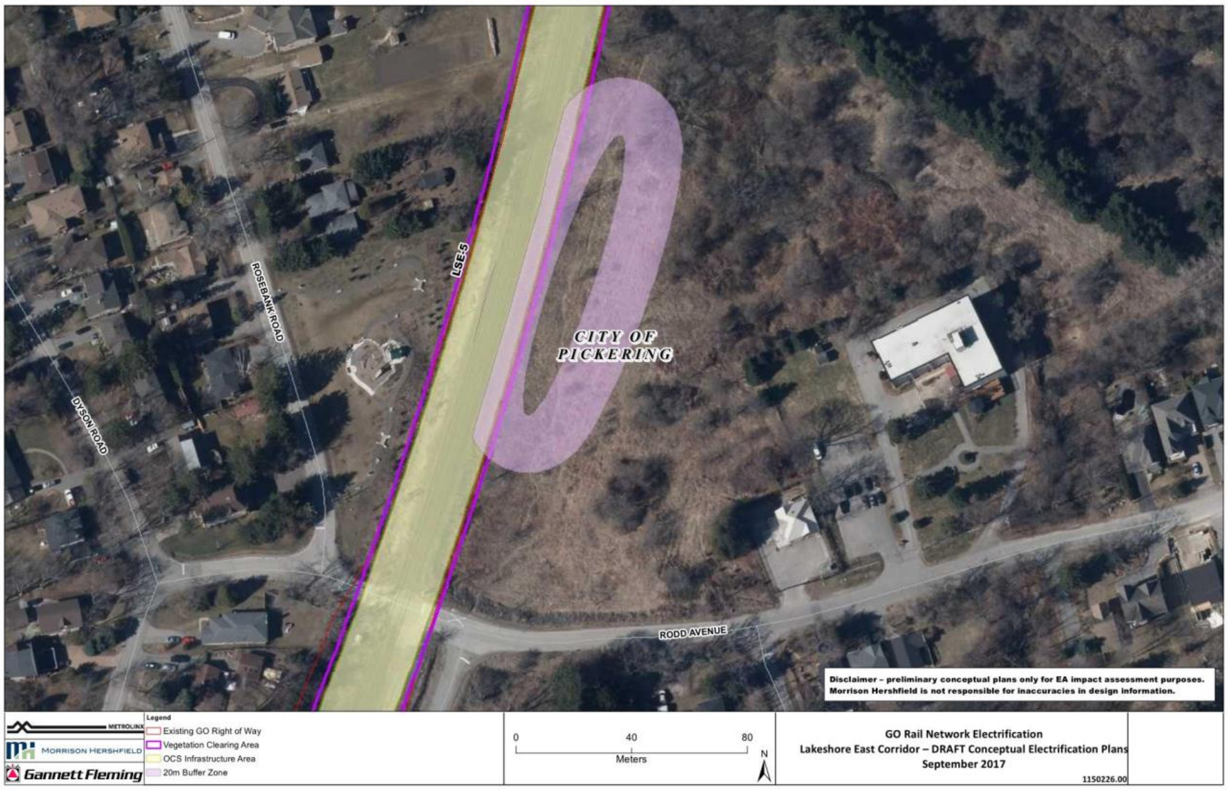
The OCS footprint for the Lakeshore East Corridor includes active GO Railway lines and existing bridges. A property inspection of the study corridor was conducted by Robert Pihl (P057), ASI on May 12, 2016. Access points for the property inspection consisted of road crossings at grade or bridges, or at one of the many GO station platforms along the way. Each location was photo-documented in one or both directions as deemed appropriate (Refer to **Appendix D2** for further details).

8.4.5.1 Potential Effects and Mitigation Measures

OCS Footprint

The Stage 1 Archaeological Assessment determined that the entire OCS footprint consists of an active GO Rail corridor which has been severely disturbed by previous rail construction, often by filling or down-cutting the landscape to produce an appropriate grade for the train and then by installing a raised bed for the steel rail.. With respect to the Rodd Avenue area along the Lakeshore East corridor, a Stage 2 archaeological assessment was previously completed and determined archaeological potential in the direct vicinity of the rail corridor; however within the rail right of way is disturbed and therefore there is no archeological potential. If during Detailed Design it is determined that OCS/electrification infrastructure will be required outside of the Metrolinx owned right of way in this particular area and that subsequent ground disturbance is required within the established 20 metre buffer area (**Figure 8-14**), a Stage 3 archaeological assessment will be undertaken prior to construction.

Figure 8-14: Rodd Avenue 20 metre Buffer Area



Bridge Modifications

For overhead and pedestrian bridges along the Lakeshore East corridor that will require modifications (e.g., lower tracks) to achieve required vertical clearances and/or to accommodate the addition of a protective bridge barrier, the Stage 1 Archaeological Assessment confirmed that the existing footprint of these bridges within the GO rail ROW/7 metre zone is within an active railway line on disturbed lands, therefore no further Archaeological Assessment is recommended.

If during detailed, potential impacts to areas that extend outside the 7 metre OCS/Vegetation Removal zone are identified, a review will be undertaken of potential disturbance to Indigenous and Euro-Canadian archaeological resources for these areas. As part of this review, further archaeological assessment work will be identified and undertaken for any areas anticipated to be impacted outside the 7 metre OCS/Vegetation Removal zone, such as Stage 1 Archaeological Assessment.

8.4.5.2 Net Effects

Net effects associated with the OCS/Vegetation Zone footprint in the vicinity of Rodd Avenue (site AkGs-468) will be determined during Detailed Design and/or upon further assessment if ground disturbance is proposed outside the Metrolinx ROW and within the 20 metre buffer. . If during detailed, potential impacts to areas that extend outside the 7 metre OCS/Vegetation Removal zone are identified, a review will be undertaken of potential disturbance to Indigenous and Euro-Canadian archaeological resources for these areas. As part of this review, further archaeological assessment work will be identified and undertaken for any areas anticipated to be impacted outside the 7 metre OCS/Vegetation Removal zone, such as Stage 1 Archaeological Assessment.

8.5 Land Use

Please refer to **Appendix E2** for a description of the methodology followed for assessment of land use impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in **Appendix E2**.

8.5.1 East Rail Maintenance Facility Tap and TPS Location

8.5.1.1 Potential Effects and Mitigation Measures

The proposed East Rail Maintenance Facility (ERMF) Tap and TPS site is located in an industrial area within the Town of Whitby currently being redeveloped for the future ERMF. The site is surrounded by open space or industrial / utility uses and is therefore compatible with these uses. Lands to the north and east have a combination of commercial (office) and retail uses. It is zoned *Restricted Industrial (M1)*, which neither permits nor precludes public utilities, the existing industrial nature of the site makes a zoning conflict unlikely.

Mitigation Measures

The Tap and TPS location is located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the Town of Whitby will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. This site is currently owned by Metrolinx.

8.5.1.2 Net Effects

Given the industrial nature of the site and surroundings, the Tap and TPS are not anticipated to negatively affect future development within this zoning context, and therefore no negative net effects to land use are expected.

8.5.2 Scarborough SWS & 25kV Feeder Route

8.5.2.1 Potential Effects and Mitigation Measures

The proposed Scarborough SWS site is located in the City of Toronto in an area of open space / storage area that runs alongside the rail corridor, and is surrounded by high-density residential areas over 100 metres away and commercial warehouses. A community garden is located between the site and the residential towers. The site is zoned *Utility and Transportation (UT)*, which permits public utilities on these lands. Given its current use as a storage area and the location of the rail corridor adjacent to the site, the SWS is consistent with existing and adjacent land uses.

The 25 kV Feeder route will run along the Stouffville and Lakeshore East rail corridors from the Scarborough TPS to the Scarborough SWS. From the Scarborough TPS to the Kennedy GO Station, land use consists of a hydro transmission corridor to the west of the rail corridor and low rise residential to the east. South of the Kennedy GO Station is characterized by parking lots, open spaces, Corvette Park, and varying densities of residential. As this connection is proposed to consist of an aerial connection along the existing rail corridor, there are no expected footprint impacts to adjacent land uses.

Mitigation Measures
The SWS and feeder are located in an area of compatible land use with the existing land use and zoning of the property. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Toronto will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. The site is currently owned by Metrolinx.

8.5.2.2 Net Effects

The SWS and feeder are not anticipated to negatively affect future development within this zoning context and therefore no negative net effects to land use are expected.

8.5.3 Durham SWS

8.5.3.1 Potential Effects and Mitigation Measures

The proposed Durham SWS is located in the City of Pickering in an area of primarily open space / hydro corridor, with the Pickering Playing Fields in the southeast corner, and is surrounded by commercial uses. The northeast corner has some tree cover / vacant lots, with ponding of water in a man-made structure.

The site is zoned *Storage and Light Manufacturing (M1, M1 (CR1))* and *M2 (CR1)*, which does not permit the erection of a public utility.

Official Plan Amendment 26, approved on March 4, 2015, proposes an extension of Plummer St. to the west, and a new north-south road from Bayly Street to Pickering Parkway (crossing Highway 401 via an overpass). Both of these proposed roads would bisect the Durham SWS site; however, the actual siting of the Durham SWS will be in the north east corner of the site (adjacent to Highway 401), and thus there are no conflicts expected between the SWS and these proposed roadways.

Mitigation Measures
The SWS is located in an area with a potential land use and zoning conflict. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Pickering will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. It is assumed that following a discussion with the City of Pickering and a review of the Detailed Design of the facility the SWS will be deemed consistent with adjacent uses due to the proximity to commercial uses, commercial and highway uses surrounding it, and the distance of the SWS from proposed roadways. Metrolinx is currently in discussions with the landowners with regards to this property and will reach an agreement prior to the commencement of construction activities.

8.5.3.2 Net Effects

The potential SWS is incompatible with existing zoning for the property; however, it is compatible with existing uses in and adjacent to the site and therefore no net effects to land use are expected.

8.5.4 Don Yard PS

8.5.4.1 Potential Effects and Mitigation Measures

The proposed Don Yard site is located within the City of Toronto in an area which is currently treed, surrounded by parking lot, the Don Valley Parkway, the rail corridor and treed area. The site is zoned *Utility and Transportation (UT)*, which permits a public utility to be located on the site and thus there is no conflict with the current zoning. Given the surrounding transportation and commercial uses, the PS is consistent with existing and adjacent land uses.

In addition the following developments are being undertaken/planned in the vicinity of the Don Yard PS:

- Don Mouth Naturalization and Port Land Flood Protection Project;
- Gardiner Expressway and Lakeshore Boulevard East Reconfiguration;
- First Gulf Development (Unilever Site);
- New SmartTrack station; and,

- Broadview Avenue Extension Project.

The Don Yard PS site is within the current and future floodplain of the Don River, and flood-proofing measures as part of the Don Mouth Naturalization and Port Land Flood Protection project will not protect this site from flooding. However, existing floodplains are being considered in the design of all TPFs, and these facilities will be designed such that the finished floor of the facility will be designed/built above the 100-year level. Therefore, there are no anticipated environmental impacts associated with placement of these facilities in a floodplain.

The Don Yard PS is within the study area for the Don Landing Re-Design and the Lower Don Trail Master plan. Based on a review of the conceptual design for the Don Landing Redesign, it was determined that neither option under consideration is anticipated to be affected by the location of the Don Yard PS. The proposal redesign will occur on the western portion of the Don River, and the rail corridor segment in this area is above grade. Therefore no impacts to the Don Landing Re-Design are anticipated as a result of electrification.

East of the Don River, the corridor and Don Yard PS site fall within the boundaries of the Gardiner Expressway and Lakeshore Boulevard East Reconfiguration Environmental Assessment, which was completed concurrently with the GO Network Electrification TPAP. As a component of that study, a number of areas within the corridor are being examined for future redevelopment. During Detailed Design ongoing coordinate with City of Toronto and Waterfront Toronto will be required to minimize any impacts to both projects.

Lands south of the rail corridor between the Don Valley Parkway to the west, Lake Shore Boulevard to the south and Booth and Eastern Avenue to the east fall within the Unilever Precinct Plan, This planning study will develop a vision for a major employment area focused on office employment and retail space. In addition as per the Metrolinx Board Report "New Stations Update" issued December 2016, a new GO Station/Smart Track Station (the Don Yard/Unilever station) is to be located in the vicinity of the Don Yard PS and within the Unilever study site.

It is important to note that the access route to the Don Yard site will run along the rail corridor and open up on to Eastern Avenue. As planned within the Central Waterfront Secondary Plan, the route of the proposed Broadview Avenue extension may be located in the vicinity of the Don Yard PS site, and could conflict with the PS / access route.

Effective July 1, 2017, 22 major urban river valleys were added to the Greenbelt Plan and designated as Urban River Valley areas. The Urban River Valley designations serve to expand the Greenbelt and may be the setting for a variety of uses including recreational, cultural, tourism, and infrastructure required to support the surrounding urban areas. Lands within the Urban River Valley designation are subject to the policies of Section 6 of the Greenbelt Plan.

The Don Yard PS is sited in close proximity to the Urban River Valley lands of the Don River.The footprint of the Don Yard PS is not anticipated to encroach on these lands. If an unforeseen circumstance resulted in the need for the Don Yard PS to encroach on lands within the Greenbelt, the policies as stated in Section 6.2 of the Greenbelt Plan shall apply.

Mitigation Measures

The PS is located in an area with a potential land use and zoning conflict. Although Metrolinx and Hydro One as Provincial Agencies are not subject to municipal permits and approvals, our policy is to adhere to the intent of the relevant permits/approvals requirements to the greatest extent possible. However, further coordination (which may include a series of meetings, discussions, and agreements) with the City of Toronto will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. It is assumed that following this discussion and a review of the Detailed Design of the facility the PS will be deemed consistent with adjacent uses due to the proximity to industrial and commercial uses. The site is currently owned by Metrolinx.

Monitoring during Detailed Design process is recommended to ensure the proposed footprint remains consistent with the proposed Broadview Avenue extension, Gardiner Expressway and Lakeshore Boulevard East Reconfiguration and Unilever Station design. See the Land Use and Socio-Economic Impact Assessment (Appendix E) for more information on conformity and compliance with the Greenbelt Plan.

8.5.4.2 Net Effects

The potential PS is incompatible with existing zoning for the property; however, it is compatible with existing uses in and adjacent to the site and therefore no negative net effects to land use are expected.

8.5.5 OCS & Bridges: Section LSE-1- – Don Yard Layover to Danforth Station

8.5.5.1 Potential Effects and Mitigation Measures

OCS

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

The corridor segment is within the study area for the Don Landing Re-Design and the Lower Don Trail Master plan. Based on a review of the conceptual design for the Don Landing Redesign it was determined that the rail corridor segment in this area is above grade, and outside of the proposed Study Area. Therefore no impacts to the Don Landing Re-Design are anticipated as a result of electrification.

Bridges

None of the 15 structures within LSE-1 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

Seven structures (Pape Avenue Pedestrian Bridge, Main Street Bridge, Gerrard Street East Bridge, Carlaw Ave Bridge, Eastern Avenue Bridge, Don River and Don Valley Pkwy Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with these modifications. A full listing of the bridges within the Lakeshore East Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures
No mitigation measures are required.

8.5.5.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSE-1. There are no anticipated net effects from the replacement and modifications of bridges within LSE-1.

8.5.6 OCS & Bridges: Section LSE-2 – Danforth Station to Scarborough Station

8.5.6.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

Of the six structures in LSE-2, one bridge (Birchmount Road Bridge) has a vertical clearance issue (i.e., does not meet the minimum clearance requirement for electrification) which may require track lowering in order to accommodate electrification infrastructure. Based on the conceptual design for this modification it has been assumed that impacts are likely to be contained within the Metrolinx Right of Way (ROW), and no land use effects are anticipated.

Additionally, three bridges (Kennedy Road Bridge, Birchmount Road Bridge, and Danforth Avenue Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with these modifications. A full listing of the bridges within the Lakeshore East Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures
No mitigation measures are required.

8.5.6.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSE-2.There are no anticipated net effects from the track lowering and modifications of bridges within LSE-2.

8.5.7 OCS & Bridges: Section LSE-3 –Scarborough Station to Guildwood Station

8.5.7.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the seven structures within LSE-3 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However, five structures (Kingston Road Bridge, Markham Road Bridge, Eglinton Ave Bridge, Midland Avenue Bridge and St. Clair Ave East Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with this modification. A full listing of the bridges within the Lakeshore East Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

8.5.7.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSE-3. There are no anticipated net effects from the modifications of bridges within LSE-3.

8.5.8 OCS & Bridges: Section LSE-4 –Guildwood Station to Rouge Hill Station

8.5.8.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the three structures within LSE-4 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However, one bridge (Highland Creek Bridge) will require the addition of OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with these modifications. A full listing of the bridges within the Lakeshore East Corridor is provided in Section 3 of Volume 1 of the EPR.

8.5.9 OCS & Bridges: Section LSE-5 – Rouge Hill Station to Pickering Station

8.5.9.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the six structures within LSE-5 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However, four structures (Whites Road Bridge, Granite Court Bridge, Rouge River and Liverpool Road Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with this modification. A full listing of the bridges within the Lakeshore East Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

8.5.9.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSE-5. There are no anticipated net effects from the modifications of bridges within LSE-5.

8.5.10 OCS & Bridges: Section LSE-6 – Pickering Station to Ajax Station

8.5.10.1 Potential Effects and Mitigation Measures

The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the four structures within LSE-6 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

One pedestrian bridge (Pickering North Pedestrian Bridge) may require modification in order to accommodate the inclusion of bridge barriers. Additionally three bridges (Brock Road Bridge, Duffins Creek Bridge and Church Street Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with these modifications. A full listing of the bridges within the Lakeshore East Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures
No mitigation measures are required.

8.5.10.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSE-6. There are no anticipated net effects from the modifications of bridges within LSE-6.

8.5.11 OCS & Bridges: Section LSE-7 – Ajax Station to Whitby Station

8.5.11.1 Potential Effects and Mitigation Measures

OCS
The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges
None of the seven structures within LSE-7 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

However, three bridges (Hardwood Avenue South, Lakeridge Road and Henry Street Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with this modification. A full listing of the bridges within the Lakeshore East Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures
No mitigation measures are required.

8.5.11.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSE-7. There are no anticipated net effects from the modifications of bridges within LSE-7.

8.5.12 OCS & Bridges: Section LSE-8 – Whitby Station to Oshawa Station

8.5.12.1 Potential Effects and Mitigation Measures

OCS
The OCS infrastructure will be located within the rail ROW in this section, though there are some areas where engineering solutions will be required to keep OCS structures within the ROW. The proposed design solutions and where they will occur will be finalized in the Detailed Design phase of the project. There are no expected footprint effects as a result of this activity.

Bridges

None of the seven structures within LSE-8 are expected to have vertical clearance issues (i.e., do not meet the minimum clearance requirement for electrification).

One pedestrian bridge (GO Station Whitby Pedestrian Bridge) may require modification in order to accommodate the inclusion of bridge barriers. Additionally three bridges (Brock Street South Bridge, Victoria Street Bridge and Thickson Road Bridge) will require the addition of bridge barriers and/or OCS attachments in order to accommodate electrification infrastructure, there are no land use effects associated with these modifications. A full listing of the bridges within the Lakeshore East Corridor is provided in Section 3 of Volume 1 of the EPR.

Mitigation Measures

No mitigation measures are required.

8.5.12.2 Net Effects

There are no anticipated net effects from the construction of OCS infrastructure along LSE-8. There are no anticipated net effects from the modifications of bridges within LSE-8.

8.6 Socio-economic

Please refer to **Appendix E2** for a description of the methodology followed for assessment of socio-economic impacts. Additional details can be found in the Land Use and Socio-Economic Impact Assessment Report contained in **Appendix E2**.

8.6.1 East Rail Maintenance Facility Tap and TPS Location

8.6.1.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed ERMF Tap and TPS site and therefore there will be no footprint effects to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Lakeshore East Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 8.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 8.8 and 8.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 8.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 8.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures

Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSE corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

8.6.1.2 Net Effects

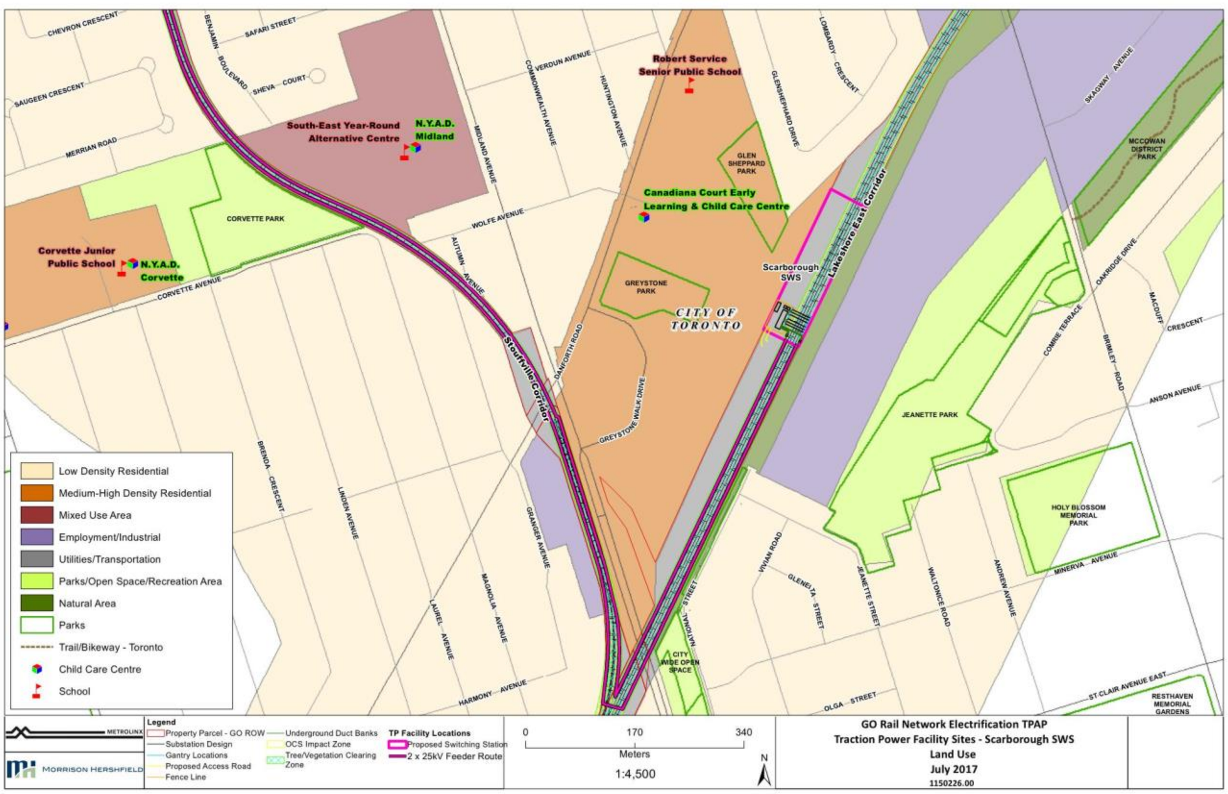
Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

8.6.2 Scarborough SWS & 25 kV Feeder

8.6.2.1 Potential Effects and Mitigation Measures

The closest sensitive facility is approximately 230 metres away from the Scarborough SWS, and therefore there will be no footprint effects to sensitive facilities as shown in **Figure 8-15**.

Figure 8-15: - Sensitive Facilities in the vicnity of Scarborough SWS



There are over seven sensitive facilities within 500 metres of the 25 kV Feeder route, the closest being approximately 20 metres from the rail corridor. With the feeder running above the existing rail corridor, there will be no footprint effects to sensitive facilities, as shown in **Figure 8-16** and **Figure 8-17**.

Figure 8-16: - Sensitive Facilities in the vicinity of the Scarborough Feeder 1

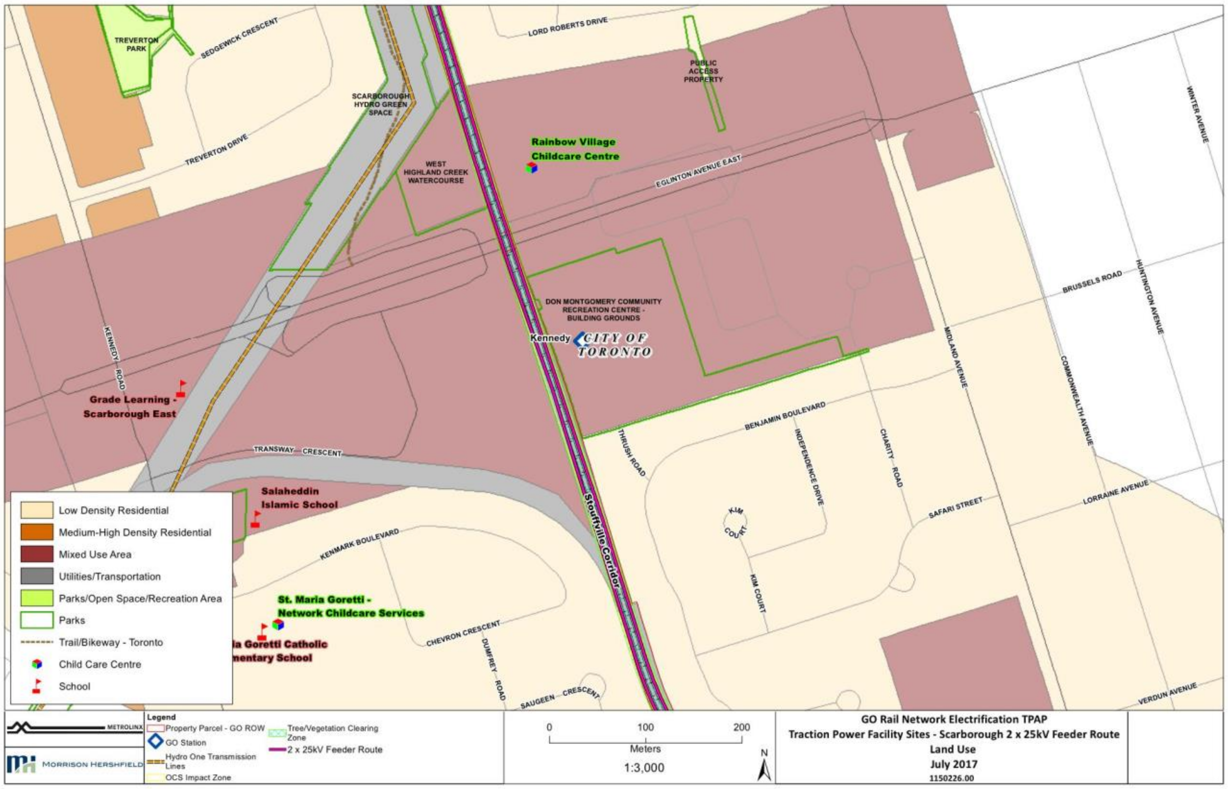


Figure 8-17:- Sensitive Facilities in the vicinity of the Scarborough Feeder 2

Other potential effects on the socio-economic environment associated with the Lakeshore East Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 8.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 8.8 and 8.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 8.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 8.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

The Scarborough SWS is within the vicinity of Greystone Park and Glenshepard Park. In addition the Gatineau Hydro Corridor Trail is located in the vicinity of the feeder route. The Gatineau Hydro Corridor Trail runs adjacent to the rail corridor from north of Kennedy GO Station to Jack Goodlad Park.

Based on the conceptual design developed for the Electrification Project as part of the TPAP, there are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required the City of Toronto will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSE corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

8.6.2.2 Net Effects

Net effects to sensitive facilities and recreational amenities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

8.6.3 Durham SWS

8.6.3.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed Durham SWS, and therefore there will be no footprint effects to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Lakeshore East Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 8.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 8.8 and 8.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 8.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 8.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSE corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

8.6.3.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

8.6.4 Don Yard PS

8.6.4.1 Potential Effects and Mitigation Measures

There are no sensitive facilities within 500 metres of the proposed Don Yard PS, and therefore there will be no footprint effects to sensitive facilities.

Other potential effects on the socio-economic environment associated with the Lakeshore East Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 8.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 8.8 and 8.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 8.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 8.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSE corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction.

8.6.4.2 Net Effects

Net effects to sensitive facilities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

8.6.5 OCS & Bridges: Sections LSE-1 to LSE-8

8.6.5.1 Potential Effects and Mitigation Measures

There are four sensitive receptor facilities (two child care centres and two long term care centre) in the vicinity of LSE-1, LSE-2 and LSE-7 as shown in **Table 8-32**. The closest of these is approximately 4.5 metres from the OCS impact zone, and therefore there may be some footprint effects to this sensitive facility.

Table 8-32: Sensitive Facilities within the vicinity of LSE-1 and LSE-7

Corridor Segment	Type	Name	Address	Distance from 5 metre OCS Impact Zone
LSE-1	Child Care Centre	Le Petit Chaperon Rouge – Jones	343 Jones Ave, Toronto	12 metres
LSE-1	Child Care Centre	Enderby (Woodgreen)	118 Enderby Rd, Toronto	35 metres
LSE-2	Long Term Care Centre	Chester Village	355 Danforth Avenue	4.5 metres
LSE-7	Long Term Care Centre	Ballycliffe Lodge Nursing Home	70 Station St, Ajax	20 metres

Other potential effects on the socio-economic environment associated with the Lakeshore Corridor have been assessed through other studies as part of the TPAP as follows:

- *Air Quality – see EPR Volume 3 Section 8.7 as well as the Air Quality Assessment Report contained in Appendix F)*
- *Noise and Vibration – see EPR Volume 3 Section 8.8 and8.9, as well as the Noise and Vibration Assessment Report contained in Appendix G*
- *Visual/Aesthetics – see EPR Volume 3 Section 8.10 as well as the Visual Assessment Report contained in Appendix H*
- *EMI/EMF – see EPR Volume 3 Section 8.12 as well as the EMI/EMF Assessment Report contained in Appendix J*

In order to avoid repeating the effects and mitigation measures as they pertain to these studies, and for further detail, please refer to the respective sections/reports outlined above.

There are a number of existing and proposed recreational amenities (parks and trails) within the vicinity of the Lakeshore East rail corridor, including a number of enhancement proposals within the southern segment of the Rouge National Urban Park. There are no anticipated adverse effects on these recreational amenities due to the implementation of electrification infrastructure identified as part of the conceptual design developed for this TPAP. Notwithstanding this, potential conflicts with recreational amenities will be reviewed in further detail during the Detailed Design phase, and if required Parks Canada and the relevant municipalities will be consulted to determine appropriate design solutions to mitigate/minimize any effects to recreational amenities. For more information on recreational amenities please see the Land Use and Socio-Economic Report contained in **Appendix E**.

Mitigation Measures
Ensure that the mitigation recommendations outlined in the respective reports listed above for the LSE corridor pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction. In order to mitigate impact to the sensitive facility at 355 Danforth Avenue further coordination (which may include a series of meetings, discussions, and agreements) with property owners will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses.

8.6.5.2 Net Effects

Based on the conceptual design developed, the OCS pole foundations can generally be accommodated within Metrolinx owned rail ROW, and no property impacts/conflicts are anticipated due to placement of OCS infrastructure along the corridors. Net effects to sensitive facilities and recreational amenities are not anticipated. For a summary of net effects related to Air Quality, Noise/Vibration, Visual/Aesthetics and EMI/EMF, refer to the respective reports listed above.

8.7 Air Quality

Please refer to Appendix F2 for a description of the methodology followed for assessment of air quality impacts. Additional details can be found in the Air Quality Impact Assessment Report contained in **Appendix F2.**

Electrification of the GO Rail Network will result in the reduction of diesel emissions (due to electric powered trains) which will have a benefit to local air quality near the rail corridors. The increased electricity generation will generate some pollutants through the combustion of fossil fuels, but overall the total air emissions will be lower as a result of the electrification. Similarly, the distribution of electricity via the Traction Power Facilities (and ancillary components such as gantries) and 25kV feeder routes does not produce air pollutants and therefore no impacts are anticipated and no mitigation measures are required. No significant changes to emissions or new sources of air emissions are expected as a result of modifying the existing East Rail maintenance facility to accommodate electric GO Trains. As such, no impacts are anticipated and no mitigation measures are required. As there will be a net benefit to air quality, post-construction monitoring is not necessary.

Further details related to the air quality assessment undertaken as part of the TPAP have been included in **Section 9.7.**

8.8 Noise

Recognizing that electrification of the GO network is a component of the over-arching Regional Express Rail plan, a comprehensive noise study was undertaken to examine the noise effects of the conversion to increased electric service[28] as part of the GO Rail Network Electrification TPAP.

The objective of the Noise study was to assess the effects on noise levels due to the conversion from existing/present day (2015) diesel-based GO service levels (referred to as the Future No-Build scenario) to the Electric (2025) GO RER electric-based service levels (referred to as the Future Build Scenario), and to subsequently determine whether mitigation measures may be required to address adverse noise effects. The scope of the study examined noise effects due to electric RER GO service along the rail corridors as well as noise effects related to the proposed Tap locations and Traction Power Facilities.

It is noted that numerous (i.e., thousands of) receptors were included in the noise model and considered as part of the analysis; however in order to present the results in a comprehensible way for purposes of reporting, representative receptors were chosen to demonstrate the general conditions and sound levels modelled in the area.

In order to carry out this detailed noise modeling exercise, several assumptions were established. Some of the key assumptions were as follows (note - this is not an exhaustive list, please refer to **Appendix G – Noise and Vibration Modelling Reports**):

- Present day 2015 diesel based GO service was modelled as the ‘base case’. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Future (2025) electric based GO RER service levels were modelled as the ‘future case’. It should be noted that the 2025 scenario includes a mixed GO fleet of diesel and electric trains. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports**.
- Freight traffic was included/considered in the modelling. Detailed rail traffic volumes are summarized in **Appendix G – Noise and Vibration Modelling Reports.**
- Data was gathered on existing noise barriers as well as planned noise barriers along the rail corridors and were included/considered in the modelling. Planned barriers were defined as: noise barriers that were identified/proposed as part of previously completed Metrolinx/GO Transit Environmental Assessment/TPAP studies. While it is recognized that not all of these barriers have been implemented at the time the assessment was completed, they were included/considered in the modelling. It should be noted these ‘planned barriers’ were not evaluated for technical feasibility.
- The scope of the study did not include a comprehensive analysis of the technical, operational, economical, or administrative feasibility of implementing noise mitigation measures. Rather, a preliminary assessment of technical feasibility was completed.

[28] *The electric RER scenario will entail a mixed diesel and electric fleet.*

- Noise sources associated with GO diesel and/or GO electric rail activity include:
    - Moving trains (applicable to all trains);
    - Idling trains at each station (applicable to all trains);
    - Road crossings signals (applicable to all trains);
    - Crossovers and Switches (applicable to all trains);
    - Wheel squeal (applicable to all trains); and
    - Pantograph (applicable to electric trains only).

A complete list of all assumptions applied can be found in the **Appendix G – Noise and Vibration Modelling Reports.**

Future/Committed Land Use

As per the 1995 MOEE / GO Transit Protocol, noise and vibration impacts are evaluated at lands which have been committed for (future) sensitive land uses. Committed uses beyond existing developments include: approved site plans, approved condominium plans or draft approved plans of subdivision. As part of carrying out the noise/vibration modelling work, this data was requested from the municipalities located within the Electrifciation TPAP study area. It should be noted that the only data that was available/provided was from the City of Toronto for approved building permits for new residential uses, therefore this data was reviewed and included in the assessment. Modelling was completed for all receptors identified through review of this data; results are presented for selected representative receptors.

For those sections of the corridor outside of the City of Toronto, a screening level assessment was conducted based on the limited detail provided in the available data on planned developments provided for municipalities other than the City of Toronto. The screening level assessment was designed to flag potential planned areas of development that may experience Adjusted Noise Impacts of greater than 5 dB based on the limited information available. This assessment was completed for the Electric RER scenario only and does not include the investigation of barriers within these areas. Notwithstanding this, the reports contained in **EPR Appendix G** include figures showing flagged potential planned areas of (future) development that were provided by their respective municipalities. Metrolinx will use this information for consideration of noise mitigation for new planned developments (if approved by the relevant municipalities) during the detail design stage as appropriate.

8.8.1 Credible Worst Case Scenario

The credible worst-case scenario is based on established service goals upon which the minimum infrastructure needs were determined. Increase to the service levels would require additional infrastructure due to operational and safety considerations. Current rail regulations are principally governed by Transport Canada and the US Federal Rail Administration; while Metrolinx, CN and CP are the principal sources of operational policies, standards, and rules. Other contributors to rail policy are the

American Railway Engineering and Maintenance of Way Association (AREMA) and the American Public Transportation Association (APTA). Collectively, these regulators and associations set limits on how railways are designed, operated and maintained. Therefore the proposed infrastructure and service levels represent a credible worst-case scenario.

8.8.2 Ambient Sound Levels

8.8.2.1 Along the Rail Corridors

According to the MOEE/GO Protocol, ambient noise is the sound existing at a receptor in the absence of all noise from the GO Transit rail project. Ambient noise can be used as a component of the sound level objective, in combination with the sound level from any existing rail activity. The ambient levels are primarily due to noise from local road traffic and surrounding industry.

Ambient noise from road traffic and other background noise sources including industry was assumed to be negligible compared to existing rail traffic noise at most receptors near the rail corridor, and not a significant factor in determining the desirable sound level objective. Therefore, ambient noise was not assessed.

8.8.2.2 At Traction Power Facilities

The sound level objective for traction power facilities is the higher of the exclusion limit values for L_{EQ} (1-hr) in NPC-300 or the minimum background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the traction power facilities. Therefore, the exclusion limits were adopted as the desired sound level objectives.

8.8.2.3 At Layover Sites

The sound level objectives for layover sites are the higher of the exclusion limits for L_{EQ} (1-hr) in the MOEE/GO Protocol or the minimum 1-hr L_{EQ} background sound levels that occur at receptors.

For the present study, the exclusion limits were assumed to be higher than the minimum background sound levels at receptors near the layover sites. Therefore, the exclusion limits were adopted as the desired sound level objectives.

8.8.3 Rail Activity Sound Levels

8.8.3.1 Cadna/A Modelling

The MOEE/GO Protocol stipulates the use of a model known as Sound from Trains Environmental Analysis Method (STEAM) for predicting rail traffic noise levels. STEAM was developed by the MOECC (MOECC, 1990). The present study deviated from this guidance in that the rail traffic noise levels were modelled using the “Federal Noise and Vibration Impact Assessment” (FTA Protocol) (FTA, 2006) incorporated in Cadna/A. Cadna/A allows for the modelling of complex railway schemes including curves, parallel and intervening tracks which cannot be easily assessed using STEAM. Cadna/A is software that includes the implementation of the FTA noise propagation algorithms and as well as aspects of ISO 9613 algorithms (ISO 1994, ISO 1996). Refer to **EPR Appendix G** for a copy of the correspondence from Metrolinx to MOECC on the use of CADNA/A.

The existing, Diesel RER and Electric RER noise levels were modelled for the entire Study Area. Results at each discrete receptor were used to establish the adjusted noise impact of the Diesel RER scenario relative to the existing scenario, as well as that of the Electric RER scenario relative to the existing scenario.

As per the FTA Protocol, the diesel trains and electric trains were modelled with a noise source height of 2.4 metres (8 ft) and 0.6 metres (2ft), respectively. The noise from a diesel train is dominated by the engine (located at approximately 2.4 metres above the rail) with a lesser contribution from the wheels (located at approximately 0.6 metres above the rail). The noise from an electric train, on the other hand, is dominated by wheel noise (emitted approximately 0.6 metres above the rail), since the electric engine is relatively quiet.

Topography was included in the Cadna/A model to take into consideration the elevation differences of the railway, receptors and the intervening terrain. The topographical features were assumed to be the same in the existing and future scenarios. High-resolution (i.e., 5 m) topographical information was obtained from public databases (Ministry of Natural Resources and Forestry, 2016).

"Retained" Noise Barriers

The diesel and electric locomotives were defined using the FTA standards implemented into Cadna/A. At the time of the original noise assessment, the electric locomotive train type was defined mathematically within Cadna/A with a "K" constant[29] that differed from the "K" constant defined in the FTA model. Metrolinx presented the results of the preliminary noise modelling for electric RER service at a series of public consultations throughout the TPAP.

Following the original assessment, an option within Cadna/A to use the "K" constant which corresponds to the FTA model was created by Datakustik, the developers of the Cadna/A software. Re-assessment using this updated Cadna/A option showed that a limited number of areas where mitigation was previously identified using the preliminary noise modelling no longer achieves an increase of 5 dB or more with the updated Cadna/A noise modelling. This was a result of the correction to the noise modelling input that more accurately reflects the quieter nature of electrified locomotives. Metrolinx believes these supplemental areas should still be included for consideration of noise mitigation. As a result, the locations of these particular mitigation barriers are identified as "retained mitigation barriers" throughout **EPR Appendix G**, and in the mapping provided in **EPR Appendix S**. Refer to the orange coloured lines/symbols shown on the Lakeshore East Corridor **EPR Appendix S** maps.

[29] The "K" constant is un unnamed parameter in the FTA calculations, which describes the locomotive type (i.e., passenger diesel, electric, DMU, etc.)

8.8.4 Traction Power Facilities – Predicted Noise Impacts

Generally, the traction power substations are comprised of two power transformers and a control / switchgear room and the paralleling stations and switching stations are comprised of two autotransformers and a control / switchgear room.

The sound power level generated by a typical 10 MVA transformer, estimated at approximately 87 dBA (Metrolinx, 2014), was used as an estimate for the power transformers at the traction power substations and the autotransformers at the switching stations. The MOECC requires that a 5 dB tonal penalty be applied to sources exhibiting a humming characteristic. As transformers are known to exhibit tonal characteristics, the 5 dB penalty was applied to all the transformers.

The noise impacts from the traction power facilities, as part of the Electric RER scenario, were evaluated at nearby receptors and are summarised in **Table 8-33**. The figures contained in **Appendix S** show the receptors for each Traction Power Facility. The predicted noise impacts from the traction power facilities at nearby receptors were below the MOECC applicable exclusion limits. Therefore, no mitigation measures were investigated for these facilities.

Table 8-33: Noise Impacts – Lakeshore East Traction Power Facilities

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
R001	Don Yard PS	Façade	Daytime	35	Class 1	50	Yes
		Façade	Evening	35		50	Yes
		Façade	Nighttime	35		45	Yes
		Outdoor Area	Daytime	34		50	Yes
		Outdoor Area	Evening	34		50	Yes
R002	Don Yard PS	Façade	Daytime	17	Class 1	50	Yes
		Façade	Evening	17		50	Yes
		Façade	Nighttime	17		45	Yes
		Outdoor Area	Daytime	15		50	Yes
		Outdoor Area	Evening	15		50	Yes
R003	Don Yard PS	Façade	Daytime	23	Class 1	50	Yes
		Façade	Evening	23		50	Yes
		Façade	Nighttime	23		45	Yes
		Outdoor Area	Daytime	21		50	Yes
		Outdoor Area	Evening	21		50	Yes
R004	Don Yard PS	Façade	Daytime	15	Class 1	50	Yes
		Façade	Evening	15		50	Yes
		Façade	Nighttime	15		45	Yes
		Outdoor Area	Daytime	11		50	Yes
		Outdoor Area	Evening	11		50	Yes
R005	Don Yard PS	Façade	Daytime	18	Class 1	50	Yes
		Façade	Evening	18		50	Yes
		Façade	Nighttime	18		45	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Daytime	16		50	Yes
		Outdoor Area	Evening	16		50	Yes
R006	Don Yard PS	Façade	Daytime	19	Class 1	50	Yes
		Façade	Evening	19		50	Yes
		Façade	Nighttime	19		45	Yes
		Outdoor Area	Daytime	17		50	Yes
		Outdoor Area	Evening	17		50	Yes
R007	Don Yard PS	Façade	Daytime	18	Class 1	50	Yes
		Façade	Evening	18		50	Yes
		Façade	Nighttime	18		45	Yes
		Outdoor Area	Daytime	16		50	Yes
		Outdoor Area	Evening	16		50	Yes
R008	Don Yard PS	Façade	Daytime	16	Class 1	50	Yes
		Façade	Evening	16		50	Yes
		Façade	Nighttime	16		45	Yes
		Outdoor Area	Daytime	14		50	Yes
		Outdoor Area	Evening	14		50	Yes
R009	Don Yard PS	Façade	Daytime	14	Class 1	50	Yes
		Façade	Evening	14		50	Yes
		Façade	Nighttime	14		45	Yes
		Outdoor Area	Daytime	13		50	Yes
		Outdoor Area	Evening	13		50	Yes
R010A	Don Yard PS	Façade	Daytime	9	Class 1	50	Yes
		Façade	Evening	9		50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
		Façade	Nighttime	9		45	Yes
		Outdoor Area	Daytime	4		50	Yes
		Outdoor Area	Evening	4		50	Yes
R010B	Don Yard PS	Façade	Daytime	13	Class 1	50	Yes
		Façade	Evening	13		50	Yes
		Façade	Nighttime	13		45	Yes
		Outdoor Area	Daytime	11		50	Yes
		Outdoor Area	Evening	11		50	Yes
R011	Don Yard PS	Façade	Daytime	12	Class 1	50	Yes
		Façade	Evening	12		50	Yes
		Façade	Nighttime	12		45	Yes
		Outdoor Area	Daytime	11		50	Yes
		Outdoor Area	Evening	11		50	Yes
R012	Don Yard PS	Façade	Daytime	12	Class 1	50	Yes
		Façade	Evening	12		50	Yes
		Façade	Nighttime	12		45	Yes
		Outdoor Area	Daytime	9		50	Yes
		Outdoor Area	Evening	9		50	Yes
R037B	Scarborough SWS	Façade	Daytime	12	Class 1	50	Yes
		Façade	Evening	12		50	Yes
		Façade	Nighttime	12		45	Yes
		Outdoor Area	Daytime	10		50	Yes
		Outdoor Area	Evening	10		50	Yes
R038		Façade	Daytime	12	Class 1	50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
	Scarborough SWS	Façade	Evening	12		50	Yes
		Façade	Nighttime	12		45	Yes
		Outdoor Area	Daytime	11		50	Yes
		Outdoor Area	Evening	11		50	Yes
R039	Scarborough SWS	Façade	Daytime	13	Class 1	50	Yes
		Façade	Evening	13		50	Yes
		Façade	Nighttime	13		45	Yes
		Outdoor Area	Daytime	12		50	Yes
		Outdoor Area	Evening	12		50	Yes
R040	Scarborough SWS	Façade	Daytime	18	Class 1	50	Yes
		Façade	Evening	18		50	Yes
		Façade	Nighttime	18		45	Yes
		Outdoor Area	Daytime	11		50	Yes
		Outdoor Area	Evening	11		50	Yes
R041A	Scarborough SWS	Façade	Daytime	19	Class 1	50	Yes
		Façade	Evening	19		50	Yes
		Façade	Nighttime	19		45	Yes
		Outdoor Area	Daytime	16		50	Yes
		Outdoor Area	Evening	16		50	Yes
R041B	Scarborough SWS	Façade	Daytime	24	Class 1	50	Yes
		Façade	Evening	24		50	Yes
		Façade	Nighttime	24		45	Yes
		Outdoor Area	Daytime	23		50	Yes
		Outdoor Area	Evening	23		50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
R042	Scarborough SWS	Façade	Daytime	28	Class 1	50	Yes
		Façade	Evening	28		50	Yes
		Façade	Nighttime	28		45	Yes
		Outdoor Area	Daytime	27		50	Yes
		Outdoor Area	Evening	27		50	Yes
R043	Scarborough SWS	Façade	Daytime	26	Class 1	50	Yes
		Façade	Evening	26		50	Yes
		Façade	Nighttime	26		45	Yes
		Outdoor Area	Daytime	24		50	Yes
		Outdoor Area	Evening	24		50	Yes
R044	Scarborough SWS	Façade	Daytime	34	Class 1	50	Yes
		Façade	Evening	34		50	Yes
		Façade	Nighttime	34		45	Yes
		Outdoor Area	Daytime	32		50	Yes
		Outdoor Area	Evening	32		50	Yes
R045	Scarborough SWS	Façade	Daytime	31	Class 1	50	Yes
		Façade	Evening	31		50	Yes
		Façade	Nighttime	31		45	Yes
		Outdoor Area	Daytime	29		50	Yes
		Outdoor Area	Evening	29		50	Yes
R046	Scarborough SWS	Façade	Daytime	39	Class 1	50	Yes
		Façade	Evening	39		50	Yes
		Façade	Nighttime	39		45	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
		Outdoor Area	Daytime	38		50	Yes
		Outdoor Area	Evening	38		50	Yes
R047	Scarborough SWS	Façade	Daytime	18	Class 1	50	Yes
		Façade	Evening	18		50	Yes
		Façade	Nighttime	18		45	Yes
		Outdoor Area	Daytime	16		50	Yes
		Outdoor Area	Evening	16		50	Yes
R048	Scarborough SWS	Façade	Daytime	15	Class 1	50	Yes
		Façade	Evening	15		50	Yes
		Façade	Nighttime	15		45	Yes
		Outdoor Area	Daytime	14		50	Yes
		Outdoor Area	Evening	14		50	Yes
R049	Scarborough SWS	Façade	Daytime	18	Class 1	50	Yes
		Façade	Evening	18		50	Yes
		Façade	Nighttime	18		45	Yes
		Outdoor Area	Daytime	17		50	Yes
		Outdoor Area	Evening	17		50	Yes
R050	Scarborough SWS	Façade	Daytime	13	Class 1	50	Yes
		Façade	Evening	13		50	Yes
		Façade	Nighttime	13		45	Yes
		Outdoor Area	Daytime	11		50	Yes
		Outdoor Area	Evening	11		50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
R080	Durham SWS	Façade	Daytime	9	Class 1	50	Yes
		Façade	Evening	9		50	Yes
		Façade	Nighttime	9		45	Yes
		Outdoor Area	Daytime	7		50	Yes
		Outdoor Area	Evening	7		50	Yes
R081	Durham SWS	Façade	Daytime	21	Class 1	50	Yes
		Façade	Evening	21		50	Yes
		Façade	Nighttime	21		45	Yes
		Outdoor Area	Daytime	19		50	Yes
		Outdoor Area	Evening	19		50	Yes
R082	Durham SWS	Façade	Daytime	34	Class 1	50	Yes
		Façade	Evening	34		50	Yes
		Façade	Nighttime	34		45	Yes
		Outdoor Area	Daytime	33		50	Yes
		Outdoor Area	Evening	33		50	Yes
R083	Durham SWS	Façade	Daytime	18	Class 1	50	Yes
		Façade	Evening	18		50	Yes
		Façade	Nighttime	18		45	Yes
		Outdoor Area	Daytime	17		50	Yes
		Outdoor Area	Evening	17		50	Yes
R092	ERMF TPS	Façade	Daytime	18	Class 2	50	Yes
		Façade	Evening	18		50	Yes

Receptor ID	Nearby	Evaluation Location	Period [1]	Predicted Noise Levels (dBA)	Exclusion Limit Classification	Exclusion Limit[2] (dBA)	Compliance with Performance Limit (Yes/No)
		Façade	Nighttime	18		45	Yes
		Outdoor Area	Daytime	17		50	Yes
		Outdoor Area	Evening	17		45	Yes

Notes:
[1] Daytime occurs from 0700-1900h. Evening occurs from 1900h-2300h. Nighttime occurs from 2300-0700h.

8.8.5 Noise Impacts from Layover Sites

The noise impacts from the Henry and Oshawa layover sites were evaluated at nearby receptors and are summarised in **Table 8-34**. The predicted noise impacts from the layover sites at nearby receptors were below the MOEE/GO Protocol applicable exclusion limit of 55 dBA. Therefore, no mitigation measures were investigated for these facilities.

Table 8-34: Noise Impacts of the Electric RER Scenario – Lakeshore East Layover Sites

Receptor ID	Existing					Electric RER			
	Layover Facility	Evaluation Location	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit [1] (dBA)	Compliance with Performance Limit (Yes/No)	Layover Facility	Predicted 1-hr LEQ Noise Levels (dBA)	Exclusion Limit[1] (dBA)	Compliance with Performance Limit (Yes/No)
R088	Henry Layover	Outdoor Area	42	55	Yes	Henry Layover	42	55	Yes
		Façade	44	55	Yes		44	55	Yes
R089		Outdoor Area	45	55	Yes		45	55	Yes
		Façade	50	55	Yes		50	55	Yes
R090		Outdoor Area	42	55	Yes		43	55	Yes
		Façade	45	55	Yes		45	55	Yes
R091		Outdoor Area	31	55	Yes	Henry Layover / EMRF Layover	38	55	Yes
		Façade	33	55	Yes		41	55	Yes
R092	Oshawa Layover	Outdoor Area	27	55	Yes	EMRF Layover / Oshawa Layover	35	55	Yes
		Façade	34	55	Yes		39	55	Yes

Notes:
[1] The LEQ is evaluated for any 1-hour period.

8.8.6 Lakeshore East Corridor - Adjusted Noise Impact of the Electric RER Scenario

The following section summarizes the results of the noise modelling analysis for the Lakeshore East corridor. The Adjusted Noise Impact between Existing and Electric RER noise levels for Lakeshore East is summarised in **Table 8-35.**

Impact ratings for the evaluated 104 representative receptors can be summarised as follows:

- 74 daytime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 26 daytime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB;
- 4 daytime Adjusted Noise Impacts were deemed to be Significant (i.e., between 5 and 9.99 dB increase).
- 57 nighttime Adjusted Noise Impacts were deemed to be Insignificant (i.e., less than 2.99 dB);
- 18 nighttime Adjusted Noise Impacts were deemed to be Noticeable (i.e., between 3 and 4.99 dB); and
- 29 nighttime Adjusted Noise Impacts were deemed to be Significant (i.e., between 5 and 9.99 dB increase).

Mitigation measures were investigated for all receptors with a Significant Adjusted Noise Impact (i.e., between 5 and 9.99 dB increase) in accordance with the MOEE/GO Protocol. The Adjusted Noise Impacts were predicted to be Significant or greater for 28 receptors.

Table 8-35: Adjusted Noise Impacts of the Electric RER Scenario in Comparison to Existing GO Service – Lakeshore East Corridor

Receptor ID	Period	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Post-Project Noise (dBA)				
R001	Daytime	N/A	55.0	55.0	N/A	58.9	58.9	3.9	Noticeable	No	Yes
	Nighttime	N/A	50.8	50.8	N/A	55.9	55.9	5.1	Significant	Yes	
R002	Daytime	N/A	66.8	66.8	N/A	70.9	70.9	4.1	Noticeable	No	Yes
	Nighttime	N/A	61.9	61.9	N/A	67.6	67.6	5.7	Significant	Yes	
R003	Daytime	N/A	64.8	64.8	N/A	69.3	69.3	4.5	Noticeable	No	Yes
	Nighttime	N/A	60.1	60.1	N/A	65.9	65.9	5.8	Significant	Yes	
R004	Daytime	N/A	59.0	59.0	N/A	60.7	60.7	1.7	Insignificant	No	No
	Nighttime	N/A	55.4	55.4	N/A	58.8	58.8	3.4	Noticeable	No	
R005	Daytime	N/A	69.0	69.0	N/A	73.7	73.7	4.7	Noticeable	No	Yes
	Nighttime	N/A	64.0	64.0	N/A	70.2	70.2	6.2	Significant	Yes	
R006	Daytime	N/A	63.0	63.0	N/A	67.1	67.1	4.1	Noticeable	No	Yes
	Nighttime	N/A	58.9	58.9	N/A	64.0	64.0	5.1	Significant	Yes	
R007	Daytime	N/A	64.5	64.5	N/A	68.9	68.9	4.4	Noticeable	No	Yes
	Nighttime	N/A	60.2	60.2	N/A	65.4	65.4	5.2	Significant	Yes	
R008	Daytime	N/A	64.1	64.1	N/A	68.1	68.1	4.0	Noticeable	No	Yes
	Nighttime	N/A	60.3	60.3	N/A	65.8	65.8	5.5	Significant	Yes	
R009	Daytime	N/A	59.5	59.5	N/A	63.4	63.4	3.9	Noticeable	No	Yes
	Nighttime	N/A	55.5	55.5	N/A	60.9	60.9	5.4	Significant	Yes	
R010A	Daytime	N/A	62.1	62.1	N/A	65.8	65.8	3.7	Noticeable	No	Yes
	Nighttime	N/A	57.7	57.7	N/A	62.7	62.7	5.0	Significant	Yes	
R010B	Daytime	N/A	60.1	60.1	N/A	63.6	63.6	3.5	Noticeable	No	No

Receptor ID	Period	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Post-Project Noise (dBA)				
	Nighttime	N/A	55.9	55.9	N/A	60.8	60.8	4.9	Noticeable	No	
R011	Daytime	N/A	58.2	58.2	N/A	63.3	63.3	5.1	Significant	Yes	Yes
	Nighttime	N/A	53.5	53.5	N/A	59.9	59.9	6.4	Significant	Yes	
R012	Daytime	N/A	64.9	64.9	N/A	71.6	71.6	6.7	Significant	Yes	Yes
	Nighttime	N/A	61.8	61.8	N/A	69.3	69.3	7.5	Significant	Yes	
R013	Daytime	N/A	64.4	64.4	N/A	68.3	68.3	3.9	Noticeable	No	No
	Nighttime	N/A	60.0	60.0	N/A	64.8	64.8	4.8	Noticeable	No	
R014	Daytime	N/A	57.7	57.7	N/A	62.6	62.6	4.9	Noticeable	No	Yes
	Nighttime	N/A	53.3	53.3	N/A	59.3	59.3	6.0	Significant	Yes	
R015	Daytime	N/A	63.7	63.7	N/A	68.6	68.6	4.9	Noticeable	No	Yes
	Nighttime	N/A	59.2	59.2	N/A	65.3	65.3	6.1	Significant	Yes	
R016A	Daytime	N/A	62.6	62.6	N/A	66.6	66.6	4.0	Noticeable	No	Yes
	Nighttime	N/A	58.2	58.2	N/A	63.2	63.2	5.0	Significant	Yes	
R016B	Daytime	N/A	59.0	59.0	N/A	63.1	63.1	4.1	Noticeable	No	Yes
	Nighttime	N/A	54.8	54.8	N/A	59.9	59.9	5.1	Significant	Yes	
R017	Daytime	N/A	61.1	61.1	N/A	63.2	63.2	2.1	Insignificant	No	Yes
	Nighttime	N/A	61.2	61.2	N/A	66.7	66.7	5.5	Significant	Yes	
R018	Daytime	N/A	52.2	55.0	N/A	55.5	55.5	0.5	Insignificant	No	No
	Nighttime	N/A	48.2	50.0	N/A	52.7	52.7	2.7	Insignificant	No	
R019A	Daytime	N/A	60.0	60.0	N/A	63.8	63.8	3.8	Noticeable	No	No
	Nighttime	N/A	56.0	56.0	N/A	60.8	60.8	4.8	Noticeable	No	
R019B	Daytime	N/A	62.7	62.7	N/A	66.1	66.1	3.4	Noticeable	No	No
	Nighttime	N/A	59.3	59.3	N/A	63.9	63.9	4.6	Noticeable	No	

Receptor ID	Period	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Post-Project Noise (dBA)				
R020	Daytime	N/A	62.6	62.6	N/A	63.3	63.3	0.7	Insignificant	No	Yes
	Nighttime	N/A	61.3	61.3	N/A	66.5	66.5	5.2	Significant	Yes	
R021A	Daytime	N/A	62.8	62.8	N/A	66.9	66.9	4.1	Noticeable	No	Yes
	Nighttime	N/A	58.5	58.5	N/A	63.7	63.7	5.2	Significant	Yes	
R021B	Daytime	N/A	67.5	67.5	N/A	71.9	71.9	4.4	Noticeable	No	Yes
	Nighttime	N/A	62.7	62.7	N/A	68.2	68.2	5.5	Significant	Yes	
R022A	Daytime	N/A	63.3	63.3	N/A	66.9	66.9	3.6	Noticeable	No	No
	Nighttime	N/A	59.1	59.1	N/A	63.5	63.5	4.4	Noticeable	No	
R022B	Daytime	N/A	61.7	61.7	N/A	64.9	64.9	3.2	Noticeable	No	No
	Nighttime	N/A	57.3	57.3	N/A	61.5	61.5	4.2	Noticeable	No	
R023A	Daytime	N/A	63.5	63.5	N/A	67.4	67.4	3.9	Noticeable	No	No
	Nighttime	N/A	59.0	59.0	N/A	64.0	64.0	5.0	Significant	No	
R023B	Daytime	N/A	64.1	64.1	N/A	64.9	64.9	0.8	Insignificant	No	Yes
	Nighttime	N/A	61.4	61.4	N/A	67.3	67.3	5.9	Significant	Yes	
R024A	Daytime	N/A	56.1	56.1	N/A	58.6	58.6	2.5	Insignificant	No	Yes
	Nighttime	N/A	56.3	56.3	N/A	61.7	61.7	5.4	Significant	Yes	
R024B	Daytime	N/A	54.7	55.0	N/A	56.7	56.7	1.7	Insignificant	No	No
	Nighttime	N/A	56.2	56.2	N/A	57.5	57.5	1.3	Insignificant	No	
R025	Daytime	N/A	51.5	55.0	N/A	52.5	52.5	-2.5	Insignificant	No	No
	Nighttime	N/A	51.1	51.1	N/A	52.9	52.9	1.8	Insignificant	No	
R026	Daytime	N/A	60.9	60.9	N/A	64.5	64.5	3.6	Noticeable	No	Yes
	Nighttime	N/A	56.0	56.0	N/A	61.0	61.0	5.0	Significant	Yes	
R027	Daytime	N/A	64.6	64.6	N/A	69.9	69.9	5.3	Significant	Yes	Yes

Receptor ID	Period	Existing: Predicted Ambient Noise Levels (dBA) [2]	Existing: Predicted Rail Noise Levels (dBA)	Existing: Pre-Project Noise (dBA) [3]	Electric RER: Predicted Ambient Noise Levels (dBA) [2]	Electric RER: Predicted Rail Noise Levels (dBA)	Electric RER: Post-Project Noise (dBA)	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
	Nighttime	N/A	60.0	60.0	N/A	66.5	66.5	6.5	Significant	Yes	
R028A	Daytime	N/A	53.4	55.0	N/A	57.0	57.0	2.0	Insignificant	No	No
	Nighttime	N/A	50.0	50.0	N/A	54.8	54.8	4.8	Noticeable	No	
R028B	Daytime	N/A	61.9	61.9	N/A	63.9	63.9	2.0	Insignificant	No	No
	Nighttime	N/A	57.7	57.7	N/A	61.4	61.4	3.7	Noticeable	No	
R029	Daytime	N/A	60.2	60.2	N/A	64.2	64.2	4.0	Noticeable	No	Yes
	Nighttime	N/A	55.8	55.8	N/A	61.0	61.0	5.2	Significant	Yes	
R030	Daytime	N/A	61.6	61.6	N/A	63.7	63.7	2.1	Insignificant	No	No
	Nighttime	N/A	57.6	57.6	N/A	61.3	61.3	3.7	Noticeable	No	
R031	Daytime	N/A	65.6	65.6	N/A	70.6	70.6	5.0	Significant	Yes	Yes
	Nighttime	N/A	61.0	61.0	N/A	67.1	67.1	6.1	Significant	Yes	
R032	Daytime	N/A	67.3	67.3	N/A	70.5	70.5	3.2	Noticeable	No	No
	Nighttime	N/A	63.1	63.1	N/A	67.0	67.0	3.9	Noticeable	No	
R033	Daytime	N/A	57.1	57.1	N/A	59.4	59.4	2.3	Insignificant	No	Yes
	Nighttime	N/A	53.1	53.1	N/A	58.1	58.1	5.0	Significant	Yes	
R034	Daytime	N/A	61.2	61.2	N/A	62.9	62.9	1.7	Insignificant	No	Yes
	Nighttime	N/A	58.7	58.7	N/A	63.9	63.9	5.2	Significant	Yes	
R035	Daytime	N/A	56.2	56.2	N/A	55.3	55.3	-0.9	Insignificant	No	No
	Nighttime	N/A	53.0	53.0	N/A	53.6	53.6	0.6	Insignificant	No	
R036A	Daytime	N/A	63.4	63.4	N/A	66.3	66.3	2.9	Insignificant	No	Yes
	Nighttime	N/A	59.8	59.8	N/A	65.2	65.2	5.4	Significant	Yes	
R036B	Daytime	N/A	53.5	55.0	N/A	57.5	57.5	2.5	Insignificant	No	No
	Nighttime	N/A	50.0	50.0	N/A	54.5	54.5	4.5	Noticeable	No	

Receptor ID	Period	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Post-Project Noise (dBA)				
R037A	Daytime	N/A	54.2	55.0	N/A	57.1	57.1	2.1	Insignificant	No	No
	Nighttime	N/A	55.5	55.5	N/A	60.0	60.0	4.5	Noticeable	No	
R037B	Daytime	N/A	52.0	55.0	N/A	55.9	55.9	0.9	Insignificant	No	No
	Nighttime	N/A	53.6	53.6	N/A	57.6	57.6	4.0	Noticeable	No	
R038	Daytime	N/A	49.0	55.0	N/A	52.5	52.5	-2.5	Insignificant	No	No
	Nighttime	N/A	46.9	50.0	N/A	50.5	50.5	0.5	Insignificant	No	
R039	Daytime	N/A	51.1	55.0	N/A	54.7	54.7	-0.3	Insignificant	No	No
	Nighttime	N/A	49.9	50.0	N/A	54.4	54.4	4.4	Noticeable	No	
R040	Daytime	N/A	52.7	55.0	N/A	55.7	55.7	0.7	Insignificant	No	No
	Nighttime	N/A	53.2	53.2	N/A	56.2	56.2	3.0	Noticeable	No	
R041A	Daytime	N/A	56.3	56.3	N/A	59.5	59.5	3.2	Noticeable	No	No
	Nighttime	N/A	52.4	52.4	N/A	56.3	56.3	3.9	Noticeable	No	
R041B	Daytime	N/A	61.3	61.3	N/A	61.9	61.9	0.6	Insignificant	No	No
	Nighttime	N/A	57.0	57.0	N/A	58.5	58.5	1.5	Insignificant	No	
R042	Daytime	N/A	58.4	58.4	N/A	60.6	60.6	2.2	Insignificant	No	No
	Nighttime	N/A	54.2	54.2	N/A	57.5	57.5	3.3	Noticeable	No	
R043	Daytime	N/A	63.0	63.0	N/A	64.4	64.4	1.4	Insignificant	No	No
	Nighttime	N/A	58.7	58.7	N/A	60.9	60.9	2.2	Insignificant	No	
R044	Daytime	N/A	58.5	58.5	N/A	59.9	59.9	1.4	Insignificant	No	No
	Nighttime	N/A	54.7	54.7	N/A	57.6	57.6	2.9	Insignificant	No	
R045	Daytime	N/A	62.7	62.7	N/A	64.5	64.5	1.8	Insignificant	No	No
	Nighttime	N/A	58.6	58.6	N/A	61.0	61.0	2.4	Insignificant	No	
R046	Daytime	N/A	59.6	59.6	N/A	60.6	60.6	1.0	Insignificant	No	No

Receptor ID	Period	Existing: Predicted Ambient Noise Levels (dBA) [2]	Existing: Predicted Rail Noise Levels (dBA)	Existing: Pre-Project Noise (dBA) [3]	Electric RER: Predicted Ambient Noise Levels (dBA) [2]	Electric RER: Predicted Rail Noise Levels (dBA)	Electric RER: Post-Project Noise (dBA)	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
	Nighttime	N/A	56.0	56.0	N/A	58.1	58.1	2.1	Insignificant	No	
R047	Daytime	N/A	48.6	55.0	N/A	46.4	46.4	-8.6	Insignificant	No	No
	Nighttime	N/A	47.1	50.0	N/A	45.6	45.6	-4.4	Insignificant	No	
R048	Daytime	N/A	60.7	60.7	N/A	59.1	59.1	-1.6	Insignificant	No	No
	Nighttime	N/A	56.4	56.4	N/A	55.7	55.7	-0.7	Insignificant	No	
R049	Daytime	N/A	52.5	55.0	N/A	52.3	52.3	-2.7	Insignificant	No	No
	Nighttime	N/A	48.8	50.0	N/A	49.1	49.1	-0.9	Insignificant	No	
R050	Daytime	N/A	52.3	55.0	N/A	48.9	48.9	-6.1	Insignificant	No	No
	Nighttime	N/A	55.4	55.4	N/A	50.2	50.2	-5.2	Insignificant	No	
R051	Daytime	N/A	54.3	55.0	N/A	51.1	51.1	-3.9	Insignificant	No	No
	Nighttime	N/A	50.3	50.3	N/A	47.9	47.9	-2.4	Insignificant	No	
R052	Daytime	N/A	57.3	57.3	N/A	54.6	54.6	-2.7	Insignificant	No	No
	Nighttime	N/A	52.9	52.9	N/A	51.4	51.4	-1.5	Insignificant	No	
R053	Daytime	N/A	59.9	59.9	N/A	58.8	58.8	-1.1	Insignificant	No	No
	Nighttime	N/A	56.9	56.9	N/A	58.1	58.1	1.2	Insignificant	No	
R054	Daytime	N/A	60.1	60.1	N/A	60.3	60.3	0.2	Insignificant	No	No
	Nighttime	N/A	57.1	57.1	N/A	58.4	58.4	1.3	Insignificant	No	
R055	Daytime	N/A	66.9	66.9	N/A	68.2	68.2	1.3	Insignificant	No	No
	Nighttime	N/A	62.6	62.6	N/A	64.4	64.4	1.8	Insignificant	No	
R056	Daytime	N/A	45.2	55.0	N/A	47.2	47.2	-7.8	Insignificant	No	No
	Nighttime	N/A	47.5	50.0	N/A	48.8	48.8	-1.2	Insignificant	No	
R057	Daytime	N/A	62.3	62.3	N/A	64.0	64.0	1.7	Insignificant	No	No
	Nighttime	N/A	59.2	59.2	N/A	61.2	61.2	2.0	Insignificant	No	

Receptor ID	Period	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Post-Project Noise (dBA)				
R058	Daytime	N/A	59.4	59.4	N/A	58.2	58.2	-1.2	Insignificant	No	No
	Nighttime	N/A	55.3	55.3	N/A	54.9	54.9	-0.4	Insignificant	No	
R059	Daytime	N/A	58.3	58.3	N/A	57.5	57.5	-0.8	Insignificant	No	No
	Nighttime	N/A	54.1	54.1	N/A	53.3	53.3	-0.8	Insignificant	No	
R060	Daytime	N/A	60.3	60.3	N/A	60.4	60.4	0.1	Insignificant	No	No
	Nighttime	N/A	56.2	56.2	N/A	56.0	56.0	-0.2	Insignificant	No	
R061	Daytime	N/A	61.9	61.9	N/A	63.8	63.8	1.9	Insignificant	No	No
	Nighttime	N/A	58.2	58.2	N/A	60.1	60.1	1.9	Insignificant	No	
R062	Daytime	N/A	57.0	57.0	N/A	59.3	59.3	2.3	Insignificant	No	No
	Nighttime	N/A	53.8	53.8	N/A	55.9	55.9	2.1	Insignificant	No	
R063	Daytime	N/A	58.3	58.3	N/A	60.3	60.3	2.0	Insignificant	No	No
	Nighttime	N/A	55.2	55.2	N/A	57.2	57.2	2.0	Insignificant	No	
R064	Daytime	N/A	60.6	60.6	N/A	61.7	61.7	1.1	Insignificant	No	No
	Nighttime	N/A	56.5	56.5	N/A	58.1	58.1	1.6	Insignificant	No	
R065	Daytime	N/A	61.5	61.5	N/A	62.1	62.1	0.6	Insignificant	No	No
	Nighttime	N/A	57.6	57.6	N/A	58.7	58.7	1.1	Insignificant	No	
R066	Daytime	N/A	57.0	57.0	N/A	57.2	57.2	0.2	Insignificant	No	No
	Nighttime	N/A	53.1	53.1	N/A	53.7	53.7	0.6	Insignificant	No	
R067	Daytime	N/A	56.3	56.3	N/A	57.3	57.3	1.0	Insignificant	No	No
	Nighttime	N/A	52.4	52.4	N/A	53.8	53.8	1.4	Insignificant	No	
R068	Daytime	N/A	66.3	66.3	N/A	67.1	67.1	0.8	Insignificant	No	No
	Nighttime	N/A	62.3	62.3	N/A	63.6	63.6	1.3	Insignificant	No	
R069	Daytime	N/A	58.4	58.4	N/A	59.7	59.7	1.3	Insignificant	No	No

Receptor ID	Period	Existing: Predicted Ambient Noise Levels (dBA) [2]	Existing: Predicted Rail Noise Levels (dBA)	Existing: Pre-Project Noise (dBA) [3]	Electric RER: Predicted Ambient Noise Levels (dBA) [2]	Electric RER: Predicted Rail Noise Levels (dBA)	Electric RER: Post-Project Noise (dBA)	Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
	Nighttime	N/A	54.6	54.6	N/A	56.3	56.3	1.7	Insignificant	No	
R070	Daytime	N/A	63.6	63.6	N/A	64.9	64.9	1.3	Insignificant	No	No
	Nighttime	N/A	60.5	60.5	N/A	62.9	62.9	2.4	Insignificant	No	
R071	Daytime	N/A	61.8	61.8	N/A	58.9	58.9	-2.9	Insignificant	No	No
	Nighttime	N/A	58.4	58.4	N/A	57.3	57.3	-1.1	Insignificant	No	
R072	Daytime	N/A	64.2	64.2	N/A	64.8	64.8	0.6	Insignificant	No	No
	Nighttime	N/A	60.0	60.0	N/A	60.6	60.6	0.6	Insignificant	No	
R073A	Daytime	N/A	62.4	62.4	N/A	63.6	63.6	1.2	Insignificant	No	No
	Nighttime	N/A	58.9	58.9	N/A	60.3	60.3	1.4	Insignificant	No	
R073B	Daytime	N/A	58.3	58.3	N/A	59.5	59.5	1.2	Insignificant	No	No
	Nighttime	N/A	54.6	54.6	N/A	56.2	56.2	1.6	Insignificant	No	
R074	Daytime	N/A	63.8	63.8	N/A	65.0	65.0	1.2	Insignificant	No	No
	Nighttime	N/A	60.2	60.2	N/A	61.9	61.9	1.7	Insignificant	No	
R075	Daytime	N/A	58.6	58.6	N/A	57.7	57.7	-0.9	Insignificant	No	No
	Nighttime	N/A	58.4	58.4	N/A	57.6	57.6	-0.8	Insignificant	No	
R076	Daytime	N/A	63.9	63.9	N/A	64.7	64.7	0.8	Insignificant	No	No
	Nighttime	N/A	60.4	60.4	N/A	62.3	62.3	1.9	Insignificant	No	
R077	Daytime	N/A	65.7	65.7	N/A	66.1	66.1	0.4	Insignificant	No	No
	Nighttime	N/A	62.6	62.6	N/A	64.8	64.8	2.2	Insignificant	No	
R078	Daytime	N/A	50.7	55.0	N/A	51.5	51.5	-3.5	Insignificant	No	No
	Nighttime	N/A	48.4	50.0	N/A	49.5	49.5	-0.5	Insignificant	No	
R079	Daytime	66.0	55.0	66.3	66.0	54.8	66.3	0.0	Insignificant	No	No
	Nighttime	63.0	57.3	64.0	63.0	58.5	64.3	0.3	Insignificant	No	

Receptor ID	Period	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Post-Project Noise (dBA)				
R080	Daytime	70.1	52.6	70.2	70.1	52.3	70.2	0.0	Insignificant	No	No
	Nighttime	64.0	47.8	64.1	64.0	49.8	64.2	0.1	Insignificant	No	
R081	Daytime	65.7	53.7	66.0	65.7	51.6	65.9	-0.1	Insignificant	No	No
	Nighttime	60.0	50.9	60.5	60.0	49.9	60.4	-0.1	Insignificant	No	
R082	Daytime	76.0	54.5	76.0	76.0	51.5	76.0	0.0	Insignificant	No	No
	Nighttime	69.5	51.3	69.6	69.5	49.6	69.5	0.0	Insignificant	No	
R083	Daytime	62.4	51.4	62.7	62.4	52.4	62.8	0.1	Insignificant	No	No
	Nighttime	61.5	48.6	61.7	61.5	50.4	61.8	0.1	Insignificant	No	
R084	Daytime	67.8	52.4	67.9	67.8	48.9	67.9	-0.1	Insignificant	No	No
	Nighttime	63.9	54.2	64.3	63.9	52.6	64.2	-0.1	Insignificant	No	
R085	Daytime	73.7	55.7	73.8	73.7	56.3	73.8	0.0	Insignificant	No	No
	Nighttime	67.4	52.3	67.5	67.4	54.2	67.6	0.1	Insignificant	No	
R086	Daytime	69.2	45.0	69.2	69.2	45.7	69.2	0.0	Insignificant	No	No
	Nighttime	65.9	48.8	66.0	65.9	49.7	66.0	0.0	Insignificant	No	
R087	Daytime	66.0	52.0	66.2	66.0	53.0	66.2	0.0	Insignificant	No	No
	Nighttime	60.5	51.3	61.0	60.5	52.8	61.2	0.2	Insignificant	No	
R088	Daytime	72.9	56.0	73.0	72.9	58.7	73.1	0.1	Insignificant	No	No
	Nighttime	66.5	53.2	66.7	66.5	55.9	66.9	0.2	Insignificant	No	
R089	Daytime	66.2	51.7	66.4	66.2	52.8	66.4	0.0	Insignificant	No	No
	Nighttime	61.6	51.0	62.0	61.6	53.2	62.2	0.2	Insignificant	No	
R090	Daytime	66.8	46.6	66.8	66.8	48.1	66.9	0.0	Insignificant	No	No

Receptor ID	Period	Existing			Electric RER			Adjusted Noise Impact (dB)	Adjusted Impact Rating	5 dB or Greater Increase? [4]	Investigate Mitigation?
		Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Pre-Project Noise (dBA) [3]	Predicted Ambient Noise Levels (dBA) [2]	Predicted Rail Noise Levels (dBA)	Post-Project Noise (dBA)				
	Nighttime	62.8	47.2	62.9	62.8	48.2	62.9	0.0	Insignificant	No	
R091	Daytime	N/A	61.3	61.3	N/A	58.4	58.4	-2.9	Insignificant	No	No
	Nighttime	N/A	58.9	58.9	N/A	56.0	56.0	-2.9	Insignificant	No	
R092	Daytime	N/A	44.0	55.0	N/A	39.4	39.4	-15.6	Insignificant	No	No
	Nighttime	N/A	44.6	50.0	N/A	41.6	41.6	-8.4	Insignificant	No	

Notes:
[1] The LEQ (Day) is evaluated for a 16-hour period (i.e., from 0700h to 2300h) and the LEQ (Night) is evaluated for an 8 hour period (i.e., from 2300h to 0700h).
[2] Predicted ambient noise levels are from the Highway 401 where it is located in close proximity to receptors. "N/A" means the ambient noise was assumed to be significantly lower than noise from existing rail activity and was therefore not assessed.
[3] The pre-project noise is the higher of the ambient sound level, combined with the existing rail activity, or 55 dBA (Daytime) / 50 dBA (Nighttime).
[4] The potential to mitigate is considered when a significant (or greater) impact is predicted. This is equivalent to an increase of 5 dB or greater, relative to the objective level, as per the MOEE / GO Protocol for Noise and Vibration Assessments. An adjusted noise impact greater than 5 dB requires the investigation of mitigation.

8.8.7 Retained Noise Barriers

he noise barriers that were recommended as a result of the *original assessment* were retained as part of the proposed mitigation. The locations of these barriers are shown as orange coloured lines/symbols shown on the Lakeshore East Corridor **EPR Appendix S** maps. The *original assessment* is defined as the previously completed noise assessment reflecting the electric locomotive train type defined mathematically within Cadna/A with a “K” constant that differed from the “K” constant defined in the FTA mode as described above.

8.8.8 Approach to Investigation of Mitigation - Operational Noise

Based on the Adjusted Noise Impacts resulting from a project, an investigation of noise mitigation measures is required. MOEE/GO Protocol includes the following mitigation guidance:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering, economic and administrative feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

For the purposes of this study, it was assumed that noise mitigation would be limited to locations within the GO Transit right-of-way, and to be considered feasible, the mitigation measures should achieve at least a 5 dB reduction in noise at the first row of affected receptors. The ID numbers of the barriers correspond to the ID numbers of the representative first row receptors.

If the Adjusted Noise Impact at a receptor is deemed significant during the daytime period, technical feasibility of a noise barrier was evaluated based on the noise reduction achieved during the daytime period only. Similarly, if the Adjusted Noise Impact at a receptor was deemed significant during nighttime period, technical feasibility of a noise barrier is evaluated based on the noise reduction achieved during the nighttime period only. If the Adjusted Noise Impacts at a receptor were deemed significant during both the daytime and nighttime periods and noise reduction resulting from a noise barrier is at least 5 dB in either the daytime or nighttime period, the noise barrier was deemed technically feasible.

Noise barriers can be formed of earthen berms, engineered noise walls, or some combination of the two. Where earthen berms are used, side slopes of 3:1 should be used for drainage and erosion control and right-of-way maintenance. Where noise walls are to be used, they should be free of gaps and cracks, and have a minimum surface density (mass per unit of face area) of 20 kg/m^2 (4 lb. per sq. ft.). It is preferable that barriers are sound absorptive at least on the railway side, and this is mandatory in situations where parallel barriers (e.g., barriers on both sides of a railway) are proposed.

GO Transit will use barriers with a height of 5 metres for all new or replacement noise barriers. Higher noise barriers require specially engineered footings, which may not be technically and/or economically feasible to implement. The investigation of mitigation was limited to noise barriers with heights of 5 metres.

During detailed design, each location identified as a technically feasible noise mitigation location along each rail corridor will be further reviewed to determine the administrative, operational, economic and technical feasibility and to further define what type of mitigation will be implemented.

An additional 6 barriers were recommended as a result of the original assessment and were retained as part of the proposed mitigation.

8.8.9 Lakeshore East Corridor - Investigation of Mitigation

The technically feasible and non-technically feasible noise barriers are shown in **Appendix S.** Of the 32 barrier groupings investigated for the Electric RER scenario, 26 are considered technically feasible, as they achieve at least a 5 dB reduction in sound levels at nearby receptors. For details regarding length of barrier, side of rail ROW, approximate number of receptors shielded by barrier, etc. please refer to **Appendix G - Noise and Vibration Assessment Report.**

For all locations where there will be a change in noise levels of 5dB or more and where noise barrier locations deemed either technically and non-technically feasible (as part of the study carried out for the TPAP), Metrolinx will undertake more detailed analysis during Detailed Design to assess technical, economic, administrative and operational feasibility as per the MOECC Protocol to finalize the type and locations of noise mitigation along the rail corridors. In addition, Metrolinx will investigate other forms of noise mitigation such as train technology, rail dampeners etc. during Detailed Design to assess feasibility. The MOEE/GO Protocol provides the following mitigation guidance with respect to noise mitigation measures:

- Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering and economic feasibility should be evaluated.
- If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective.

Metrolinx will continue to consult with the public during Detailed Design with respect to further assessment and implementation of noise mitigation along the rail corridors.

8.9 Vibration

The MOEE/GO Protocol outlines desired objectives for vibration levels from GO Transit projects. The requirement to investigate vibration mitigation focuses on the change between the existing vibration levels and the future vibration levels. Change in vibration levels may occur under the following circumstances: change in track alignment, addition of track, and change/addition of special track work (such as switches).

It should be noted that vibration impacts are associated with the characteristics of individual trains (especially the weight of the locomotive) and are not related to the increased rail traffic associated with future RER service.

Vibration effects were predicted in accordance with the methods of the United States Department of Transportation - Federal Transit Administration (FTA, 2006). Vibration levels were expressed in terms of root-mean-square (RMS) velocity in the vertical direction, which is the dominant axis for vibration generated from mobile sources such as trains and most closely correlated with human annoyance and perceptibility. The relative change between existing and future vibration levels is presented as a percentage. For further details ad supporting information please refer to **Appendix G - Noise and Vibration Assessment Report.**

8.9.1 Applicable Criteria

The desirable objective of the MOEE/GO Protocol is that the RMS velocity of vibration produced by the future GO Transit operations at a sensitive receptor should not exceed:

- 0.14 mm/s; or
- The existing vibration levels where existing operations already produce vibration that exceeds 0.14 mm/s.

Furthermore, the MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the RMS velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

The FTA vibration level predictions were calibrated by measuring existing vibration levels at a small selection of locations in the vicinity of the GO network. The measurements informed the selection of appropriate adjustment factors. The adjustment factors in the FTA vibration calculations account for:

- Vehicle speed;
- Track type and track conditions;
- Type of locomotive power; and
- Condition of wheels (i.e., wheel wear).

The intent of the MOEE/GO protocol's impact assessment is to evaluate change in vibration between the pre-project and post-project scenarios. One method (i.e. modelling) was chosen to evaluate both scenarios to ensure consistency. Comparing existing measured vibration levels to future modelled vibration levels inherently introduces an additional source of uncertainty into the impact assessment. For this reason, the assessment evaluates modelled existing vibration levels against modelled future vibration levels, as opposed to measured existing vibration levels against modelled future vibration level. At the detailed design stage, verification measurements of existing conditions at receptors where the greatest effect is expected and a reasonable number of additional receptors will be conducted to validate FTA vibration calculations.

A literature review was conducted to compare the gross weight of a diesel MP40 locomotive and an electric locomotive with a similar horsepower rating. It was determined that the difference in locomotive weight was not significant enough to have an impact on the vibration levels; therefore, a single set of predicted vibration levels applies to both diesel trains and electric trains.

8.9.2 Lakeshore East Corridor - Vibration Impacts Electric RER Scenario

Within the Lakeshore East corridor, receptors R021B, R023B, R037B and R043, near proposed new switches, and receptors R013, R027, R031 and R077, near proposed new track, were the closest receptors to a change in the track configuration that could affect vibration levels; therefore, the vibration assessment focused on these seven receptors.

The predicted existing and future vibration levels and change in vibration levels for a GO train pass-by, passenger train and a freight train pass-by are presented in **Table 8-36**.

The predicted change in vibration level between existing conditions and future conditions is in excess of the 25% increase threshold set out in the MOEE/GO Protocol, at all of the identified receptors except R027 and R031. In the case of receptors R021B and R023B, the threshold is exceeded during pass-bys of GO trains, other passenger trains and freight trains. In the case of receptors R037B and R043, the threshold is exceeded during pass-bys of GO trains and freight trains. In the case of R013 and R077, the threshold is exceeded during freight pass-bys only. The approximate locations of trackwork and switches requiring mitigation are presented in **Appendix S**. The recommended vibration mitigation is identified as ballast mats though consideration to other mitigation options, such as under sleeper pads or resilient fixation will be assessed at the detailed design stage.

Table 8-36: Vibration Impact Assessment Results of the Electric RER Scenario – Lakeshore East Rail Corridor

Train Type Assessed	Receptor	Speed Over Track (km/h)	Special Trackwork Present?		Distance to Rail Component		Predicted Vibration Level		Objective (mm/s)	% Above Objective	Mitigation Required? [2]
			Existing	Future	Existing (m)	Future (m)	Existing (mm/s)	Future (mm/s)			
Go Train	R021B	153	No	Yes	30	25	0.11	0.81	0.14	480%	Yes
VIA Train		152					0.11	0.30	0.14	115%	Yes
Freight Train		104					0.81	6.11	0.81	652%	Yes
Go Train	R023B	153	No	Yes	35	30	0.09	0.66	0.14	373%	Yes
VIA Train		152					0.09	0.25	0.14	76%	Yes
Freight Train		104					0.66	4.83	0.66	627%	Yes
Go Train	R037B	153	No	Yes	42	42	0.08	0.46	0.14	229%	Yes
VIA Train		152					0.08	0.17	0.14	22%	No
Freight Train		104					0.53	3.17	0.53	494%	Yes
Go Train	R043	153	No	Yes	74	74	0.04	0.25	0.14	78%	Yes
VIA Train		152					0.04	0.09	0.14	N/A	No
Freight Train		104					0.29	1.75	0.29	494%	Yes
Go Train	R013	153	No	No	25	20	0.14	0.17	0.14	24%	No
VIA Train		152					0.14	0.17	0.14	23%	No
Freight Train		104					1.03	1.35	1.03	31%	Yes
Go Train	R077	153	No	No	30	25	0.11	0.14	0.14	N/A	No
VIA Train		152					0.09	0.11	0.14	N/A	No
Freight Train		104					0.81	1.03	0.81	27%	Yes

Train Type Assessed	Receptor	Speed Over Track (km/h)	Special Trackwork Present?		Distance to Rail Component		Predicted Vibration Level		Objective (mm/s)	% Above Objective	Mitigation Required? [2]
			Existing	Future	Existing (m)	Future (m)	Existing (mm/s)	Future (mm/s)			
Go Train	R031	153	No	No	35	30	0.09	0.11	0.14	N/A	No
VIA Train		152					0.09	0.11	0.14	N/A	No
Freight Train		104					0.66	0.81	0.66	22%	No
Go Train	R027	153	No	No	40	35	0.08	0.09	0.14	N/A	No
VIA Train		152					0.08	0.09	0.14	N/A	No
Freight Train		104					0.56	0.66	0.56	19%	No

Notes:
[1] See Figure 2s for receptor location.
[2] The MOEE/GO Protocol stipulates that the requirement to evaluate mitigation is triggered when the vibration velocity exceeds the objective by 25% or more (i.e., the greater of 0.175 mm/s, or a 25% increase over existing levels).

8.10 Visual

Please refer to Section **3.10** for a description of the methodology followed for assessment of visual impacts. Additional details can be found in the Visual Impact Assessment Report contained in **Appendix H2**.

8.10.1 East Rail Maintenance Facility Tap and TPS

8.10.1.1 Potential Effects and Mitigation Measures

The East Rail Maintenance Facility Tap is located with the East Railroad Maintenance Facility TPS north of the railroad on a vacant parcel of land adjacent to the future site of the East Railroad Maintenance Facility. The site is surrounded by industrial development. As a result, the site has negligible visual impacts and no mitigation measures are required. Refer to **Figure 4-21** and **Figure 4-22** for photographs of typical TAP infrastructure and a typical Traction Power Substation (TPS).

8.10.1.2 Net Effects

There will be no anticipated net visual effects.

8.10.2 Scarborough SWS & 25kV Feeder Route

8.10.2.1 Potential Effects and Mitigation Measures

The Scarborough SWS is located north of the railroad on vacant land behind a residential high-rise complex. This complex consists of three buildings all of which have windows facing east and west, so that no windows look directly out at the proposed facility. To the southwest, farther from the SWS site is a second high-rise development which has a 21 storey building directly facing the SWS site. This building is over 150 metres from the switching station with a landscaped area between the residential building and the SWS. This landscaping is expected to partially screen the lower floors from the SWS facility, notwithstanding this some form of visual screening around the proposed SWS is recommended. It should however be noted that the SWS will still be visible from the upper floors of the high-rise building. As a result, there will be low to moderate visual impact due to installation of the SWS.

Refer to **Figure 4-24** for a photograph of a typical Switching Station (SWS).

The Scarborough 25kV feeder route runs along the Stouffville rail corridor. The 25 kV feeder follows the rail corridor where an existing electric transmission line already exists. The feeder route will, therefore, have negligible additional visual effects beyond those created by the existing power lines.

8.10.2.2 Net Effects

Adverse net visual effects associated with the Scarborough SWS will be minimized through implementation of screening measures. There will be negligible net visual effects associated with the Scarborough 25 kV Feeder Route.

8.10.3 Durham SWS

8.10.3.1 Potential Effects and Mitigation Measures

The Durham SWS is located immediately to the south of the railroad on a vacant parcel of land behind industrial buildings. The site will not be visible from any public areas. Therefore, there will be negligible visual impacts and no mitigation measures are required. Refer to **Figure 4-24** for a photograph of a typical Switching Station (SWS).

8.10.3.2 Net Effects

There will be no anticipated net visual effects.

8.10.4 Don Yard PS

8.10.4.1 Potential Effects and Mitigation Measures

The Don Yard PS is proposed to be located on railroad embankment north of the railroad corridor and approximately 60 metres east of the bridge over the Don River Parkway. The site is behind an automobile dealership parking lot, and there is little to no visibility from surrounding areas. The facility will require an access road from Eastern Avenue to the PS which will run along the back of the parking lot associated with the automobile dealership on Sunlight Park Road. The access road will be built into the base of the embankment behind the parked vehicles.

It is recognized that there are several future land developments proposed in the vicinity of the Don Yard PS, e.g., Unilever Mixed Use Development adjacent to the PS site, future Harbor GO Station, etc. In addition, the City of Toronto expressed concern as part of the TPAP consultation efforts that this particular area has scenic views. Therefore, Metrolinx's preferred design will include some form of visual screening at this facility due to the nature of the surrounding scenic environment and its proximity to these future/proposed land uses. In addition, during detailed design, further review will be undertaken in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible.

8.10.4.2 Net Effects

Adverse net visual effects will be minimized through implementation of screening measures.

8.10.5 OCS & Bridges: Section LSE-1 – Don Yard Layover to Danforth Station

8.10.5.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

The majority of Section LSE-1 passes through older inner-city development comprised of residential and small scale industrial buildings. The industrial areas are classified as having negligible visual impact, and require no mitigation measures. However, most of the residential development consists of single-family homes backing up to the railroad. These houses are more than 8 metres from the railroad, and are classified as having a potential low to moderate visual impact.

There are two areas where high-rise residential development is less than 30 metres from the railroad. One high-rise building at Pape Avenue is oriented so that no windows overlook the railroad which is classified as having negligible visual impact. The second high-rise development at Coxwell Avenue has some vegetation to hide the railroad from view but the extent to which this will remain after clearing for installation of OCS is unclear. Therefore, this area has been classified as having a potential for high visual impact. Refer **Figure 4-32** to for photographs of typical OCS infrastructure in a suburban setting.

There are several small neighborhood parks along this section but they appear to be well buffered by vegetation from the railroad and are therefore classified as negligible visual impact areas.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are no stations in this section.

Mitigation Recommendations:
No mitigation is required.

Proposed Noise Barriers

There are noise barriers on both sides of the railroad along residential areas where space permits in this section. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are two bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

The road bridge at Main Street in Danforth will require a protective barrier but is classified as having a potential low visual impact since the views from the bridge are of no particular interest or scenic value.

Pedestrian bridges will require protective barriers on both sides and are classified as potential moderate visual impact. Pedestrian bridges should be designed to allow views to and from people walking across the bridge to avoid a claustrophobic tunnel effect and maintain a safe environment. In addition, the Pape Avenue Bridge has an important west facing view that should be maintained.

Therefore, there are potential low to moderate visual impacts due to the installation of protective barriers on these bridge structures (see **Table 8-37**).

Table 8-37: Summary of Bridges - Section LSE-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSE-1	F-2	Pape Avenue (#545)	Pedestrian Bridge	No	Yes *Moderate Visual Impact*
LSE-1	F-4	Main Street (#541)	Bridge	Yes. Preferred solution to vertical clearance issue reduce track maintenance allowance.	Yes *Low Visual Impact*

In addition, there are 13 rail overpasses in this section, including the Don River crossing, a long structure over the Don Valley Parkway as well as the Don River. Not a noteworthy structure, and though the OCS infrastructure on the bridge will be visible from a distance on either side of the bridge, the environment is not regarded as visually sensitive and is already compromised by other electrical wires and infrastructure. Therefore, this area is classified as having a potential low visual impact.

Carlaw Avenue and Gerrard Avenue East Rail Overpassess are classified as having a moderate visual impact due to the heritage nature of the structures.The remaining overpasses are classified as having a potential negligible visual impact (see **Table 8-37**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 8-38: Summary of Rail Overpasses - Section LSE-1

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-1	F-1	Don River	Rail Overpass	N/A.	Yes *Low Visual Impact*
LSE-1	F-1	Don Valley Parkway (#017)	Rail Overpass	N/A.	Yes *Low Visual Impact*
LSE-1	F-1	Eastern Avenue	Rail Overpass	N/A	Yes *Negligible Visual Impact*
LSE-1	F-1	Queen Street East	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-1	F-2	Dundas Street East (#043)	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-1	F-2	Logan Avenue	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-1	F-2	Carlaw Avenue	Rail Overpass	N/A	Yes *Moderate Visual Impact*
LSE-1	F-2	Gerrard Street East	Rail Overpass	N/A	Yes *Moderate Visual Impact*
LSE-1	F-2	Jones Avenue (#540)	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-1	F-3	Greenwood Avenue (#534)	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-1	F-3	Woodfield Road (Pedestrian Underpass)	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-1	F-3	Coxwell Avenue (#514)	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-1	F-3	Woodbine Avenue (#045)	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, the Don River and Don Valley Parkway

Bridge and the new park west of the Don River are the most important features requiring careful design consideration.

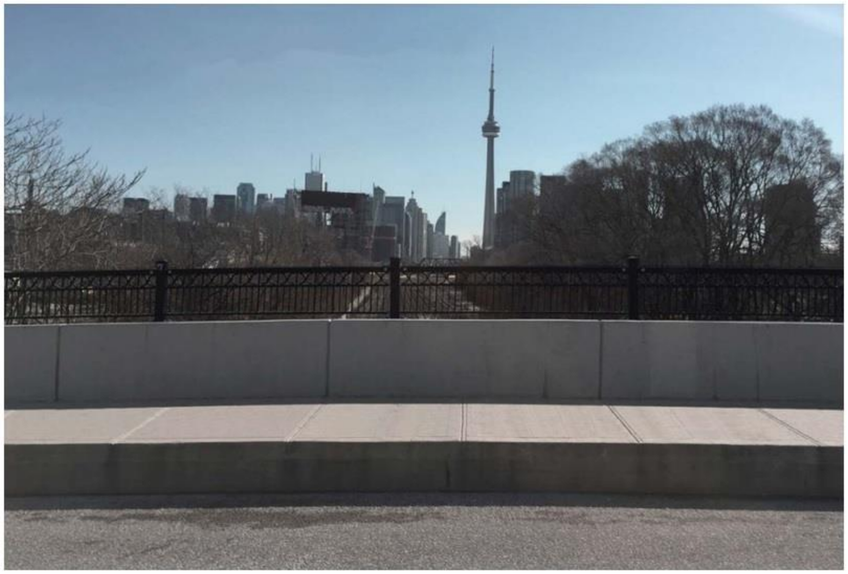
As part of detailed design, Metrolinx's Design Excellence Committee will be engaged to review possible design treatments/option for enhancing the aesthetics of bridge barriers where feasible/required. It is anticipated that the basis of the protection barrier will be a post and panel (solid-faced) design with customizable panels toward suiting visual preferences (in consultation with the applicable bridge owners as appropriate), such as:

- Multilane, restricted access highways and non-visually sensitive locations;
- Visually sensitive locations;
- Structures of heritage value or sensitivity.

An example of a bridge barrier in a visually sensitive location has been provided in **Figure 8-18**. Additional design option examples have been provided in **Figure 8-19** and **Figure 8-20**.It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

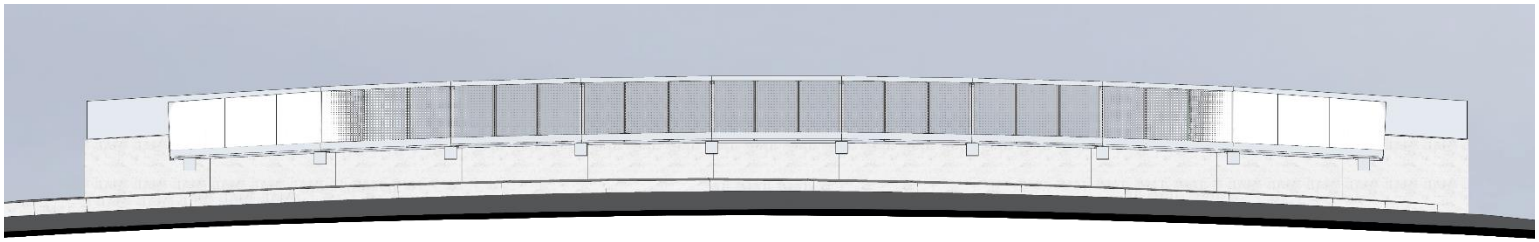
Figure 8-18: Example Of Bridge Barrier In A Visually Sensitive Location

Before



After

Figure 8-19: Illustrative Bridge Barrier Design Options (Examples)



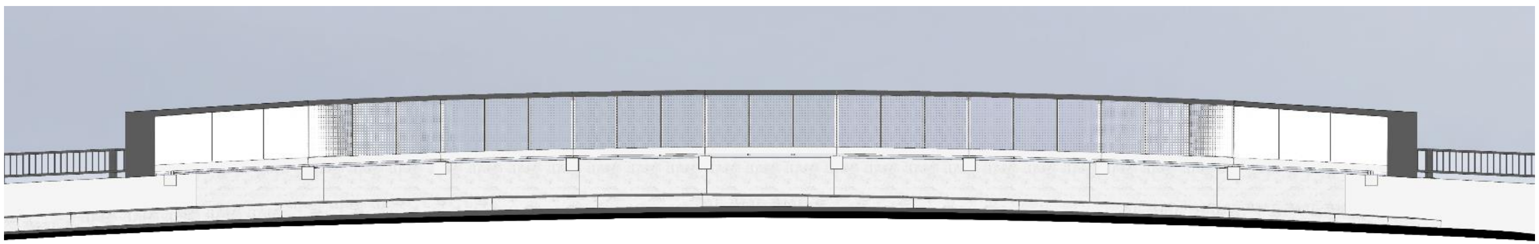


Figure 8-20: Bridge Barrier Design Option Example (Glass Back View)

8.10.5.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSE-1 such as the residential areas of single family and high rise development will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low except for the residential building at Coxwell Avenue where residual visual effects may be reduced to moderate as a result of mitigation.

GO Stations

There are no stations in this section.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to moderate.

8.10.6 OCS & Bridges: Section LSE-2 – Danforth Station to Scarborough Station

8.10.6.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section LSE-2 is similar in character to Section LSE-1, with a mix of residential and small scale industrial uses along both sides of the corridor. The industrial areas are classified as having negligible visual impact and will require no mitigation measures. However, the residential development consists of single-family homes backing up to the railroad and some high rise development. The houses are more than 8 metres and the high rises more than 30 metres from the railroad, and are classified as having a potential low to moderate visual impact. The rail corridor immediately abuts Kimridge Avenue where existing vegetation will be removed to build the OCS. This will create a moderate impact to the residences on the opposite side of Kimridge Avenue. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are two stations within this section, Danforth GO Station and Scarborough GO Station. These stations are classified as having a potential for low visual impact. At Danforth, passengers standing on the platform will have a close-up views of the rail corridor and any infrastructure placed in it, but for those arriving at the station the view is restricted by self-storage buildings immediately behind the platform. At Scarborough, passengers arriving at the station as well as those on the platform will also have a clear view of the rail corridor and infrastructure.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There are several areas of noise barriers, both on the north and south sides of the railroad, in this section adjacent to residential properties. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:
During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are three bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

The Birchmount Road and Kennedy Road Bridges both have sidewalks on both sides affording views up and down the corridor, but the views are not regarded as scenic and the bridges are classified as having a potential low visual impact.

The Woodrow Avenue pedestrian bridge connects two residential neighborhoods.. Pedestrian bridges will require protective barriers on both sides and are classified as potential moderate visual impact. Pedestrian bridges should be designed to allow views to and from people walking across the bridge to avoid a claustrophobic tunnel effect and maintain a safe environment.

Therefore, there are potential low to moderate visual impacts from the installation of protective barriers on these bridge structures (see **Table 8-39**).

Table 8-39: Summary of Bridges - Section LSE-2

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSE-2	F-6	Birchmount Road (#825)	Bridge	Yes. Preferred solution to vertical clearance issue: reduce track maintenance allowance	Yes *Low Visual Impact*
LSE-2	F-6	Woodrow Avenue (#969)	Pedestrian Bridge	No.	Yes *Moderate Visual Impact*
LSE-2	F-7	Kennedy Road (#851)	Bridge	No	Yes *Low Visual Impact*

There are three rail overpasses in this section. The Victoria Park Avenue overpass is in an industrial area and is classified as negligible visual impact. The bridges at Danforth and Warden Avenues are in residential areas and the Danforth Avenue Bridge is visible from a long distance. Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Therefore, there are negligible to potential low visual impacts due to the installation of OCS support structures on or in the vicinity of these rail overpass structures (see **Table 8-40**).

Table 8-40: Summary of Rail Overpasses - Section LSE-2

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-2	F-4	Victoria Park Avenue (#046)	Rail Overpass	N/A	No *Negligible Visual Impact*

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-2	F-5	Warden Avenue	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-2	F-5	Danforth Avenue (#089)	Rail Overpass	N/A	Yes *Low Visual Impact*

<u>Mitigation Recommendations:</u>

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Danforth and Scarborough GO Stations are the most important features requiring careful design consideration.

Refer to **Section 8.10.5** for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

8.10.6.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSE-2 such as single family and high rise residential development will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Danforth and Scarborough GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low, except for the pedestrian bridge on Woodrow Avenue where residual visual effects will be low to moderate.

8.10.7 OCS & Bridges: Section LSE-3 – Scarborough Station to Guildwood Station

8.10.7.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section LSE-3 consists of industrial buildings, open space, and residential development. The industrial areas are classified as having negligible visual impact and will require no mitigation measures. The open spaces and golf courses with tees and greens distant from the corridor along the railroad are also classified as negligible visual impact, and will require no mitigation measures. However, the residential development consists of single-family homes backing up to the railroad. These houses are more than 8 metres from the railroad, and are classified as having a potential low to moderate visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Eglinton GO Station is the only station within this section and is classified as having a potential low visual impact. Both passengers arriving at the station and standing on the platform, as well as people walking in the downtown area, will have close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There is only one noise barrier location in this section on the north side of the railroad immediately east of Scarborough Junction. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations:

During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are two bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

Markham and Kingston Roads cross over the railroad. At these locations, although there are sidewalks on both sides of the bridges, few people are likely to be walking over the bridges. Both areas are open and views from the bridges are undistinguished. Therefore, although protective barriers are required, these bridges are classified as having a potential low visual impact (see **Table 8-41**).

Table 8-41: Summary of Bridges - Section LSE-3

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSE-3	F-10	Markham Road (#129)	Bridge	No	Yes *Low Visual Impact*
LSE-3	F-11	Kingston Road (#180)	Bridge	No	Yes *Low Visual Impact*

In addition, there are five rail overpasses in this section. The Brimley Road overpass is in an industrial area and is classified as having negligible visual impact. The remaining overpasses are in residential areas and are classified as having potential negligible to low visual impacts (see **Table 8-42**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Table 8-42: Summary of Rail Overpasses - Section LSE-3

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-3	F-7	St. Clair Avenue East	Rail Overpass	N/A	Yes *Low Visual Impact*
LSE-3	F-8	Midland Avenue	Rail Overpass	N/A	Yes *Low Visual Impact*
LSE-3	F-8	Brimley Road	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-3	F-9	McCowan Road (#933)	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-3	F-9	Eglinton Avenue	Rail Overpass	N/A	Yes *Low Visual Impact*

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Eglinton GO Station is the most important feature requiring careful design consideration.

Refer to Section 8.10.5 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

8.10.7.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSE-3 such as the residential areas will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low.

GO Stations

Residual visual effects due to OCS installation within the Eglinton GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

8.10.8 OCS & Bridges: Section LSE-4 – Guildwood Station to Rouge Hill Station

8.10.8.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

The first part of this section between Guildwood GO Station and the lakefront is a mix of industrial and residential development. Industrial areas and areas are classified as having negligible visual impact. However, the residential development consists of single-family homes backing up to the railroad. These houses are more than 20 metres from the railroad, and are classified as having a potential low visual impact. In addition there are several small neighbourhood parks in this section including, Poplar Park and Grey Abbey Park and Ravine which all have mature vegetation screening and are classified as having negligible visual impact from OCS.

To the east of the Highland Creek Wastewater Treatment Plant, the environment changes character and the railroad is close to the lakeshore. There are two larger parks, Lower Highland Park and East Point Park, both of which have negligible visual impacts. From here to Rouge Hill GO Station the lakeshore is linear parkland called Port Union Waterfront a recreational trail runs through the park immediately adjacent to the railroad. However, the actual lakeshore, while close to the tracks, is down a steep, vegetated bluff resulting in the railroad and any OCS infrastructure being shielded from view from the actual shore. This section is classified as having a potential moderate visual impact due to the proximity of the recreational trail. Areas of residential development which are close to the railroad on the north side of the tracks are classified as having potential low visual impact. Refer to **Figure 4-32** for photographs of typical OCS infrastructure in a suburban setting.

Mitigation Recommendations:
The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

Guildwood and Rouge Hill GO Stations are both within this section. Platforms and the approaches to platforms provide clear close-up views of the rail corridor and any infrastructure placed in it. Guildwood GO Station is classified as having potential low visual impact. Rouge Hill GO Station is classified as having potential moderate visual impact based on its prominent location along the waterfront with the bicycle/pedestrian trail immediately adjacent to it on the south side.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There are no noise barriers within this section.

Mitigation Recommendations:
No mitigation is required.

Bridges/Rail Overpasses

There are no bridges in this section, but there are two rail overpasses. One overpass crosses over Highland Creek and a pedestrian path, and is classified as having a moderatevisual impact due to the heritage nature of the structure. The other overpass crosses over the Rouge Hill pedestrian underpass and is more visible to people in this area, however thisoverpass is classified as having potential negligible visual impact (see **Table 8-43**).

There is a pedestrian at-grade crossing adjacent to the Rouge Hill GO Station. In addition, there are five additional at-grade roadway crossings that are not located in sensitive areas and require no mitigation measures. Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 8-43: Summary of Rail Overpasses - Section LSE-4

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-4	F-13	Highland Creek and Pedestrian Underpass	Rail Overpass	N/A	Yes *ModerateVisual Impact*
LSE-4	F-14	Rouge Hill Pedestrian Underpass	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:

During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Rouge Hill GO Station and the waterfront are the most important features requiring careful design consideration.

8.10.8.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSW-3 in particular the riverfront park area as well as residential areas along the corridor will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low to moderate along the lakeshore park.

GO Stations

Residual visual effects due to OCS installation within the Guildwood and Rouge Hill GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

There are no noise barriers in this section.

Bridges/Rail Overpasses

There are no bridges in this section. Residual visual effects due to modifications to rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to low.

8.10.9 OCS & Bridges: Section LSE-5 – Rouge Hill Station to Pickering Station

8.10.9.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

East of Rouge Hill GO Station to the Rouge River, the railroad has lakeshore on the south and residential on the north, similar to the area west of the station. A recreational trail runs through the park immediately adjacent to the railroad. However, the actual lakeshore, while close to the tracks, is down a steep, vegetated bluff resulting in the railroad and any OCS infrastructure being shielded from view from the actual shore. This section is classified as having a potential moderate visual impact due to the proximity of the recreational trail. Areas of residential development which are close to the railroad on the north side of the tracks are classified as having potential low visual impact

The area in the vicinity of the Rouge River crossing is within the Rouge National Urban Park and is regarded as having high scenic value and is classified as having potential high visual impact due to the visibility of the OCS infrastructure from the river and the shoreline which has high visitation and is utilized for recreational purposes.

East of this area to Pickering GO Station, the corridor consists of industrial and commercial uses or residential development. Industrial areas and areas where residential homes are classified as having negligible visual impact with no mitigation required. However, much of the residential development consists of single-family homes backing up to the railroad. These houses are more than 8 metres from the railroad, and are classified as having potential low visual impact.

Mitigation Recommendations:

The installation of OCS infrastructure will affect the viewshed along the rail corridors, particularly in areas of vegetation/tree clearing. Visual impact mitigation strategies for OCS will be identified and incorporated into the Detailed Design process. These strategies will address the range of visual conditions, area allocations, and mitigation needs that will be found along the corridor. Areas of 'high' visual impact will be identified and specific design measures will be incorporated to mitigate visual impacts of OCS.

GO Stations

There are no stations within this section.

Mitigation Recommendations:

No mitigation is required.

Figure 8-21: Current View of the Rouge River Crossing

Figure 8-22: Visualization of New OCS Infrastructure at the Rogue River Crossing

Proposed Noise Barriers

There is only one section of noise barrier in this section, on the north side of the railroad east of Rouge Hill Station. Noise barriers while lower in height than the OCS, create a continuous barrier that will block existing views to and across the rail corridor. As such they could be regarded as having a positive or negative impact on adjacent residential and commercial land uses. On the positive side, where vegetation is being removed, noise barriers may replace some of the visual privacy previously provided by trees and other vegetation. However, the installation of noise barriers also has the potential to block light and existing interesting views in some locations which could be perceived as a negative effect. For additional detail on the noise study, refer to the Noise/Vibration Modeling Reports contained in Appendix G to the EPR.

Mitigation Recommendations

During Detailed Design, further review will be undertaken to determine the final designs of noise barriers and to confirm administrative, operational, economic and technical feasibility of the barriers.

Bridges/Rail Overpasses

There are four bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

Three roadway bridges are located at Liverpool Road, Whites Road and Granite Court. Liverpool and Whites Roads both also cross over Highway 401, with access ramps from both these roads to the highway. Granite Court gives access to an industrial subdivision. Views from the bridges are undistinguished and, although protective barriers are required, these bridges are classified as having a potential low visual impact.

In addition, there is one railroad bridge in this section at the York Sub. Protective barriers are required, and this bridge is classified as having negligible visual impact with no mitigation measures required (see **Table 8-44**).

Table 8-44: Summary of Bridges - Section LSE-5

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSE-5	F-17	Granite Court	Bridge	Yes. Preferred solution to vertical clearance issue: reduce track maintenance allowance	Yes *Low Visual Impact*
LSE-5	F-18	Whites Road	Bridge	No	Yes *Low Visual Impact*

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSE-5	F-19	York Sub	Bridge	N/A	Yes *Negligible Visual Impact*
LSE-5	F-19	Liverpool Road	Bridge	No	Yes *Low Visual Impact*

In addition, there is one rail overpass in this section. It crosses a pedestrian path and the Rouge River in a scenic area within the Rouge National Urban Park and the overpass itself is an attractive girder structure. The river and its banks are used for recreational purposes. A nearby pedestrian river crossing closely parallels the rail overpass and gives close-up views to the bridge and out to the river mouth and lake. For these reasons this overpass is classified as having potential high visual impacts (see **Table 8-45**). Refer to **Figure 8-22** for a visualization of new OCS infrastructure at the Rouge River Crossing.

Table 8-45: Summary of Rail Overpasses - Section LSE-5

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-5	F-16	Unnamed Ped Walk and Rogue River	Rail Overpass	N/A.	Yes *High Visual Impact*

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several moderate impact areas in this section related to the Rouge River crossing and the lakeshore where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area.

Refer to Section 8.10.5 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

8.10.9.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

Residual visual effects due to OCS installation on adjacent visual receptors along LSE-5 lakeshore, the Rouge River estuary and residential areas north of the railroad will be minimized based on the implementation of the mitigation measures outlined above. Residual effects are considered low to moderate along the lakeshore park.

GO Stations

There are no stations within this section.

Proposed Noise Barriers

The installation of noise barriers in certain locations along the rail corridors will introduce new infrastructure that will affect the existing viewsheds. Although in some locations, visual effects of the noise barriers may be perceived as negative, this is considered a trade-off as the barriers are required in order to mitigate increased noise levels due to train service.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered low to moderate.

8.10.10 OCS & Bridges: Section LSE-6 – Pickering Station to Ajax Station

8.10.10.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

The entire section between Pickering and Ajax GO Stations runs adjacent to Highway 401 on the north with industrial development to the south. North of Highway 401 there are noise walls that eliminate any views of the rail corridor from residential development. This entire section, except for the station areas, is classified as having negligible visual impact and requires no mitigation measures.

Mitigation Recommendations:
No mitigation required.

GO Stations

Two stations are located within this section, Pickering GO Station and Ajax GO Station. These stations are classified as low impact. Passengers approaching Pickering GO Station and standing on the platforms will have clear close-up views of the rail corridor and any infrastructure placed in it. At Ajax GO Station the views for people accessing the station are shielded by commercial development. However, once on the platforms, passengers will have close-up views of the rail corridor and the new OCS infrastructure.

Mitigation Recommendations:
During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There are no noise barriers in this section.

Mitigation Recommendations:
No mitigation is required.

Bridges/Rail Overpasses

There are two bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

One bridge crosses the railroad at Brock Road, which also cross over Highway 401 with access ramps from the road to the highway. While Brock Road has sidewalks and will require protective barriers, the bridge is not pedestrian friendly and is classified as having potential low impact due to narrow sidewalks adjacent to fast moving traffic with no shoulder or buffer and free flowing access ramps to Highway 401 which are hard to cross.

The other bridge in this section is at Pickering GO Station (see **Figure 8-23**), where a prominent architecturally designed pedestrian bridge brings people from north of Highway 401 across the highway and railroad to the station. This bridge may require modification to protect the maintenance catwalks on either side of the bridge which could alter its appearance, and is classified as having potential moderate visual impact (see **Table 8-46**).

Figure 8-23: View of Pickering GO Station and Pedestrian Bridge from Highway 401

Table 8-46: Summary of Bridges - Section LSE-6

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSE-6	F-19	Pickering North GO Station	Pedestrian Bridge	No. However a maintenance catwalk outside the bridge on either side will require a 2 metres solid barrier	Yes *Moderate Visual Impact*
LSE-6	F-20	Brock Road	Bridge	No.	Yes *Low Visual Impact*

In addition, there are two rail overpasses at a viaduct over Church Road and Duffins Creek where a bike trail that follows the creek also passes under the viaduct. Both these overpasses are classified as having potential low visual impacts (see **Table 8-47**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure a typical rail overpass.

Table 8-47: Summary of Rail Overpasses - Section LSE-6

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-6	F-21	Church Street	Rail Overpass	N/A.	Yes *Low Visual Impact*
LSE-6	F-21	Duffins Creek	Rail Overpass	N/A.	Yes *Low Visual Impact*

Mitigation Recommendations:
All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Pickering and Ajax GO Stations are the most important features requiring careful design consideration.

Refer to Section 8.10.5 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

8.10.10.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

There are no areas to mitigate in this section.

GO Stations

Residual visual effects due to OCS installation within the Pickering and Ajax GO Station areas will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

There are no noise barriers within this section.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered low to moderate.

8.10.11 OCS & Bridges: Section LSE-7 – Ajax Station to Whitby Station

8.10.11.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

Section LSE-7 passes through industrial and agricultural areas. There is one section of residential development but it is well buffered by a road and vegetation. This entire section is classified as having negligible visual impact and requires no mitigation measures.

Mitigation Recommendations:
No mitigation is required.

GO Stations

There are no stations located in this section.

Mitigation Recommendations:
No mitigation is required.

Proposed Noise Barriers

There are no noise barriers within this section.

Mitigation Recommendations:
No mitigation is required.

Bridges/Rail Overpasses

There are three bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

Three roadway bridges cross over the railroad at Harwood Avenue, Lakeridge Road and Henry Street. All three bridges have sidewalks on both sides. However, the Henry Street Bridge has no sidewalk leading to the bridge on the west side from the south. None of these bridges are pedestrian friendly, due to narrow sidewalks adjacent to fast moving traffic with no shoulder or buffer. Lake Ridge Road also has free flowing access ramps to Highway 401 which are hard to cross. Henry Street however is a major pedestrian link for access to the GO station and the Whitby waterfront. All three bridges will require protective barriers and are classified as having potential low visual impact (see **Table 8-48**).

Table 8-48: Summary of Bridges - Section LSE-7

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSE-7	F-22	Harwood Avenue South	Bridge	No	Yes *Low Visual Impact*
LSE-7	F-24	Lakeridge Road	Bridge	No	Yes *Low Visual Impact*
LSE-7	F-25	Henry Street	Bridge	No	Yes *Low Visual Impact*

In addition, four rail overpasses are located in this section. Two cross over roads and the remaining two cross creeks in areas where they are not visible and are therefore classified as having negligible visual impacts (see **Table 8-49**). Refer **Figure 3-7** to for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 8-49: Summary of Rail Overpasses - Section LSE-7

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-7	F-21	Westney Road South	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-7	F-23	Salem Road South	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-7	F-23	Carruthers Creek	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-7	F-24	Lynde Creek	Rail Overpass	N/A	No *Negligible Visual Impact*

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, the Westney Road Bridge is the most important feature requiring careful design consideration.

Refer to Section 8.10.5 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

8.10.11.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

There are no areas to mitigate in this section.

GO Stations

There are no stations located in this section.

Proposed Noise Barriers

There are no noise barriers within this section.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above. Residual visual effects are considered negligible to low.

8.10.12 OCS & Bridges: Section LSE-8 – Whitby Station to Oshawa Station

8.10.12.1 Potential Effects and Mitigation Measures

OCS/Rail Corridors

This entire section is vacant or industrial and is classified as having negligible visual impacts.

Mitigation Recommendations:
No mitigation is required.

GO Stations

The only station in this section is Oshawa GO Station which is classified as having a potential low visual impact. On one side of this station is the storage yard and on the other the access and parking lot. Storage tracks for overnight storage which will also be electrified are also immediately adjacent to the station. Passengers approaching the station and standing on the platforms will have clear close-up views of the rail corridor and any infrastructure placed in it.

Mitigation Recommendations:

- During Detailed Design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible.

Proposed Noise Barriers

There are no noise barriers within this section.

Mitigation Recommendations:

No mitigation is required.

Bridges/Rail Overpasses

There are two bridges in this section. To protect the public from energized equipment, barriers will be installed where the new OCS passes under a bridge accessible to pedestrians. These bridge barriers will be two (2) metres high, and shall extend at least 3 metres beyond any electrified wire(s) running under the bridge. Refer to **Figure 4-25** for photographs of typical bridge barriers.

Brock Street South is not pedestrian friendly, with no shoulder or buffer and free flowing access ramps to Highway 401 which are hard to cross, but will require protective barriers and is classified as having potential low visual impact.

The other bridge in this section is at Whitby GO Station (see **Figure 8-24**), where a prominent architecturally designed pedestrian bridge brings people from the southern parking lot across the railroad to the station. This bridge may require modification to protect the maintenance catwalks on either side of the bridge, and is classified as having potential moderate visual impact (see **Table 8-50**).

Figure 8-24: View of Whitby GO Station and Pedestrian Bridge from Brock Street South Bridge

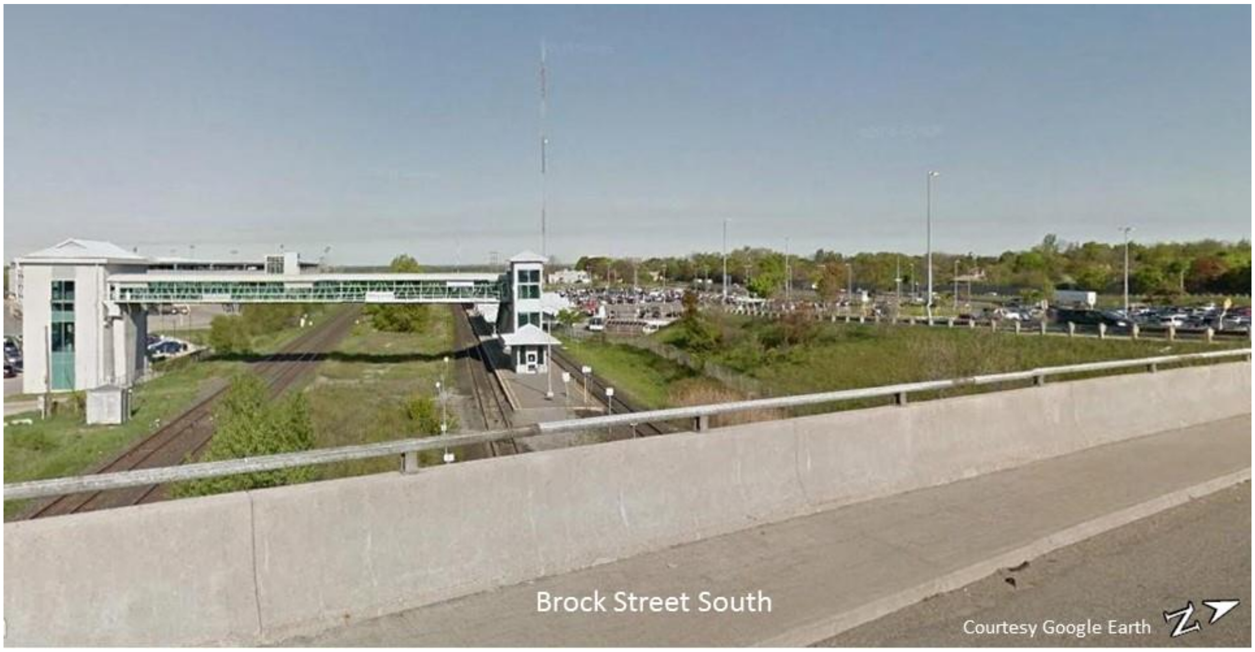


Table 8-50: Summary of Bridges - Section LSE-8

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	Bridge Protection Barrier to Be Added or Modified?
LSE-8	F-25	GO Whitby	Pedestrian Bridge	No. However, maintenance walkways on either side of the bridge will need 2 metres solid barriers	Yes *Moderate Visual Impact*
LSE-8	F-25	Brock Street South	Bridge	No	Yes *Low Visual Impact*

In addition there are five rail overpasses in this section, three over roadways and two creek crossings. This is a heavily industrial area. Victoria Street and Thickson Road are classified as having a low visual impact while the other three overpasses are classified as having negligible visual impact. No mitigation is required (see **Table 8-51**). Refer to **Figure 3-7** for a visualization of the proposed OCS Infrastructure at a typical rail overpass.

Table 8-51: Summary of Rail Overpasses - Section LSE-8

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-8	F-26	Victoria Street	Rail Overpass	N/A	Yes *LowVisual Impact*

Corridor	Map No. (See Appendix T)	Primary Name	Type of Structure	Vertical Clearance Issue?	OCS Attachments Required?
LSE-8	F-26	Pringle Creek	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-8	F-26	South Blair Street	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-8	F-26	Creek	Rail Overpass	N/A	No *Negligible Visual Impact*
LSE-8	F-27	Thickson Road	Rail Overpass	N/A	Yes*LowVisual Impact*

Mitigation Recommendations:

All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate.

In summary, there are several areas where carefully placed and designed OCS infrastructure will result in minimal visual impact on the surrounding area. Among these areas, Oshawa GO Station is the most important feature requiring careful design consideration.

Refer to Section 8.10.5 for examples of bridge barrier design options to be further considered during detailed design, particularly for bridges in visually sensitive locations. It is noted that the final design of each bridge barrier will be determined during detailed design in consultation with relevant municipalities as appropriate.

8.10.12.2 Net Effects

Since the electrification infrastructure will be permanent, there will be residual visual effects due to the installation of OCS and modifications to bridges/rail overpasses. Notwithstanding this, the degree of the net effects has been further detailed below based on consideration of the mitigation measures as outlined in the preceding sections.

OCS/Rail Corridors

There are no areas to mitigate in this section.

GO Stations

Residual visual effects due to OCS installation within the Oshawa GO Station area will be minimized based on the implementation of mitigation measures outlined above. Residual effects are considered low.

Proposed Noise Barriers

There are no noise barriers within this section.

Bridges/Rail Overpasses

Residual visual effects due to modifications to bridges/rail overpasses will be minimized based on the implementation of mitigation measures outlined above including design considerations for bridge barriers and placement of OCS poles away from rail overpasses where possible. Residual visual effects are considered negligible to moderate.

8.11 Utilities

A Utilities Impact Assessment study was completed as part of the TPAP to carry out preliminary identification of existing utilities within the study area and to identify possible utility conflicts between these utilities and the planned electrification infrastructure. Conflicts were characterized under the following three categories:

1. **Spatial Conflicts**

Spatial conflicts occur where OCS structures and foundations occupy the same physical space as overhead or buried utilities. Spatial conflicts can also occur where utilities attached to bridges occupy the same space as proposed bridge barriers or bridge barrier fixing points. Overhead transmission, distribution, and communication lines are identified as potential spatial conflicts if they are located within the OCS impact zone and have a vertical clearance from top of rail of less than 10.7 metres. Buried utilities running parallel to the rail corridor within the OCS impact zone are identified as potential spatial conflicts, irrespective of depth.

2. **Electrical Zone of Influence Conflicts**

"Influence" describes the unintended effect of electrified OCS wires on adjacent infrastructure and includes the induction of current (counteracted by grounding and bonding) and electromagnetic interference (EMI). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the Overhead Contact Line Zone (OCLZ) (see **Figure 8-25**). An overhead utility is identified as an electrical zone of influence conflict if its clearance from top of rail at its maximum sag encroaches on the OCLZ. Because vertical spatial clearance requirements (10.7 metres) are more conservative than those shown in **Figure 8-25**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

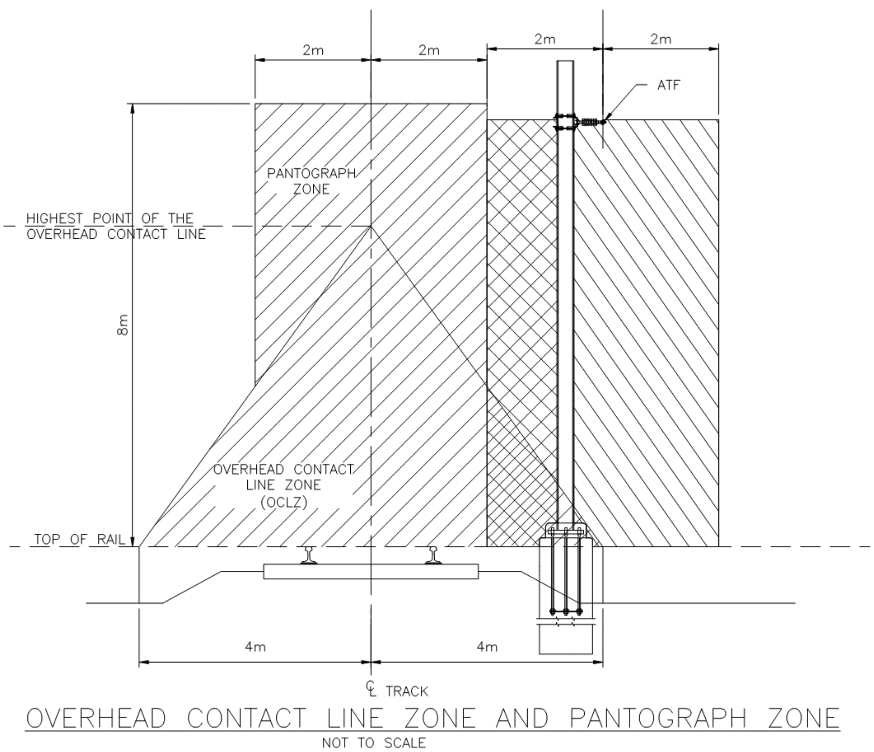
Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements (5.0 metres from centerline of track as captured in the OCS impact zone) are more conservative than the OCLZ clearance requirements (4.0 metres from centerline of track as shown in **Figure 8-25**) those shown in **Figure 8-25**, resolution for a utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.

Infrastructure that is considered an electrical zone of influence conflict is also a spatial conflict. The resolution for a spatial conflict (usually relocation) will also remove the utility from the electrical zone of influence and thus grounding and bonding will not be required. Existing utilities in the rail corridor outside of the electrical zone of influence may be grounded and bonded at the request of the owner but it is not a requirement for Electrification as the effects of stray current are anticipated to be minimal. Future utilities in the rail corridor outside of the electrical zone of influence should be grounded and bonded at installation.

With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.

Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

Figure 8-25: Overhead Contact Line Zone



3. Electrical Clearance Conflicts

Electrical clearance is defined as the minimum distance between live components and grounded structures or rolling stock. Electrical clearance conflicts occur where the minimum required vertical (see

Table 8-52) or parallel (see **Table 8-53**) clearances are not met. Electrical clearance does not apply to buried utilities.

Table 8-52: Vertical Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Min. Vertical Clearance Between Wires Crossing Each Other (m)	Min. Distance Above OCS (m) for Max. Wire Sag (Measured From Track)
>0 ≥ 150kV	5.0	15.7
>150kV ≥ 250kV	6.5	17.2
250kV	8.0	18.7

Table 8-53: Lateral Electrical Clearance Requirements – Utilities

Nominal Phase to Phase Voltage Rating	Minimum Distance (m)
>0 ≥ 150kV	5.2
>150kV ≥ 250kV	6.7
250kV	8.2

Additional details on the methodology followed for assessment of utilities impacts can be found in the Utilties Impact Assessment Report contained in **Appendix I2**.

8.11.1 East Rail Maintenance Facility Tap and TPS

8.11.1.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-54: ERMF TPS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Whitby Hydro	Overhead	Electrical	Unknown	Metallic	Victoria Street E
Hydro One	Overhead	Electrical	230kV	Metallic	Victoria St E
Enbridge Gas	Buried	Gas	2''	Metallic	Hopkins Street
Enbridge Gas	Buried	Gas	16''	Metallic	Victoria St E

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

8.11.1.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.2 Scarborough SWS

8.11.2.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-55: Scarborough SWS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Allstream	Buried	Conduit	Unknown	Unknown	Midland Ave
Bell	Buried	Conduit	Unknown	Unknown	Midland Ave
Telus	Buried	Conduit	144F	Unknown	Midland Ave
Unknown	Buried	Unknown	Unknown	Unknown	Midland Ave

Using the criteria set out in Section **8.11**, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

8.11.2.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.3 Durham SWS

8.11.3.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-56: Durham SWS Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Durham Region	Buried	Water	750mm	Concrete (Unreinforced)	HWY 401
Durham Region	Buried	Sewer	200-250mm	Unknown	Bayly St
Durham Region	Buried	Sewer	3000mm	Unknown	HWY 401
Durham Region	Buried	Water	300mm	Unknown	Bayly St

Owner	Utility Class	Description	Size	Material	Nearest Street
Durham Region	Buried	Storm	Unknown	Reinforced Concrete	Bayly St
Hydro One	Overhead	Electrical	230kV	Metallic	Bayly St
Rogers	Overhead	Conduit	Unknown	Metallic	Bayly St
Unknown	Buried	Electrical	Unknown	Metallic	Bayly St
Veridian	Overhead	Electrical	13.8kV	Metallic	Salk Rd
Veridian	Overhead	Electrical	13.8kV	Metallic	Salk Rd
Veridian	Buried	Electrical	Unknown	Metallic	Salk Rd
Veridian	Overhead	Electrical	13.8kV	Metallic	Bayly St
Veridian	Buried	Electrical	Unknown	Metallic	Salk Rd
Veridian	Overhead	Electrical	44kV	Metallic	Bayly St
Veridian	Buried	Electrical	Unknown	Metallic	Bayly St

Using the criteria set out in the Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

8.11.3.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.4 Don Yard PS

8.11.4.1 Potential Effects and Mitigation Measures

There are no records found of third party utilities on or near the proposed Don Yard PS location.

8.11.4.2 Net Effects

As no records were found there are no further impacts to utilities in this location.

8.11.5 Don Yard PS Access Road

8.11.5.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-57:. Don Yard PS Access Road Potentially Impacted Utilities

Owner	Utility Class	Description	Size	Material	Nearest Street
Toronto Hydro	Buried	Duct Bank	Unknown	Reinforced Concrete	Don Valley Pkwy
Unknown	Buried	Electrical	Unknown	Metallic	Don Valley Pkwy
Unknown	Buried	Electrical	Unknown	Metallic	Don Valley Pkwy
Unknown	Buried	Electrical	Unknown	Metallic	Don Valley Pkwy

Using the criteria set out in Utilities Impact Assessment, the potential conflicts identified above are spatial in nature, meaning that they may occupy the same physical space as TPF infrastructure. This has been a conservative approach as the final layout of the TPF infrastructure is not determined. It is most likely that the majority of conflicts can be mitigated by placing the TPF infrastructure such that utilities are avoided. Where this is not possible, other mitigation measures include removal, relocation, reconfiguration or burying of the utility in question.

8.11.5.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.6 OCS & Bridges: Section LSE-1 – Don Yard Layover to Danforth Station

8.11.6.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-58: Section LSE-1 Don Yard Layover to Danforth Station

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
332.15	11.71	Bell	Buried - Parallel to ROW	Cable	Unknown	Other	Rouge Hills Dr to Oshawa GO Station	Y	N	N
332.14	331.81	Telus	Buried - Parallel to ROW	Duct Bank	3x144F/288F	Metallic	Don Valley Pkwy to Eastern Ave	Y	N	N
332.14	330.95	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Don Valley Pkwy to Pape Ave pedestrian bridge	Y	N	N
332.13		Hydro One	OH - Crossing ROW	Electrical	115kV	Metallic	Don Valley Pkwy	Y	Y	N
332.13		Sun-Canadian	Buried - Crossing ROW	Oil	216 mm	Metallic encasing	Don Valley Pkwy	Y	N	N
332.08		Trans-Northern	Buried - Crossing ROW	Oil	400mm	Metallic encasing	Don Valley Pkwy	Y	N	N
332.08		Imperial Oil	Buried - Crossing ROW	Oil	250mm	Metallic encasing	Don Valley Pkwy	Y	N	N
331.81	331.24	Telus	Buried - Parallel to ROW	Duct Bank	3x144F/288F	Metallic	Eastern Ave to Logan Ave	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
331.63		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Queen St E	N	Y	N
331.62		TTC	Buried - Crossing ROW	Electrical	600V	Metallic	Queen St E	N	Y	N
331.62		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Queen St E	N	Y	N
331.35		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Dundas St E	N	Y	N
331.33		TTC	Buried - Crossing ROW	Electrical	600V	Metallic	Dundas St E	N	Y	N
331.24	330.92	Telus	Buried - Parallel to ROW	Duct Bank	4x144F/288F	Metallic	Logan Ave to Pape Ave pedestrian bridge	Y	N	N
331.04		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Gerrard St E	N	Y	N
331.03		TTC	Buried - Crossing ROW	Electrical	600V	Metallic	Gerrard St E	N	Y	N
331.03		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Gerrard St E	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
311.03		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Pape Ave	Y	N	N
330.95	323.29	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Pape Ave to Eglinton Station	Y	N	N
330.92		Toronto Hydro	Buried - Crossing ROW	Duct Bank	13.8kV 2W1H	Reinforced Concrete	Pape Ave pedestrian bridge	Y	N	N
330.92		Cogeco Data	Buried - Crossing ROW	Conduit	288ct, 48ct	Metallic	Pape Ave pedestrian bridge	Y	N	N
330.92		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Pape Ave	Y	N	N
330.92	330.20	Telus	Buried - Parallel to ROW	Duct Bank	4x144F/288F	Metallic	Pape Ave pedestrian bridge to Greenwood Ave	Y	N	N
330.91		Toronto Hydro	Buried - Crossing ROW	Conduit	Unknown	Concrete (Unreinforced)	Pape Ave pedestrian bridge	Y	N	N
330.47	330.38	Bell	OH - Parallel to ROW	Cable	Unknown	Metallic	Leslie St to Seymour Ave	N	Y	N
330.24	330.23	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Greenwood Ave	N	Y	N
330.22		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Greenwood Ave	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
330.21		Bell	Buried - Crossing ROW	Duct Bank	4 ducts	Plastic	Greenwood Ave	Y	N	N
330.20	329.81	Telus	Buried - Parallel to ROW	Duct Bank	3x144F/288F	Metallic	Greenwood Ave to Coxwell Ave	Y	N	N
329.85	329.77	Toronto Hydro	OH - Parallel to ROW	Electrical	Unknown	Metallic	Craven Rd to Coxwell Ave	N	Y	N
329.81	328.74	Telus	Buried - Parallel to ROW	Duct Bank	3x144F/288F	Metallic	Rhodes Ave to Westlake Ave	Y	N	N
329.75		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Coxwell Ave	Y	N	N
328.943	328.62	Hydro One	Buried - Parallel to ROW	Electrical	115kV	Metallic	Main Street	Y	N	N
328.942	328.62	Hydro One	Buried - Parallel to ROW	Electrical	115kV	Metallic	Main Street	Y	N	N
328.75		Toronto Hydro	OH - Crossing ROW	Electrical	13.8kV	Metallic	Westlake Ave	Y	Y	Y
328.74	328.65	Telus	Buried - Parallel to ROW	Duct Bank	3x144F/288F	Metallic	Westlake Ave to Main St	Y	N	N
328.67	327.88	Telus	Buried - Parallel to ROW	Duct Bank	4x144F/288F	Metallic	Enderby Rd to Victoria Park Ave	Y	N	N
328.63		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Main St	Y	N	N
328.63		Hydro One	Buried - Crossing ROW	Electrical	115kV	Metallic	Main St	Y	N	N

Mitigation/Avoidance Measures

- Further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Spatial and electrical conflicts will be mitigated by the removal, relocation, reconfiguration or burial of overhead utilities. Further consultation and coordination with affected utility companies will need to be undertaken during Detailed Design to confirm conflicts and to establish the preferred mitigation approach. In some cases, primarily relating to those utilities attached to bridges, further study of the potential conflict during the design phase will be required to determine the extent of actual conflict.
- Electrical zone of influence conflicts will be resolved by installing appropriate grounding and bonding measures to counteract electromagnetic interference (EMI). Because vertical spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- Above ground (parallel) metal pipe or metallic conduits outside the OCLZ are to be bonded to ground electrodes as per the utility standards/requirements. Because horizontal spatial clearance requirements are more conservative than the OCLZ clearance requirements, resolution involving the utility to avoid a spatial conflict will automatically resolve conflicts due to electrical zone of influence.
- With regard to existing buried utilities, notification shall be provided to the third party of the anticipated AC electrification of the rail ROW.
- With regard to new/proposed utilities within the OCLZ or crossing the rail ROW, water lines, gas lines and pipes carrying flammable substances shall be encased in a metal casing (isolated from the pipe itself) and the metal casing shall be bonded to the railroad return system.
- Electrical service in bridges are to be bonded to traction return, or insulated. Water lines, gas lines and other flammable substances have insulation requirements and will be flagged as potential conflicts.

8.11.6.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.7 OCS & Bridges: Section LSE-2 – Danforth Station to Scarborough Station

8.11.7.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-59: Section LSE-2 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
328.60		Bell	Buried - Crossing ROW	Duct Bank	20 ducts	Plastic	Main St	Y	N	N
328.60		Cogeco Data	Buried - Crossing ROW	Conduit	288ct	Metallic	Main St	Y	N	N
328.60		Toronto Hydro	Buried - Crossing ROW	Duct Bank	13.8kV	Reinforced Concrete	Main St	Y	N	N
328.64		Toronto Hydro	On Bridge	Duct Bank	13.8kV	Reinforced Concrete	Main St	Y	Y	Y
328.59		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Main St	N	Y	N
328.59		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Main St	N	Y	N
328.58		City of Toronto	Buried - Crossing ROW	Sewer	1.753m	Other	Main St	Y	N	N
328.64		Toronto Hydro	On Bridge	Electrical	13.8kV	Metallic	Main St	Y	Y	Y
328.58		TTC	Buried - Crossing ROW	Electrical	Unknown	Metallic	Main St	N	Y	N
328.64		Rogers	On Bridge	Conduit	Unknown	Metallic	Main St	Y	N	N
328.57		Bell	Buried - Crossing ROW	Duct Bank	23 Ducts	Plastic	Main St	Y	N	N
328.55	328.53	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	Unknown	Reinforced Concrete	Danforth GO Station	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
327.88	325.07	Telus	Buried - Parallel to ROW	Duct Bank	3x144F/288F	Metallic	Victoria Park Ave to St Clair Ave E	Y	N	N
327.84		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Thora Ave	Y	Y	N
326.98		Bell	Buried - Crossing ROW	Conduit	1 duct	Plastic	Danforth Ave	Y	N	N
326.90		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Eastwood Ave	Y	Y	N
326.85		Cogeco Data	OH - Crossing ROW	Electrical	24ct	Metallic	Eastwood Ave	Y	Y	N
326.85		Cogeco Data	OH - Crossing ROW	Electrical	288ct	Metallic	Eastwood Ave	Y	Y	N
326.58	326.52	H. Paulin & Co.	OH - Parallel to ROW	Electrical	Unknown	Metallic	Milne Ave to Birchmount Rd	N	Y	N
326.90		Enbridge Gas	Buried - Crossing ROW	Gas	400mm	Metallic	Birchmount Rd	Y	N	N
326.50		City of Toronto	Buried - Crossing ROW	Water	450mm	Metallic	Birchmount Rd	Y	N	N
326.15		Toronto Hydro	On Bridge	Electrical	120V	Metallic	Woodrow Ave	Y	Y	Y
325.76		Toronto Hydro	On Bridge	Electrical	Unknown	Metallic	Kennedy Rd	Y	Y	Y
325.71		City of Toronto	Buried - Crossing ROW	Water	300mm	Other	Kennedy Rd	Y	N	N
325.76		Toronto Hydro	On Bridge	Electrical	Unknown	Metallic	Kennedy Rd	Y	Y	Y
325.70		City of Toronto	Buried - Crossing ROW	Water	Unknown	Unknown	Kennedy Rd	Y	N	N
325.75		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Kennedy Rd	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
325.61	325.58	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	27.6kV	Plastic	Kennedy Rd	Y	N	N
325.54	325.20	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Kennedy Rd to Scarborough GO Station	Y	Y	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **8.11.6.1** also apply to LSE-2.

8.11.7.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.8 OCS & Bridges: Section LSE-3 – Scarborough Station to Guildwood Station

8.11.8.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-60: Section LSE-3 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
325.17		Rogers	Buried - Crossing ROW	Conduit	Unknown	Metallic	Scarborough GO Station	Y	N	N
325.21		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Scarborough GO Station	Y	Y	N
325.21		Bell	OH - Crossing ROW	Conduit	Unknown	Metallic	Scarborough GO Station	Y	Y	N
325.21		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Scarborough GO Station	Y	Y	N
325.21		Cogeco Data	OH - Crossing ROW	Electrical	288ct	Metallic	Scarborough GO Station	Y	Y	N
325.17		Enbridge Gas	Buried - Crossing ROW	Gas	300mm	Metallic	St. Clair Ave E	Y	N	N
325.07	324.92	Telus	Buried - Parallel to ROW	Duct Bank	144F	Metallic	St Clair Ave E to Midland Ave	Y	N	N
325.07	11.91	Telus	Buried - Parallel to ROW	Duct Bank	144F	Metallic	St Clair Ave E to Thornton Rd S	Y	N	N
324.89		Cogeco Data	OH - Crossing ROW	Electrical	24ct	Metallic	Midland Ave	Y	Y	Y
324.96		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Midland Ave	Y	Y	Y
324.96		Bell	OH - Crossing ROW	Conduit	Unknown	Metallic	Midland Ave	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
324.89		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Midland Ave	Y	Y	Y
324.36	324.27	Bell	OH - Parallel to ROW	Cable	Unknown	Metallic	Glenshephard Dr	N	Y	N
324.21		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Brimley Rd	Y	Y	N
323.66		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	McCowan Rd	Y	Y	N
323.66		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	McCowan Rd	Y	Y	N
323.29	323.00	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Eglinton Ave E	Y	N	N
323.27	323.21	Toronto Hydro	Buried - Parallel to ROW	Duct Bank	2W1H	Reinforced Concrete	Eglinton GO Station	Y	N	N
323.10		Cogeco Data	Buried - Crossing ROW	Conduit	100mm	HDPE Conduit	Eglinton Ave E	Y	N	N
323.18		Toronto Hydro	OH - Crossing ROW	Electrical	347/600V, 4.16kV, 27.6kV	Metallic	Eglinton Ave E	N	Y	N
323.09		Enbridge Gas	Buried - Crossing ROW	Gas	300mm	Metallic	Eglinton Ave	Y	N	N
323.00	321.42	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Bellamy Rd N to Kingston Rd	Y	N	N
322.53		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Markham Rd	Y	Y	Y
322.53		Cogeco Data	OH - Crossing ROW	Conduit	144ct	Metallic	Markham Rd	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
322.53		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Markham Rd	Y	Y	Y
322.53		Bell	Buried - Crossing ROW	Conduit	2 ducts	Plastic	Markham Rd	Y	N	N
322.51		Toronto Hydro	On Bridge	Electrical	120V	Metallic	Markham Rd	Y	Y	Y
322.50		City of Toronto	Buried - Crossing ROW	Water	300mm	Metallic encasing	Markham Rd	Y	N	N
322.11	321.63	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Scarborough Golf Club Rd	Y	Y	N
321.98		Toronto Hydro	OH - Crossing ROW	Electrical	120V, 27.6kV	Metallic	Scarborough Golf Club Rd	Y	Y	N
321.92		Bell	Buried - Crossing ROW	Conduit	2 ducts	Plastic	Scarborough Golf Club Rd	Y	N	N
321.52	321.44	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Kingston Rd	Y	Y	N
321.48		City of Toronto	Buried - Crossing ROW	Water	750mm	Metallic encasing	Kingston Rd	Y	N	N
321.45		Toronto Hydro	On Bridge	Electrical	Unknown	Metallic	Kingston Rd	Y	Y	Y
321.40		Rogers	Buried - Crossing ROW	Conduit	Unknown	Metallic	Kingston Rd	Y	N	N
321.45		Toronto Hydro	On Bridge	Electrical	Unknown	Metallic	Kingston Rd	Y	Y	Y
321.39		Rogers	Buried - Crossing ROW	Conduit	100mm	Metallic encasing	Kingston Rd	Y	N	N
321.45		Cogeco Data	Buried - Crossing ROW	Conduit	144ct	Plastic	Kingston Rd	Y	N	N
321.45		Shaw	Buried - Crossing ROW	Conduit	Unknown	Plastic	Kingston Rd	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
321.38	320.86	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Kingston Rd to Galloway Rd	Y	N	N
321.43		Toronto Hydro	OH - Crossing ROW	Electrical	120V, 4.16kV, 27.6kV	Metallic	Kingston Rd	Y	Y	N
321.43		Rogers	Buried - Crossing ROW	Conduit	Unknown	Metallic	Kingston Rd	Y	N	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **8.11.6.1** also apply to LSE-3.

8.11.8.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.9 OCS & Bridges: Section LSE-4 – Guildwood Station to Rouge Hill Station

8.11.9.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-61: Section LSE-4 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
321.01	320.93	Bell	Buried - Parallel to ROW	Cable	Unknown	Plastic	Emcarr Dr to Galloway Rd	Y	N	N
320.96		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV, 4.16kV & 120/240V	Metallic	Galloway Rd	Y	Y	N
320.86	318.54	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Galloway Rd to Beechgrove Dr	N	Y	N
320.86	320.33	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Galloway Rd to Morningside Ave	Y	N	N
320.65		Toronto Hydro	OH - Crossing ROW	Electrical	2.4kV, 120/240V & 120V	Metallic	Poplar Rd	N	Y	N
320.41		Toronto Hydro	OH - Crossing ROW	Electrical	120V/240V, 4.16kV	Metallic	Morningside Ave	N	Y	N
320.36	320.27	Bell	Buried - Parallel to ROW	Cable	Unknown	Other	Morningside Ave	Y	N	N
320.33	11.76	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Morningside Ave to Thornton Rd S	Y	N	N
319.90		Toronto Hydro	OH - Crossing ROW	Electrical	120V, 4.16kV, 27.6kV	Metallic	Manse Rd	Y	Y	N
319.37		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Chemical Ct	Y	Y	Y

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
318.89		Toronto Hydro	OH - Crossing ROW	Electrical	27.6kV	Metallic	Beechgrove Dr	Y	Y	N
318.48	318.03	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Highland Creek	N	Y	N
317.26	316.93	Toronto Hydro	OH - Parallel to ROW	Electrical	120V/240V, 8kV	Metallic	Rouge Hill GO Station to Portwine Dr	Y	Y	N
317.19	313.91	Unknown	OH - Parallel to ROW	Electrical	Unknown	Metallic	Rouge Hill GO Station to W Shore Blvd	Y	Y	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **8.11.6.1** also apply to LSE-4.

8.11.9.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.10 OCS & Bridges: Section LSE-5 – Rouge Hill Station to Pickering Station

8.11.10.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-62: Section LSE-5 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
317.22		Toronto Hydro	OH - Crossing ROW	Electrical	8kV	Metallic	Chesterton Shores	Y	Y	N
316.40	316.11	Toronto Hydro	OH - Parallel to ROW	Electrical	Unknown	Metallic	Rouge Hills Dr	N	Y	N
316.11		Bell	Buried - Crossing ROW	Conduit	Unknown	Plastic	Rouge River	Y	N	N
315.97		Veridian	OH - Crossing ROW	Electrical	27.6kV	Metallic	Rodd Ave	Y	Y	N
315.97		Bell	OH - Crossing ROW	Cable	Unknown	Metallic	Rodd Ave	Y	Y	N
315.90		Bell	Hardware	vault/handwell	Unknown	Other	Rodd Ave	Y	Y	N
314.96		Veridian	OH - Crossing ROW	Electrical	27.6kV	Metallic	Granite Ct	N	Y	N
314.96		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Granite Ct	Y	Y	N
314.96		Bell	OH - Crossing ROW	Conduit	Unknown	Metallic	Granite Ct	N	Y	N
314.96		Allstream	OH - Crossing ROW	Conduit	Unknown	Metallic	Granite Ct	N	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
314.88		Enbridge Gas	Buried - Crossing ROW	Gas	100mm	Metallic	Granite Ct	Y	N	N
314.88		Bell	Buried - Crossing ROW	Conduit	4 ducts	Plastic	Granite Ct	Y	N	N
314.72		Durham Region	Buried - Crossing ROW	Sewer	150mm	Metallic encasing	Whites Rd S	Y	N	N
314.70		Bell	Hardware	vault/handwell	Unknown	Other	Whites Rd S	Y	N	N
314.74		Veridian	OH - Crossing ROW	Electrical	27.6kV	Metallic	Whites Rd S	Y	Y	N
314.74		Bell	OH - Crossing ROW	Conduit	Unknown	Metallic	Whites Rd S	Y	Y	N
0.34	0.90	Allstream	Buried - Parallel to ROW	Conduit	Unknown	Plastic	Liverpool Rd	Y	N	N
0.35		Bell	Buried - Crossing ROW	Cable	Unknown	Other	West of Begley St	Y	N	N
0.35		Bell	Buried - Crossing ROW	Conduit	3 Ducts	Plastic	West of Begley St	Y	N	N
0.36		Enbridge Gas	Buried - Crossing ROW	Gas	300mm	Metallic Encasing	Dixie Rd	Y	N	N
0.36	0.52	Enbridge Gas	Buried - Parallel to ROW	Gas	300mm	Metallic	Dixie Rd	Y	N	N
0.86		Bell	Hardware	vault/handwell	Unknown	Other	Liverpool Rd	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
0.88		Bell	Buried - Crossing ROW	Conduit	4 ducts	Plastic	Liverpool Rd	Y	N	N
0.89		Bell	Buried - Crossing ROW	Conduit	1 duct	Plastic	Liverpool Rd	Y	N	N
0.89		Rogers	Buried - Crossing ROW	Conduit	Unknown	Metallic	Liverpool Rd	Y	N	N
0.90		Allstream	Buried - Crossing ROW	Conduit	Unknown	Plastic	Liverpool Rd	Y	N	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **8.11.6.1** also apply to LSE-5.

8.11.10.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.11 OCS & Bridges: Section LSE-6 – Pickering Station to Ajax Station

8.11.11.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-63: Section LSE-6 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
1.57		Veridian	OH - Crossing ROW	Electrical	44kV	Metallic	West of Brock Rd	Y	Y	N
1.58		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	West of Brock Rd	N	Y	N
1.60		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	West of Brock Rd	N	Y	N
1.64		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	West of Brock Rd	N	Y	N
1.66		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	West of Brock Rd	N	Y	N
1.68		Veridian	OH - Crossing ROW	Electrical	13.8kV	Metallic	West of Brock Rd	N	Y	N
1.69		Veridian	OH - Crossing ROW	Electrical	13.8 kV	Metallic	West of Brock Rd	N	Y	N
2.47		Veridian	OH - Crossing ROW	Electrical	13.8 to 44kV	Metallic	Squires Beach Rd	Y	Y	N
2.48		Veridian	OH - Crossing ROW	Electrical	Unknown	Metallic	Squires Beach Rd	Y	Y	N
2.48		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Squires Beach Rd	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
3.01		Bell	Buried - Crossing ROW	Conduit	3 ducts	Plastic	Church St S	Y	N	N
3.01		Enbridge Gas	Buried - Crossing ROW	Gas	150mm	Metallic	Church St	Y	N	N
3.58		Telus	Buried - Crossing ROW	Duct Bank	48F	Metallic	Westney Rd S	Y	N	N
3.59	3.62	Bell	Buried - Parallel to ROW	Conduit	17 ducts	Plastic	Westney Rd S	Y	N	N
3.59	4.95	Bell	Buried - Parallel to ROW	Duct Bank	4 ducts	Concrete (Unreinforced)	Westney Rd S to Salem Rd S	Y	N	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **8.11.6.1** also apply to LSE-6.

8.11.11.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.12 OCS & Bridges: Section LSE-7 – Ajax Station to Whitby Station

8.11.12.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-64: Section LSE-7 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
3.61		Bell	Buried - Crossing ROW	Conduit	17 ducts	Plastic	Westney Rd S	Y	N	N
4.12		Veridian	OH - Crossing ROW	Electrical	13.8 to 44kV	Metallic	Station St	N	Y	N
4.38		Veridian	OH - Crossing ROW	Electrical	13.8kV	Metallic	West of Harwood Ave S	Y	Y	N
4.38		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	West of Harwood Ave S	Y	Y	N
4.56		Bell	Buried - Crossing ROW	Conduit	6 ducts	Plastic	Harwood Ave S	Y	N	N
4.57		Bell	Buried - Crossing ROW	Conduit	1 duct	Plastic	Harwood Ave S	Y	N	N
4.57		Bell	Buried - Crossing ROW	Conduit	4 ducts	Plastic	Harwood Ave S	Y	N	N
4.58		Bell	Buried - Crossing ROW	Conduit	1 duct	Plastic	Harwood Ave S	Y	N	N
4.58		Bell	Buried - Crossing ROW	Conduit	3 ducts	Plastic	Harwood Ave S	Y	N	N
5.02		Veridian	OH - Crossing ROW	Electrical	13.8 to 44kV	Metallic	West of Salem Rd S	Y	Y	N
5.02		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	West of Salem Rd S	Y	Y	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
6.61		Bell	Buried - Crossing ROW	Conduit	2 ducts	Plastic	Lake Ridge Rd	Y	N	N
6.62		Enbridge Gas	Buried - Crossing ROW	Gas	300mm	Metallic	Lake Ridge Rd	Y	N	N
8.76		Bell	Buried - Crossing ROW	Conduit	2 ducts	Plastic	Henry St	Y	N	N
8.73		Whitby Hydro	OH - Crossing ROW	Electrical	2x13.8kV + 44kV	Metallic	Henry St	N	Y	N
8.74		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Henry St	Y	Y	N

Mitigation/Avoidance Measures
The mitigation/avoidance measures included in Section **8.11.6.1** also apply to LSE-7.

8.11.12.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.11.13 OCS & Bridges: Section LSE-8 – Whitby Station to Oshawa Station

8.11.13.1 Potential Effects and Mitigation Measures

The potentially impacted utilities in this area are:

Table 8-65: Section LSE-8 Potentially Impacted Utilities

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
8.79		Enbridge Gas	Buried - Crossing ROW	Gas	150mm	Metallic	Henry St	Y	N	N
8.78		OPP	OH - Crossing ROW	Electrical	Unknown	Metallic	East of Henry St	N	Y	N
9.00		Enbridge Gas	Buried - Crossing ROW	Gas	Unknown	Metallic	West of Brooks St S	Y	N	N
9.02		Whitby Hydro	OH - Crossing ROW	Electrical	3 Phase Circuit	Metallic	Brock St S	Y	Y	N
9.02		Bell	OH - Crossing ROW	Cable	1 duct	Metallic	Brock St S	Y	Y	N
9.02		Rogers	OH - Crossing ROW	Conduit	Unknown	Metallic	Brock St S	Y	Y	N
9.37		Bell	Buried - Crossing ROW	Cable	Unknown	Other	Victoria St E	Y	N	N
9.67		Whitby Hydro	OH - Crossing ROW	Electrical	2x44kV + 13.8kV	Metallic	S Blair St	N	Y	N
9.67		Bell	Buried - Crossing ROW	Conduit	4 ducts	Plastic	S Blair St	Y	N	N
9.67		Enbridge Gas	Buried - Crossing ROW	Gas	200mm	Metallic	South Blair St	Y	N	N
9.72		Enbridge Gas	Buried - Crossing ROW	Gas	Unknown	Metallic	East of S Blair St	Y	N	N

Mi. Start	Mi. End	Owner	Utility Class	Description	Size	Material	Nearest Street	Spatial	Electrical Clearance	Electrical Zone of Influence
10.41		Hydro One	OH - Crossing ROW	Electrical	230kV	Metallic	East Rail MF	N	Y	N
10.70		Durham Region	Buried - Crossing ROW	Water	750mm	Reinforced Concrete	Thickson Rd S	Y	N	N
10.67		Whitby Hydro	OH - Crossing ROW	Electrical	44kV + 13.8 kV	Metallic	Thickson Rd S	Y	Y	N
11.62		Enbridge Gas	Hardware	Gas			West of Thornton Rd S	Y	N	N

Mitigation/Avoidance Measures

The mitigation/avoidance measures included in Section **8.11.6.1** also apply to LSE-8.

8.11.13.2 Net Effects

Based on the implementation of the mitigation measures outlined above, utility conflicts will be resolved and no net adverse effects are anticipated.

8.12 EMI & EMF

This section provides a summary of the key potential EMI/EMF effects, mitigation measures, and (resultant) net effects. The impact assessment was carried out using the baseline conditions data summarized in the EMI/EMF Baseline Conditions Report which entailed a survey of existing EMI/EMF conditions throughout the study area including along the rail corridors, feeder routes and at Taps/TPF locations (see **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report**).

Please refer to **Appendix J2** for a description of the methodology followed for assessment of EMI/EMF impacts. Additional details can be found in the Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Impact Assessment Report contained in Appendix J2.

The primary effects assessed with regard to electromagnetic compatibility (EMC) relate to human exposure, i.e., Extremely Low Frequency (ELF) Electromagnetic Fields (EMF).

With regard to Electromagnetic Interference (EMI), the primary concern is adverse effects on electronics.

8.12.1 Conservative 10 mG Reassessment Value

As part of carrying out the EMI/EMF Impact Assessment for the TPAP, a conservative value of 10.0 mG magnetic field strength was established as the threshold for which a measured location along the rail corridors or at Taps/TPFs would trigger the recommendation for re-assessing/confirming baseline EMF and EMI measurements during the next phase of the project and before operation commences. This value was based upon the values summarized in **Table 8-66**, which presents information found in *NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power*. Additional supporting technical information may be found in EN 62233:2008, *Measurement Methods for EMF of Household Appliances and Similar Apparatus with Regard to Human Exposure.*

Table 8-66: Typical Magnetic Field Strengths

Electrical Appliances in Home or Office	Magnetic Field Strength
Dishwasher	30 mG (at 30 cm)
Vacuum Cleaner	200 mG (at 30 cm)
Hair Dryer	70 mG (at 30 cm)
Electric Shaver	100 mG (at 30 cm)
Video Display	6 mG (at 30 cm)
Other Environmental Sources	

Electrical Appliances in Home or Office	Magnetic Field Strength
Electric Power Distribution/Subtransmission Lines[30] (4 to 24 kV)	
Within Right-of-Way	10 to 70 mG
Edge of Right-of-Way	N/A
High-Voltage Transmission Lines[31] (115 kV to 500 kV)	
Within Right-of-Way	30 to 87 mG (at 1 metre height above ground)
Edge of Right-of-Way	7 to 29 mG (at 1 metre height above ground)

8.12.2 Lakeshore East Rail Corridor

8.12.2.1 Potential Effects and Mitigation Measures – General

- Radio Frequency EMI from the control system(s) leading to improper operation of electronics on-board the train or in the surrounding neighbourhood.
- Radiated Magnetic Fields and Time-Varying EMFs leading to damage to belongings, i.e., magnetic media, of passengers.
- Induced Current in metallic wires, rail transit tracks, metallic fences, underground communication cables, gas pipelines, and track circuits in neighbouring rail properties leading to contact burns or shocks, or communication errors.
- ELF EMF from the power system(s) leading to effects on workers, passengers, or residents.

Mitigation Measures - General

- Implementation of an EMC Control Plan, the objective of which is to is to facilitate and confirm formal qualification of the electrification system and all its components with respect to the required EMC standards. The components of the EMC Control Plan will include but are not limited to:
    - Characterizes potential EMI sources and hazards to transit/rail operations;
    - Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed);
    - Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.);

[30] As per NIEHS 2002 Electric and Magnetic Fields Associated with the Use of Electric Power, these values "can vary considerably depending on the current carried by the line."
[31] Ibid. "During peak loads (about 1% of the time), magnetic fields are about twice as strong as the mean levels" quoted here.

  - Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B *EMF Modeling and Measurement Tools*.;
  - Includes (or references) a safety analysis and failure analysis of the transit system;
  - Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a key input to the detailed, post-electrification EMI scans taken at each TPF and compared to levels shown in EN 50121.)
  - Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions;
  - Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.).
- Baseline EMF and EMI measurements before and after system construction and operation.
- Use of ATF power systems.
- Design and installation of the electrification system and all of its components using industry-standard practices, including:
  - Good electrical grounds;
  - Proper shielding;
  - Physical separation, including burial to proper depths; and,
  - The installation of filters, capacitors, and inductors.

8.12.2.2 Net Effects – General

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

8.12.2.3 Potential Effects and Mitigation Measures – Specific Commitments (Lakeshore East Corridor)

- ELF EMF at higher-than-background levels was found in certain areas along Lakeshore East corridor.
- No EMI signals measured for Lakeshore East emanated from unknown sources.
- Areas requiring special attention in relation to re-assessment of background EMI/EMF levels, as summarized in **Table 8-67**.

Table 8-67: EMI/EMF Commitments – Specific Locations Along Lakeshore East Rail Corridor

Location	Commitment
ERMF, Scarborough, Durham, and Don Yard Traction Power Facilities	Re-Assessment of Background EMI
ERMF, Scarborough, Durham, and Don Yard Traction Power Facilities	Full Characterization of EMI Profile, using Frequencies Identified in EMC Control Plan and Corresponding Harmonics as per EN 50121.
ERMF Tap Location, ERMF, Scarborough, Durham, and Don Yard Traction Power Facilities.	Confirmation/Re-Assessment of ELF EMF

Specific Mitigation Measures – Lakeshore East

As per **Table 8-67**:

- Confirmation/Re-assessment of ELF EMF levels post-electrification, particularly at location(s) where higher-than-background ELF EMF was measured during baseline surveys.
- Re-assessment of EMI levels post-electrification, specifically at a selection of EMI sensitive locations identified during baseline surveys.

8.12.2.4 Net Effects

There are no anticipated net adverse effects related to EMI on neighboring equipment or related to EMF on workers/passengers/residents/the public as the potential will be minimized or mitigated as per Industry Standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for a full list of applicable standards) based on the implementation and adherence to the above listed mitigation measures and commitments during Detailed Design and construction/operational phases of the project.

8.13 Stormwater Management

A Preliminary Stormwater Management Assessment (see **Appendix K – Preliminary Stormwater Management Report** for additional detail) was undertaken at each Tap/TPF site as part of the TPAP to: determine existing and proposed drainage features/patterns, carry out a preliminary flow analysis, establish proposed drainage patterns once the Taps/TPFs are implemented, and to carry out a preliminary assessment of the development impact on drainage (including recommendations for mitigation measures as required). As this preliminary assessment was based on conceptual design information, a more detailed review and SWM analysis will need to be carried out as part of the Detailed Design phase once final design is prepared and additional information (e.g., survey results) is available for each Tap/TPF site.

Please refer to **Appendix K** for a description of the methodology followed for assessment of stormwater management impacts. Additional details can be found in the Preliminary Stormwater Management Report contained in **Appendix K**.

With respect to track lowering, it is noted that no adverse impacts to watercourses are anticipated based on the conceptual design developed as part of the TPAP. Similarly, with respect to drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to track lowering activities (or other electrification infrastructure proposed along the corridors) based on the preliminary analysis undertaken as part of the conceptual design work. Notwithstanding this, if environmental impacts are subsequently identified as part of Detailed Design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction.

8.13.1 East Rail Maintenance Facility Tap/TPS

The proposed site is located between the West Corbett Creek tributary, to the east, and the Pringle Creek tributary, to the west. Under the existing condition, the proposed site is a tributary to the West Corbett Creek and is located within the jurisdiction of CLOCA regulated area. If necessary, the site should be investigated further, for flood elevations, floodproofing and cut and fill balance within the flood plain, during the Detailed Design phase.

The existing drainage pattern and drainage features for the study area are shown on **Figure 8-26**.

The total TPF Assessment Area is approximately 6.6 ha. The portion of the parcel affected by the development resulting by the construction of the future building and gravel pad, for the placement of electrical equipment, will be approximately 0.45 ha. For the existing condition, the runoff coefficient, 'C' is estimated 0.2. In the subsequent sections of this report, only the area affected by the development i.e., 0.45 ha, is considered for the analysis.

The TPF Assessment Area for the proposed Tap/TPF is a part of the Metrolinx East Rail Maintenance Facility larger Site area of approximately 32.21 ha.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

8.13.1.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern and areas are shown on **Figure 8-26.** The site under existing condition is undeveloped land with no impervious area. A runoff coefficient, 'C' of 0.2 is estimated for the site area of 0.45 ha.

The proposed ERMF Tap/TPS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The approximate foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.45 ha as shown on **Figure 8-27.** The runoff coefficient for the 0.42 ha of granular surface is estimated 0.8 while for the building area of 0.03 ha it is estimated 0.9. The composite runoff coefficient for the whole site area of 0.45 ha, after development, will be approximately 0.81.

The proposed development areas and their location shown on **Figure 8-27** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

Figure 8-26: ERMF Tap/TPS Existing Drainage Conditions

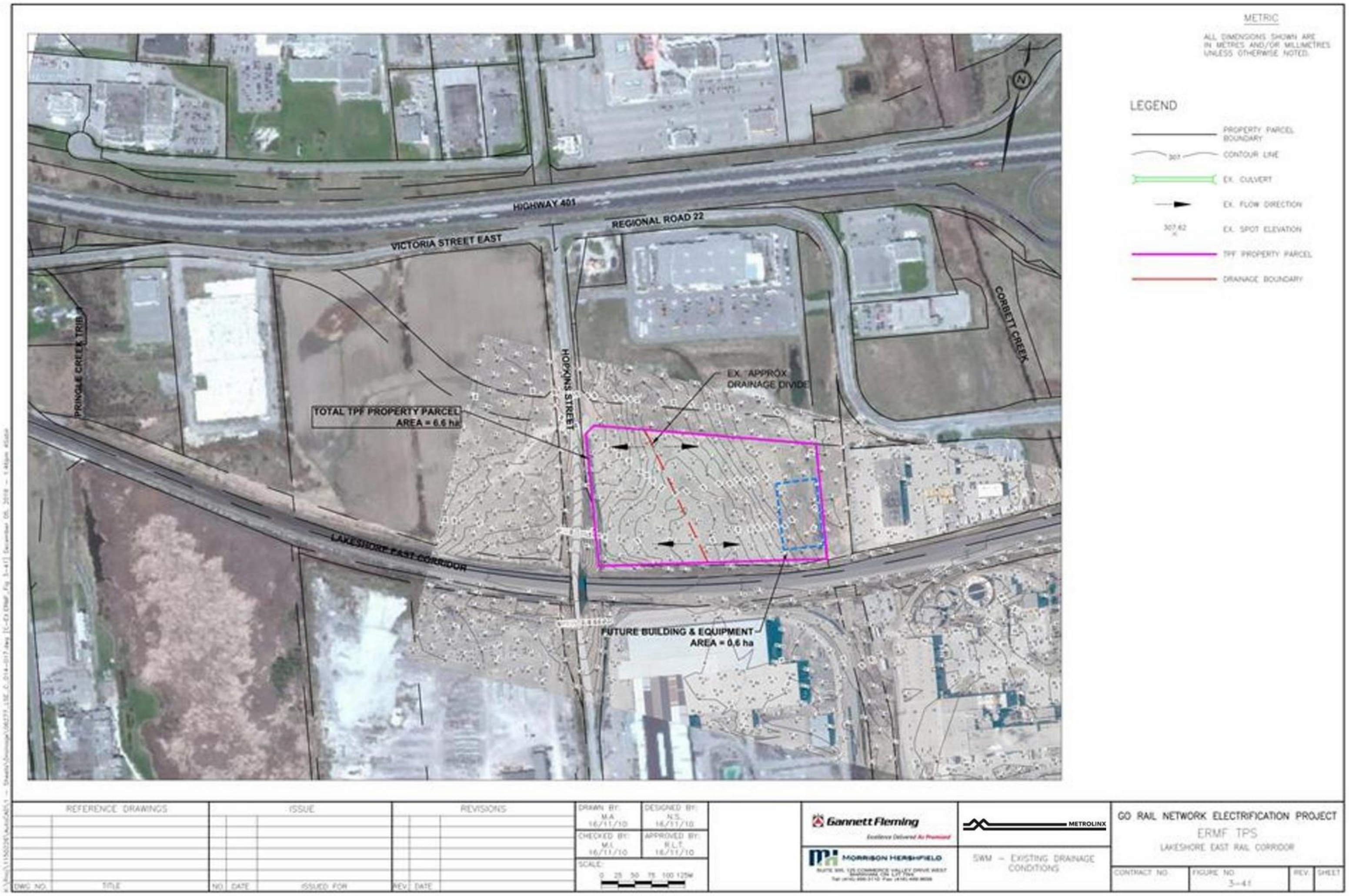
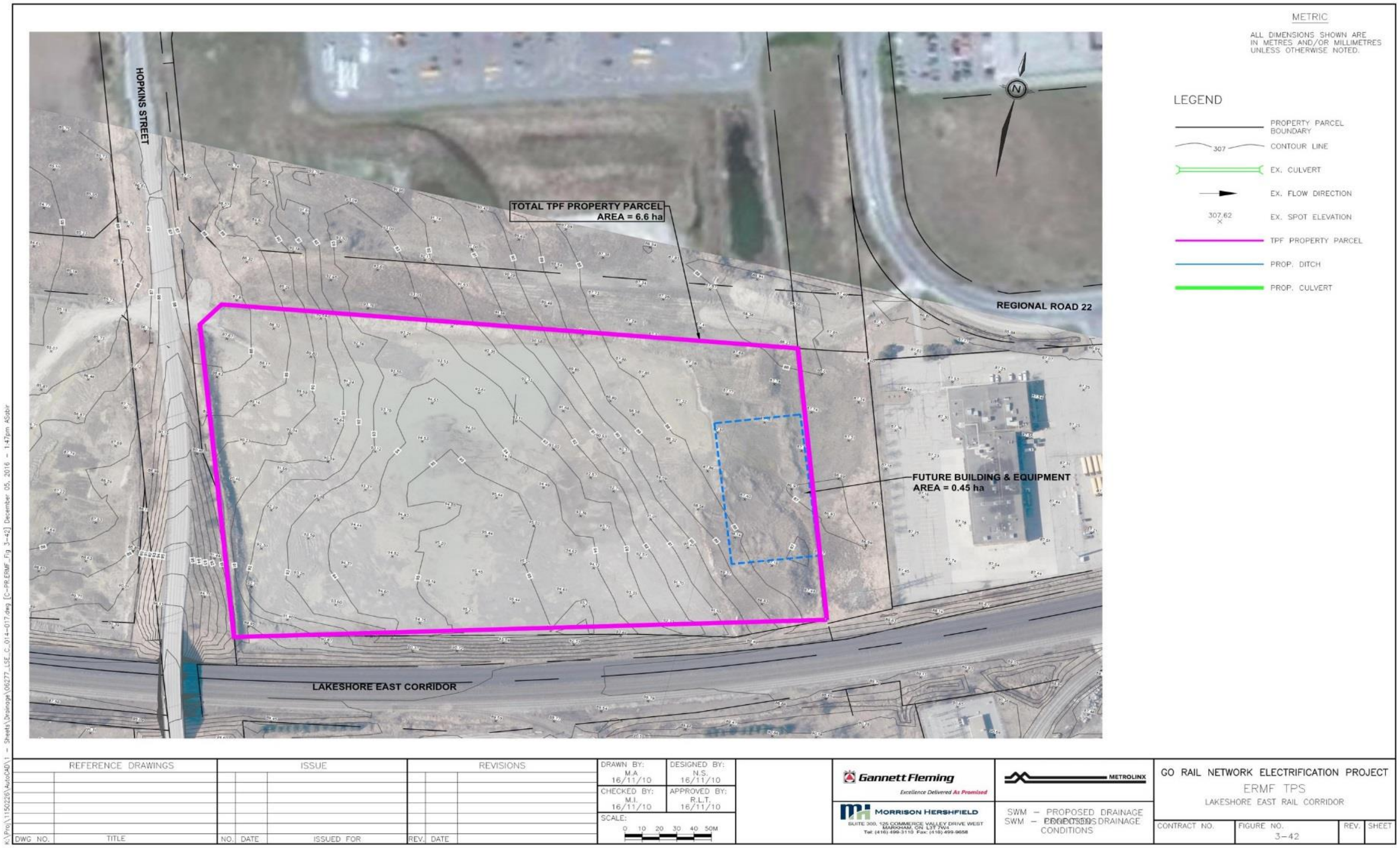


Figure 8-27: ERMF Tap/TPS Proposed Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 8-68**.

Table 8-68: East Rail Maintenance Facility Tap/TPS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area	Runoff Coefficient	Area Type	Drainage Area	Runoff Coefficient
Undeveloped	0.45	0.2	Building	0.03	0.9
			Gravel	0.42	0.8
Total/Composite	**0.45**	**0.2 OR 0% Impervious**		**0.45**	**0.81 OR 87 % Impervious**

Flow Analysis

Rational Formula was utilized to do the preliminary analysis of the runoff from the site area for the existing and the proposed condition. It can be seen in **Table 8-68** that there is an 87 % increase in impervious area and the development will cause some increase in the stormwater runoff.

Flows were computed for the 2 year to 100 year storm event using the MTO IDF Curve Data. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 10 minutes was used in the flow computations

If necessary, a more refined flow analysis for the site drainage would be done at Detailed Design phase.

Runoff computations and the Parameters used for the computations and the MTO IDF Curve Data are presented in **Appendix K**. Results are summarized below in **Table 8-69**.

Table 8-69: East Rail Maintenance Facility Tap/TPS - Existing and Proposed Development Flows

Storm event	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.004	0.041	0.037
2yr	0.018	0.074	0.056
5yr	0.025	0.099	0.075
10yr	0.029	0.116	0.087
25yr	0.037	0.150	0.113
50yr	0.045	0.180	0.134
100yr	0.052	0.197	0.146

8.13.1.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the East Rail Maintenance Facility Tap/TPS will result in 87 % increase in impervious area. However, this area is considered fully impervious as part of the larger ERMF Site area.

A perimeter ditch is proposed around the building and the equipment area to collect the runoff from the Tap/TPS site. This ditch will be extended to the headwall to convey and discharge runoff to the 1200 mm stormsewer**.** As discussed, the Tap/TPF Site area will be draining to a stormwater management pond designed for the larger ERMF site area which will provide both the quantity and quality treatment to the runoff from the site. Measures proposed for water balance for the larger ERMF site will take care of the Tap/TPF site area also.

8.13.1.3 Recommendations

As the site is located within the floodplain, the facility should be built 0.3m above the floodplain. Fill below the flood line will need to be compensated with a cut volume for the cut-fill balance. Whether the site can accommodate compensating cut or not is to be finalized during the detailed design stage.

Since a flood barrier is already proposed at the eastern boundary of the site to protect the site from flood waters of Corbett Creek, additional floodproofing measures are likely not required. This should be confirmed at the Detailed Design stage.

External drainage onto and off the site will be determined at Detailed Design stage.

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the East Rail Maintenance Facility Tap/TPS will result in minimal increase in the runoff rate and quantity which will be mitigated within the Stormwater management pond proposed for the larger ERMF Site and the quantity, quality and erosion control targets will be achieved within the pond.

Water balance targets will be achieved by the measures proposed for the larger ERMF Site area.

8.13.2 Scarborough SWS

The proposed site is a tributary to the Don River and is located within the jurisdiction of TRCA but is outside the regulated area.

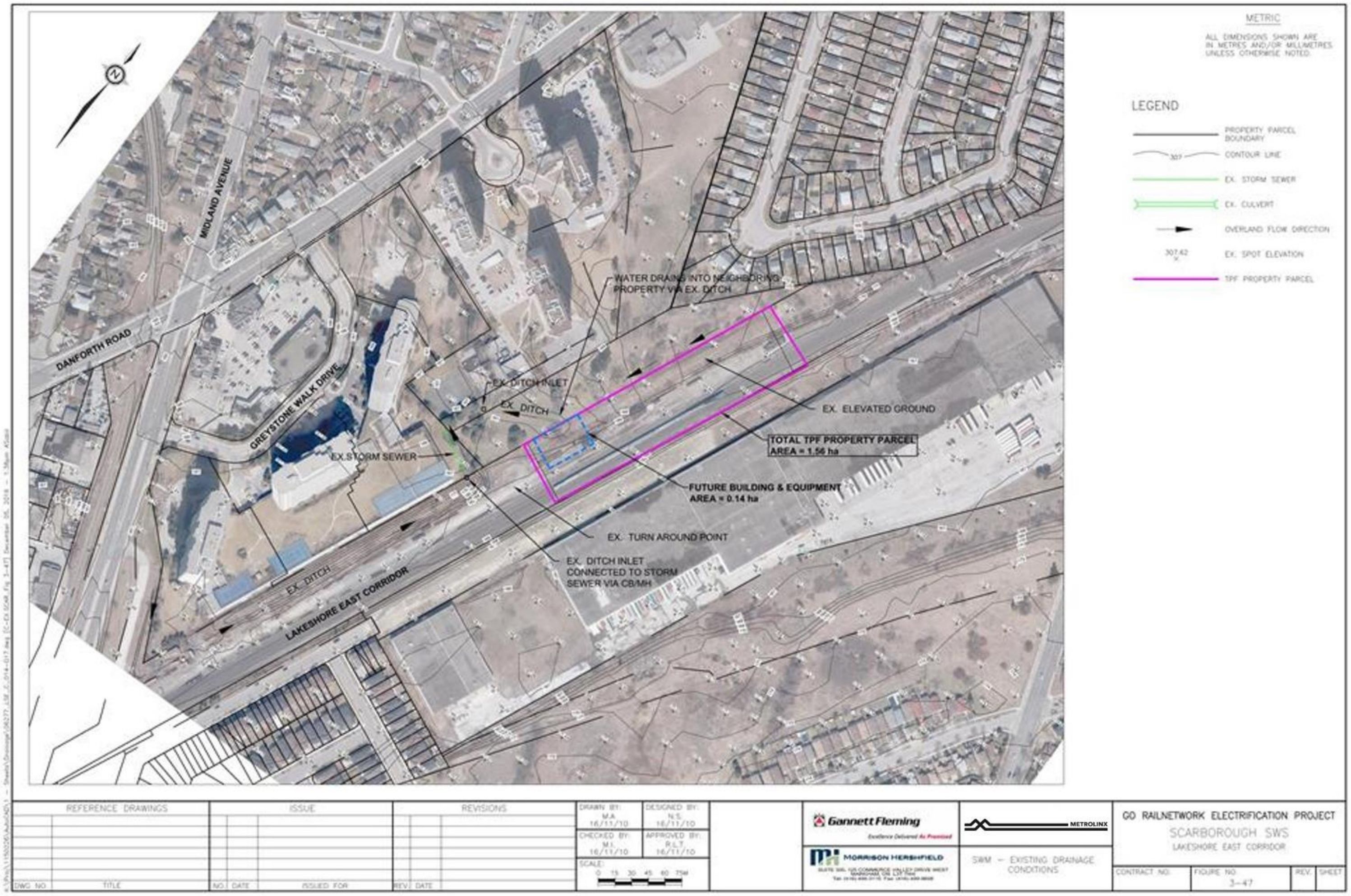
The existing drainage pattern for the site area is shown on **Figure 8-28**. The total TPF Assessment Area is approximately 1.5 ha consisting of rail tracks and undeveloped area. The portion of the site area affected by the development, including the future access road, will be approximately 0.14 ha as shown on the figure.

Under existing condition, there is no defined drainage system for the site area. Storm water runs overland to the north and southwest direction. Near west end of the site, the runoff exists the site towards west direction to discharge into the neighbouring property existing drainage system.

There is an existing ditch which flows from southwest towards the site area and ends just few metres away from the site area. At this location the runoff from the ditch discharges into an existing storm sewer system via a ditch inlet as identified on **Figure 8-28**. This location could be a potential discharge point for the proposed drainage.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Report.**

Figure 8-28: Scarborough SWS Existing Drainage Conditions



8.13.2.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 8-28**. The site under existing condition is flat undeveloped land. A runoff coefficient, 'C' of 0.3 is estimated for the site area of 1.5 ha.

The proposed Scarborough SWS development will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be asphalt set at lower grades. The approximate foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.13 ha and for the access road it will be approximately 0.02 ha at the location shown on **Figure 8-29**. The runoff coefficient for the granular surface area of 0.11 ha is estimated at 0.8.the run off coefficient for the rail corridor area of 0.5 ha is estimated at 0.5 while for the building and access road it is estimated 0.9. The composite runoff coefficient for the whole site area of 1.5 ha, after development, will be approximately 0.36.

The proposed development areas and their location shown on **Figure 8-29** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

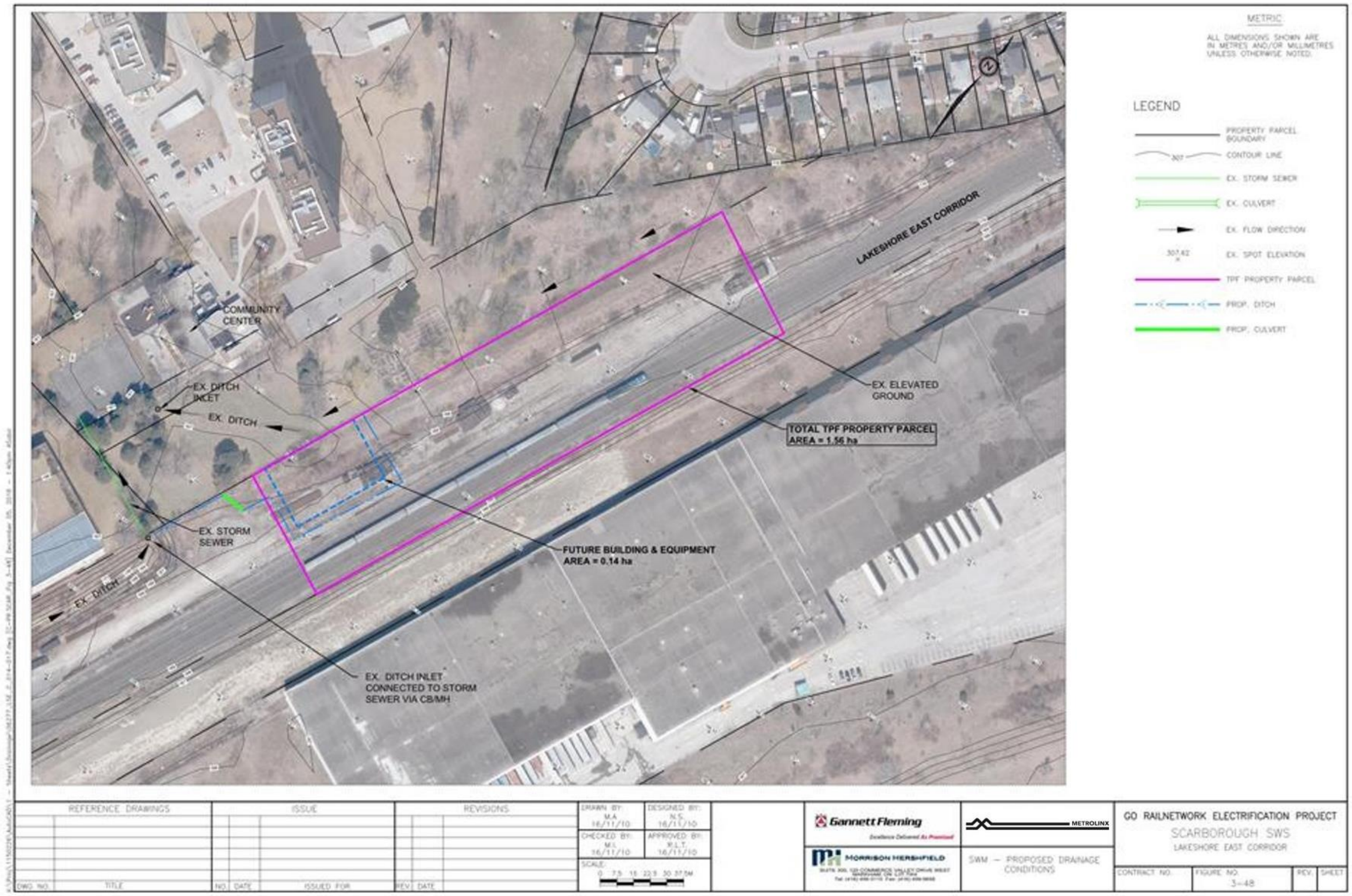
The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 8-70**.

Table 8-70: Scarborough SWS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped	1.0	0.2	Building	0.02	0.9
Rail Corridor	0.5	0.5	*Access Road	0.02	0.9
			Granular Surface	0.11	0.8
			Rail Corridor	0.50	0.5
			Undeveloped	0.85	0.2
Total/Composite	**1.5**	**0.3 Or 14% Impervious**		**1.5**	**0.36 Or 23% Impervious**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Figure 8-29: Scarborough SWS Proposed Drainage Conditions



Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. It can be seen in **Table 8-70** that increase in impervious area is very small and the development will not cause a substantial increase in the stormwater runoff.

Flows were computed for the 2 year to 100 year storm event using City of Toronto IDF curves from Wet Weather Guidelines. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 15 minutes was used in the flow computations.

Runoff computations and the Parameters used for the computations and rainfall intensities for time of concentration (Tc) of 15 minutes, from the City of Toronto IDF curve data, are presented in **Appendix K**. Results are summarized below in **Table 8-71**.

Table 8-71: Scarborough SWS - Pre and Post Development Flows

Storm event	Area Draining to West		
	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.024	0.032	0.009
2yr	0.080	0.097	0.017
5yr	0.120	0.145	0.025
10yr	0.147	0.177	0.031
25yr	0.188	0.228	0.039
50yr	0.243	0.294	0.051
100yr	0.283	0.342	0.059

8.13.2.2 Development Impact on Drainage & Proposed Measures

Based on this preliminary assessment, and that there is no substantial change in impervious area for the post development condition, extensive measures for the quantity, quality or water balance would not be required. A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City of Toronto / TRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the perimeter ditch can be converted to a bio-swale. The bio-swale can be used for quantity control as well.

It is anticipated that the quantity and quality control targets will be achieved by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be provided at Detailed Design phase.

8.13.2.3 Recommendations

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Scarborough SWS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

8.13.3 Durham SWS

The proposed site is a tributary to the Krosno Creek and is located within the jurisdiction of TRCA but is outside the regulated area.

The existing drainage pattern for the site area is shown on **Figure 8-30**. The total TPF Assessment Area is approximately 7.71 ha and consists of existing commercial building and parking area, grassed playing fields and hydro corridor. The portion of the property parcel affected by the development resulting by the construction of future building and gravel pad, for the placement of electrical equipment, will be approximately 0.11 ha. Future access road outside this area will be approximately 0.07 ha. In the subsequent sections of this report only the area affected by the development, including future access road (total of 0.18 ha), is considered for the discussion and the analysis.

Under existing condition, there is no defined drainage system for the site area. In general the ground elevations drop in the south and west direction. Storm water runs overland toward Bayly Street to the south of the property parcel where minor flow discharges to the road catchbasins and major flow runs on the road to the west direction. Based on the available information, both major and minor storm runoff ultimately discharge to Krosno Creek south of Bayly St, just east of Krosno Blvd.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

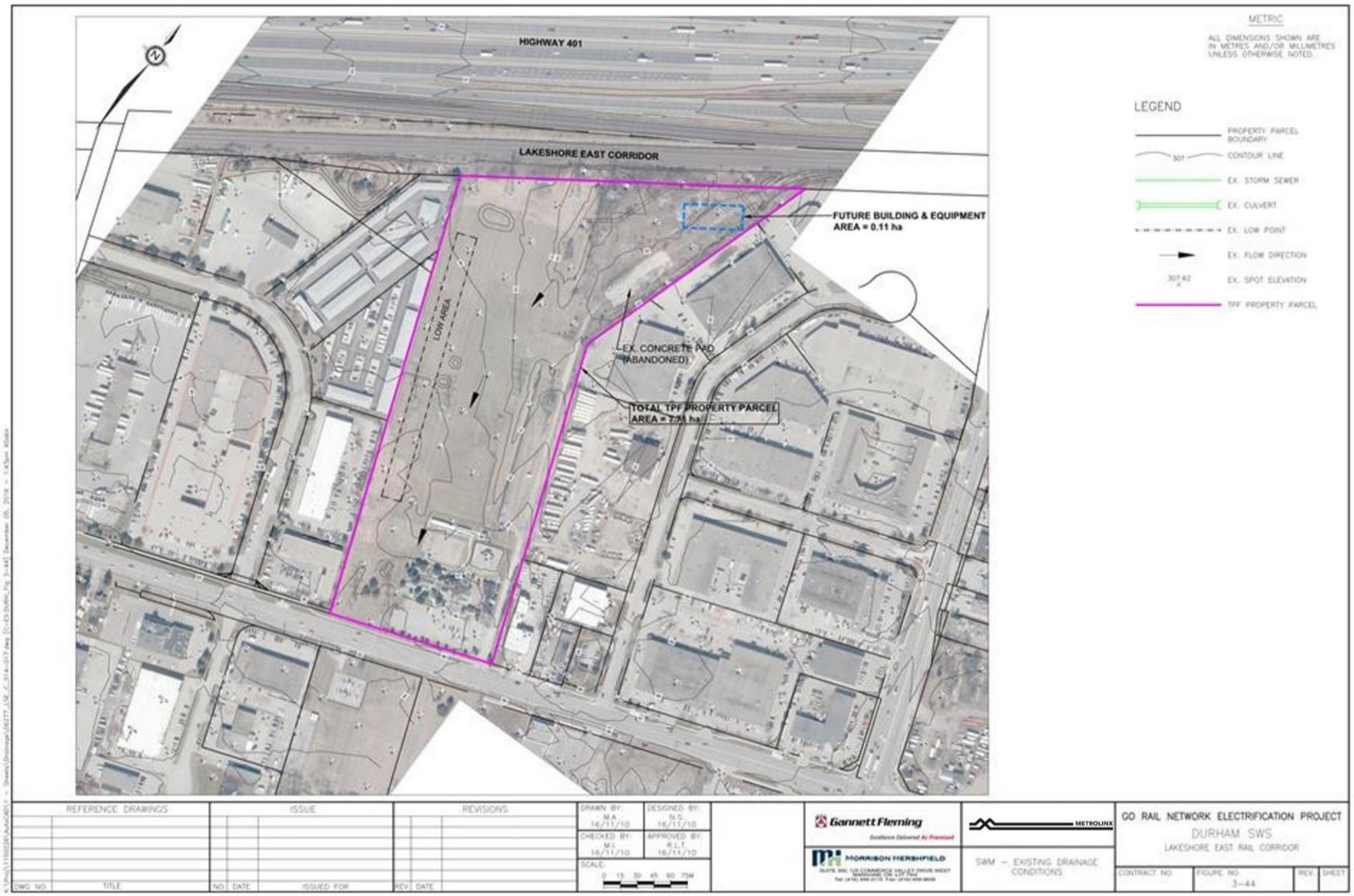
8.13.3.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 8-30**. The site under existing condition is flat undeveloped land. A runoff coefficient, 'C' of 0.2 is estimated for the site area of 0.18 ha.

The proposed Durham SWS development will consist of a building and a level site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be asphalt set at a low grades. The approximate foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.11 ha and for the access road it will be approximately 0.07 ha at the location shown on **Figure 8-31**. The runoff coefficient for the granular surface is estimated at 0.8 while for the building and access road it is estimated at 0.9. The composite runoff coefficient for the whole site area of 0.18 ha, after development, will be approximately 0.85.

Figure 8-30: Durham SWS Existing Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 8-72.**

Table 8-72: Durham SWS – Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped	0.18	0.2	Building	0.02	0.9
			*Access Road	0.07	0.9
			Gravel	0.09	0.8
Total/Composite	**0.18**	**0.2 Or 0 % Impervious**		**0.18**	**0.85 Or 93 % Impervious**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Flow Analysis

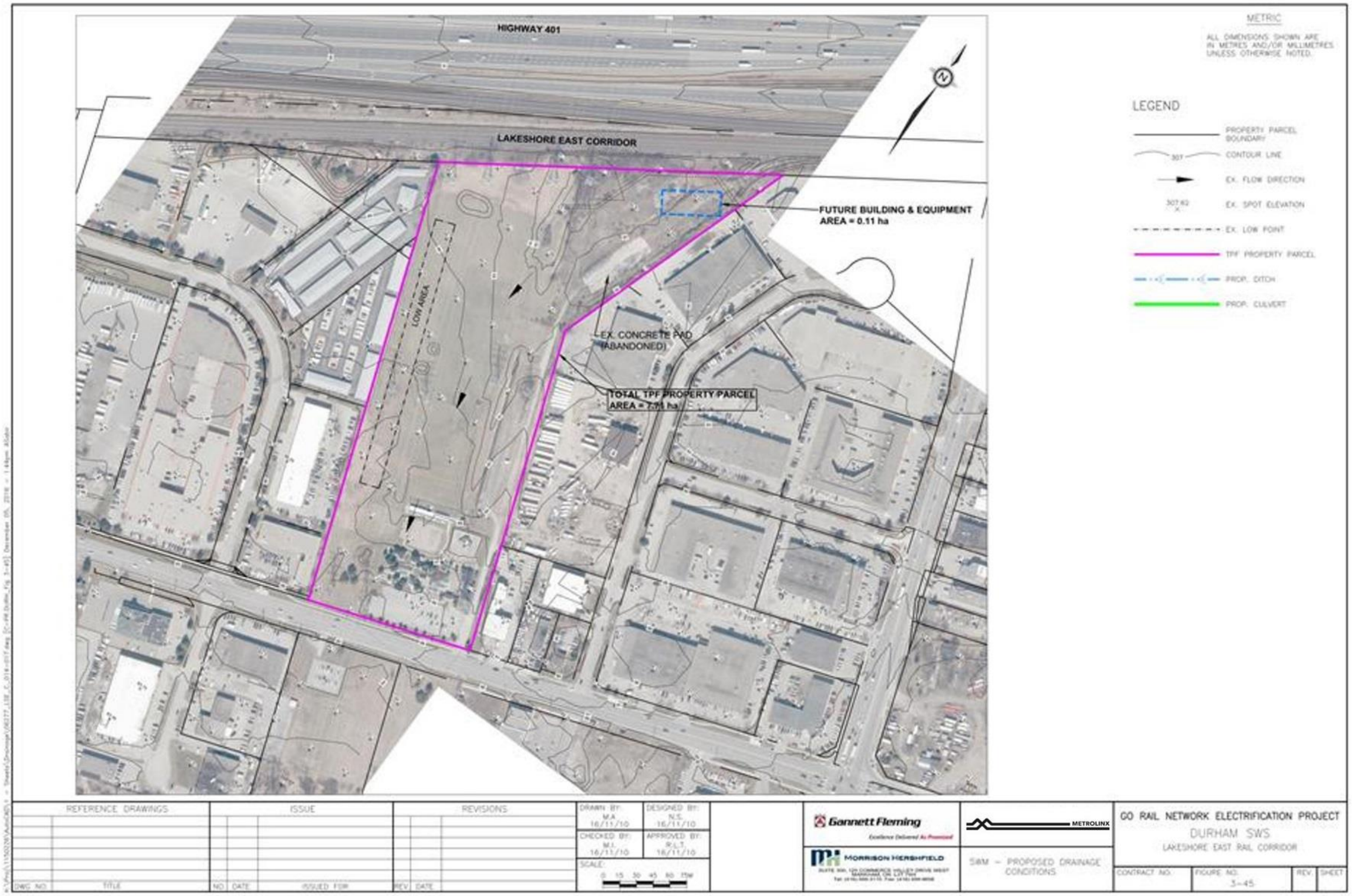
A preliminary analysis of runoff from the site area was performed, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage.

It can be seen in **Table 8-72** that there is an increase of 93% in impervious area and the development will cause increase in the stormwater runoff.

Flows were computed for the 2 year to 100 year storm event using City of Pickering IDF curves. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 10 minutes was used in the flow computations.

A more refined flow analysis for the site drainage will be required at Detailed Design phase.

Figure 8-31: Durham SWS Proposed Drainage Conditions



Runoff computations and the Parameters used for the computations and MTO rainfall data are presented in **Appendix K**. Results are summarized below in **Table 8-73**.

Table 8-73: Durham SWS – Pre and Post Development Flows

Storm event	Area Draining to West		
	Pre Dev Flow m3/s	Post Dev Flow m3/s	Flow Increase m3/s
25mm	0.001	0.018	0.017
2yr	0.008	0.032	0.025
5yr	0.010	0.043	0.033
10yr	0.012	0.050	0.039
25yr	0.015	0.065	0.050
50yr	0.019	0.074	0.055
100yr	0.021	0.081	0.060

8.13.3.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Durham SWS will result in 93 % increase in impervious area. However the total site area is very small (0.18 ha) and the impervious area is even smaller. Based on this preliminary assessment, the increase in flows resulting from the construction of the Durham SWS is not substantial, therefore, extensive measures for the quantity, quality or water balance won't be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City of Pickering / TRCA Criteria of onsite infiltration for water balance/erosion control, a portion of the perimeter ditch can be converted to a bio-swale.

It is anticipated that the quantity and quality control targets will be achieved by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be provided at Detailed Design phase.

8.13.3.3 Recommendations

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Durham SWS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing drainage system downstream and its flow capacity is not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures at the site runoff outfalls.

8.13.4 Don Yard PS

The proposed site is a tributary to the Don River and is located within the jurisdiction of TRCA regulated area. The site should be investigated further, for flood elevations, floodproofing and cut and fill balance within the flood plain, during the Detailed Design phase.

This area may be subject to further flood proofing measures by the TRCA as part of the Don Mouth Naturalization and Port Land Flood Protection Project (DMNP).

The existing drainage pattern for the study area is shown on **Figure 8-32**. The total TPF Assessment Area including future access road is approximately 0.31 ha of undeveloped land. The site area is situated is on a steep slope between rail corridor and the neighbouring property parking area. The rail corridor elevation is approximately 5 metres higher than the toe of the slope. A ditch runs along the rail corridor at the toe of the slope and discharges to the Don River to the west via an existing culvert under the Highway. Construction of the Don Yard PS will cover part of the existing ditch and an alternate drainage route would be required to convey the runoff.

For further details regarding existing conditions, refer to **Appendix K – Preliminary Stormwater Management Report.**

8.13.4.1 Hydrologic Analysis

Drainage Areas

The existing drainage pattern is shown on **Figure 8-32**. The site under existing condition is undeveloped land with no impervious area. A runoff coefficient, 'C' of 0.2 is estimated for the site area of 0.31 ha.

The proposed development of Don Yard PS will consist of a building and a levelled site with new electrical equipment enclosed by chain link fence, set on a granular surface. The access road will be asphalt set at lower grades. The approximate foot print for the tentative location of the proposed building and electrical equipment will be approximately 0.09 ha and for the access road it will be approximately 0.12 ha at the location shown on **Figure 8-33**. The runoff coefficient for the granular surface is estimated 0.8 while for the building and access road it is estimated 0.9. The composite runoff coefficient for the whole site area of 0.31 ha, after development, will be approximately 0.65.

The proposed development areas and their location shown on **Figure 8-33** are based on conceptual design; therefore reassessment of the drainage areas will be required at the subsequent Detailed Design phase.

Figure 8-32: Don Yard PS Existing Drainage Conditions

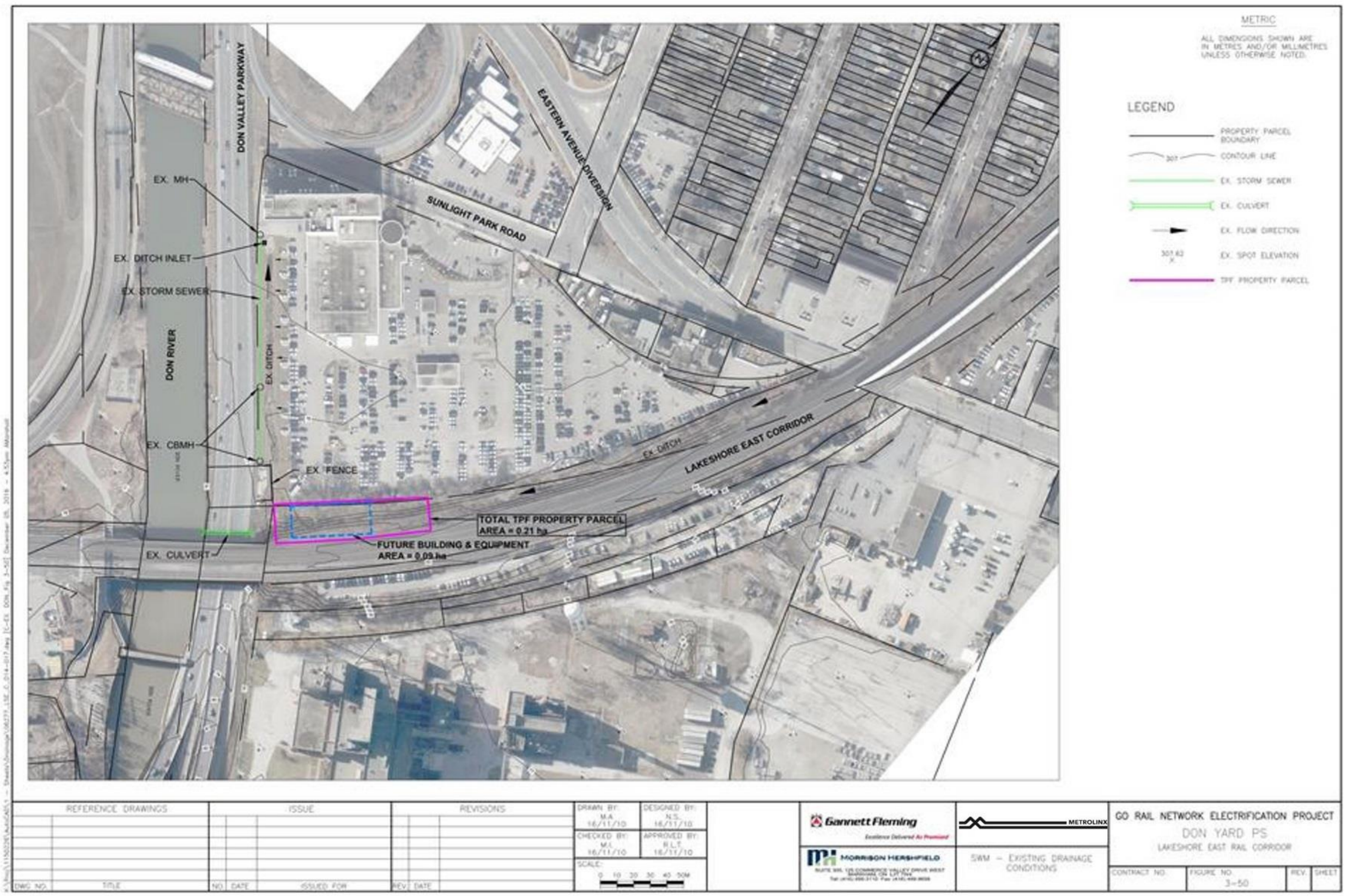
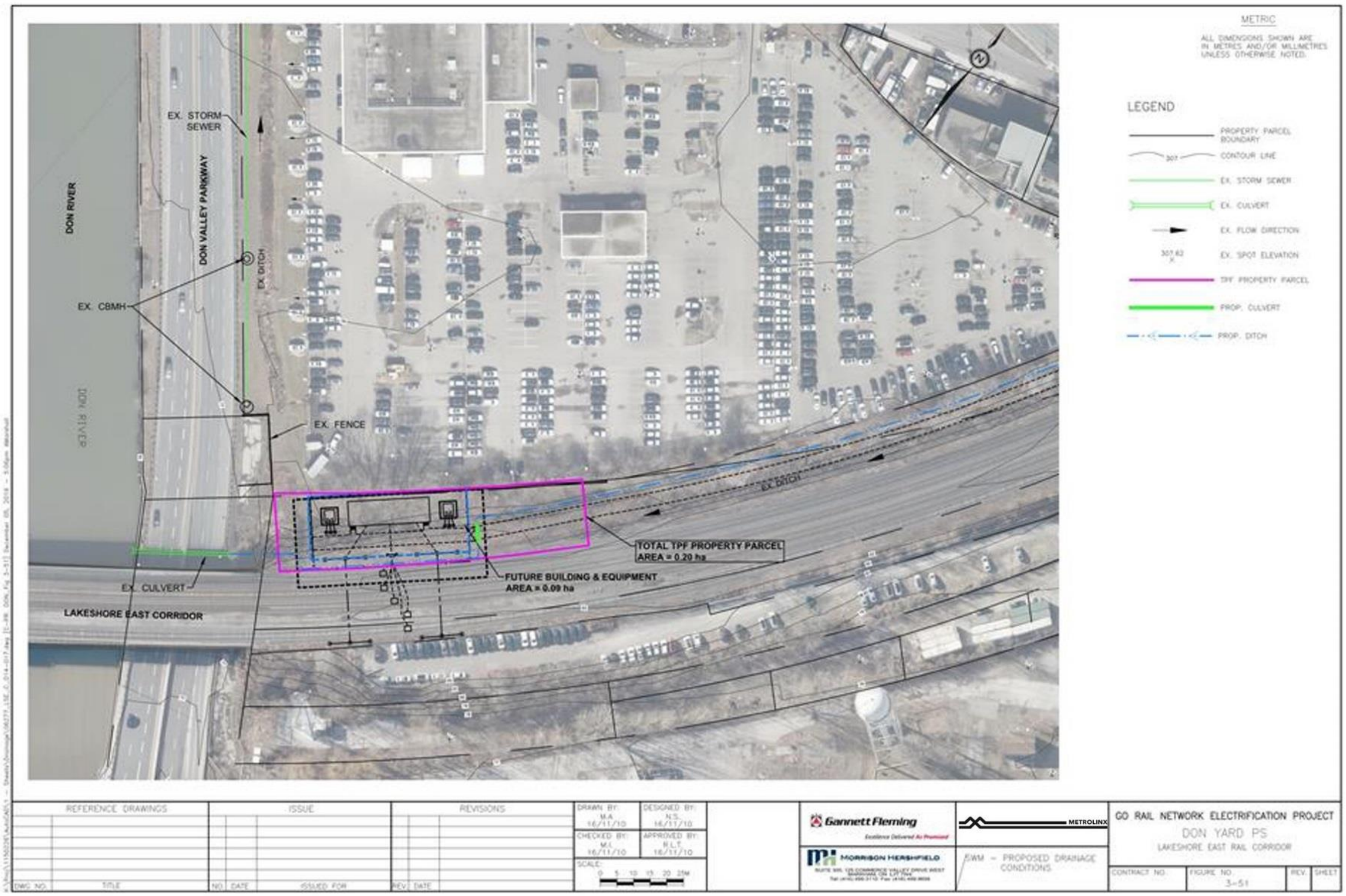


Figure 8-33: Don Yard PS Proposed Drainage Conditions



The existing and the proposed drainage areas and runoff coefficients are summarized below in **Table 8-74**.

Table 8-74: Don Yard PS - Existing and Proposed Drainage Areas

Existing Condition			Proposed Condition		
Area Type	Drainage Area (ha)	Runoff Coefficient	Area Type	Drainage Area (ha)	Runoff Coefficient
Undeveloped including future access road area	0.31	0.2	Building	0.02	0.9
			*Access Road	0.12	0.9
			Gravel	0.07	0.8
			Undeveloped	0.10	0.2
Total/Composite	**0.31**	**0.2 Or 0% Impervious**		**0.31**	**0.65 Or 65%Impervious**

** The type of the proposed Access Road is not confirmed (i.e. it may be gravel or asphalt). As a conservative approach, at this stage, it is assumed as asphalt.*

Flow Analysis

A preliminary analysis of runoff from the site area was done, utilizing the Rational Formula, for the existing condition and for the proposed development to assess the requirement of proposed measures and to mitigate the impact of the development on stormwater drainage. It can be seen in **Table 8-74** that there is 65% increase in impervious area and the development will cause increase in the stormwater runoff.

Flows were computed for the 2 year to 100 year storm event using City of Toronto IDF curves from Wet Weather Guidelines. The runoff for the 25mm storm was computed using equation 4.8 and 4.9 presented in the Stormwater Management Planning and Design manual by MOECC (March 2003) to assess the requirements for the runoff quality control. An estimated time of concentration (Tc) of 10 minutes was used in the flow computations

A more refined flow analysis for the site drainage would be required at Detailed Design phase.

Runoff computations and the Parameters used for the computations and City of Toronto IDF curve data are presented in **Appendix K**. Results are summarized below in **Table 8-75** .

Table 8-75: Don Yard PS - Pre and Post Development Flows

Storm event	Area Draining to West		
	Pre Dev Flow m³/s	Post Dev Flow m³/s	Flow Increase m³/s
25mm	0.002	0.019	0.017
2yr	0.015	0.049	0.034
5yr	0.023	0.074	0.051
10yr	0.028	0.091	0.063
25yr	0.036	0.117	0.081
50yr	0.046	0.151	0.105
100yr	0.054	0.176	0.122

8.13.4.2 Development Impact on Drainage & Proposed Measures

The proposed construction of the Don Yard PS will result in 65 % increase in impervious area. However the total site area is small (less than 2 ha) and the impervious area is even smaller. Based on this preliminary assessment, the increase in flows resulting from the construction of the Don Yard PS is not substantial, therefore, extensive measures for the quantity, quality or water balance would not be required.

A perimeter ditch is proposed around the building and equipment area and along the access road to mitigate the impact of runoff increase and to provide quality control. To meet City of Toronto / TRCA criteria of onsite infiltration for water balance/erosion control, a portion of the perimeter ditch can be converted to a bio-swale. The bio-swale can be used for quantity control as well.

It is anticipated that the quantity and quality control targets will be achieved by the runoff infiltration within the ditches and the bio-swale.

A more detailed analysis for the quantity, quality, erosion control and water balance will be provided at Detailed Design phase.

8.13.4.3 Recommendations

As the site is located within the floodplain, the facility should be built 0.3m above the floodplain. Fill below the flood line will need to be compensated with a cut volume for the cut-fill balance. Whether the site can accommodate compensating cut or not is to be finalized during the Detailed Design stage.

External drainage onto and off the site require determination at Detailed Design stage.

From the hydrological analysis and the consequent discussion presented, it is concluded that the construction of the Don Yard PS will result in minimal increase in the runoff rate and quantity which will be mitigated by infiltration within the proposed vegetated ditches conveying the runoff downstream and within the proposed bio-swale.

Quantity and quality control targets will be achieved by infiltration within the proposed vegetated ditches and the proposed bio-swale.

Erosion control and water balance targets will be achieved by infiltrating 5 mm of runoff within the proposed bio-swale.

The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.

8.14 Groundwater and Wells

Please refer to Appendix V for a description of the methodology followed for assessment of groundwater impacts. Additional details can be found in the Groundwater Impact Assessment Report contained in **Appendix V**.

8.14.1 East Rail Maintenance Facility Tap

8.14.1.1 Potential Effects and Mitigation Measures

There was one (1) domestic supply well identified within 500 metres of the East Rail Maintenance Facility Tap. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There is one (1) waterbody, tributary of Corbett Creek, located within 500 metres of the Tap location.

The subsurface footprint of the East Rail Maintenance Facility Tap structure foundations and duct banks are relatively small (i.e., less than 0.5 hectare) and shallow (i.e., up to 10 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including the tributary of Corbett Creek. Therefore, no mitigation measures are recommended.

8.14.1.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated

8.14.2 East Rail Maintenance Facility TPS

8.14.2.1 Potential Effects and Mitigation Measures

There were six (6) domestic supply wells identified within 500 metres of the East Rail Maintenance Facility traction power station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There are two (2) waterbodies, a tributary of Corbett Creek and the Whitby Harbour Wetland Complex, located within 500 metres of the traction power station.

The subsurface footprint of the East Rail Maintenance Facility traction power station grounding grid, gantry foundations, duct banks and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including the tributary of Corbett Creek and the Whitby Harbour Wetland Complex. Therefore, no mitigation measures are recommended.

8.14.2.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated

8.14.3 Scarborough SWS

8.14.3.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the Scarborough switching station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There were no waterbodies identified in this segment.

The subsurface footprint of the Scarborough switching station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse groundwater impacts are anticipated. Therefore, no mitigation measures are recommended.

8.14.3.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated

8.14.4 Scarborough 25kV Feeder Route

There were no water supply wells identified within 500 metres of the Scarborough 25kV feeder route. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There were no waterbodies identified in this segment.

The feeder route will run via aerial cables mounted on top of the proposed OCS from the Scarborough SWS to the point where the Stouffville corridor converges with the Lakeshore East Corridor. The subsurface footprint of the OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse groundwater impacts are anticipated. Therefore, no mitigation measures are recommended.

8.14.5 Durham SWS

8.14.5.1 Potential Effects and Mitigation Measures

There was one (1) domestic supply well identified within 500 metres of the Durham switching station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There is one (1) waterbody, Kronso Creek, located within 500 metres of the switching station.

The subsurface footprint of the Durham switching station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Kronso Creek. Therefore, no mitigation measures are recommended.

8.14.5.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated

8.14.6 Don Yard PS

8.14.6.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the Don Yard paralleling station. The surrounding area is characterized by an urban setting and the use of private water wells is likely negligible. There are two (2) waterbodies, Don River and Lake Ontario, located within 500m of the paralleling station.

The subsurface footprint of the Don Yard paralleling station grounding grid, gantry foundations, duct banks, and OCS foundations is relatively small (i.e., less than 0.5 hectare) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Don River and Lake Ontario. Therefore, no mitigation measures are recommended.

8.14.6.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8.14.7 OCS & Bridges: Section LSE-1 – Don Yard Layover to Danforth Station

8.14.7.1 Potential Effects and Mitigation Measures

There was one (1) domestic supply well and one (1) industrial/commercial supply well identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells is likely negligible. There are two (2) waterbodies, Don River and Lake Ontario, located within 500 metres of the rail corridor in this section.

There are seven (7) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at Don River, Don Valley Parkway, Eastern Avenue, Carlaw Avenue, Gerrard Street East, Main Street, and Pape Avenue. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Don River and Lake Ontario. Therefore, no mitigation measures are recommended.

8.14.7.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8.14.8 OCS & Bridges: Section LSE-2 – Danforth Station to Scarborough Station

8.14.8.1 Potential Effects and Mitigation Measures

There were no water supply wells identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells is likely negligible. There were no waterbodies identified within 500 metres of the rail corridor in this section.

There are four (4) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at Danforth Avenue, Birchmount Road, Woodrow Avenue pedestrian bridge, and Kennedy Road. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

- Track lowering at Birchmount Road. No adverse effect on groundwater is anticipated; however, this will be assessed during the Detailed Design phase for the affected structure.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse groundwater impacts are anticipated. Therefore, no mitigation measures are recommended.

8.14.8.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8.14.9 OCS & Bridges: Section LSE-3 – Scarborough Station to Guildwood Station

8.14.9.1 Potential Effects and Mitigation Measures

There was one (1) industrial/commercial supply well identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells is likely negligible. There is one (1) waterbody, West Highland Creek, located within 500 metres of the rail corridor.

There are five (5) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at St. Clair Avenue East, Midland Avenue, Eglinton Avenue, Markham Road and Kingston Road. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including West Highland Creek. Therefore, no mitigation measures are recommended.

8.14.9.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8.14.10 OCS & Bridges: Section LSE-4 – Guildwood Station to Rouge Hill Station

8.14.10.1 Potential Effects and Mitigation Measures

There was one (1) domestic supply well and one (1) industrial/commercial supply well identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells is likely negligible. There are three (3) waterbodies, Lake Ontario, Highland Creek and Highland Creek Wetland Complex, located within 500 metres of the rail corridor.

There is one (1) bridge requiring modifications, including the following:

- Installation of OCS wires at Highland Creek. This modification will occur above ground on the existing bridge and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Lake Ontario, Highland Creek and Highland Creek Wetland Complex. Therefore, no mitigation measures are recommended.

8.14.10.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8.14.11 OCS & Bridges: Section LSE-5 – Rouge Hill Station to Pickering Station

8.14.11.1 Potential Effects and Mitigation Measures

There were 15 domestic supply wells and two (2) supply wells of unknown type identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells is likely negligible. There are seven (7) waterbodies, Lake Ontario, Rouge River Marshes Wetland Complex, Petticoat Creek, Amberlea Creek, Dunbarton Creek, Pine Creek and Frenchman's Bay Coastal Wetland Complex, located within 500 metres of the rail corridor.

There are five (5) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at Rouge River, Granite Court, Whites Road, York Sub and Liverpool road. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Lake Ontario, Rouge River Marshes Wetland Complex, Petticoat Creek, Amberlea Creek, Dunbarton Creek, Pine Creek and Frenchman's Bay Coastal Wetland Complex. Therefore, no mitigation measures are recommended.

8.14.11.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8.14.12 OCS & Bridges: Section LSE-6 – Pickering Station to Ajax Station

8.14.12.1 Potential Effects and Mitigation Measures

There were one (1) domestic supply well, four (4) commercial/industrial supply wells and one (1) supply well of unknown type identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There were four (4) waterbodies, Kronso Creek, Duffins Creek, Millers Creek, and Lower Duffins Creek Wetland Complex, located within 500 metres of the rail corridor.

There are four (4) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and OCS wires at GO Station Pickering North pedestrian bridge, Brock Road, Duffins Creek, and Church Street. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Kronso Creek, Duffins Creek, Millers Creek, and Lower Duffins Creek Wetland Complex. Therefore, no mitigation measures are recommended.

8.14.12.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8.14.13 OCS & Bridges: Section LSE-7 – Ajax Station to Whitby Station

8.14.13.1 Potential Effects and Mitigation Measures

There were 25 domestic supply wells and five (5) supply wells of unknown type identified within 500 metres of the rail corridor in this section. However, this section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There were five (5) waterbodies, tributary of Carruthers Creek, Carruthers Creek, Kinsale Creek, Carruthers Creek Wetland Complex and Lynde Creek Coastal Wetland Complex, located within 500 metres of the rail corridor.

There are three (3) bridges requiring modifications, including the following:

- Installation of flash plates and bridge barriers at Harwood Avenue South, Lakeridge Road and Henry Street. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including tributary of Carruthers Creek, Carruthers Creek, Kinsale Creek, Carruthers Creek Wetland Complex and Lynde Creek Coastal Wetland Complex. Therefore, no mitigation measures are recommended.

8.14.13.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

8.14.14 OCS & Bridges: Section LSE-8 – Whitby Station to Oshawa Station

8.14.14.1 Potential Effects and Mitigation Measures

There were five (5) domestic supply wells identified within 500 metres of the rail corridor in this section. This section is characterized by an urban setting and the use of private water wells in this area is likely negligible. There were five (5) waterbodies, Pringle Creek, tributary of Corbett Creek, Corbett Creek, Whitby Harbour Wetland Complex and Corbett Creek Coastal Wetland Complex, located within 500 metres of the rail corridor.

There are five (5) bridges requiring modifications, including the following:

- Installation of flash plates, bridge barriers, and/or OCS wires at Whitby GO Station pedestrian bridge, Brock Street South, Victoria Street, and Thickson Road. These modifications will occur above ground on the existing bridges and therefore will have no impact on groundwater.

The subsurface footprint of the OCS foundations is relatively small (i.e., a few square metres) and shallow (i.e., approximately 5 metres deep) and therefore not expected to cause any adverse groundwater impacts.

Based on the above, no adverse impacts are anticipated to water supply wells, groundwater or groundwater dependent features including Pringle Creek, tributary of Corbett Creek, Corbett Creek, Whitby Harbour Wetland Complex and Corbett Creek Coastal Wetland Complex. Therefore, no mitigation measures are recommended.

8.14.14.2 Net Effects

No net adverse groundwater effects related to the project footprint are anticipated.

9 Operations and Maintenance Impacts

This section provides a detailed overview of the types of (longer term) effects that can be expected during the operational phase.

9.1 Natural Environment

9.1.1 Overhead Contact System

9.1.1.1 Potential Effects and Mitigation Measures

9.1.1.1.1 Terrestrial

During the operation of the electrified corridors, regular maintenance of the OCS clearance zones will require vegetation pruning and/or vegetation removals. The following mitigation measures are intended to minimize damage to trees from operation and maintenance activities:

- All pruning should be carried out according to accepted arboriculture practices by a Certified Arborist or under the supervision of a Certified Arborist.
- Request and/or coordinate with private landowners for the felling or pruning of any tree, which is causing concern per GO Transit Vegetation Management Approach[32]
- Advise the landowner and/or occupiers of GO Transit-initiated tree pruning activities on trees overhanging or leaning over the railway corridor per GO Transit Vegetation Management Approach.

- The removal of bird's nests may also result from vegetation removal activities. Nests of migratory birds are protected by the federal *Migratory Birds Convention Act.* This Act prohibits harm to migratory birds and their nests, eggs and young. Nest of Species at Risk birds are protected by the provincial *Endangered Species Act.* Under this Act, no person shall kill, harm, harass, capture or take a living member of a protected species or damage or destroy its habitat. The following mitigation measures are proposed in order to reduce or mitigate the potential for adverse effects on birds and their nests:

- Vegetation removals should occur outside of the migratory bird nesting season from April 1st to August 31st;
- Should vegetation removals be required within the period from April 1st to August 31st, a nesting survey protocol shall be developed and implemented prior to any vegetation removals ;
- Active nests and eggs of protected migratory birds shall not be destroyed at any time and site specific mitigation should be developed in consultation with the Canadian Wildlife Service;.

[32] http://www.gotransit.com/public/en/aboutus/railways_in_your_community.aspx

- Nests and eggs of protected Species at Risk birds shall not be destroyed at any time. If the nest of a protected Species at Risk must be damaged or destroyed, consultation with the appropriate regulatory agency is required and a permit under the ESA, 2007 or Species at Risk Act (Federal lands only) may be necessary.

Impacts to migratory birds from the operation and maintenance of the OCS are anticipated to be low as the infrastructure will be placed within the active/existing rail corridor. The height of the portals/cantilevers used to support the OCS wires over the electrified tracks will range between approximately 7.6 metres to 12.0 metres above the top of the highest rail. Contact wire height will range from 6.0 metres to 7.6 metres. The OCS will not create a solid barrier to migratory bird movement as they will have the ability to navigate around the wires, similar to electrical transmission lines elsewhere throughout Ontario. There is limited risk to birds associated with the OCS wires or supporting structures with respect to electrocution as the conductor and ground wires will not be positioned within close enough proximity. Birds will be able to perch on the wires without harm.

The changes to the existing infrastructure are not anticipated to result in any impacts to wildlife over pre-existing conditions related noise, vibration or wildlife movements through lighted areas or culverts. No additional lighting or crossings are anticipated related to electrification. Air quality will improve due to the discontinuation of diesel trains. Vibration levels are no anticipated to change, although the frequency of train trips will increase.

9.1.1.1.2 Aquatic

Operation of the electrified routes and OCS maintenance activities will be contained within the existing Metrolinx rail corridors, including on the associated watercourse bridges. Therefore, there are no potential adverse effects on the watercourses related to operations/maintenance throughout the entire Metrolinx rail system.

9.1.1.1.3 Species at Risk

There are no anticipated impacts to Species at Risk associated with operations and maintenance of the OCS.

9.1.1.1.4 Designated Areas

There are no anticipated impacts to Designated Areas associated with operations and maintenance of the OCS.

9.1.1.2 Net Effects

The risk of damaging or destroying trees and/or protected Migratory Bird species or their habitat during OCS maintenance activities will be minimized based on implementation of the mitigation measures described above and will not result in any net adverse effects.

There are no net adverse effects as there are no anticipated to aquatic features species at risk or designated areas during operations/maintenance of the electrified system.

9.1.2 Bridge Modifications

9.1.2.1 Potential Effects and Mitigation Measures

9.1.2.1.1 Terrestrial

Operation of the electrified routes and bridge maintenance activities may require the removal of nests of migratory birds. To ensure compliance with the MBCA, the following mitigation measures should be applied:

- Nests on bridges shall be inspected for eggs prior to maintenance activities.
- Nests and eggs of protected migratory birds shall not be destroyed at any time and site specific mitigation should be developed in consultation with the Canadian Wildlife Service.
- Nests and eggs of protected Species at Risk birds shall not be destroyed at any time. If the nest of a protected Species at Risk must be damaged or destroyed, consultation with the appropriate regulatory agency is required and a permit under the ESA, 2007 or Species at Risk Act (Federal lands only) may be necessary.

9.1.2.1.2 Aquatic

Operation of the electrified routes and bridge maintenance activities will be contained within the existing Metrolinx rail corridors, including on associated watercourse bridges. Therefore, there are no potential adverse effects related to operations/maintenance on the watercourses throughout the entire Metrolinx rail system.

9.1.2.1.3 Species at Risk

Potential impacts to Species at Risk associated with operations and maintenance of bridges includes the possible removal of nests belonging to Barn Swallow. Should the removal of a Barn Swallow nest be necessary, consultation with the MNRF will be required to determine requirements under the ESA, 2007.

9.1.2.1.4 Designated Areas

There are no anticipated impacts to Designated Areas associated with operations and maintenance of bridges.

9.1.2.2 Net Effects

The risk of damaging or destroying nests of a protected Migratory Bird species during bridge maintenance activities will be minimized based on implementation of the mitigation measures described above.

There are no net adverse effects as there are no anticipated to aquatic features species at risk or designated areas during operations/maintenance of the electrified system.

9.1.3 Hydro One Tap locations – Power Supply

9.1.3.1 Potential Effects and Mitigation Measures

9.1.3.1.1 Terrestrial

During the operation of the electrified corridors, regular maintenance of the vegetation clearance zones will require vegetation removals within areas surrounding the Hydro One Tap tower locations. Vegetation removals have the potential to impact nests of migratory birds protected by the MBCA. To ensure compliance with the MBCA, the following mitigation measures are proposed:

- Vegetation removals should occur outside of the migratory bird nesting season fom April 1st to August 31st;
- Should vegetation removals be required within the period from April 1st to August 31st, a nesting survey protocol shall be developed and implemented prior to any vegetation removals;
- Active nests and eggs of protected migratory birds shall not be destroyed at any time and site specific mitigation should be developed in consultation with the Canadian Wildlife Service;
- Nests and eggs of protected Species at Risk birds shall not be destroyed at any time. If the nest of a protected Species at Risk must be damaged or destroyed, consultation with the MNRF is required and a permit under the ESA, 2007 many be necessary.

9.1.3.1.2 Aquatic

There are no aquatic features within any Hydro One Tap locations.

9.1.3.1.2.1 Species at *Risk*

There are no anticipated impacts to Species at Risk associated with operations and maintenance of the Tap locations.

9.1.3.1.3 Designated Areas

There are no anticipated impacts to Designated Areas associated with operations and maintenance of the Tap locations.

9.1.3.2 Net Effects

The risk of damaging or destroying trees and/or protected migratory bird species or their habitat during OCS maintenance activities within the Hydro One Tap locations will be minimized based on implementation of the mitigation measures described above and will not result in any net adverse effects.

There are no net adverse effects as there are no anticipated to aquatic features species at risk or designated areas during operations/maintenance of the Tap locations.

9.1.4 Traction Power Facilities

9.1.4.1 Potential Effects and Mitigation Measures

9.1.4.1.1 Terrestrial

During maintenance activities associated with the TPS facilities, use of oils and insulating fluids may be required. As a result, accidental spills may occur during the handling and storage of these products. The following mitigation measures are proposed to reduce the potential for contamination to occur due to accidental spills:

- The TPS facilities will be fully equipped with spill containment and oil/water separation facilities. In the event on an equipment failure, oily water will not escape from the site.
- An Emergency Preparedness and Response Plan will govern spill response.
- Spill cleanup and response equipment will be located on site.
- Transportation of fuel will be conducted in compliance with the Transportation of Dangerous Goods Act.
- Spill decks should be used for transferring products to smaller containers.
- Fire extinguishers should be located near petroleum, oil and lubricants storage areas.
- Routine inspection of the facilities, including transformer oil should be carried out.
- All necessary precautions will be implemented to prevent the spillage and release of hazardous materials to the environment.
- All leaks or spills will be immediately reported to the Ministry of the Environment and Climate Change, Spills Action Centre at 1-800-268-6060.

During the operation of the electrified corridors, regular maintenance of the vegetation clearance zones will require vegetation pruning and/or vegetation removals within areas surrounding the feeder lines. The following mitigation measures are intended to minimize damage to trees from operation and maintenance activities:

- All pruning should be carried out according to accepted arboriculture practices by a Certified Arborist or under the supervision of a Certified Arborist.

Vegetation removals have the potential to impact nests of migratory birds protected by the MBCA. To ensure compliance with the MBCA, the following mitigation measures are proposed:

- Vegetation removals should occur outside of the migratory bird nesting season from April 1st to August 31st; Should vegetation removals be required within the period from April 1st to August 31st, a nesting survey protocol shall be developed and implemented prior to any vegetation removals;

- Active nests and eggs of protected migratory birds shall not be destroyed at any time and site specific mitigation should be developed in consultation with the Canadian Wildlife Service;
- Nests and eggs of protected Species at Risk birds shall not be destroyed at any time. If the nest of a protected Species at Risk must be damaged or destroyed, consultation with the MNRF and Canadian Wildlife Services is required and a permit under the ESA, 2007 or Species at Risk Act (Federal lands only) may be necessary.

9.1.4.1.2 Aquatic

The operation and maintenance of TPS facilities is not expected to have any impacts on aquatic features.

9.1.4.1.3 Species at Risk

There are no anticipated impacts to Species at Risk associated with operations and maintenance of the TPF.

9.1.4.1.4 Designated Areas

There are no anticipated impacts to Designated Areas associated with operations and maintenance of the TPF.

9.1.4.2 Net Effects

The potential for contamination to occur as a result of an accidental spill during TPFs maintenance activities will be minimized/mitigated through the implementation of the mitigation measures identified above. The risk of damaging or destroying trees and/or protected migratory bird species or their habitat during OCS maintenance activities along the feeder lines will be minimized based on implementation of the mitigation measures described above and will not result in any net adverse effects.

The risk of damaging or destroying trees and/or protected migratory bird species or their habitat during OCS maintenance activities within the Hydro One Tap locations will be minimized based on implementation of the mitigation measures described above and will not result in any net adverse effects.

There are no net adverse effects as there are no anticipated to aquatic features species at risk or designated areas during operations/maintenance of the Tap locations.

9.2 Preliminary Environmental Site Assessment

9.2.1.1.1 Potential Effects and Mitigation Measures

In the event that soil and/or groundwater contamination remains at the site following construction, there is the potential for these impacts to be disturbed during the O&M of the electrified GO Transit network, such as during any required subsurface and/or excavation activities. In order to mitigate human and ecological exposure and release of these impacts to the environment, an Excess Materials Management will be developed and implemented. The plan would be similar to that developed to mitigate the effects of construction-related activities.

9.2.1.1.2 Net Effects

Potential for human and ecological exposure and release of any remaining contaminated soil and/or groundwater to the environment will be mitigated through the implementation of an Excess Materials Management Plan.

9.3 Cultural Heritage

9.3.1.1.1 Potential Effects and Mitigation Measures

No long-term effects are anticipated to identified or potential cultural heritage resources due to the operation and maintenance of the electrified system.

9.3.1.1.2 Net Effects

No net adverse effects on cultural heritage resources are anticipated due to the operation and maintenance of the electrified system.

9.4 Archaeology

9.4.1.1.1 Potential Effects and Mitigation Measures

No long-term effects are anticipated to archaeological resources due to the operation and maintenance of the electrified system.

9.4.1.1.2 Net Effects

No net adverse effects on archaeological resources are anticipated due to the O & M of the electrified system.

9.5 Land Use

9.5.1 Overhead Contact System

9.5.1.1 Potential Effects and Mitigation Measures

The electrified trains will be operating in the same corridor as the diesel train service, and as such, the project works and activities associated with the operation of the electric trains are compatible with existing land uses. It is recognized that land use over time does change as neighbourhoods, industry and businesses evolve; however, all land use is regulated through the Official Plan process and zoning by-laws established in each of the communities traversed by the rail corridor. As such, no potential effects on land use are anticipated during operations/maintenance.

Mitigation Measures
No mitigation measures are required.

9.5.1.2 Net Effects

No net effects on land use are anticipated during operations/maintenance as these activities will not fundamentally change the function of adjacent land uses.

9.5.2 Bridge Modifications

9.5.2.1 Potential Effects and Mitigation Measures

Bridge modifications are not expected to lead to any potential effects to land use conditions, since all work is anticipated to occur within the existing Metrolinx ROW. There are no expected effects as a result of this activity.

Mitigation Measures
No mitigation measures are required.

9.5.2.2 Net Effects

There are no net effects on land use anticipated during operations/maintenance of bridges.

9.5.3 Hydro One Tap Locations – Power Supply

9.5.3.1 Potential Effects and Mitigation Measures

Hydro One Tap locations are all located in areas already being used for electrical transmission. As a result, no potential effects to existing land use are expected. There are no expected effects as a result of this activity.

Mitigation Measures
No mitigation measures are required.

9.5.3.2 Net Effects

There are no net effects on land use anticipated during operations/maintenance of Tap locations.

9.5.4 Traction Power Facilities

9.5.4.1 Potential Effects and Mitigation Measures

In most cases, TPF facilities will be located in areas surrounded by existing industrial and commercial uses, and their operations/maintenance are not expected to cause negative land use effects. The exceptions to this is the proposed Maple PS (Alt 6) and Don Yard PS, which may have potential effects on future land uses that are being proposed for its location.

The proposed Maple PS site is currently open space/agricultural land, surrounded almost entirely by other agricultural fields, with a small private cemetery to the southeast. There are no expected operation and maintenance land use impacts regarding these surrounding land uses. However, as the City of Vaughan is currently studying the future implementation of the Block 27 Secondary Plan, the requirements for access to the site for operations and maintenance could potentially affect the proposed land use of the site in the future. Given the nature and function of a PS, it likely to have a similar impact on adjacent land uses as other types of similar critical infrastructure (i.e. sewage pumping station, well houses, electrical distribution stations) and is therefore not anticipated to conflict with proposed land uses.

Similarly, the Don Yard PS and its associated access road may affect the route of the proposed Broadview Avenue Extension.

Mitigation Measures
Given the nature and function of the two PSs described above, these facilities will likely have a similar impact on adjacent land uses as other types of similar critical infrastructure (i.e., sewage pumping station, well houses, electrical distribution stations) and are therefore not anticipated to conflict with proposed land uses. In addition, any minor impacts can be greatly reduced through the incorporation and consideration of the Maple PS and Don Yard PS within the Block 27 Secondary Plan and Broadview Avenue extension route, respectively.

Metrolinx will continue to coordinate with the City of Toronto to ensure that conflicts between the Don Yard PS and the Broadview Avenue extension are minimized to the extent possible.

9.5.4.2 Net Effects

There are no expected net effects resulting from the operation or maintenance of TPFs.

9.6 Socio-Economic

9.6.1.1 Potential Effects and Mitigation Measures

The socio-economic effects of the Project are generally positive for riders and the general public. These positive effects include:

- *Faster service*. Electric trains can accelerate faster and stay at top speed for longer, saving time for riders.
- *Reduced congestion*. By attracting additional riders, frequent electric train service reduces road congestion.
- *A more frequent and reliable service*. Electric trains allow for more frequent service, reducing reliance on scheduled trips and increasing the number of available seats.
- *Lower operating and maintenance costs*. Electric trains have lower operating costs and require less maintenance than diesel trains.
- *Improved local air quality and noise levels*. The use of electric trains will reduce the amount of greenhouse gas emissions from rail transport regionally, leading to improved local air quality. Electric trains are also generally quieter than diesel trains, reducing the amount of noise that would otherwise be generated as service increases. Noise from Traction Power Facilities (TPFs) is

generally expected to be extremely low and facilities have generally been sited to avoid impacts to sensitive facilities.

Mitigation Measures
No mitigation measures required as positive effects are anticipated.

9.6.1.2 Net Effects

Positive net socio-economic effects are anticipated due to operation of the electrified GO system.

9.7 Air Quality

Electrification will result in a significant reduction of diesel emissions which have both local and regional impacts, but also requires increased electricity generation, some of which will come from power plants operating on fossil fuel, thus adding back some regional impacts. The air quality study carried out as part of the TPAP quantified the emissions from both the electricity generation required to power the electric trains based on the future (2025) service levels, and from the locomotives themselves if the trains were to remain diesel-powered. These calculations are used to establish what the net change in regional emissions will be due to electrification. The impact on climate change is also assessed by quantifying the emissions of greenhouse gases (as carbon dioxide equivalent, or CO_2e) for diesel versus electric trains.

Overall, electrification of the GO Rail Network shows a net reduction in total emissions when compared to present-day (mostly Tier 2/3) or potential future (Tier 4) diesel-powered trains. The predicted benefits of electrification with respect to air quality and climate change are greatest when more of the electrificty is assumed to be generated through nuclear or hydroelectric power plants.

The reduction in diesel exhaust emissions will translate into a reduction in the local levels of air pollutants at locations adjacent to the rail corridors. Most of the pollutants of concern have significant contributions from other sources, such as other rail operators, road traffic, industry, residential/commercial heating, etc., and therefore, are not strongly impacted by the reduction of GO Transit's diesel locomotive emissions. The most significant exception is nitrogen dioxide (NO_2), which may experience a more significant decrease in maximum short-term concentrations adjacent to the corridors. In terms of regional air quality implications, the contribution of the GO Rail Network to the total regional emissions is small, and as such, the electrification provides only a small benefit for regional air quality. It also provides a small direct benefit in terms of greenhouse gas emissions.

Two existing maintenance facilities (Willowbrook and East Rail Maintenance Facility) will be modified to accommodate electric GO Trains. No significant changes to emissions or new sources of air emissions are expected as a result of modifying the existing maintenance facilities to accommodate electric GO Trains.

9.7.1 Diesel Locomotive Emissions

Table 9-1 summarizes the total annual emissions of Nitrogen Oxides (NOx), Carbon Monoxide (CO), Volatile Organic Compounds (VOCs), particulate matter less than 2.5 µm in diameter ($PM_{2.5}$), and greenhouse gases in terms of carbon dioxide equivalent (CO_2e) from the Metrolinx diesel trains. These emissions include only the corridors proposed for electrification, and exclude trains that will remain diesel-powered in the future. These emissions are compared against the indirect emissions from electricity generation for electric locomotives in **Section 9.7.2**.

Table 9-1: Annual Emissions from Diesel Locomotives

Pollutant	Annual Emissions (tonnes/year)	
	Tier 2 Emissions Standards	Tier 4 Emissions Standards
NOx	3,170	660
CO	1,050	1,050
VOC	294	88
PM2.5	108	16
CO2e	327,000	327,000

9.7.2 Emissions from Electricity Generation for Electric Locomotives

Table 9-2 summarizes the total annual indirect emissions of NOx, CO, VOC, $PM_{2.5}$, and CO_2e from electrified trains. These emissions are presented for two electrification scenarios (with and without regenerative braking, which stores and reuses energy from the braking process) and for two emission scenarios (assuming electricity generation is distributed evenly across all types of power generating stations, and assuming electricity generation is met by a variety of power generating stations operating at levels approaching capacity). These scenarios are compared against the direct emissions from diesel powered locomotives in **Section 9.7.1**.

Table 9-2: Annual Indirect Emissions from Electric Locomotives

Pollutant	Annual Emissions (tonnes/year)			
	Average Electricity Production (10% from fossil fuels)		Capacity Electricity Production (28% from fossil fuels)	
	Without Regenerative Braking	With Regenerative Braking	Without Regenerative Braking	With Regenerative Braking
NOx	40.7	37.1	114	104
CO	22.3	20.4	62.6	57.1
VOC	0.572	0.522	1.60	1.46
PM2.5	1.14	1.04	3.20	2.92
CO2e	32,700	29,800	91,500	83,500

9.7.3 Potential Effects & Mitigation Measures

Table 9-3 and **Table 9-4** show the change in emissions between the diesel trains and electric trains, both as an absolute value and as a percent change. **Table 9-3** is comparing against the Tier 2 diesel scenario and **Table 9-4** is comparing against the Tier 4 diesel scenario. Again, these emissions are presented for two electrification scenarios (with and without regenerative braking) and for two emission scenarios (assuming electricity generation is distributed evenly across all types of power generating stations and assuming electricity generation is met by a variety of power generating stations operating at levels approaching capacity).

Table 9-3: Annual Net Impacts of Electrification Compared Against Tier 2 Diesel Scenario

Pollutant	Change in Emissions With Electrification			
	Average Electricity Production (10%from fossil fuels)		Capacity Electricity Production (28%from fossil fuels)	
	Without Regenerative Braking	With Regenerative Braking	Without Regenerative Braking	With Regenerative Braking
NOx (tonnes/year)	-3,130	-3,130	-3,050	-3,060
NOx (% change)	-99%	-99%	-96%	-97%
CO (tonnes/year)	-1,030	-1,030	-988	-994
CO (% change)	-98%	-98%	-94%	-95%
VOC (tonnes/year)	-294	-294	-293	-293
VOC (% change)	-99.8%	-99.8%	-99.5%	-99.5%
PM2.5 (tonnes/year)	-107	-107	-105	-105
PM2.5 (% change)	-99%	-99%	-97%	-97%
CO2e (tonnes/year)	-294,000	-297,000	-235,000	-243,000
CO2e (% change)	-90%	-91%	-72%	-74%

Table 9-4: Annual Net Impacts of Electrification Compared Against Tier 4 Diesel Scenario

Pollutant	Change in Emissions With Electrification			
	Average Electricity Production (10%from fossil fuels)		Capacity Electricity Production (28%from fossil fuels)	
	Without Regenerative Braking	With Regenerative Braking	Without Regenerative Braking	With Regenerative Braking
NOx (tonnes/year)	-616	-620	-543	-553
NOx (% change)	-94%	-94%	-83%	-84%
CO (tonnes/year)	-1,030	-1,030	-988	-994
CO (% change)	-98%	-98%	-94%	-95%
VOC (tonnes/year)	-87	-87	-86	-286
VOC (% change)	-99%	-99%	-98%	-98%
PM2.5 (tonnes/year)	-15	-15	-13	-13
PM2.5 (% change)	-93%	-94%	-80%	-82%
CO2e (tonnes/year)	-294,000	-297,000	-235,000	-243,000

Pollutant	Change in Emissions With Electrification			
	Average Electricity Production (10%from fossil fuels)		Capacity Electricity Production (28%from fossil fuels)	
	Without Regenerative Braking	With Regenerative Braking	Without Regenerative Braking	With Regenerative Braking
CO2e (% change)	-90%	-91%	-72%	-74%

It should first off be noted that the four total electrification emission scenarios show a net benefit from electrification (reduction in emissions). Even for the case when 28% of electricity is generated from gas power plants, most pollutants show a substantial decrease in emissions after electrification. In general, this is because the majority of the electricity is produced by power plants that have minimal impact on air quality (nuclear and hydroelectric). The predicted benefits of electrification with respect to air quality and climate change are greatest when more of the electricity is assumed to be generated through nuclear or hydroelectric power plants.

Mitigation Measures
No mitigation measures are proposed as positive effects on air quality are anticipated.

9.7.4 Net Effects

To get an indication of the implications of the emission changes for local air quality at locations adjacent to the rail corridors, previous air quality modelling studies undertaken by Metrolinx were examined (Stouffville Corridor Rail Service Expansion Air Quality Assessment, May 2014; Georgetown South & Air Rail Link Air quality Impact Assessment – Enhanced Analysis, February 2011). These studies indicated that, with Tier 2 diesel locomotives, GO Transit's contribution to air pollutant levels adjacent to the corridors is relatively small compared to background air pollutant levels for most pollutants (less than 10% in most cases). The most significant exception is nitrogen dioxide (NO_2), for which GO Transit's contribution to maximum short-term concentrations could be on the order of 60% at locations adjacent to the right-of-way (although the short-term levels remain within provincial criteria for NO_2). Thus, it is anticipated that the replacement of diesel locomotives with electric locomotives will not significantly change the baseline air quality levels, with the possible exception of nitrogen dioxide at locations in close proximity to the busier sections of corridor within the GO Transit network. The baseline air quality levels were reported separately (GO Rail Network Electrification TPAP Air Quality Baseline Conditions Report, May 2016), with the data categorized into three broad categories: urban, suburban and rural.

To understand the implications of the emissions changes for regional air quality, the predicted changes were compared to the total regional emission inventory. **Table 9-5** shows the total Ontario emissions from all sources, mobile sources, and rail transportation sources alongside the predicted change in emissions associated with the Metrolinx GO Rail Network Electrification.

The table shows that the anticipated emissions changes represent a moderate reduction in overall rail transportation emissions for the Province Ontario, but only a very small reduction in total emissions for all sources in Ontario.

Table 9-5: Annual Ontario Emissions Compared Against Annual Net Impacts of Electrification

Pollutant	Total Ontario Emissions (tonnes/year)	Total Ontario Mobile Source Emissions (tonnes/year)	Total Ontario Rail Transportation Source Emissions (tonnes/year)	Change in Emissions With Electrification (tonnes/year)			
				Average Electricity Production		Capacity Electricity Production	
				Without Regenerative Braking	With Regenerative Braking	Without Regenerative Braking	With Regenerative Braking
Tier 2 Diesel Scenario							
NOx	315,693	220,615	20,638	-3,130	-3,130	-3,050	-3,060
CO	1,494,031	1,048,917	2,993	-1,030	-1,030	-988	-994
VOC	391,355	108,205	1,028	-294	-294	-293	-293
PM2.5	304,283	11,923	480	-107	-107	-105	-105
CO2e	167,000,000	56,600,000	1,200,000	-294,000	-297,000	-235,000	-243,000
Tier 4 Diesel Scenario							
NOx	315,693	220,615	20,638	-616	-620	-543	-553
CO	1,494,031	1,048,917	2,993	-1,030	-1,030	-988	-994
VOC	391,355	108,205	1,028	-87	-87	-86	-286
PM2.5	304,283	11,923	480	-15	-15	-13	-13
CO2e	167,000,000	56,600,000	1,200,000	-294,000	-297,000	-235,000	-243,000

Note:
Ontario Emissions of NOx, CO, VOC, and PM2.5 are for 2014 (NPRI Air Pollutant Emission Inventory – Online Data Search). Ontario Emissions of CO2e are for 2012 (Ontario Ministry of the Environment and Climate Change, 2014; Natural Resources Canada Online).

9.8 Noise & Vibration

9.8.1.1.1 Potential Effects and Mitigation Measures

Refer to Sections 3.8, 4.8, 5.8, 6.8, 7.8, and 8.8 above which detail the potential increased noise levels due to the operation of increased train service under the Electric RER scenario (2025). These sections also provide a summary of locations where noise and vibration mitigation will be further detailed and investigated during Detailed Design.

9.8.1.1.2 Net Effects

Refer to Sections 3.8, 4.8, 5.8, 6.8, 7.8, and 8.8 above for a summary of locations where noise and vibration mitigation will be further detailed and investigated during Detailed Design.

9.9 Visual

9.9.1.1.1 Potential Effects and Mitigation Measures

The potential visual effects associated with the Electrification Project have been detailed in Sections 3.10, 4.10, 5.10, 6.10, 7.10, and 8.10 above; it is recognized that these effects will be permanent once the electrified system is built and operational. As outlined in the previous sections, efforts will be made during Detailed Design to minimize visual effects where possible.

9.9.1.1.2 Net Effects

A net visual effect will remain during operation of the electrified system.

9.10 Utilities

Once the system has been constructed and is operational, Utilities will require access to the relocated services for their own maintenance purposes. They may also require access to the rail corridors for construction of new services. All new utility crossings are already subject to a Metrolinx review process which will ensure compliance to the engineering standards.

9.10.1 Overhead Contact System

9.10.1.1 Potential Effects and Mitigation Measures

Access to rail corridors is currently restricted for safety reasons. Once the corridors are electrified, even more stringent restrictions will be put in place to ensure safety to the public and to workers. One of these measures will include de-energizing the line for the section in which any third party maintenance or construction work will occur. In addition, the increased service levels proposed by RER will further limit the operational windows available for this type of work.

As a mitigation measure, in addition to the access restrictions currently in place for working near or within rail corridors, third parties will need to apply to Metrolinx (or their appointed operator) for de-energizing services and coordinate their work with the now more restrictive operational windows.

Another potential effect during this phase is the risk of cable fall. This describes the situation where third party utilities crossing over the Overhead Contact System become detached and fall onto the OCS system below. While this event is unlikely without the occurrence of an unanticipated situation (exceptionally heavy weather conditions, etc.), the resulting risks to public safety and operations are significant.

In some jurisdictions, this effect is mitigated by placing protection nets over the OCS system. A less visually obtrusive mitigation measure would be to encourage the Utilities to bury their services under the rail corridors. The risks could also be liquidated and passed on to Utility companies as a punitive fine. However, the enforcement of such fines, in the context of the existing contractual agreements as well as the unforeseen conditions in which they would typically be applied would need legal review prior to implementation.

In summary, the increased costs of maintenance and construction work, as well as the potential for cable fall fines could be used to encourage Utilities to bury all crossings who are typically reluctant to do so due to the higher capital cost. If services are not buried, Utilities will be required to coordinate their work in shorter operational windows and pay de-energizing costs. These costs will need to be included in their current agreements, the mechanism for which will require legal input. To mitigate the risks of cable fall for services that remain overhead, a fall protection system could be constructed over the OCS or passed onto Utility companies in the form of fines. The implementation of these fines will also require legal input.

9.10.1.2 Net Effects

Net effects entail administrative related effects such as additional costs associated with maintenance and construction work as well as potential for cable fall, however no net adverse effects to utilities are anticipated due to the operation of the electrified GO system.

9.10.2 Bridge Modifications

9.10.2.1 Potential Effects and Mitigation Measures

The potential effects to utilities as a result of bridge modifications during the operation and maintenance stages are similar to those outlined in the Overhead Contact System section above. Primarily these relate to additional costs associated with more restrictive access, de-energizing services and, in the case of road over rail bridges, cable fall.

The associated mitigation measures include encouraging burial, implementing de-energizing costs, shorter operational windows and cable fall fines (for road over rail bridges). Inclusion of these “non-burial” mitigation measures within the existing contractual framework will require legal input.

9.10.2.2 Net Effects

Net effects entail administrative related effects such as additional costs associated with more restrictive access, de-energizing services and cable fall, however no net adverse effects to utilities are anticipated due to the operation of the electrified GO system.

9.10.3 Tap Locations and Traction Power Facilities

9.10.3.1 Potential Effects and Mitigation Measures

The potential effects to utilities on Hydro One Tap locations and TPFs during the operation and maintenance stages are similar to those outlined in the Overhead Contact System section above. Primarily these relate to additional costs associated with more restrictive access, de-energizing services and cable fall. Specifically for the tap sites, some of the land identified for Taps/TPFs already belongs to Hydro One and so is already subject to restrictive access conditions.

The associated mitigation measures include encouraging burial, implementing de-energizing costs, shorter operational windows and cable fall fines. Inclusion of these “non-burial” mitigation measures within the existing contractual framework will require legal input. In addition, the existing agreements between third parties and Hydro One for services within the Hydro One corridors will need to be taken into account.

9.10.3.2 Net Effects

Net effects entail administrative related effects such as additional costs associated with more restrictive access, de-energizing services and cable fall, however no net adverse effects to utilities are anticipated due to the operation of the electrified GO system.

9.11 EMI & EMF

9.11.1 Rolling Stock

9.11.1.1 Potential Effects and Mitigation Measures

As the electric rolling stock has not yet been selected, verification and testing will be required during Detailed Design and before operation commences to ensure EMI/EMF levels are within permissible levels in accordance with applicable industry standards (refer to **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report** for further detail).

Potential effects related to operation of the electrified rolling stock include:

- EMI.
- Time-Varying EMFs.
- Radiated Magnetic Fields.
- ELF EMF.

Mitigation Measures

- EMI – Mitigated via EMC Control Plan.
- Time-Varying EMFs – Mitigated by through design, e.g., grounding and shielding, physical separation.

- Radiated Magnetic Fields – Mitigated by proper design, e.g., grounding and shielding.
- ELF EMF – Mitigated by through design; Verified by before-and-after measurements.
- EMI, Time-Varying EMFs, Radiated Magnetic Fields, and ELF EMF should be verified both statically (while vehicle at rest) and dynamically (while vehicle moving under power).
- Baseline measurements will be taken statically while vehicle is powered off and while vehicle is under power but not moving, both inside and outside the vehicle, at heights and distances mandated by EN 50121 and EN 50500.
- Dynamic measurements will be taken at both selected station and/or platform location(s) and at identified EMI-sensitive sites, including Burgess Veterinary Hospital. (Note: Measurements taken at Burgess Veterinary Hospital will serve as conformance tests for other EMI-sensitive sites, given its close proximity to the tracks.)

Future commitments related to EMI/EMF effects due to operation of electric rolling stock are summarized in **Table 9-6**.

Table 9-6: Commitments for Future Rolling Stock Testing and Verification

Monitoring / Testing Commitment	Location	Timing
Full Characterization of EMI, Time-Varying EMF, Radiated Magnetic Fields, and ELF EMF as per EN 50121 and EN 50500. (With and Without Power, Static)	Type Test (Locomotive) Type Test (Passenger Compartment)	Post-Electrification
Full Characterization of EMI, Time-Varying EMF, Radiated Magnetic Fields, and ELF EMF as per EN 50121 and EN 50500. (With and Without Movement, Dynamic)	Type Test (Locomotive) Type Test (Passenger Compartment)	Post-Electrification

9.11.1.2 Net Effects

No net adverse EMI/EMF effects are anticipated during operational phase related to the electric rolling stock as in-design mitigation will be implemented, the EMC Control Plan will be adhered to, and testing and verification of the rolling stock will be carried out prior to initiating operations.

9.11.2 Neighbouring Rail Systems

The GO Rail Network Electrification Project could affect existing transit systems or neighbouring rail systems. Existing infrastructure and neighbouring rail systems can be classified in two categories. One category is existing transit systems, which includes the Toronto Transit Commission (TTC). The other category is existing freight rail systems, which includes freight operators: Canadian National Railway (CN) and Canadian Pacific Railway (CP).

9.11.2.1 Toronto Transit Commission

TTC is the Owner and Operator of an existing transit system in the City of Toronto. The TTC and Metrolinx will coordinate during Detailed Design to ensure that the structural integrity of the existing systems and interchanges is maintained through the design and construction stages.

9.11.2.2 Freight Operators

Both Canadian National Railway (CN) and Canadian Pacific Railway (CP) maintain locations where Metrolinx rails cross or run parallel, as well as being owner and operator of lines where Metrolinx will be electrifying portions of the existing territory. Items that will be reviewed and addressed during Detailed Design as required include: CTC Signaling Systems; signal cables and fiber optic cables; crossing control equipment; bungalows and junction boxes; hot box detectors; and, locations where OCS poles/portals cross existing shared rail territory. Considerations for each of these areas are discussed below.

CTC Signal System

- CTC locations shall be of designs that conform to EMC standards as per EPS-04000 *Electromagnetic Compatibility and Interference*, and shall demonstrate the reliable operation of the deployed system in an electrified territory. These locations are prime applications for fibre optic communications networks, which have high EMI immunity.

Signal Cables and Fibre Optic Cables

- Fibre optic equipment is compact, lightweight, functionally fast, and of high capacity for data transmission. A further advantage is its immunity from EMI. Its use instead of line wire shall be considered for data networks between remote locations and between signaling control points. As per the Recommendations from Induced Current Calculations for GO Network Electrification Project, dated 11-Nov-15, the use of unshielded cable presents a theoretical concern due to the effects of EMI. The results of a full safety analysis should be used to identify any hazards with respect to signal cables. In the case of a full safety analysis, the operation of all track side devices, the failures that could occur, and the existing or planned mitigations for these effects will properly address any theoretical concerns.

Constant Warning Crossing Control Equipment

- Every future installation of Grade Crossing Warning systems shall be designed and installed to conform to EMC standards as per EPS-04000 *Electromagnetic Compatibility and Interference*, and shall demonstrate the reliable operation of the deployed system in an electrified environment. The signaling compatibility requirements listed in this specification apply to future resignalling projects. For future resignalling projects, an analysis of then-current technology should be performed, and any proven system that accommodates constant warning times should be deployed.

Bungalows and Junction Boxes

- Bungalows and Junction Boxes are generally designed with industry-standard immunity.

Hot Box Detectors

- Hot box detector locations shall be of designs that conform to EMC standards as per EPS-04000 Electromagnetic Compatibility and Interference, and shall demonstrate the reliable operation of the deployed system in an electrified territory. Currently used detectors are expected to be compatible with EMC standards. Any new Hot Box Detector equipment or designs shall be demonstrated to be electrification compatible.

Refer to Volume 5 for additional commitments related to Freight Operators.

9.11.3 Overhead Contact System

During routine operation, spark discharges due to imperfect contact between the pantograph on top of the rolling stock and the OCS catenary wire are a common source of broad-band EMI. Undesirable EMI is due to broad-band EMFs, which can affect electronic devices (computers) and electrical scientific and medical devices along the wayside or in stations.

Mitigation Measures

- EMI – mitigated via design and implementation/adherence to an EMC Control Plan.
- Time-Varying EMFs – mitigated through design, e.g., grounding and shielding, physical separation.
- Induced Current in Neighbouring Metallic Wires and Fences – mitigated through design, e.g., grounding and shielding, and, physical separation.

9.11.3.1 Net Effects

No net adverse EMI/EMF effects are anticipated during operational phase related to the OCS, as in-design mitigation will be implemented (e.g., grounding and bonding) and the EMC Control Plan will be adhered to.

9.11.4 Bridge Modifications

The primary potential effect of bridge modifications on EMC would be due to decreased separation distances between electrified components such as the OCS and potential receptors for induced current.

9.11.4.1 Potential Effects and Mitigation Measures

- Time-Varying EMFs.
- Induced Current in Neighbouring Metallic Wires and Fences.

Mitigation Measures

- Time-Varying EMFs – mitigated through design, e.g., grounding and shielding, physical separation.
- Induced Current in Neighbouring Metallic Wires and Fences – mitigated through design, e.g., grounding and shielding, and, physical separation.

9.11.4.2 Net Effects

No net adverse EMI/EMF effects are anticipated during operational phase related to bridge modifications, as in-design mitigation will be implemented (e.g., grounding and bonding).

9.11.5 Tap Locations/Traction Power Facilities

For all of the Tap locations, TPFs, and 25kV feeder routes being constructed as part of the GO Rail Network Electrification Project, ELF EMF measurements have been collected before construction of the facility as outlined in this EPR and in **Appendix J- Electromagnetic Interference/Electromagnetic Fields (EMI/EMF) Report**. Confirmation/re-assessment of these readings after construction will be undertaken to ensure the predicted EMI/EMF levels are within acceptable industry standards. It should be noted that the post-electrification EMI scans that must include not only a re-assessment of background EMI at the survey location, but a more detailed scan, including harmonics for installed electronic devices, at fixed distance and height from the facility. The EMC Control Plan will include the inventory of devices and corresponding oscillator frequencies which will be used to develop the test plan.

9.11.5.1 Potential Effects and Mitigation Measures

- EMI
- Time-Varying EMFs.
- Induced Current in Neighbouring Metallic Wires and Fences.
- ELF EMF

Mitigation Measures

- EMI – mitigated via design and implementation/adherence to an EMC Control Plan.
- Time-Varying EMFs – mitigated through design, e.g., grounding and shielding, physical separation.
- Induced Current in Neighbouring Metallic Wires and Fences – mitigated through design, e.g., grounding and shielding, and, physical separation.
- ELF EMF – mitigated through verification measurements and testing during Detailed Design/construction

9.11.5.2 Net Effects

No net adverse EMI/EMF effects are anticipated during operation of the Taps/TPFs, as in-design mitigation will be implemented (e.g., grounding and bonding) and an EMC Control Plan will be developed and adhered to.

9.12 Stormwater Management

9.12.1.1.1 Potential Effects and Mitigation Measures

There are no anticipated operational effects on Stormwater management due to operation of the Taps/Traction Power Facilities as proper measures for quantity control, erosion control, and quality control will be established and implemented through the Stormwater Management Plan and Design.

9.12.2 Net Effects

There are no anticipated net adverse effects on Stormwater management during operation of the Taps/TPFs.

9.13 Groundwater and Wells

9.13.1 Overhead Contact System

9.13.1.1 Potential Effects and Mitigation Measures

During OCS maintenance activities, use of oils and insulating fluids may be required. As a result, accidental spills may occur during the handling of these products. Such spills have the potential to contaminate groundwater. The following mitigation measures are proposed to reduce the potential for adverse effects on groundwater:

- An Emergency Preparedness and Response Plan will govern spill response;
- Spill cleanup and response equipment will be available at the location of the maintenance activities;
- Transportation of fuel will be conducted in compliance with the Transportation of Dangerous Goods Act;
- Spill decks should be used for transferring products to smaller containers;
- Fire extinguishers will be located near the work areas;
- All necessary precautions will be implanted to prevent the spillage and release of hazardous materials to the environment;
- All leaks or spills will be immediately reported to the Ministry of the Environment and Climate Change, Spills Action Centre.

9.13.1.2 Net Effects

There is potential for groundwater contamination resulting from accidental spills during OCS maintenance. However, the risk will be minimized through implementation of the mitigation measures as described in **Section 9.13.1.1**.

9.13.2 Bridge Modifications

9.13.2.1 Potential Effects and Mitigation Measures

All routine bridge maintenance activities are expected to occur above ground and no potential impacts to groundwater are anticipated in connection with the maintenance of bridges.

9.13.2.2 Net Effects

There are no anticipated impacts to groundwater associated with operations and maintenance of bridges.

9.13.3 Tap locations – Power Supply

9.13.3.1 Potential Effects and Mitigation Measures

No potential impacts to groundwater are anticipated in connection with the maintenance of Tap structures.

9.13.3.2 Net Effects

There are no anticipated impacts to groundwater associated with operations and maintenance of the Tap locations.

9.13.4 Traction Power Facilities

9.13.4.1 Potential Effects and Mitigation Measures

During maintenance activities associated Traction Power Facilities, use of oils and insulating fluids may be required. As a result, accidental spills may occur during the handling of these products. Such spills have the potential to contaminate groundwater. The following mitigation measures are proposed to reduce the potential for adverse effects on groundwater:

- The TPF facilities will be fully equipped with spill containment and oil/water separation facilities. In the event of an equipment failure, oily water will not escape from the site; An Emergency Preparedness and Response Plan will govern spill response;
- Spill cleanup and response equipment will be available at the location on site; and
- Transportation of fuel will be conducted in compliance with the Transportation of Dangerous Goods Act;
- Spill decks should be used for transferring products to smaller containers;
- Fire extinguishers will be located near petroleum, oil and lubricants storage areas;
- All necessary precautions will be implanted to prevent the spillage and release of hazardous materials to the environment;
- All leaks or spills will be immediately reported to the Ministry of the Environment and Climate Change, Spills Action Centre.

9.13.4.2 Net Effects

There is potential for groundwater contamination resulting from accidental spills during Traction Power Station maintenance. However, the risk will be minimized through implementation of the mitigation measures as described in **Section 9.13.4.1**.

9.14 Climate Change

Climate change is defined as any significant change in long-term weather patterns. The term can apply to any major variation in temperature, wind patterns or precipitation that occurs over time.

Global warming describes the recent rise in the average global temperature caused by increased concentrations of greenhouse gases (GHGs) trapped in the atmosphere. Scientists have concluded that human activity is largely responsible for recently observed changes to our climate since GHGs are mainly caused by burning fossil fuels to produce energy, for transportation, etc.

The Government of Ontario has committed to reducing GHG emissions to 80% below 1990 levels by 2050 and has established two mid-term targets of 15% below 1990 levels by 2020 and 37% below 1990 levels by 2030.

In addition, the MOECC has developed a Climate Change Strategy (MOECC, 2016), which outlines the five areas that Ontario will focus on in order to achieve the GHG reduction targets including:

1. A prosperous low-carbon economy with world-leading innovation, science and technology;
2. Government collaboration and leadership;
3. A resource-efficient, high-productivity society;
4. Reducing GHG emissions across key sectors; and
5. Adaptation and risk awareness.

As an agency of the Government of Ontario, Metrolinx has prioritized achieving progress towards sustainability (Metrolinx 2014) which is in alignment with the MOECC Climate Change Strategy. Metrolinx has developed a Five Year Strategy 2015-2020 that outlines priorities and objectives that provide a framework to guide work in all parts of the organization as the implementation of the regional transportation plan is lead through an extensive program of tangible deliverables. Metrolinx's Strategy includes International Association of Public Transport (UITP) and American Public Transportation Association (APTA) sustainability commitments. These associations aim to enhance quality of life and promote sustainable transportation in urban areas. Both of these programs support becoming more sustainable by following a framework of requirements and measuring progress year over year. Deliverables listed in the Five Year Strategy include:

- Establish an executive-sponsored corporate Sustainability Framework by 2015, addressing energy use, emissions and environmental management, and develop and implement workplans and supporting policies for priority initiatives.
- Attain APTA Sustainability Commitment Gold status by 2017 and UITP Sustainability Charter Full Signatory status by 2016.
- Establish a corporate Climate Adaptation Plan covering facilities, practices and protocols, by 2018.

- Introduce cleaner twin-engine Tier 4 locomotives to the GO Transit fleet in 2016, beginning an ongoing conversion program.

9.14.1 Potential Effects of Climate Change on the Project

It is recognized that climate change is already underway and that extreme weather is affecting the Greater Toronto Hamilton Area (GTHA) and the operation and maintenance of the Metrolinx GO Rail system. Past risk and vulnerability studies and work done in the GTHA and in other areas indicate that the following are some of the key climate change and severe weather effects that may need to be considered for the GO Network Electrification Project:

- Higher average temperatures and higher average minimum and maximum temperatures;
- Extreme/intense rain and flooding;
- Ice storms/freezing rain;
- Lightning strikes and severe winds; and
- Faster tree growth with potentially higher rates of disease and pest conditions.

Projected changes in extreme weather conditions may be of particular concern in assessing the potential future climate change implications for the Electrification Project and the need for enhanced resiliency. Continuously changing rather than static weather may require ongoing monitoring and adaptation.

Some of the potential future climate/weather – rail system interactions for the Metrolinx GO Network Electrification that may warrant steps to reduce vulnerability and enhance resiliency and ongoing adaptive capacity include:

- High heat affecting power transformer capacity and/or electrical transmission efficiency;
- High heat resulting in sagging overhead wires;
- Exceedance of storm sewer/culvert and overland flow system capacities resulting in flooding;
- Scour and damage to or failure of culverts, bridges or embankment side slopes;
- Ice accumulation affecting infrastructure and equipment;
- High winds could result in damage to overhead catenary system (OCS) structures;
- Storm or high demand related power outages and impacts to system operation and communications – potentially affecting multiple system components (e.g. traction power substations);
- Potentially higher rates of downed trees along the perimeter of rail corridors or affecting any project components causing power outages or damage; and

- Potentially higher rates of tree maintenance along the perimeter of corridors or affecting any project components.

Modifications to project design/design solutions may be appropriate to reduce vulnerability to changes in some of the above noted climate/weather parameters. Potential adaptations to deal with changing climate conditions may include the following:

- *High heat:*
  - Transformers and electrical distribution system: Enhance capacity to deal with higher temperature conditions (in accordance with established Institute of Electrical and Electronics Engineering (IEEE) standards);
  - Implement energy storage devices such as batteries, compressed air and flywheels, that during power outages can bring stranded trains safely to stations; and
  - Sagging wires: Consider utilizing a constant tension system for a broader temperature range (already being included in the Project).
- *Extreme/intense rain and flooding:*
  - Review/modify flood plain/storm frequency design criteria and implement Stormwater Management Plan during construction/opration;
  - Elevate assets to keep from flooding, build flood protection structures;
  - Redirect storm runoff from track bed;
  - Slope stabilization to prevent washouts; and
  - Erosion and sediment control (ESC) measures will be implemented during the construction phase of the project to ensure stormwater runoff is not laden with sediment.
  - Back-up power: Provide back-up power to address power outages considering power storage options during off-peak periods - potentially applicable if more than one traction power substation fails which could trigger shut-down of the whole system.
- *Increased ice accumulation:*
  - Provide structural reinforcement for overhead structures to protect against ice accumulation;
  - Bury sections of wire if possible to protect from ice accumulation;
  - Use remotely operated vehicle to de-ice critical sections of overhead wires;
  - Apply current which heats wire to melt ice from wires; and
  - Apply protective coating which prevents ice from accumulating on the surface.

- *Faster tree growth with potentially higher rates of disease and pest conditions:*
  - Increased tree maintenance along the perimeter of corridors or affecting any project components.

Adaptive management should be planned for as part of the Electrification Project to monitor changing climate conditions over time with a view to introducing new measures in the future as needed.

Further climate change vulnerability and risk assessment of the proposed Metrolinx GO Rail Network Electrification Project should be undertaken to assess the need for and to provide enhanced resiliency and adaptive capacity as part of the design process where feasible.

9.15 Sustainability

Investment in sustainable transportation is a key part of Ontario's 2015 Climate Change Strategy (see section 4.3.4) to address climate change and is anticipated to bring significant benefits including reduced greenhouse gas (GHG) emissions (and 'carbon footprint'). The Big Move (2008) Regional Transportation Plan for the Greater Toronto and Hamilton Area (GTHA) highlights Metrolinx's GO Network Electrification as a key climate change mitigation measure that will contribute to Ontario's achievement of its GHG/carbon dioxide equivalent (CO_{2e}) emission reduction targets.

While the Electrification Project is anticipated to result in a significant reduction in GHG emissions vs. continuing to operate using diesel powered rolling stock, the GO Rail system will still over its life cycle produce GHG emissions. Given this contribution over time, opportunities to further reduce GHG emissions may be considered. Key recommendations based on the APTA Transit Sustainability Guidelines related to infrastructure and facilities that may be further reviewed and considered if appropriate/feasible include:

- Select materials with low embodied energy (i.e. local, recycled, recyclable) – as long as transit-specific requirements are also met: longevity, durability, low maintenance;
- Incorporate innovative sustainable construction practices;
- To lower the energy consumption and carbon footprint of infrastructure and facilities, explore (sequentially) the following groups of methods for applicability and feasibility: energy efficiency, energy conservation and recovery, and energy harvesting. Examples include:
  - Energy efficiency – use premium efficiency motors or other equipment;
  - Energy conservation and recovery – employ regenerative braking systems to capture energy from braking vehicles (already proposed for the GO Rail Network Electrification); and
  - Energy harvesting – consider incorporating solar thermal systems, passive solar systems and/or ground source heat pump systems to replace or augment fuel-based systems;
- Establish a baseline of GHG emissions for the Project once operational and monitor energy use of all forms for future opportunities for reduction (this should be done using a three year baseline in order to establish a normalization of energy data). An accurate picture of energy savings can be developed in accordance with the new Metrolinx GHG Corporate Reporting process and standards;
- Create / implement a Measurement and Verification Plan to monitor energy usage during the construction and operation of the electrified network. Implement this plan in parallel with electrical infrastructure design, including point-of-use metering to evaluate and reduce energy use effectively;
- Set targets for construction and demolition debris diversion from landfill through on-site and off-site reuse and recycling;
- Incorporate environmentally preferable materials and prioritize their acquisition/use based on key attributes – i.e., recyclability, weight, carbon footprint, etc.; and

- Put in place a sustainable procurement policy and/or supply chain policy based on comprehensive sustainability principles.

10 Construction Impacts

This section provides a detailed overview of the types of (shorter term) effects that are anticipated during the construction phase of the GO Rail Network Electrification Project.

10.1 Natural Environment

10.1.1 Overhead Contact System

10.1.1.1 Potential Effects and Mitigation Measures

10.1.1.1.1 Terrestrial

During the construction for the installation of the OCS, vegetation removals will be required. A Vegetation Management Plan will be prepared during Detailed Design. There are also many natural vegetation communities which could be potentially be impacted because of their proximity to proposed clearing areas and site specific Edge Management mitigation measures will be identified at Detailed Design. Trees not slated for removal should be protected and maintained. The most typical construction damage to trees is root damage through compaction and severance and damage to the trunk. Root loss can impact trees through compromising structural integrity and through restriction of nutrient uptake. Trees that are very large are more susceptible to construction damage. The following mitigation measures related to Tree Protection, as part of the Vegetation Management Plan, should be followed:

- Adhere to relevant guidelines and OPSS for clearing and grubbing (OPSS 201), site preparation and tree protection (OPSS 801);
- Existing vegetation will be protected by erecting and maintaining a temporary fence for tree protection, pruning interfering branches and treating with approved dressing, treating any damaged roots >25 mm in diameter with approved tree paint.
- Do not damage the root system, trunk or branches of any tree; if any roots are encountered during excavation, they shall be cut off cleanly.
- All exposed roots of trees to be retained shall be covered in a minimum of 5 cm of firm moist soil within 24 hours of exposure
- Any exhaust fumes from all equipment shall not be directed towards any tree's canopy
- Branches that are likely to be damaged by construction equipment, should be removed before construction so that bark is not torn accidentally and wounds are not more extensive than absolutely necessary.

During the installation of OCS, vegetation clearing will be required and nests of migratory birds may be encountered. To ensure compliance with the MBCA, the following mitigation measures are proposed in order to reduce or mitigate the potential for adverse effects on birds and their nests:

- Vegetation removals should occur outside of the migratory bird nesting season from April 1st to August 31st.
- Should vegetation clearing be required within the period from April 1st to August 31st, a nesting survey protocol shall be developed and implemented prior to any vegetation removals.
- Active nests and eggs of protected migratory birds shall not be destroyed at any time and site specific mitigation should be developed in consultation with the Canadian Wildlife Service.Nests and eggs of protected Species at Risk birds shall not be destroyed at any time. If the nest of a protected Species at Risk must be damaged or destroyed, consultation with the appropriate regulatory agency is required and a permit under the ESA, 2007 or Species at Risk Act (Federal lands only) may be necessary.

Impacts to migratory birds from the installation of the OCS are anticipated to be low as the infrastructure will be placed within the active/existing rail corridor. The height of the portals/cantilevers used to support the OCS wires over the electrified tracks will range between approximately 7.6 metres to 12.0 metres above the top of the highest rail. Contact wire height will range from 6.0 metres to 7.6 metres. The OCS will not create a solid barrier to migratory bird movement as they will have the ability to navigate around the wires, similar to electrical transmission lines elsewhere throughout Ontario. There is limited risk to birds associated with the OCS wires or supporting structures with respect to electrocution as the conductor and ground wires will not be positioned within close enough proximity. Birds will be able to perch on the wires without harm.

While no direct impacts to amphibian breeding habitat area anticipated, there is potential for these species within wetland areas adjacent to the OCS impact zone, particularly within wetland areas identified as environmentally significant (PSWs, ESAs). Where wetland features are present within or immediately adjacent to the OCS footprint impact/vegetation removal zone, it is recommended the following mitigation measure is implemented to mitigate impacts:

- Silt fencing should be erected to act as a physical barrier between the limit of vegetation removal zone and adjacent wetlands.

Sedimentation and erosion may result from vegetation clearing and excavations for OCS foundations. Mitigation measures to reduce or mitigate the potential for adverse effects caused by sediment and erosion include:

- Adhere to relevant guidelines and Ontario Provincial Standard Specifications relating to proper sediment and erosion controls including consideration of TRCA[33] Erosion and Sediment Control

[33] *As a Crown Agency, GO/Metrolinx is exempt from the Conservation Authorities Act and as such does not have a requirement to apply for and obtain permits from conservation authorities. Wherever possible, GO/Metrolinx will engage the conservation authority on specific projects (or components thereof) and will adhere to requirements when and where possible.*

Guidelines to Urban Construction) and Ontario Provincial Standards Specifications (OPSS) – OPSS 805 (Erosion and Sediment Control Measures).

- Where temporary storage of the soil is required, the soil will be stored immediately adjacent to the excavation site.
- Topsoil and subsoil will not be mixed nor will topsoil be contaminated with any other material.
- Exposed soils will be hydroseeded within 45 days, both for temporary work areas and final grades.
- Existing vegetation on embankments shall be maintained as long as possible and exposed areas shall be stabilized as soon as possible by seeding and mulching.
- Appropriate lengths of silt fencing will be installed along the perimeter of minimized, designated work areas to limit construction impacts.
- Once construction areas are stabilized, all sediment and erosion controls are to be removed.

Construction will also generate dust, noise and light that may affect vegetation and wildlife. Wildlife utilizing the site may be temporarily displaced during construction. However, these animals are already exposed to high noise levels and are tolerant of urban conditions. Mitigation measures to reduce or mitigate the potential for adverse effects caused by construction activities include:

- Dust should be controlled as much as possible by watering of appropriate surfaces. The contractor shall adhere to relevant guidelines and Ontario Provincial Standard Specifications, including OPSS 506 (Dust Control).
- All construction equipment and vehicles will yield the right-of-way to wildlife, if it is safe to do so.
- Advise workers to perform visual survey of machinery and work area prior to commencing work since wildlife may be found basking or hiding on or under equipment, rocks, debris piles etc.
- Do not allow construction debris to accumulate on-site and on the soils surface but regularly clean up the site to reduce the possibility of wildlife using debris piles for shelter.
- Clean up all litter daily and provide waste disposal containers so wildlife does not ingest indigestible materials or become entangled in debris.
- Any wildlife incidentally encountered during construction will be protected and will not be knowingly harmed.
- Advise workers to perform a visual survey of machinery and work area prior to commencing work since wildlife may be found hiding in or under equipment, rocks, debris piles, etc. and any individuals found shall be left to move on their own or moved properly out of harm's way in the direction they were heading.

In addition, there is potential for invasive and disturbance-tolerant non-native species to establish on exposed stockpiles of excavated soils, or be introduced on equipment during construction. Construction activities may cause the spread of non-native and invasive species. The *Invasive Species Act, 2015* provides a legislative framework for classifying invasive species as either prohibited or restricted species. Species are classified by either regulation or designation by the Minister. The Act provides prohibitions for each class of invasive species as well as mechanisms for preventative measures, inspection and action once an invasive species is identified. Mitigation measures related to invasive species with potential within the study area will ensure compliance with the Act. These species include Emerald Ash Borer (*Agrilus planipennis* Farmaire), Asian Long-horned Beetle (*Anoplophora glapripennis*), and Common Reed (*Phragmites australis*). The following mitigation measures are proposed to deal with invasive species:

- Where possible, excavated soils should be stored for a period of less than 45 days.
- Where excavated soils must be stored for a period longer than 45 days, they should be covered or seeded with a cover crop, such as Annual Oats or Canada Wild Rye.
- Once soils are replaced, they should be re-seeded with a native seed mix suited to the site conditions.
- Equipment should be cleaned between sites to prevent the spread of invasive species.
- Vegetation removals of Ash trees must be carried out in a manner in compliant with the Ministerial Order issued by the Federal Government which identifies prohibitions and restrictions of movement on trees, leaves, logs, lumber, wood/wood chips from all ash species. Unless authorized by a Movement Certificate issued by the CFIA, moving these products out of the Regulated Area is prohibited. This is necessary to prevent the spread of the Emerald Ash Borer (EAB) to un-infested areas in other parts of Ontario and Canada. The Contractor must dispose of all wood at a registered Waste Facility.
- Vegetation removals within the Regulation Area for Asian Long-Horn Beetle (associated with Kitchener Corridor segments only) within the 12 genera identified as host trees must be carried out carried out in a manner in compliant with the Ministerial Order issued by the Federal Government in 2013 which identifies prohibitions and restrictions of movement on trees, leaves, logs, lumber, wood/wood chips from host species of the Asian Long-horned Beetle. Unless authorized by a Movement Certificate issued by the CFIA, moving these products out of the Regulated Area is prohibited. The Contractor must dispose of all wood at a registered Waste Facility.

During construction, equipment may leak, or spills may occur. Accidental contamination may occur during the handling and storage of toxic products such as fuel and concrete mixtures.

- An Emergency Preparedness and Response Plan will govern spill response.
- Spill cleanup and response equipment should be located on site.
- Fuel transport should be conducted in compliance with the Transportation of Dangerous Goods Act.
- Spill decks should be used for transferring products to smaller containers.
- Fire extinguishers should be located near petroleum, oil and lubricants storage areas.

- All necessary precautions shall be implemented to prevent the spillage and release of hazardous materials to the environment.
- All leaks or spills to be immediately reported to the Ministry of the Environment and Climate Change (MOECC), Spills Action Centre at 1-800-268-6060.

10.1.1.1.2 Aquatic

There are no direct impacts to watercourses anticipated to result from OCS installation activities throughout the corridor as all work will be within the existing Metrolinx rail corridor ROW away from the watercourses. However, prescribed work at Joshua Creek Bridge (Oakville Sub Mile 18.90) may result in potential impacts to Joshua Creek (East Branch). Net adverse effects to the creek will be determined once design information is available. Potential indirect effects of the construction works include siltation, introduction of contaminants into the watercourse through the use of industrial equipment, and construction debris. These potential impacts can be mitigated by implementing the following measures related to sediment and erosion control:

- Adhere to relevant guidelines and Ontario Provincial Standard Specifications relating to proper sediment and erosion controls including consideration of TRCA[34] Erosion and Sediment Control Guidelines to Urban Construction) and Ontario Provincial Standards Specifications (OPSS) – OPSS 805 (Erosion and Sediment Control Measures).
- Design and implement erosion and sediment controls to contain/isolate the construction zones, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to any watercourses, and ensure sites are stabilized prior to removal following construction.
- Stockpiles to be located at a minimum of 30m from watercourses and isolated to ensure material will not enter any watercourse or ditchline. All stockpiles to be removed upon completion of the works and the site restored, as appropriate.
- Exposed soils to be stabilized with hydroseed within 45 days.
- Limit access to waterbody and banks to protect riparian vegetation and minimize bank erosion.

Mitigation measures relating to accidental contamination of watercourses include:

- An Emergency Preparedness and Response Plan will govern spill response.
- Ensure spill kits are on-site at all times for implementation in the event of an accidental spill during construction.
- Operate, store and maintain all equipment and associated materials in a manner that prevents the entry of any deleterious substance to the waterbody.

[34] *As a Crown Agency, GO/Metrolinx is exempt from the Conservation Authorities Act and as such does not have a requirement to apply for and obtain permits from conservation authorities. Wherever possible, GO/Metrolinx will engage the conservation authority on specific projects (or components thereof) and will adhere to requirements when and where possible.*

- All mobile equipment will have drip pans installed and refueling will take place no closer than 30m to any study area watercourses or ditchlines in order to prevent water contamination due to accidental fuel spills.
- Fuel transport should be conducted in compliance with the Transportation of Dangerous Goods Act.
- All necessary precautions shall be implemented to prevent the spillage and release of hazardous materials to the environment.
- All leaks or spills to be immediately reported to the Ministry of the Environment and Climate Change (MOECC), Spills Action Centre at 1-800-268-6060.

As noted above, no direct impacts to watercourses including in-water works are anticipated. Should impacts to watercourses be identified at Detailed Design, additional investigations (as required) will be undertaken by the Contractor as appropriate in accordance with applicable legislation to characterize the impacts. In the event the need for in-water works is identified post EA the following mitigation measures shall include but not exclusive to:

- A qualified Fisheries Specialist shall undertake an assessment to determine measures to avoid causing harm to fish and fish habitat, including aquatic species at risk and determine the need for DFO review.
- All in-water works shall comply with the timing windows identified by MNRF.
- Compliance with OPSS 180 (Management of Excess Materials) and OPSS 182 (Environmental Protection for Construction in Waterbodies and on Waterbody Banks) during construction.

10.1.1.1.3 Species at Risk

The habitat of threatened and endangered species is protected under the ESA, 2007. If avoidance and mitigation measures are implemented, a contravention under the *Endangered Species Act Section 9 ("No person shall, kill, harm, harass, capture or take a living member of a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered or threatened species") and/or Section 10 ("No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario [SARO] list as an endangered or threatened species")* would not occur. Early consultation with the MNRF during the Detailed Design phase will be required to evaluate impacts to Species at Risk from any construction activities including access roads, construction pads, and vegetation removals; develop options for reducing or mitigating impacts; implement appropriate timing windows; and determine permitting/authorization requirements. Any sediment and erosion control measures for any habitat regulated pursuant to the Environmental Site Assessment will be reviewed and/or approved by the MNRF.

Based on background research and field investigations, there is potential for Butternut to occur within the rail corridors and be affected by construction impacts.

The presence/absence of Butternuts will be confirmed during Detailed Design. Should any Butternuts be found during Detailed Design, a health assessment will be required for any pure butternuts and appropriate approval under the ESA, 2007 obtained. Dependent on number of individuals found and their conditions, this may include a registration process or permit. Protective measures for any Butternuts within 50 metres of the construction footprint that do not need to be removed, shall be implemented.Where Species at Risk habitat is identified/confirmed during Detailed Design, recommended mitigation measures for species such as Redside Dace, Species at Risk bats, and Species at Risk birds include conducting activities (i.e. tree/vegetation clearing) outside of designated timing windows for these species. The timing windows are as follows:

- Species at Risk birds are protected by the general migratory bird window of April 1st to August 31st;
- Species at Risk bats are protected by the timing window of April 30th to September 1st;
- Redside Dace are protected by the timing window of September 16th to June 30th.

In addition to respecting appropriate timing windows for work within regulated habitat for Redside Dace, the MNRF will review and approve all plans for sediment and erosion control measures within the regulated habitat.

As part of Detailed Design and permitting, the MNRF Bat Protocol will be discussed with MNRF in relation to applicability and preferred approach for any required permits/approval as it relates to the Electrification Project works. Any required MNRF permits/approval will be obtained prior to project implementation.

In order to protect Bank Swallows within the identified nesting area as part of the Lakeshore East (LSE) Guildwood to Pickering track expansion project (AECOM, 2016), located within the LSW-5 segment, the following mitigation measure is recommended:

- No vegetation removal, grading or construction with heavy equipment should occur within 50 metres of the bluff during the Bank Swallow breeding period (May 1st to July 31st).
- Following the LSE track expansion project, monitoring of the Bank Swallow colony will be conducted to determine any adverse effects. Results of this monitoring should be used to determine appropriate mitigation that will be required during construction.

In addition to the potential direct footprint impacts noted above there is potential for SAR species to travel through the rail corridor to adjacent habitats, as such the following recommended general mitigation measures to protect Species at Risk include:

- All workers should be provided with awareness training (e.g. factsheets) that addresses the existence of potential Species at Risk on site, identification of those species and proper actions when an individual is encountered and/or needs to be moved out of harm's way.

- Prior to commencing work, each work site shall be inspected for individual SAR and any individuals found shall be left to move on their own or moved properly out of harm's way in the direction they were heading;
- Report all Species at Risk sightings and encounters to the appropriate MNRF District office using the appropriate reporting form;

If a nesting snake or turtle is found the MNRF shall be notified immediately and a ten (10) metre buffer zone shall be flagged around the site and that area protected from harm during the nesting season.

In addition, portions of the Stouffville and Lakeshore East Corridors pass through Rouge National Urban Park (RNUP). As such, any works that may affect Species at Risk outside Metrolinx's ROW within RNUP are also subject to the Species at Risk Act and a permit from Parks Canada may be required. Further consultation with Parks Canada will be undertaken during Detailed Design, as required.

10.1.1.1.4 Designated Areas

Some Overhead Contact System (OCS) infrastructure is proposed within the Oak Ridges Moraine Boundary, Greenbelt Plan areas and Lake Simcoe Protection Plan areas. There are no reasonable alternatives to siting OCS in these areas, given that OCS can only be located within the pre-existing rail corridors, which were located on these lands prior to the adoption of the Oak Ridges Moraine Plan, Greenbelt Plan and Lake Simcoe Protection Plan.

For impacts and mitigation related to terrestrial features within Designated Areas associated with construction of the OCS, refer to **Section 10.1.1.1.1.**

10.1.1.2 Net Effects

10.1.1.2.1 Terrestrial

While there will be a net loss of vegetation within the OCS impact zone, there are no net adverse effects anticipated to result from construction providing identified mitigation measures are adhered to. The potential for adverse effects on migratory birds related to OCS construction activities will be mitigated based on implementation of the above listed mitigation measures. Net adverse effects related to soil erosion and potential for invasive and disturbance-tolerant non-native species to establish will be minimized via implementation of the mitigation measures outlined above. The potential for soil contamination related to accidental spills will be minimized. Potential temporary displacement of wildlife during construction activities will be minimized by ensuring the mitigation measures described above are implemented.

10.1.1.2.2 Aquatic

The implementation of mitigation measures will ensure that no net adverse effects will result from sedimentation or potential contamination of watercourses during construction related to OCS installation.

10.1.1.2.3 Species at Risk

Net effects to Butternut will be determined during Detailed Design following detailed tree inventories.

10.1.1.2.4 Designated Areas

Net effects related to possible construction related impacts will be minimized though the implementation of the mitigation measures identified above.

10.1.2 Bridge Modifications

10.1.2.1 Potential Effects and Mitigation Measures

10.1.2.1.1 Terrestrial

Nests of migratory birds may be encountered on bridges where OCS attachments are required. To ensure compliance with the MBCA, the following mitigation measures are proposed in order to reduce or mitigate the potential for adverse effects on birds and their nests:

- Bridges shall be inspected for nests and eggs prior to any construction activities.
- Nests and eggs of protected migratory birds shall not be destroyed at any time.
- Nests and eggs of protected Species at Risk birds shall not be destroyed at any time. If the nest of a protected Species at Risk must be damaged or destroyed, consultation with the appropriate regulatory agency is required and a permit under the ESA, 2007 or Species at Risk Act (Federal lands only) may be necessary.
- If a nest is removed from bridge, the bridge should be netted outside of the breeding bird season to prevent the recurrence of nesting activity.

10.1.2.1.2 Aquatic

Since the bridge modifications will be placed on the existing bridge structures and not in or adjacent to the water, no direct adverse effects to the associated watercourses or fish/fish habitat are anticipated to result from bridge modifications. However, prescribed work at Joshua Creek Bridge (Oakville Sub Mile 18.90) may result in potential impacts to Joshua Creek (East Branch). Net adverse effects to the creek will be determined once design information is available. Potential indirect effects of the construction works include siltation, introduction of contaminants into the watercourse through the use of industrial equipment, and construction debris. These potential impacts can be mitigated by implementing the following measures related to sediment and erosion control:

- Adhere to relevant guidelines and Ontario Provincial Standard Specifications relating to proper sediment and erosion controls including consideration of TRCA[35] Erosion and Sediment Control

[35] *As a Crown Agency, GO/Metrolinx is exempt from the Conservation Authorities Act and as such does not have a requirement to apply for and obtain permits from conservation authorities. Wherever possible, GO/Metrolinx will engage the conservation authority on specific projects (or components thereof) and will adhere to requirements when and where possible.*

Guidelines to Urban Construction) and Ontario Provincial Standards Specifications (OPSS) – OPSS 805 (Erosion and Sediment Control Measures).

- Design and implement erosion and sediment controls to contain/isolate the construction zones, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to any watercourses, and ensure sites are stabilized prior to removal following construction.
- Stockpiles to be located at a minimum of 30m from watercourses and isolated to ensure material will not enter any watercourse or ditchline. All stockpiles to be removed upon completion of the works and the site restored, as appropriate.
- Exposed soils to be stabilized with hydroseed within 45 days.
- Limit access to waterbody and banks to protect riparian vegetation and minimize bank erosion.

Mitigation measures relating to accidental contamination of watercourses include:

- An Emergency Preparedness and Response Plan will govern spill response.
- Ensure spill kits are on-site at all times for implementation in the event of an accidental spill during construction.
- Operate, store and maintain all equipment and associated materials in a manner that prevents the entry of any deleterious substance to the waterbody.
- All mobile equipment will have drip pans installed and refueling will take place no closer than 30m to any study area watercourses or ditchlines in order to prevent water contamination due to accidental fuel spills.
- Fuel transport should be conducted in compliance with the Transportation of Dangerous Goods Act.
- All necessary precautions shall be implemented to prevent the spillage and release of hazardous materials to the environment.
- All leaks or spills to be immediately reported to the Ministry of the Environment and Climate Change (MOECC), Spills Action Centre at 1-800-268-6060.
- Use shrouding or debris platforms to trap and prevent concrete and other bridge materials from entering the watercourse during construction.

Should additional bridge modifications over water be identified, such as bridge widening that may have additional construction related impacts to watercourses, further analysis of potential impacts would be required.

As noted above, no direct impacts to watercourses including in-water works are anticipated. In the event the need for in-water works is identified post EA the following mitigation measures shall include but not exclusive to:

- A qualified Fisheries Specialist shall undertake an assessment to determine measures to avoid causing harm to fish and fish habitat, including aquatic species at risk and determine the need for DFO review.
- All in-water works shall comply with the timing windows identified by MNRF.
- Compliance with OPSS 180 (Management of Excess Materials) and OPSS 182 (Environmental Protection for Construction in Waterbodies and on Waterbody Banks) during construction.

10.1.2.1.3 Species at Risk

No Barn Swallow nests were observed on bridges requiring modification or with vertical clearance issues. However, individuals/nests were observed at the following bridges to undergo modifications: Bronte Creek Bridge (Mile 25.87) and Holland River Bridge (Mile 41.00). A follow up inspection for migratory nests, including Barn Swallows, should occur prior to commencing work to ensure compliance with the Environmental Site Assessment. Early consultation with the MNRF during the Detailed Design phase will be required to evaluate impacts to Species at Risk, develop options for reducing or mitigating impacts and confirm the implementation of appropriate timing windows.

If a Barn Swallow nest is identified on a bridge scheduled for modifications or with vertical clearance issues, the following measures should be followed to remain in compliance with the Environmental Site Assessment:

Under provincial laws (ESA, 2007 and Ontario Regulation 242/08), prior to the start of work, the project will require registration with the MNRF and follow the Notice of Activity – Alter a Structure (Habitat for Barn Swallow) rules.

Under the MNRF's Notice of Activity – Alter a Structure (Habitat for Barn Swallows), Metrolinx is required to:

- Avoid anything that could harm the bird(s) if they are using the structure.
- Take steps to prevent the bird(s) from building nests or entering the structure during their active season (April 1st to August 31st) (e.g., install tarp or netting).
- Replace any nests that are removed, damaged or destroyed with a nest cup.
- Install nest cups on a the existing structure, different suitable structure (within 1 km) or a new structured created or modified to be suitable for Barn Swallow nesting (within 1 km).
- Build or modify a structure within 1 km of the affected habitat and within 200 metres of an area that is accessible and suitable for foraging.

If the rehabilitated bridge is no longer suitable for Barn Swallow, Metrolinx must:

Build or modify a structure within 1 km of the affected habitat and within 200 metres of an area that is accessible and suitable for foraging;

- Provide more habitat than what was removed; and
- Provide suitable nesting conditions.

The works on the Barn Swallow habitat must be completed before the next active season begins (if work started outside the active season) or before the active season begins (if work will be done during the active season).

10.1.2.1.4 Designated Areas

There are no anticipated impacts to Designated Areas associated with construction related to bridge modifications.

10.1.2.2 Net Effects

10.1.2.2.1 Terrestrial

The potential for adverse effects on migratory birds related to bridge modification activities will be mitigated based on implementation of the above listed mitigation measures.

10.1.2.2.2 Aquatic

The implementation of mitigation measures will ensure there are no net adverse effects that will result from construction activities related to routine bridge modifications. Effects resulting from possible bridge widenings will be assessed once technical information becomes available.

10.1.2.2.3 Species at Risk

Should Barn Swallow nests be found prior to construction on the Bronte Creek Bridge (Mile 25.87) and/or Holland River Bridge (Mile 41.00) (or any additional Bridge that requires modification), registration and mitigation under the Environmental Site Assessment will ensure no net adverse effects to Barn Swallows

10.1.2.2.4 Designated Areas

There are no net adverse effects as there are no anticipated construction impacts.

10.1.3 Taps/Traction Power Facilities

10.1.3.1 Potential Effects and Mitigation Measures

10.1.3.1.1 Terrestrial

Vegetation clearing (for some sites) and soil excavation will be required for installation of the duct banks (approximately 4 metres wide, 1 metre deep) that will carry feeder lines from the TPF facilities to the rail corridor. Gantry foundations will also be installed within the rail ROW. Similarly, soil excavation is required in order to install grounding and bonding material within the TPF facilities property boundaries. The following mitigation measures related to vegetation removals, including the protection of migratory birds should be followed:

- Adhere to relevant guidelines and OPSS for clearing and grubbing (OPSS 201), site preparation and tree protection (OPSS 801).
- Vegetation removals should occur outside of the migratory bird nesting season (April 1st to August 31st.
- Should vegetation removals be required within the period from April 1st to August 31st, a nesting survey protocol shall be developed and implemented prior to any vegetation removals.
- Nests and eggs of protected migratory birds shall not be destroyed at any time and site specific mitigation should be developed in consultation with the Canadian Wildlife Service.
- Nests and eggs of protected Species at Risk birds shall not be destroyed at any time. If the nest of a protected Species at Risk must be damaged or destroyed, consultation with the MNRF is required and a permit under the ESA, 2007 or Species at Risk Act (Federal lands only) may be necessary.

Soil excavation may result in erosion of the work areas during excavations and/or soil storage. Mitigation measures to reduce or mitigate the potential for adverse effects caused by sediment and erosion include:

- Adhere to relevant guidelines and Ontario Provincial Standard Specifications relating to proper sediment and erosion controls including consideration of TRCA[36] Erosion and Sediment Control Guidelines to Urban Construction) and Ontario Provincial Standards Specifications (OPSS) – OPSS 805 (Erosion and Sediment Control Measures).
- Where temporary storage of the soil is required, the soil will be stored immediately adjacent to the excavation site.
- Topsoil and subsoil will not be mixed nor will topsoil be contaminated with any other material.
- Exposed soils will be hydroseeded within 45 days, both for temporary work areas and final grades.
- Appropriate lengths of silt fencing will be installed along the perimeter of minimized, designated work areas to limit construction impacts.
- Once construction areas are stabilized, all sediment and erosion controls are to be removed.

Construction will also generate dust, noise and light that may affect vegetation and wildlife. Wildlife utilizing the site may be temporarily displaced during construction. However, these animals are already exposed to high noise levels and are tolerant of urban conditions. Mitigation measures to reduce or mitigate the potential for adverse effects caused by construction activities include:

[36] *As a Crown Agency, GO/Metrolinx is exempt from the Conservation Authorities Act and as such does not have a requirement to apply for and obtain permits from conservation authorities. Wherever possible, GO/Metrolinx will engage the conservation authority on specific projects (or components thereof) and will adhere to requirements when and where possible.*

- Dust should be controlled as much as possible by watering of appropriate surfaces. The contractor shall adhere to relevant guidelines and Ontario Provincial Standard Specifications, including OPSS 506 (Dust Control).
- All construction equipment and vehicles will yield the right-of-way to wildlife, if it is safe to do so.
- Advise workers to perform visual survey of machinery and work area prior to commencing work since wildlife may be found basking or hiding on or under equipment, rocks, debris piles etc.
- Do not allow construction debris to accumulate on-site and on the soils surface but regularly clean up the site to reduce the possibility of wildlife using debris piles for shelter.
- Clean up all litter daily and provide waste disposal containers so wildlife does not ingest indigestible materials or become entangled in debris.
- Any wildlife incidentally encountered during construction will be protected and will not be knowingly harmed.
- Advise workers to perform a visual survey of machinery and work area prior to commencing work since wildlife may be found hiding in or under equipment, rocks, debris piles, etc. and any individuals found shall be left to move on their own or moved properly out of harm’s way in the direction they were heading.

In addition, there is potential for invasive and disturbance-tolerant non-native species to establish on exposed stockpiles of excavated soils, or be introduced by equipment during construction. Construction activities may cause the spread woody and herbaceous non-native and invasive species. The following mitigation measures are proposed to deal with invasive species:

- Where possible, excavated soils should be stored for a period of less than 45 days.
- Where excavated soils must be stored for a period longer than 45 days, they should be covered or seeded with a cover crop, such as Annual Oats or Canada Wild Rye.
- Once soils are replaced, they should be re-seeded with a native seed mix suited to the site conditions.
- Equipment should be cleaned between sites to prevent the spread of invasive species.
- Vegetation removals of Ash trees must be carried out in a manner in compliant with the Ministerial Order issued by the Federal Government which identifies prohibitions and restrictions of movement on trees, leaves, logs, lumber, wood/wood chips from all ash species. Unless authorized by a Movement Certificate issued by the CFIA, moving these products out of the Regulated Area is prohibited. This is necessary to prevent the spread of the Emerald Ash Borer (EAB) to un-infested areas in other parts of Ontario and Canada. The Contractor must dispose of all wood at a registered Waste Facility.

During construction, equipment may leak, or spills may occur. Accidental contamination may occur during the handling and storage of toxic products such as fuel and concrete mixtures.

- An Emergency Preparedness and Response Plan will govern spill response.
- Spill cleanup and response equipment should be located on site.
- Fuel transport should be conducted in compliance with the Transportation of Dangerous Goods Act.
- Spill decks should be used for transferring products to smaller containers.
- Fire extinguishers should be located near petroleum, oil and lubricants storage areas.
- All necessary precautions shall be implemented to prevent the spillage and release of hazardous materials to the environment.
- All leaks or spills to be immediately reported to the Ministry of the Environment and Climate Change (MOECC), Spills Action Centre at 1-800-268-6060.

10.1.3.1.2 Aquatic

There are no aquatic features located within TPF property boundaries. No aquatic construction impacts will result from the construction of the TPF facilities for the sites with no watercourses present. Mitigation measures relevant to sediment and erosion control include:

- Adhere to relevant guidelines and Ontario Provincial Standard Specifications relating to proper sediment and erosion controls including consideration of TRCA[37] Erosion and Sediment Control Guidelines to Urban Construction) and Ontario Provincial Standards Specifications (OPSS) – OPSS 805 (Erosion and Sediment Control Measures).
- Design and implement erosion and sediment controls to contain/isolate the construction zones, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to any watercourses, and ensure sites are stabilized prior to removal following construction.
- Stockpiles to be located at a minimum of 30m from watercourses and isolated to ensure material will not enter any watercourse or ditchline. All stockpiles to be removed upon completion of the works and the site restored, as appropriate.
- Exposed soils to be stabilized with hydroseed within 45 days.
- Limit access to waterbody and banks to protect riparian vegetation and minimize bank erosion.

Mitigation measures relating to accidental contamination of the watercourse include:

- An Emergency Preparedness and Response Plan will govern spill response.

[37] *As a Crown Agency, GO/Metrolinx is exempt from the Conservation Authorities Act and as such does not have a requirement to apply for and obtain permits from conservation authorities. Wherever possible, GO/Metrolinx will engage the conservation authority on specific projects (or components thereof) and will adhere to requirements when and where possible.*

- Ensure spill kits are on-site at all times for implementation in the event of an accidental spill during construction.
- Operate, store and maintain all equipment and associated materials in a manner that prevents the entry of any deleterious substance to the waterbody.
- All mobile equipment will have drip pans installed and refueling will take place no closer than 30m to any study area watercourses or ditchlines in order to prevent water contamination due to accidental fuel spills.
- Fuel transport should be conducted in compliance with the Transportation of Dangerous Goods Act.
- All necessary precautions shall be implanted to prevent the spillage and release of hazardous materials to the environment.
- All leaks or spills to be immediately reported to the Ministry of the Environment and Climate Change (MOECC), Spills Action Centre at 1-800-268-6060.

As noted above, no direct impacts to watercourses including in-water works are anticipated. In the event the need for in-water works is identified post TPAP the following mitigation measures shall include but not exclusive to:

- A qualified Fisheries Specialist shall undertake an assessment to determine measures to avoid causing harm to fish and fish habitat, including aquatic species at risk and determine the need for DFO review;
- All in-water works shall comply with the timing windows identified by MNRF; and
- Compliance with OPSS 180 (Management of Excess Materials) and OPSS 182 (Environmental Protection for Construction in Waterbodies and on Waterbody Banks) during construction.

10.1.3.1.3 Species at Risk

There are no anticipated impacts to Species at Risk associated with construction related to TPF Facilities known at this time with the exception of Bank Swallow at East Rail Maintenance Facility TPS. The following mitigation measures are propose to prevent Bank Swallows from nesting on site during construction:

- Avoid vertical faced slopes (either 20 degrees more or 20 degrees less than a 90 degree angle).
- Stockpiles and exposed slopes should be covered or netted prior to the start of the breeding bird window (April 1st) and maintained until the end of breeding season (August 31st).

The following recommended general mitigation measures to protect Species at Risk include:

- All workers should be provided with awareness training (e.g. factsheets) that addresses the existence of potential Species at Risk on site, identification of those species and proper actions when an individual is encountered and/or needs to be moved out of harm's way.

- Prior to commencing work, each work site shall be inspected for individual SAR and any individuals found shall be left to move on their own or moved properly out of harm's way in the direction they were heading.
- Report all Species at Risk sightings and encounters to the appropriate MNRF District office using the appropriate reporting form.

There are currently no impacts to Eastern Meadowlark or Bobolink associated with the TPF sites. Crop cover located within the AG (Agricultural) communities at Maple PS should be reassessed prior to the commencement of construction. In the event suitable crop cover is planted supporting Eastern Meadowlark and Bobolink breeding habitat conditions a SAR Bird Survey may be required to determine the presence/absence of Eastern Meadowlark and Bobolink within the AG communities.

10.1.3.1.4 Designated Areas

There are no anticipated impacts to Designated Areas associated with construction related to Tap locations.

The proposed Lincolnville PS is located within the settlement area of Oak Ridges Moraine Plan lands. Traction power facilities (TPFs) are required to be located in close proximity to the existing rail corridors (amongst other technical criteria) as described in Section 3.4 of EPR Volume 1. The Lincolnville PS is located within the settlement area and is not anticipated to effect any features within the ORM.

None of the proposed TPFs are located within protected lands as stipulated by the Greenbelt Plan. As a result, no policies within the Greenbelt Plan are applicable to the construction and placement of these facilities. Effective July 1, 2017, 22 major urban river valleys were added to the Greenbelt Plan and designated as Urban River Valley areas. The Urban River Valley designations serve to expand the Greenbelt and may be the setting for a variety of uses including recreational, cultural, tourism, and infrastructure required to support the surrounding urban areas. Lands within the Urban River Valley designation are subject to the policies of Section 6 of the Greenbelt Plan.

The Don Yard PS is sited in close proximity to the Urban River Valley lands of the Don River. The footprint of the Don Yard PS is not anticipated to encroach on these lands. If an unforeseen circumstance resulted in the need for the Don Yard PS to encroach on lands within the Greenbelt, the following policies as stated in Section 6.2 of the Greenbelt Plan shall apply. This will be further reviewed during detailed design and the Contractor will be required to comply all applicable laws/legislation.

Three TPFs are located within the Lake Simcoe Protection Plan (LSPP lands), including Newmarket SWS, Gilford PS, and Allandale Tap and TPS. Traction power facilities are required to be located in close proximity to the existing rail corridors (amongst other technical criteria) and there are no reasonable alternatives to siting TPFs in the LSPP lands.

For impacts and mitigation related to terrestrial features within Designated Areas associated with construction of the TPF, refer to **Section 10.1.3.1.1.**

10.1.3.2 Net Effects

10.1.3.2.1 Terrestrial

There are no net adverse effects anticipated to result from construction providing identified mitigation measures are adhered to. The potential for adverse effects on migratory birds related to TPF construction activities will be mitigated based on implementation of the above listed mitigation measures. Net adverse effects related to soil erosion and potential for invasive and disturbance-tolerant non-native species to establish will be minimized via implementation of the mitigation measures outlined above. The potential for soil contamination related to accidental spills will be minimized. Potential temporary displacement of wildlife during construction activities will be minimized by ensuring the mitigation measures described above are implemented.

10.1.3.2.2 Aquatic

There are no aquatic features present on the Tap or TPF sites therefore no net effects.

10.1.3.2.3 Species at Risk

There are no anticipated construction impacts for the majority of TPF Facilities with the exception of the East Rail Maintenance Facility Tap/TPS and Don Yard PS. Adherence to mitigation measures during construction will result in no net adverse effects to Bank Swallow at ERMF. There are no anticipated net adverse effects as the Butternuts present on the Don Yard PS site are considered hybrids. However, this will be confirmed following further testing of the trees during Detailed Design.

10.1.3.2.4 Designated Areas

Net effects related to possible construction related impacts will be minimized though the implementation of the mitigation measures identified above, resulting in no adverse effects.

10.2 Preliminary Environmental Site Assessment

10.2.1 Rail Corridors and Taps/Traction Power Facilities

10.2.1.1 Potential Effects and Mitigation Measures

In the event that soil and/or groundwater contamination is identified at the sites and the identified impacts have the potential to effect the electrification-related construction activities, mitigation measures may be recommended. Soil and/or groundwater contamination will be identified as part of the Environmental Site Assessment and/or subsurface investigation activities recommended for the sites.

These measures may include the remediation of the identified impacts and/or the development of a management plan for impacts which are present at the sites. Remediation may include the excavation and off-site disposal of impacted fill and soil, and/or the on-site treatment of impacted soil and groundwater to reduce contaminant concentrations to acceptable levels. The management plan would address contaminants that remain at the site and include measures to minimize human and ecological exposure to these contaminants during and following construction.

Depending on the location, extent and degree of impact and its potential to be disturbed during construction, management measure may include modified construction procedures to minimize the generation of dust, odour and waste materials; and/or implementation of site specific health and safety procedures during construction to minimize worker and public exposure to contaminants. The remedial measures and/or management plan are to be developed following completion of the Environmental Site Assessment and/or subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site.

Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04).

10.2.1.2 Net Effects

Following remediation and the implementation of the management plan, construction related effects would be sufficiently mitigated.

10.3 Cultural Heritage

10.3.1 Overhead Contact System & Bridge Modifications

10.3.1.1 Potential Effects and Mitigation Measures

Short-term disruption to the setting of cultural heritage resources resulting from construction activities though the introduction of physical, visual, noise-related, and atmospheric elements that are not in keeping with the character of the property.

Staging areas should be carefully selected so that they are non-invasive and avoid all heritage attributes. Pre-construction vibration studies may be required to mitigate any potential vibration related impacts. Pre-construction conditions should be re-established through post-construction landscape treatments.

10.3.1.2 Net Effects

Short-term disruption to potential and known cultural heritage resources would be minimized through appropriate mitigation measures. Potential mitigation measures may include the selection of non-invasive staging areas, pre-construction vibration studies (if needed), post-construction landscape treatments, and avoidance of heritage attributes.

10.3.2 Hydro One Tap locations – Power Supply

No cultural heritage resources were identified at Hydro One Tap locations in the study area.

10.3.2.1 Potential Effects and Mitigation Measures

Not applicable.

10.3.2.2 Net Effects

Not applicable.

10.3.3 Traction Power Facilities

10.3.3.1 Potential Effects and Mitigation Measures

Short-term disruption of the heritage attributes associated with cultural heritage resources due to the introduction of physical, visual, audible, and atmospheric elements resulting from construction related activities.

Staging areas should be carefully selected so that they are non-invasive and, if possible, avoid heritage attributes, including views. Pre-construction conditions would be re-established or improved upon through post-construction landscape treatments.

10.3.3.2 Net Effects

Short-term disruption to cultural heritage resources should be minimized through the selection of non-invasive staging areas, post-construction landscape treatments, and avoidance of heritage attributes.

10.4 Archaeology

10.4.1 Discovery of Human Remains

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner.

10.4.2 Engagement with Indigenous Communities

During construction as applicable, Metrolinx will engage with Indigenous communities when assessing the cultural heritage value or interest of specific site types (or presence of human remains) during Stage 3 Archaeological Assessments, in accordance with the document *Engaging Aboriginal Communities in Archaeology: A Draft Technical Bulletin for Consultant Archaeologists*, Section 1.

10.4.3 Stage 2/3 Archaeological Studies

Stage 2 and 3 Archaeological Assessment Studies have been recommended as detailed in Sections 3.4, 4.4, 5.4, 6.4, 7.4, 8.4 above and in the Stage 1 Archaeological Assessment Report contained in **Appendix D**. Based on the results of the Stage 2 studies, Stage 3 and/or 4 Archaeological Assessments will also be carried out as required.

10.5 Land Use/Socio-Economic

10.5.1.1 Potential Effects and Mitigation Measures

Construction activities associated with the Electrification Project are anticipated to be temporary, short-term and localized in nature. There is the potential for minor, temporary effects on land use during construction due to construction staging areas, equipment storage areas, etc. that may be required as well as short term nuisance effects on nearby residents (e.g., dust, noise, and vibration) however, these effects will cease once construction has finished. Refer to Sections 10.7 and 10.8 for a discussion of Air Quality and Noise/Vibration mitigation measures applicable to the construction phase.

Potential effects to sensitive facilities resulting from the construction of the electrification components (e.g., OCS, bridge modifications) may include nuisance effects such as noise, vibration, and temporary traffic effects (e.g., temporary detours); however, these effects will cease once construction has finished.

Mitigation Measures
Proper fencing should be erected around all work areas prior to commencement of any earth moving, clearing or construction activities in order to prevent encroachment on adjacent properties. Fencing should remain for the duration of the work, and be periodically inspected to ensure it is in good repair.

Staging options should be developed to minimize potential effects on local access and travel patterns where possible. A Construction Management Plan and Traffic Management Plan should be developed prior to construction and circulated to local municipalities/road authorities for review and discussion.

Mitigation measures for nuisance effects on sensitive facilities from construction are outlined in the Air Quality Section 10.7 and Noise & Vibration Section 10.8 below.

10.5.1.2 Net Effects

Potential effects on land use and sensitive features will be temporary in nature and will cease once construction is complete.

10.6 Air Quality

10.6.1.1 Potential Effects and Mitigation Measures

In general, construction activities will involve heavy equipment that generates air pollutants and dust. Mitigation of construction emissions is normally achieved through diligent implementation of operating procedures.

The construction activities that are likely to have short term air quality effects are the construction of the TPS facilities, and the installation of OCS support foundation structures. Construction of the TPS facilities will require the sites to be prepared with the use of a bulldozer, excavator, grader, and haul truck. Installing the OCS support foundation structures will require the use of augers and excavators to create holes, the removal of excess material by haul truck, and the filling of holes with cement from a cement truck. All these activities can produce significant dust but it can be minimized by watering or applying other dust suppressants, covering up stockpiles, reducing travel speeds for heavy vehicles, minimizing haul distances, and efficiently staging the activities. By-products of combustion (NOx, CO, VOCs, and PM) from trucks or other construction equipment could also be a concern but the impacts can be minimized by ensuring that any diesel equipment complies with the latest emission standards (Tier 3 or Tier 4).

After the OCS support structures have been installed, the OCS wire will be run the entire length of the corridor with use of a work train consisting of a locomotive and three cars or a rail mounted work unit as well as two large haul trucks. The main emissions from this activity will be the combustion of fuel and the potential for some dust from transportation, however, these emissions are expected to be modest relative to the emissions from other locomotives using the corridor. As a result, this activity is expected to have minimal impact on air quality.

Lastly, safety barriers will also be installed on bridges however the impact on air quality from this activity is expected to be minimal.

10.6.1.2 Net Effects

Temporary effects (dust and emissions) on air quality during construction activities will be minimized by implementing the mitigation measures described above.

10.7 Noise

10.7.1 Potential Effects and Mitigation Measures

During construction activities (OCS installation, construction of bridge modifications, installation of TPFs, etc.) for the GO Rail Network Electrification Project, there will be temporary increases in sound levels above ambient conditions at nearby receptor locations.

Mitigation Measures

- Metrolinx Community Relations staff will communicate construction work and respond to inquiries from residents and businesses as appropriate.
- When possible, construction should be limited to the time periods allowed by the locally applicable by-laws (generally during the daytime hours and during weekdays). Certain type of construction work can only be completed when trains are not in service (i.e., outside of business hours). Although provincial agencies such as Metrolinx and Hydro One are not subject to municipal by-laws, Metrolinx (and it's Contractor) will endeavour to adhere to these local by-laws as a best practice, where practical. As part of the electrification construction activities, nighttime work may be required. Although Metrolinx is exempt from municipal noise control bylaws that place limits on the timing of construction activity, Metrolinx (and their Contractor) will strive to adhere to such bylaws by limiting nighttime noisy activities wherever practical.
- All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. All construction equipment should be verified to comply with MOE NPC-115 guidelines.

- The Contract documents should contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to be in effect.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measured may be required, where reasonably available.
- The separation distance between construction staging areas and nearby sensitive receptors is to be maximized to the extent possible to reduce noise impacts.
- Trains passing construction zones may be required to use bells and/or whistles to warn construction personnel for safety reasons. This should be minimized as much as practical while ensuring the safety of everyone involved.
- Construction equipment has safety features such as backup alarms while backing up (beeping sound). This is for the protection and safety of the workers, and is legally required. Consideration will be given to the use of broadband rather than tonal backup beepers.
- A proactive communications protocol is recommended that would advise residents in advance of nighttime construction or particularly noisy construction at any time.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative and economic feasibility of the various alternatives.

10.7.2 Net Effects

Temporary increases in sound level during construction will be minimized as much as possible through the implementation of the mitigation measures outlined above.

10.8 Vibration

10.8.1 Potential Effects and Mitigation Measures

During construction activities (OCS installation, construction of bridge modifications, installation of TPFs, etc.) for the GO Rail Network Electrification Project, the screening-level vibration calculations indicated that certain types of construction activities may cause noticeable vibration levels up to 45m away. The zone of influence for causing annoyance and building damage are defined by the setback distance where the vibration levels meet the appropriate limits. Vibration levels have the potential to cause annoyance at nearby residences that are within 45 metres of construction activities (i.e., the vibration levels are greater than 0.4 mm/s), but are predicted to remain below 3 mm/s PPV at all locations greater than 15 metres from the construction vibration source. Therefore, the zone of influence for annoyance is 45 metres and the zone of influence for building damage is 15 metres.

Mitigation Measures

- Metrolinx Community Relations staff will communicate construction work and respond to inquiries from residents and businesses;

- A proactive communications protocol is recommended that would advise residents in advance of nighttime construction.
- When possible, construction should be limited to the time periods allowed by the locally applicable bylaws (generally during the daytime hours and during weekdays). Certain type of construction work can only be completed when trains are not in service (i.e., outside of business hours). Although provincial agencies such as Metrolinx and Hydro One are not subject to municipal bylaws, Metrolinx (and it's Contractor) will endeavour to adhere to these local bylaws as a best practice, where practical. As part of the electrification construction activities, nighttime work may be required. Although Metrolinx is exempt from municipal noise control by-laws that place limits on the timing of construction activity, Metrolinx (and their Contractor) will strive to adhere to such bylaws by limiting nighttime noisy activities wherever practical.
- All construction equipment should be verified to comply with MOE NPC-115 guidelines;
- A more detailed vibration assessment of construction be completed when the specifics of construction equipment are finalized prior to the commencement of construction. This assessment should consider minimizing construction vibration levels, while balancing construction schedules and expediting construction activity;
- Pre-condition surveys for properties within the zone of influence of the planned work will be completed to establish the property condition and set a baseline prior to any work beginning.
- Consideration should be given to monitoring of vibration during vibration intensive activities, to confirm that levels do not approach those required for structural damage;
- In the presence of persistent complaints and subject to the results of a field investigation, alternative vibration control measures may be required, where reasonably available. In selecting appropriate vibration control and mitigation measures, consideration should be given to the technical, administrative and economic feasibility of the various alternatives;
- Damages to building may result when these activities occur within 15 metres. It is recommended that a 15 metre setback distance between the construction vibration source and nearby buildings be implemented where possible. If not possible, then the vibration levels associated with the activity should be monitored.

10.8.2 Net Effects

Temporary increases in vibration levels during construction will be minimized as much as possible through the implementation of the mitigation measures outlined above.

10.9 Visual

10.9.1 Overhead Contact System

10.9.1.1 Potential Effects and Mitigation Measures

During construction, there will be impacts created by the removal of vegetation to access construction areas along each side of the rail corridors where support infrastructure is to be installed. The installation of this infrastructure involving construction equipment may be temporarily visually disruptive, especially to homes close the rail right-of-way. If construction is to take place at night, construction lighting will be required. This lighting could impact adjacent homes and should be mitigated by using shielded light fixtures which can direct light to specific task areas and cut off extraneous light that might otherwise shine into people's homes.

10.9.1.2 Net Effects

There will be minor temporary nuisance/visual net effects while construction takes place.

10.9.2 Bridge Modifications

10.9.2.1 Potential Effects and Mitigation Measures

Bridge modifications include the construction of protective panels along bridge parapets and, where vertical clearance is an issue, possible reconstruction of bridges. Visual effects of this construction will include views of construction equipment from surrounding areas and possible extraneous light from night-time construction. This lighting could impact adjacent homes and should be mitigated by using shielded light fixtures which can direct light to specific task areas and cut off extraneous light that might otherwise shine into people's homes.

10.9.2.2 Net Effects

There will be minor temporary nuisance/visual net effects while construction takes place.

10.9.3 Hydro One Tap locations – Power Supply

10.9.3.1 Potential Effects and Mitigation Measures

During construction, these facilities may require special equipment such as tall cranes to install Tap equipment. If such work is done at night, temporary construction lighting may be required. While some of the Tap facilities are in entirely industrial areas, others are close to apartment buildings and homes where construction activities during day or night may have temporary impacts which cannot be fully mitigated. Where feasible, these activities should take place during the day. When carried out at night, construction lighting should be shielded from surrounding residential development.

10.9.3.2 Net Effects

There will be minor temporary nuisance/visual net effects while construction takes place.

10.9.4 Traction Power Facilities

10.9.4.1 Potential Effects and Mitigation Measures

During construction, these facilities may require special equipment such as tall cranes to install TPF equipment. If such work is done at night, temporary construction lighting may be required. While some of the TPFs are in entirely industrial areas, others are close to apartment buildings and homes where construction activities may have temporary impacts which cannot be fully mitigated. Where feasible, these activities should take place during the day. When carried out at night, construction lighting should be shielded from surrounding residential development.

10.9.4.2 Net Effects

There will be minor temporary nuisance/visual net effects while construction takes place.

10.10 Utilities

10.10.1.1 Potential Effects and Mitigation Measures

Potential effects on utilities during project construction activities such as OCS installation, bridge modifications, construction of TPFs/duct banks, etc. generally include damage or disruption of those utilities not relocated out of the way in a timely fashion to allow OCS placement. The mitigation measure for this is to either move the conflicted utility out of the way prior to construction using or to coordinate construction scheduling accordingly with affected utilities.

10.10.1.2 Net Effects

Net adverse effects to utilities during construction will be mitigated.

10.11 EMI & EMF

10.11.1.1 Potential Effects and Mitigation Measures

The primary potential construction phase impact would be unwanted exposure of ELF EMF to construction workers. However based on the EMI/EMF surveys undertaken throughout the study area as part of the TPAP study, ELF EMF levels are substantially below occupational limits for human exposure, based upon the ICNIRP Guidelines.

10.11.1.2 Net Effects

There are no anticipated net adverse effects on construction workers related to EMI/EMF during construction.

10.12 Stormwater Management

10.12.1.1 Potential Effects and Mitigation Measures

There are no anticipated construction related effects on Stormwater management due to installation/construction of the Taps/TPFs.

10.12.1.2 Net Effects

There are no anticipated construction related effects on Stormwater management due to installation/construction of the Taps/TPFs.

10.13 Groundwater and Wells

10.13.1 Overhead Contact System

10.13.1.1 Potential Effects and Mitigation Measures

OCS foundations will be installed at an approximate depth of 5 m. Depending on the type of OCS structure, the foundation sizes will range from 36" (900 mm) diameter to 48" (1200 mm) diameter. Groundwater may be encountered during construction and minor amounts removed along with any excess soil. The potential impact on groundwater due to these activities is expected to be imperceptible; however, this will be further evaluated at the Detailed Design phase along with the requirement to prepare an Erosion and Sediment Control Plan and/or Discharge/Mitigation Plan, obtain a PTTW or register the water taking on the EASR.

The potential for groundwater contamination may result from mobile vehicle re-fueling during construction. This risk will be minimized by implementing the following measures:

- Vehicle refueling should be done in designated areas only, preferably situated on a paved, impermeable surface; and
- An emergency response plan should be prepared by the contractor to establish methods to clean up accidental spills.

10.13.1.2 Net Effects

There are no anticipated net effects related to encountering and/or removing groundwater during construction of the OCS foundations. The potential for groundwater contamination during spillage of fuels during construction will be minimized through implementation of the listed mitigation measures in **Section 10.13.1.1**.

10.13.2 Bridge Modifications

10.13.2.1 Potential Effects and Mitigation Measures

Bridge modifications may involve overhead bridge structures, including installation of OCS attachments, grounding grids/flash plates and bridge protection barriers. In addition, the modifications may include track lowering or other modifications to achieve minimum vertical clearances.

All modifications involving overhead bridge structures will occur above ground on existing bridges and therefore there are no potential adverse impacts to groundwater as a direct result of these modifications. With respect to bridge replacements, a detailed assessment of any potential groundwater/well impacts will be completed as part of a separate EA Addendum process as outlined in the GO Rail Network Electrification EPR.

The potential for groundwater contamination may result from mobile vehicle re-fueling during construction. This risk will be minimized by implementing the following measures:

- Vehicle refueling should be done in designated areas only, preferably situated on a paved, impermeable surface;
- An emergency response plan should be prepared by the contractor to establish methods to clean up accidental spills.

10.13.2.2 Net Effects

There are no potential net effects associated with the installation of OCS attachments, grounding grids/flash plates or protection barriers on existing bridges. The potential for groundwater contamination during spillage of fuels during construction will be minimized through implementation of the mitigation measures listed in **Section 10.13.2.1**. The full extent of potential groundwater effects resulting from bridge replacements or track lowering will be assessed at the Detailed Design phase.

10.13.3 Tap locations – Power Supply

10.13.3.1 Potential Effects and Mitigation Measures

The foundations for Tap structures will require excavation and/or piles with a poured in place concrete foundation. Tap locations typically necessitate four (4) foundations of approximately 1 to 2 metres in diameter and may be installed at depths of 5 to 10 metres. Groundwater may be encountered during construction, and minor amounts removed along with any excess soil. The potential impact on groundwater due to these activities is expected to be imperceptible; however, this will be further evaluated at the Detailed Design phase along with the requirement to prepare an Erosion and Sediment Control Plan and/or a Discharge/Mitigation Plan, obtain a PTTW or register the water taking on the EASR.

Wells may exist at rural Tap locations, which could conflict with construction. Wells that are improperly decommissioned and which are disturbed during construction can cause contaminants to be released into an aquifer. This risk will be minimized by implementing the following measures:

- A well survey to determine if wells are present; and
- If present, decommissioning of wells in accordance with O. Reg. 903.

The potential for groundwater contamination may result from mobile vehicle re-fueling during construction. This risk will be minimized by implementing the following measures:

- Vehicle refueling should be done in designated areas only, preferably situated on a paved, impermeable surface; and
- An emergency response plan should be prepared by the contractor to establish methods to clean up accidental spills.

10.13.3.2 Net Effects

There are no anticipated net effects related to encountering and/or removing groundwater during construction of Tap structure foundations. The potential for groundwater contamination during spillage of fuels during construction will be minimized through implementation of the mitigation measures listed in **Section 10.13.3.1**.

10.13.4 Traction Power Facilities

10.13.4.1 Potential Effects and Mitigation Measures

A grounding grid will be installed at an approximate 1 metre depth beneath Traction Power Station. Similarly, duct banks will be installed from the Traction Power Station to the gantry locations, at an approximate 1 metre depth. During installation of the grounding grid and duct banks, it is not anticipated that groundwater will be encountered given their shallow depth. Therefore, no potential adverse effects on groundwater are anticipated.

Gantry Foundations will be installed at approximate 4 metre depth. Groundwater may be encountered during construction, and minor amounts removed along with any excess soil. The potential impact on groundwater due to these activities is expected to be imperceptible; however, this will be further evaluated at the Detailed Design phase along with the requirement to prepare an Erosion and Sediment Control Plan and/or a Discharge/Mitigation Plan, obtain a PTTW or register the water taking on the Environmental Activity and Sector Registry EASR.

Wells may exist at Allandale TPS and other rural TPS locations, which could conflict with construction. Wells that are improperly decommissioned and which are disturbed during construction can cause contaminants to be released into an aquifer. This risk will be minimized by implementing the following measures:

- A well survey to determine if wells are present; and
- If present, decommissioning of wells in accordance with O. Reg. 903.

The potential for groundwater contamination may result from mobile vehicle re-fueling during construction. This risk will be minimized by implementing the following measures:

- Vehicle refueling should be done in designated areas only, preferably situated on a paved, impermeable surface; and
- An emergency response plan should be prepared by the contractor to establish methods to clean up accidental spills.

10.13.4.2 Net Effects

There are no anticipated net effects related to encountering and/or removing groundwater during construction of the Traction Power Station foundations, grounding grid, duct banks, and gantry foundations. The potential for groundwater contamination during spillage of fuels during construction will be minimized through implementation of the mitigation measures listed in **Section 10.13.4.1**.

11 Summary of Mitigation and Monitoring Commitments

The following tables summarize the key project components/activities, potential environmental effects, and commitments to mitigation measures, monitoring and future work identified through the GO Rail Network Electrification TPAP for each environmental component. For a comprehensive description of all commitments to be fulfilled by Metrolinx and Hydro One during the subsequent Detailed Design, construction and operational phases of the project, refer to Volume 5.

Table 11-1 Summary of Natural Environmental Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
All project components as identified in this EPR/Table 11-1	• Footprint Impacts • Construction • Operations & Maintenance	• Any/all potential natural environmental effects as identified in this EPR/Table 11-1	• Develop and implement an Environmental Management System (EMS) to ensure the environmental protection/mitigation measures identified as part of the GO Rail Network Electrification TPAP are fulfilled and functioning as expected. The overall intent of the EMS will be to integrate environmental management into the daily operations and other quality management systems of the project.	• The need for monitoring will be reviewed as part of the Detailed Design phase in relation to developing the EMS. Any detailed monitoring requirements will be built into the EMS and implemented/complied with during construction and operation of the electrified system.
Hydro One Tap Locations	• Footprint Impacts • Construct tap •	• Footprint Impacts • Vegetation removals • Disturbance to bird nests	• Adherence to the breeding bird timing window for vegetation removals whenever possible • A nesting survey protocol will be developed and implemented prior to any removals required within the breeding bird timing window	• If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Metrolinx will work with authorities as necessary to obtain all applicable permits and approvals
Traction Power Facilities	• Footprint Impacts • Construct TPFs • Grounding and bonding of TPFs • Construct access roads • Install duct banks • Construct 25kV feeder routes	• Footprint Impacts • Vegetation removals • Disturbance to bird nests	• Adherence to relevant guidelines and OPSS for clearing and grubbing (OPSS 201), site preparation and tree protection (OPSS 801) • Tree/vegetation offsetting strategy • Adherence to the breeding bird timing window for vegetation removals whenever possible • A nesting survey protocol will be developed and implemented prior to any removals required within the breeding bird timing window	• Preparation/Implementation of a Vegetation Management Plan which includes a Tree Inventory, Tree Protection Measures, and the Vegetation Compensation Protocol (to be finalized between Metrolinx and Conservation Authorities/Municipalities) during Detailed Design • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Monitor to ensure construction activities do not interfere with any active nests of protected migratory birds, if construction activities are to occur during the breeding bird timing window • Monitor to ensure any construction activities that may result in the destruction of active nests of protected migratory birds are mitigated through discussion between Metrolinx, MNRF and Environment Canada. • Metrolinx will work with authorities as necessary to obtain all applicable permits and approvals
OCS	• Footprint Impacts • Installation of OCS • Construct Modifications to Bridges • Install duct banks • Construct 25kV feeder routes • Tree removals	• Footprint Impacts • Vegetation/Tree removals • Damage to trees not designated to be removed • Disturbance to bird nests • Where potential habitat for SAR bats is identified, tree removals may impact SAR bat habitat	Metrolinx will continue consulting with Conservation Authorities and Municipalities as required to establish a Metrolinx Tree/Vegetation Compensation Protocol for Metrolinx projects. Once the protocol is finalized, it will be included in the Contract documents and implemented during detailed design/construction. The following outlines the draft elements of the Protocol that have been developed to date: ▪ For Municipal/Private Trees: Metrolinx will work with each municipality to develop a municipality-wide streamlined tree permitting /compensation approach for municipal and private trees. The goal will be to reduce administrative permitting burden for trees along long stretches of rail corridor. ▪ For Trees within Metrolinx Owned Property: Metrolinx will develop a methodology to compensate for trees located within Metrolinx's property. This will involve categorizing trees community types/ ecological value and establishing the	• Finalize the Tree/Vegetation Compensation Protocol post TPAP. • Include requirements in the Contract Documents to follow the apllicable provisions of the finalized Tree/Vegetation Compensation Protocol so that it can be followed/implemented during detailed design/construction. • Tree/Vegetation Compensation Protocol • Preparation/Implementation of a Vegetation Management Plan which includes: a Tree Inventory, Tree Protection Measures, and the Vegetation

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			appropriate level of compensation. Metrolinx will be looking to partner with Conservation Authorities and municipalities to develop the final compensation plan. ▪ Conservation Authority Lands: For vegetation removals within conservation authority lands , applicable removal and restoration requirements will be followed where applicable/required. ▪ Federal Lands: For vegetation removals within Federally-owned lands where required, applicable removal and restoration requirements will be followed. ▪ Tree End-Use: Metrolinx will develop options for the end use of trees removed from Metrolinx property e.g., reuse/recycling options. • Preparation/Implementation of a Vegetation Management Plan which includes a Tree Inventory, Tree Protection Measures, and a Vegetation Compensation Protocol during Detail Design • Adherence to relevant guidelines and OPSS for clearing and grubbing (OPSS 201), site preparation and tree protection (OPSS 801) • Adherence to the breeding bird timing window for vegetation removals whenever possible • No vegetation removals, grading or construction with heavy equipment should occur within 5m of the bluff during Bank Swallow breeding period (May 1st to July 31st) • A nesting survey protocol will be developed and implemented prior to any removals required within the breeding bird timing window	Compensation Protocol(to be finalized as part of the *Metrolinx Vegetation Compensation Protocol*) during Detailed Design • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Further bat inventories and tree cavity assessments may be required in conjunction with detailed tree inventories during Detailed Design • As part of Detailed Design and permitting, the MNRF Bat Protocol will be discussed with MNRF in relation to applicability and preferred approach for any required permits/approval as it relates to the Electrification Project works. Any required MNRF permits/approval will be obtained prior to project implementation. • Further consultation with the MNRF is required regarding impacts within Redside Dace regulated habitat. Approvals under the Environmental Site Assessment may be required at some sites • Further consultation with the MNRF is required regarding potential additional investigations to determine impacts to SAR bats • Further consultation with Parks Canada for portions of the Stouffville and Lakeshore East Rail Corridors within RUNP is required with respect to SAR. Approvals under SARA may be required. • Metrolinx will work with authorities as necessary to obtain all applicable permits and approvals • Monitor installation of silt fencing and/or tree protection fencing/barriers to ensure it is constructed properly and thereafter monitor fencing to ensure it is properly maintained • Monitor installation of compensation plantings to ensure they are installed properly
Operation/maintenance of OCS	• Operation of OCS • Tree pruning/maintenance	• Vegetation removals • Damage to adjacent to the removal areas • Disturbance to migratory bird nests	• Adherence to relevant guidelines and OPSS for clearing and grubbing (OPSS 201), site preparation and tree protection (OPSS 801) • All pruning will be done by, or supervised by, a Certified Arborist • Adherence to the breeding bird timing window for vegetation removals whenever possible	• Consultation with property owners for tree removals on private property • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Monitor to ensure construction activities do not interfere with any active nests of protected migratory birds, if construction activities are to occur during the breeding bird timing window

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
				• Monitor to ensure any construction activities that may result in the destruction of active nests of protected migratory birds are mitigated through discussion between Metrolinx, MNRF and Environment Canada.
Construction activities with potential to cause: • **Sedimentation and erosion** • **Generation of dust** • **Wildlife harassment** • **Adverse effects on Species at Risk** • **Spill and leak precautions and clean-up measures** • **Invasive Species effects**	• Installation of OCS • Construct Modifications to Bridges • Construct Taps/TPFs • Grounding and bonding of TPFs • Construct access roads • Install duct banks • Construct 25kV feeder routes	• Sedimentation and erosion • Generation of dust • Wildlife harassment • Potential adverse effects on Species at Risk • Spills • Invasive Species effects	<u>Sediment and Erosion Control Measures:</u> • Adhere to relevant guidelines and Ontario Provincial Standard Specifications (OPSS) relating to proper sediment and erosion controls including consideration of TRCA[38] Erosion and Sediment Control Guidelines to Urban Construction), Ontario Provincial Standards Specifications (OPSS) –OPSS 805 (Erosion and Sediment Control Measures); • Where temporary storage of the soil is required, the soil will be stored immediately adjacent to the excavation site; • Topsoil and subsoil will not be mixed nor will topsoil be contaminated with any other material; • Silt fencing will be installed around all designated work areas to prevent any offsite transport of sediment; • Exposed soils will be hydroseeded within 45 days, both for temporary work areas and final grades; • Existing vegetation on embankments shall be maintained as long as possible and exposed areas shall be stabilized as soon as possible by seeding and mulching; • Appropriate lengths of silt fencing will be installed along the perimeter of minimized, designated work areas to limit construction impacts; • Design and implement erosion and sediment controls to contain/isolate the construction zones, manage site drainage/runoff and prevent erosion of exposed soils and migration of sediment to any watercourses, and ensure sites are stabilized prior to removal following construction; • Stockpiles to be located at a minimum of 30m from watercourses and isolated to ensure material will not enter any watercourse or ditchline. All stockpiles to be removed upon completion of the works and the site restored, as appropriate; and • Limit access to waterbody and banks to protect riparian vegetation and minimize bank erosion. <u>Dust control measures</u> • Dust will be controlled as much as possible by watering of appropriate surfaces. The contractor shall adhere to relevant guidelines and Ontario Provincial Standard Specifications, including OPSS 506 (Dust Control) • Covering stockpiles with a tarp or seeded • Covering trucks hauling excess material • Reducing travel speeds • Minimizing haul distances • Efficiently staging activities • Seeding/re-vegetating exposed soils	• An Environmental Inspector will be present during construction to ensure mitigation measures are implemented and functioning as predicted • Monitor installation of silt fencing and/or tree protection fencing/barriers to ensure it is constructed properly and thereafter monitor fencing to ensure it is properly maintained • Monitor installation of compensation plantings to ensure they are installed properly

[38] *As a Crown Agency, GO/Metrolinx is exempt from the Conservation Authorities Act and as such does not have a requirement to apply for and obtain permits from conservation authorities. Wherever possible, GO/Metrolinx will engage the conservation authority on specific projects (or components thereof) and will adhere to requirements when and where possible.*

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			• Sweeping and/or water flushing the entrances to the construction zones • Installing silt fences around site perimeter to prevent dust migration • Application of non-chloride dust suppressants as referenced in Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities Wildlife Harassment Precautions • All construction equipment and vehicles will yield the right-of-way to wildlife, if it is safe to do so; • Advise workers to perform visual survey of machinery and work area prior to commencing work since wildlife may be found basking or hiding on or under equipment, rocks, debris piles etc.; • Do not allow construction debris to accumulate on-site and on the soils surface but regularly clean up the site to reduce the possibility of wildlife using debris piles for shelter; • Clean up all litter daily and provide waste disposal containers so wildlife does not ingest indigestible materials or become entangled in debris; • Any wildlife incidentally encountered during construction will be protected and will not be knowingly harmed; and • Advise workers to perform a visual survey of machinery and work area prior to commencing work since wildlife may be found hiding in or under equipment, rocks, debris piles, etc. and any individuals found shall be left to move on their own or moved properly out of harm's way in the direction they were heading. General Species at Risk Protection Measures • All workers should be provided with awareness training (e.g. factsheets) that addresses the existence of potential Species at Risk on site, identification of those species and proper actions when an individual is encountered and/or needs to be moved out of harm's way; • Prior to commencing work, each work site shall be inspected for individual SAR and any individuals found shall be left to move on their own or moved properly out of harm's way in the direction they were heading; • Report all Species at Risk sightings and encounters to the appropriate MNRF District office using the appropriate reporting form; and • If a nesting snake or turtle is found the MNRF shall be notified immediately and a ten (10) metre buffer zone shall be flagged around the site and that area protected from harm during the nesting season. Spill and leak precautions and clean-up measures • An Emergency Preparedness and Response Plan will govern spill response; • Ensure spill kits are on-site at all times for implementation in the event of an accidental spill during construction; • Operate, store and maintain all equipment and associated materials in a manner that prevents the entry of any deleterious substance to the waterbody; • All mobile equipment will have drip pans installed and refueling will take place no closer than 30m to any study area watercourses or ditchlines in order to prevent water contamination due to accidental fuel spills;	

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			• Fuel transport should be conducted in compliance with the Transportation of Dangerous Goods Act; • All necessary precautions shall be implanted to prevent the spillage and release of hazardous materials to the environment; • All leaks or spills to be immediately reported to the Ministry of the Environment and Climate Change (MOECC), Spills Action Centre at 1-800-268-6060; • Use shrouding or debris platforms to trap and prevent concrete and other bridge materials from entering the watercourse during construction; • The TPS facilities will be fully equipped with spill containment and oil/water separation facilities. In the event on an equipment failure, oily water will not escape from the site; • Spill cleanup and response equipment will be located on site; • Spill decks should be used for transferring products to smaller containers; • Fire extinguishers should be located near petroleum, oil and lubricants storage areas; and • Routine inspection of the facilities, including transformer oil should be carried out. Invasive Species Management • Where possible, excavated soils should be stored for a period of less than 45 days; • Where excavated soils must be stored for a period longer than 45 days, they should be covered or seeded with a cover crop, such as Annual Oats or Canada Wild Rye; • Once soils are replaced, they should be re-seeded with a native seed mix suited to the site conditions; • Equipment should be cleaned between sites to prevent the spread of invasive species; and • Vegetation removals of Ash trees must be carried out in a manner in compliant with the Ministerial Order issued by the Federal Government which identifies prohibitions and restrictions of movement on trees, leaves, logs, lumber, wood/wood chips from all ash species. Unless authorized by a Movement Certificate issued by the CFIA, moving these products out of the Regulated Area is prohibited. This is necessary to prevent the spread of the Emerald Ash Borer (EAB) to un-infested areas in other parts of Ontario and Canada. The Contractor must dispose of all wood at a registered Waste Facility. In-water works • In the event the need for in-water works is identified post EA the following mitigation measures shall include but not exclusive to: ▪ A qualified Fisheries Specialist shall undertake an assessment to determine measures to avoid causing harm to fish and fish habitat, including aquatic species at risk and determine the need for DFO review; ▪ All in-water works shall comply with the timing windows identified by MNRF; and ▪ Compliance with OPSS 180 (Management of Excess Materials) and OPSS 182 (Environmental Protection for Construction in Waterbodies and on Waterbody Banks) during construction.	
Installation of OCS	• Excavate soil • Install OCS foundations at an approximate depth of 5m	• Vegetation removals • Damage to trees adjacent to the removal areas	• Protection measures for all trees not designated for removal including: ▪ Adhere to relevant guidelines and Ontario Provincial Standard Specifications (OPSS) for clearing and grubbing (OPSS 201), site preparation and tree protection (OPSS 801);	• An Environmental Inspector will be present during construction to ensure mitigation measures are implemented and functioning as predicted

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
	• Erect poles • Install wiring • Tree removals	• Disturbance to migratory bird nests • Sedimentation and erosion • Temporary displacement of wildlife during construction • Introduction of invasive species • Equipment leaks or accidental spills • Disturbance to Bank Swallow colony located within LSE-5 (station#s)	▪ Existing vegetation will be protected by erecting and maintaining a temporary fence for tree protection, pruning interfering branches and treating with approved dressing, treating any damaged roots >25 mm in diameter with approved tree paint; ▪ Do not damage the root system, trunk or branches of any tree; if any roots are encountered during excavation, they shall be cut off cleanly; ▪ All exposed roots of trees to be retained shall be covered in a minimum of 5 cm of firm moist soil within 24 hours of exposure; ▪ Any exhaust fumes from all equipment shall not be directed towards any tree's canopy ▪ Branches that are likely to be damaged by construction equipment, should be removed before construction so that bark is not torn accidentally and wounds are not more extensive than absolutely necessary; • Adherence to the breeding bird timing window for vegetation removals whenever possible • Sediment and erosion control measures • Dust control measures • Wildlife harassment precautions • General Species at Risk protection measures • Spill and leak precautions and clean-up measures • No vegetation removals, grading or construction with heavy equipment should occur within 50m of the bluff during Bank Swallow breeding period (May 1st to July 31st)	• Consultation with property owners for tree removals on private property • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Monitor to ensure construction activities do not interfere with any active nests of protected migratory birds, if construction activities are to occur during the breeding bird timing window • Monitor to ensure any construction activities that may result in the destruction of active nests of protected migratory birds are mitigated through discussion between Metrolinx, MNRF and Environment Canada. • Further consultation with MNRF regarding Redside Dace and Bats to determine requirements • Further consultation with Parks Canada with respect to portions of the Stouffville and Lakeshore East Rail Corridors within RUNP is required with respect to SAR. Approvals under SARA may be required. • An Environmental Inspector will be present during construction • Metrolinx will work with authorities as necessary to obtain all applicable permits and approvals • Monitor installation of silt fencing and/or tree protection fencing/barriers to ensure it is constructed properly and thereafter monitor fencing to ensure it is properly maintained • Monitor installation of compensation plantings to ensure they are installed properly • Adherence to applicable legislative requirements including but not limited to: Forestry Act, Migratory Bird Convention Act, Species at Risk Act, Fisheries Act, Invasive Species Act, Transportation of Dangerous Goods Act, Endangered Species Act
Construct Modifications to Bridges	• Install bridge barriers • Install OCS attachments • Install flash plates • Raise bridge • Lower tracks • Replace bridges • Replace pedestrian bridges	• Disturbance to bird nests, including 1 Barn Swallow nest on Bronte Creek bridge • Sediment and erosion • Equipment leaks or accidental spills • Concrete debris • While no direct impacts to watercourses are anticipated, bridge works are anticipated within Redside Dace regulated habitat at Fourteen	• Inspect bridges for nests prior to commencing work. • If active nests are removed prior to the breeding bird window, the bridge will be netted or tarped and the bridge will be monitored daily for any new nests. • Where Barn Swallow nests are found on bridges, consultation with the MNRF will be required to determine appropriate mitigation for this species. • Sediment and erosion control measures • Spill and leak precautions and clean-up measures • Use shrouding or debris platforms to trap and prevent concrete and other bridge materials from entering the watercourse during construction	• An Environmental Inspector will be present during construction to ensure mitigation measures are implemented and functioning as predicted • Survey all bridges requiring modifications for nests of migratory birds and SAR • Further consultation with the MNRF is required during Detailed Design regarding works proposed within Redside Dace regulated habitat to determine if any permitting or approval requirements under the Endangered Species Act (ESA, 2007) will be required.

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
		Mile Creek, Little Rouge Creek, Robinson Creek, Brice Creek, and Rouge River		• The detailed assessment of potential effects relating to Dunn, Dufferin, Jameson, and Dowling bridge replacements will be addressed in further detail as part of the future TPAP Addendum.
Construction of Taps, Traction Power Facilities & Gantries	• Auger hole • Pour foundation • Attach structure including hardware such as insulators • String conductor • Grade and seed • Construct gantries • Site clearing • Install building foundation • Install prepackaged equipment • Construct building • Grounding and bonding	• Vegetation removals • Disturbance to bird nests • Sediment and erosion • Temporary displacement of wildlife during construction • Introduction of invasive species • Equipment leaks or accidental spills	• Adherence to relevant guidelines and OPSS for clearing and grubbing, site preparation and tree protection • Adherence to the breeding bird timing window for vegetation removals whenever possible • Sediment and erosion control measures • Wildlife harassment precautions • General Species at Risk protection measures • Spill and leak precautions and clean-up measures	• An Environmental Inspector will be present during construction to ensure mitigation measures are implemented and functioning as predicted • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Monitor to ensure construction activities do not interfere with any active nests of protected migratory birds, if construction activities are to occur during the breeding bird timing window • Monitor to ensure any construction activities that may result in the destruction of active nests of protected migratory birds are mitigated through discussion between Metrolinx, MNRF and Environment Canada. • Further consultation with MNRF regarding Eastern Meadowlark and Bobolink (if required) to determine requirements
Grounding and bonding of TPFs	• Excavate the soil to the required depth (approximately 1m) • Install grounding mats, conductors and rods, as per design • Connect the grounding system internally and with adjacent existing grounding system, where required • Backfill the grounding system, as per design • Install the junction boxes and connect grounding conductors, where required	• Vegetation removals • Disturbance to bird nests • Sedimentation and erosion • Temporary displacement of wildlife during construction • Introduction of invasive species • Equipment leaks or accidental spills	• Adherence to relevant guidelines and OPSS for clearing and grubbing, site preparation and tree protection • Adherence to the breeding bird timing window for vegetation removals whenever possible • Sediment and erosion control measures • Wildlife harassment precautions • General Species at Risk protection measures • Spill and leak precautions and clean-up measures	• An Environmental Inspector will be present during construction to ensure mitigation measures are implemented and functioning as predicted • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Monitor to ensure construction activities do not interfere with any active nests of protected migratory birds, if construction activities are to occur during the breeding bird timing window • Monitor to ensure any construction activities that may result in the destruction of active nests of protected migratory birds are mitigated through discussion between Metrolinx, MNRF and Environment Canada. • Metrolinx will work with authorities as necessary to obtain all applicable permits and approvals • Monitor installation of silt fencing and/or tree protection fencing/barriers to ensure it is constructed properly and thereafter monitor fencing to ensure it is properly maintained • Monitor installation of compensation plantings to ensure they are installed properly

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
Construction of access roads for traction power facilities	• Site clearing	• Vegetation removals • Disturbance to migratory bird nests • Sedimentation and erosion • Temporary displacement of wildlife during construction • Introduction of invasive species • Equipment leaks or accidental spills	• Adherence to relevant guidelines and OPSS for clearing and grubbing, site preparation and tree protection • Adherence to the breeding bird timing window for vegetation removals whenever possible • Sediment and erosion control measures • Wildlife harassment precautions • General Species at Risk protection measures • Spill and leak precautions and clean-up measures	• An Environmental Inspector will be present during construction to ensure mitigation measures are implemented and functioning as predicted • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Monitor to ensure construction activities do not interfere with any active nests of protected migratory birds, if construction activities are to occur during the breeding bird timing window • Monitor to ensure any construction activities that may result in the destruction of active nests of protected migratory birds are mitigated through discussion between Metrolinx, MNRF and Environment Canada. • Metrolinx will work with authorities as necessary to obtain all applicable permits and approvals • Monitor installation of silt fencing and/or tree protection fencing/barriers to ensure it is constructed properly and thereafter monitor fencing to ensure it is properly maintained • Monitor installation of compensation plantings to ensure they are installed properly
Installation/construction of underground duct banks	• Excavate soil via open cut method to install duct banks • Install underground cables (feeders) within duct banks • Connect feeders to main gantry • Backfill/restore road(s), as per design	• Vegetation removals • Disturbance to migratory bird nests • Sedimentation and erosion • Temporary displacement of wildlife during construction • Impacts to Species at Risk and/or Species at Risk habitat • Introduction of invasive species • Equipment leaks or accidental spills	• Adherence to relevant guidelines and OPSS for clearing and grubbing, site preparation and tree protection • Adherence to the breeding bird timing window for vegetation removals whenever possible • Sediment and erosion control measures • Wildlife harassment precautions • General Species at Risk protection measures • Spill and leak precautions and clean-up measures • Targeted measures for Bank Swallow at East Rail Maintenance Facility TPS	• An Environmental Inspector will be present during construction to ensure mitigation measures are implemented and functioning as predicted • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Monitor to ensure construction activities do not interfere with any active nests of protected migratory birds, if construction activities are to occur during the breeding bird timing window • Monitor to ensure any construction activities that may result in the destruction of active nests of protected migratory birds are mitigated through discussion between Metrolinx, MNRF and Environment Canada. • Metrolinx will work with authorities as necessary to obtain all applicable permits and approvals • Monitor installation of silt fencing and/or tree protection fencing/barriers to ensure it is constructed properly and thereafter monitor fencing to ensure it is properly maintained

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
				• Monitor installation of compensation plantings to ensure they are installed properly
Installation/construction of 25kV aerial feeder lines	• Install pole foundations • Install poles • Install wiring	• Vegetation removals • Disturbance to bird nests	• Adherence to relevant guidelines and OPSS for clearing and grubbing, site preparation and tree protection • Adherence to the breeding bird timing window for vegetation removals whenever possible • Sediment and erosion control measures • Wildlife harassment precautions • General Species at Risk protection measures • Spill and leak precautions and clean-up measures	• An Environmental Inspector will be present during construction to ensure mitigation measures are implemented and functioning as predicted • If vegetation removals are required within the timing window, a nest survey will be conducted prior to removal • Monitor to ensure construction activities do not interfere with any active nests of protected migratory birds, if construction activities are to occur during the breeding bird timing window • Monitor to ensure any construction activities that may result in the destruction of active nests of protected migratory birds are mitigated through discussion between Metrolinx, MNRF and Environment Canada. • Metrolinx will work with authorities as necessary to obtain all applicable permits and approvals • Monitor installation of silt fencing and/or tree protection fencing/barriers to ensure it is constructed properly and thereafter monitor fencing to ensure it is properly maintained • Monitor installation of compensation plantings to ensure they are installed properly

Table 11-2 Summary of Preliminary Environmental Site Assessment Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Meaures/Commitments	Monitoring Commitments
Hydro One Tap Locations	• Installation of infrastructure on potentially contaminated lands	• Potential to encounter contaminated soils and/or groundwater at Tap locations	• Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).	• Excess soil and groundwater generated at Tap sites will be analyzed for contaminants and disposed of in accordance with applicable legislation (i.e. Ontario Environmental Protection Act Regulation 347).
Traction Power Facilities	• Installation of infrastructure on potentially contaminated lands	• Potential to encounter contaminated soils and/or groundwater at Tap locations	• Prior to project construction/implementation, complete the recommended Environmental Site Assessment and/or subsurface investigation activities to assess for potential soil and/or groundwater contamination at the sites in accordance with this EPR and in Appendix B – Preliminary Environmental Site Assessment Reports	• Prior to project construction/implementation, complete the recommended Environmental Site Assessment and/or subsurface investigation activities to assess for potential soil and/or groundwater contamination at the sites in accordance with this EPR and in Appendix B – Preliminary Environmental Site Assessment Reports
OCS along corridor / 25kV Feeder Routes	• Installation of infrastructure on potentially contaminated lands	• Potential to encounter contaminated soils and/or groundwater at Tap locations	• Prior to project construction/implementation, complete the recommended Environmental Site Assessment and/or subsurface investigation activities to assess for potential soil and/or groundwater contamination at the sites in accordance with this EPR and in Appendix B – Preliminary Environmental Site Assessment Reports	• Prior to project construction/implementation, complete the recommended Environmental Site Assessment and/or subsurface investigation activities to assess for potential soil and/or groundwater contamination at the sites in accordance with this EPR and in Appendix B – Preliminary Environmental Site Assessment Reports
Installation of OCS	• Subsurface work, such as excavation, during construction	• Disturbance of contaminated soils and/or groundwater during construction and/or excavation activities; • Improperly handled excess contaminated soil and/or groundwater pumped during dewatering (if any) has the potential to contaminate property and surface water. Respectively; and, • Without appropriate preventative measures, workers can be exposed to unacceptable levels of contamination during construction.	• Remediation and/or implement management measures to address contaminated soils and/or groundwater during construction and long term O&M. Management measures will be carried out in accordance with applicable environmental legislation. • If dewatering is determined to be required during construction, an Erosion and Sediment Control Plan and Discharge/Mitigation Plan (if applicable) will be prepared and implemented for work near surface water features before construction starts. • Implement a site specific health and safety plan for construction workers based on the findings of the subsurface investigations. • Develop and implement an Excess Materials Management Plan based on the findings of the limited subsurface investigations. • Implement and follow dust control measures during construction activities. • Implement spill management measures	• Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site; • Implement mitigation measures and Excess Materials Management Plan if contamination is identified (based on the results of the subsurface investigations). This plan should be created prior to construction for managing soil materials onsite (including excavation, location of stockpiles, reuse, and offsite disposal). This soil and groundwater management plan shall be prepared in accordance with Management of Excess Soil - A Guide for Best Management Practices (MOECC 2014), and industry best practices.
Construction Modifications to Bridges	• Lower tracks (within Metrolinx rail Right-of-Way) • Replace bridges • Replace pedestrian bridges	• Potential effects on soil/groundwater if subsurface work is required for lowering tracks • Improperly handled excess contaminated soil and/or groundwater pumped during dewatering (if any) has the potential to contaminate property and surface water. Respectively; and,	• Remediation and/or implement management measures to address contaminated soils and/or groundwater during construction and long term O&M. Management measures will be carried out in accordance with applicable environmental legislation. • If dewatering is determined to be required during construction, an Erosion and Sediment Control Plan and Discharge/Mitigation Plan (if applicable) will be prepared and implemented for work near surface water features before construction starts.	• Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site; • Implement mitigation measures and Excess Materials Management Plan if contamination is identified (based on the results of the subsurface investigations). This plan should be created prior to construction for managing

Project Component	Project Activities	Potential Effect	Mitigation Meaures/Commitments	Monitoring Commitments
		• Without appropriate preventative measures, workers can be exposed to unacceptable levels of contamination during construction.	• Implement a site specific health and safety plan for construction workers based on the findings of the subsurface investigations. • Develop and implement an Excess Materials Management Plan based on the findings of the limited subsurface investigations. • Implement and follow dust control measures during construction activities. • Implement spill management measures	soil materials onsite (including excavation, location of stockpiles, reuse, and offsite disposal). This soil and groundwater management plan shall be prepared in accordance with Management of Excess Soil - A Guide for Best Management Practices (MOECC 2014), and industry best practices. • The detailed assessment of potential effects relating to Dunn, Dufferin, Jameson, and Dowling bridge replacements will be addressed in further detail as part of the future TPAP Addendum.
Operation/maintenance of OCS	• Operation of OCS • Tree pruning/maintenance	• Not applicable as no subsurface work is anticipated in association with the operation/maintenance of the OCS	• Not Applicable	• Not Applicable
Construction of Taps, Traction Power Facilities & Gantries	• Subsurface work, such as excavation, during construction • Auger hole • Pour foundation • Attach structure including hardware such as insulators • String conductor • Grade and seed • Construct gantries • Site clearing • Install building foundation • Install prepackaged equipment • Construct building	• Construction effects possible if excavation is required in an area of subsurface contamination • Disturbance of contaminated soils and/or groundwater during construction and/or excavation activities; • Improperly handled excess contaminated soil and/or groundwater pumped during dewatering (if any) has the potential to contaminate property and surface water. • Without appropriate preventative measures, workers can be exposed to unacceptable levels of contamination during construction	• Remediation and/or implement management measures to address contaminated soils and/or groundwater during construction and long term O&M. Management measures will be carried out in accordance with applicable environmental legislation. • Implement a site specific health and safety plan for construction workers based on the findings of the subsurface investigations. • If dewatering is determined to be required during construction, an Erosion and Sediment Control Plan and Discharge/Mitigation Plan (if applicable) will be prepared and implemented for work near surface water features before construction starts. • Develop and implement an Excess Materials Management Plan based on the findings of the limited subsurface investigations. • Implement and follow dust control measures during construction activities. • Implement spill management measures	• Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations. Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site; • Implement mitigation measures and Excess Materials Management Plan if contamination is identified (based on the results of the subsurface investigations). This plan should be created prior to construction for managing soil materials onsite (including excavation, location of stockpiles, reuse, and offsite disposal). This soil and groundwater management plan shall be prepared in accordance with Management of Excess Soil - A Guide for Best Management Practices (MOECC 2014), and industry best practices.
Grounding and bonding of TPFs	• Excavate the soil to the required depth (approximately 1m) • Install grounding mats, conductors and rods, as per design • Connect the grounding system internally and with adjacent existing grounding system, where required • Backfill the grounding system, as per design • Install the junction boxes and connect grounding conductors, where required •	• Construction effects possible if excavation is required in an area of subsurface contamination • Disturbance of contaminated soils and/or groundwater during construction and/or excavation activities; • Improperly handled excess contaminated soil and/or groundwater pumped during dewatering (if any) has the potential to contaminate property and surface water. • Without appropriate preventative measures, workers can be exposed	• Remediation and/or implement management measures to address contaminated soils and/or groundwater during construction and long term O&M. Management measures will be carried out in accordance with applicable environmental legislation. • If dewatering is determined to be required during construction, an Erosion and Sediment Control Plan and Discharge/Mitigation Plan (if applicable) will be prepared and implemented for work near surface water features before construction starts. • Implement a site specific health and safety plan for construction workers based on the findings of the subsurface investigations. • Develop and implement an Excess Materials Management Plan based on the findings of the limited subsurface investigations. • Implement and follow dust control measures during construction activities. • Implement spill management measures	• Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site; • Implement mitigation measures and Excess Materials Management Plan if contamination is identified (based on the results of the subsurface investigations). This plan should be created prior to construction for managing soil materials onsite (including excavation, location of stockpiles, reuse, and offsite disposal). This soil and groundwater management plan shall be prepared in accordance with Management of Excess Soil - A Guide for Best Management Practices (MOECC 2014), and industry best practices.

Project Component	Project Activities	Potential Effect	Mitigation Meaures/Commitments	Monitoring Commitments
		to unacceptable levels of contamination during construction		
Construction of access roads for traction power facilities	• Site clearing • Possible excavation and/or grading during construction of access roadways	• Construction effects possible if excavation is required in an area of subsurface contamination • Disturbance of contaminated soils and/or groundwater during construction and/or excavation activities; • Improperly handled excess contaminated soil and/or groundwater pumped during dewatering (if any) has the potential to contaminate property and surface water. • Without appropriate preventative measures, workers can be exposed to unacceptable levels of contamination during construction	• Remediation and/or implement management measures to address contaminated soils and/or groundwater during construction and long term O&M. Management measures will be carried out in accordance with applicable environmental legislation. • If dewatering is determined to be required during construction, an Erosion and Sediment Control Plan and Discharge/Mitigation Plan (if applicable) will be prepared and implemented for work near surface water features before construction starts. • Implement a site specific health and safety plan for construction workers based on the findings of the subsurface investigations. • Develop and implement an Excess Materials Management Plan based on the findings of the limited subsurface investigations. • Implement and follow dust control measures during construction activities. • Implement spill management measures	• Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site; • Implement mitigation measures and Excess Materials Management Plan if contamination is identified (based on the results of the subsurface investigations). This plan should be created prior to construction for managing soil materials onsite (including excavation, location of stockpiles, reuse, and offsite disposal). This soil and groundwater management plan shall be prepared in accordance with Management of Excess Soil - A Guide for Best Management Practices (MOECC 2014), and industry best practices.
Installation/construction of underground duct banks	• Excavate soil via open cut method to install duct banks • Install underground cables (feeders) within duct banks • Connect feeders to main gantry • Backfill/restore road(s), as per design	• Construction effects possible if excavation is required in an area of subsurface contamination • Disturbance of contaminated soils and/or groundwater during construction and/or excavation activities; • Improperly handled excess contaminated soil and/or groundwater pumped during dewatering (if any) has the potential to contaminate property and surface water. • Without appropriate preventative measures, workers can be exposed to unacceptable levels of contamination during construction	• Remediation and/or implement management measures to address contaminated soils and/or groundwater during construction and long term O&M. Management measures will be carried out in accordance with applicable environmental legislation. • If dewatering is determined to be required during construction, an Erosion and Sediment Control Plan and Discharge/Mitigation Plan (if applicable) will be prepared and implemented for work near surface water features before construction starts. • Implement a site specific health and safety plan for construction workers based on the findings of the subsurface investigations. • Develop and implement an Excess Materials Management Plan based on the findings of the limited subsurface investigations. • Implement and follow dust control measures during construction activities. • Implement spill management measures	• Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site; • Implement mitigation measures and Excess Materials Management Plan if contamination is identified (based on the results of the subsurface investigations). This plan should be created prior to construction for managing soil materials onsite (including excavation, location of stockpiles, reuse, and offsite disposal). This soil and groundwater management plan shall be prepared in accordance with Management of Excess Soil - A Guide for Best Management Practices (MOECC 2014), and industry best practices.
Installation/construction of 25kV aerial feeder lines	• Install pole foundations • Install poles • Install wiring	• Construction effects possible if excavation is required in an area of subsurface contamination • Disturbance of contaminated soils and/or groundwater during construction and/or excavation activities; • Improperly handled excess contaminated soil and/or	• Remediation and/or implement management measures to address contaminated soils and/or groundwater during construction and long term O&M. Management measures will be carried out in accordance with applicable environmental legislation. • If dewatering is determined to be required during construction, an Erosion and Sediment Control Plan and Discharge/Mitigation Plan (if applicable) will be prepared and implemented for work near surface water features before construction starts.	• Where identified, contaminated soils and groundwater will be managed in accordance with applicable environmental legislation (i.e.; Ontario Environmental Protection Act, Ontario Regulation 347, Transportation of Dangerous Goods Act and Regulations, and Ontario Regulation 153/04). Remedial measures are to be developed following completion of the Environmental Site Assessment and subsurface investigation activities and are to be based on the specific construction and electrification infrastructure proposed for each site;

Project Component	Project Activities	Potential Effect	Mitigation Meaures/Commitments	Monitoring Commitments
		groundwater pumped during dewatering (if any) has the potential to contaminate property and surface water. • Without appropriate preventative measures, workers can be exposed to unacceptable levels of contamination during construction	• Implement a site specific health and safety plan for construction workers based on the findings of the subsurface investigations. • Develop and implement an Excess Materials Management Plan based on the findings of the limited subsurface investigations. • Implement and follow dust control measures during construction activities. • Implement spill management measures	• Implement mitigation measures and Excess Materials Management Plan if contamination is identified (based on the results of the subsurface investigations). This plan should be created prior to construction for managing soil materials onsite (including excavation, location of stockpiles, reuse, and offsite disposal). This soil and groundwater management plan shall be prepared in accordance with Management of Excess Soil - A Guide for Best Management Practices (MOECC 2014), and industry best practices.

Table 11-3 Summary of Cultural Heritage Mitigation and Monitoring Commitments

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
Union Station Rail Corridor	USRC-1-1 PHPPS	Union Station	Installation of OCS attachments	Alteration	HIA completed as part of the Electrification TPAP. Results and recommendations of the HIA will be adhered to during detailed design. Refer to EPR Volume 3, Section 3.3.1.1.1 and the HIA provided in Appendix M, Sections 5.2 and 5.3 for a complete summarization of mitigation/monitoring commitments.	None	N/A[39]	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	USRC-1-2 PHPPS	Scott Street Interlocking Tower	None	None	N/A	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	USRC-1-3 PHPPS	Cherry Street Interlocking Tower	None	None	N/A	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	USRC-1-4 PHP	Lower Jarvis Subway	None	None	N/A	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.

[39] N/A: Not Applicable

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
	USRC-1-5 PHP	Lower Sherbourne Subway	None	None	N/A	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	USRC-1-6 PHP	Parliament Street Subway	None	None	N/A	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	USRC-1-7 PHP	Cherry Street Subway	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	USRC-1-8 Part V OHA	Union Station Heritage Conservation District	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan.	Potential Alteration	Consultation with heritage staff at the City of Toronto	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	USRC-1-9 Part IV OHA	Postal Delivery Building	None expected	None	N/A	N/A	N/A	None	N/A
Lakeshore West Corridor	LSW-1-1 N/A	Dufferin Street Bridge	Raising of roadway profile and bridge replacement	None: bridge demolished	N/A: bridge has been removed	None	N/A	None	N/A

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
(Segments 1 – 8)	LSW-1-2 PHP	Dunn Avenue Bridge	Raising of roadway profile and bridge replacement	None: bridge demolished	N/A	None	N/A	None	N/A
	LSW-1-3 PHP	Dowling Avenue Bridge	Installation of bridge protection barrier and OCS wires, possible replacement of bridge	None: bridge demolished	N/A	None	N/A	None	N/A
	LSW-1-4 PHP	Humber River Bridge, Mile 5.02	Installation of OCS wires and possibly track portals	Alteration	Conduct an HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSW-1-5 Part V OHA NHS	Fort York Heritage Conservation District and National Historic Site	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSW-1-6 Part IV OHA	Palais Royale, 1601 Lakeshore Boulevard West	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSW-2-1 PHP	Islington Avenue Bridge	Installation of bridge protection barrier, OCS wires, and flash plates	Alteration	Conduct a HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
	LSW 3-1	Etobicoke Creek Bridge	Installation of OCS wires	Alteration	Conduct HIA	No negative impacts anticipated	None	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSW-4-1 PHPPS	Credit River Bridge	Installation of OCS wires and possibly track portals	Alteration	HIA completed as part of the Electrification TPAP. Results and recommendations of the HIA will be adhered to during detailed design. Refer to EPR Volume 3, Section 4.3.9.1.1 and the HIA provided in Appendix M, Sections 6 and 8 for a complete summarization of mitigation/monitoring commitments.	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSW-4-2 Part IV OHA	Port Credit Memorial Arena	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSW-5-1 Part IV OHA	The General Electric Company	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSW-6-1 PHP	Sixteen Mile Creek Bridge	Installation of OCS attachments and track portals	Alteration	Conduct a HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes;

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
								physical, visual, noise-related, and atmospheric elements)	• Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSW-7-1 PHP	Bronte Creek Bridge	Installation of OCS wires and possibly track portals	Alteration	Conduct a HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
Kitchener Corridor (Segments 1-2)	K-2-1	8000 Dixie Road	Adjacent Heritage Property	Installation of Paralleling Station	None -The portion of the property where the Bramalea PS is proposed to be located (and to be acquired[40]) by Metrolinx does not contain heritage attributes. Should the location/configuration of the proposed Bramalea PS facility change during detailed design, potential impacts to the Adjacent Heritage Property (i.e., portion of the 8000 Dixie Rd site that contains CHVI) will be considered and reviewed to ensure no adverse impacts to the Adjacent Heritage Property.	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
Barrie Corridor (Segments 1-12)	BR-1-1 Part IV OHA	National Cash Register Company Bldg, 222 Lansdowne Street	None expected	None	N/a	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes;

[40] Details regarding property acquisition were not yet finalized at the time of writing this report.

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
								physical, visual, noise-related, and atmospheric elements)	• Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-1-2 Designated HRSPA[41]	Former Rail Station at 1550 St. Clair Avenue West	None expected	None	N/A	N/A	N/A	None given that the rail station is no longer extant	N/A
	BR-1-3	St. Clair Avenue West Bridge	Installation of OCS wires	Alteration	Conduct HIA	No negative impacts anticipated	None	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-1-4 PHP	York Beltline Trail	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-3-1 PHP	Don River Culvert	None expected	None: Culvert Removed	N/A	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-4-1 PHP	Maple GO Station	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and,

[41] HRSPA: Heritage Railway Station Protection Act

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
									• Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-4-2 Part V OHA	Village of Maple Heritage Conservation District	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan.	Potential Alteration	Consultation with heritage staff at the City of Vaughan	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-5-1 Part IV OHA	Crawford and Maude Wells House	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-6-1 PHPPS	Aurora GO Station	Installation of OCS attachments	Alteration	HIA completed as part of the Electrification TPAP. Results and recommendations of the HIA will be adhered to during detailed design.	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-6-2 Part IV OHA	Radial Railway Bridge Abutment	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
	BR-7-1 PHP	Newmarket GO Station	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-7-2 Part IV OHA	Private Residence (Robinson House)	None expected	None	N/A	N/A	N/A	None, given the heritage attributes associated with this resource are more than 100 metres from the rail corridor, and separated by a modern townhouse development	None
	BR-7-3 Part IV OHA	Former Newmarket Train Station	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-9-1 PHP	Bradford GO Station	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-11-1 Part IV OHA	Cotellucci Property	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	BR-12-1 Designated HRSPA	Former Allandale Train Station	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes;

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
								physical, visual, noise-related, and atmospheric elements)	• Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
Stouffville Corridor (Segments 1-7)	SV-2-1 Potential Part V OHA	Proposed Agincourt HCD	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	SV-3-1 Part IV OHA	Thomas Rivis House	None expected	None	N/A	N/A	N/A	None, given that the identified heritage attributes associated with this resource are more than 250 metres from the rail corridor.	None
	SV-3-2 Part IV OHA	Hagerman Schoolhouse	None expected	None	N/A	N/A	N/A	None, given that the identified heritage attributes associated with this resource are more than 100 metres from the rail corridor, and separated by a parking lot.	None
	SV-4-1 Part IV OHA	James Eckardt House	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	SV-4-2 Part V OHA	Unionville HCD	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, and modifications to the existing Bruce Creek Bridge located adjacent to the HCD are	Potential Alteration	Consultation with heritage staff at the City of Markham	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
			proposed, policies identified in the HCD Plan may be applicable.						
	Sv-4-3 Part V OHA	Former Unionville Train Station (property also includes the Stiver Mill Complex)	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	SV-5-1 PHP	Markham GO Station	Installation of OCS attachments	Alteration	Conduct an HIA during detailed design	No negative impacts anticipated	None	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	SV-5-2 Part V OHA	Markham Village Heritage Conservation District	No direct or indirect impacts to the heritage attributes associated with the HCD were identified as a result of OCS infrastructure. However, given that the railway corridor passes through this HCD, it may be subject to policies identified in the HCD Plan.	Potential Alteration	Consultation with heritage staff at the City of Markham	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	SV-6-1 Protected property under federal legislation	Rouge National Urban Park	No direct impacts to the heritage attributes associated with RNUP were identified as a result of OCS infrastructure. However, given that the railway corridor passes through the park, proposed infrastructure improvements may be subject to policies	Potential Alteration	Consultation with park management staff at Rouge National Urban Park	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
			identified in the park management plan. In particular, policies on viewsheds and vegetation.						
Lakeshore East Corridor (Segments 1-8)	LSE-1-1 PHP	Carlaw Avenue Bridge	Installation of OCS wires	Alteration	Conduct HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSE-1-2 PHP	Gerrard Street East Bridge	Installation of OCS wires	Alteration	Conduct a HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSE-1-3 Part V OHA	Riverdale HCD	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSE-4-1 PHP	Highland Creek Bridge	Installation of OCS wires	Alteration	Conduct a HIA during detailed design	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSE-4-2 Part IV OHA	Purvis Castle Log Cabin	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes;

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
								physical, visual, noise-related, and atmospheric elements)	• Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions
	LSE-5-1 PHPPS	Rouge River Bridge	OCS wires are to be attached to the newly constructed bridge	**Potential Direct Effects:** This Metrolix-owned rail bridge is being replaced with a new bridge structure (as part of a separate Metrolinx project – Lakeshore East Rail Corridor Expansion [Guildwood to Pickering]). Therefore there is potential for direct impacts related to installation of OCS wires to the newly constructed bridge. **Potential Indirect Effects:** The new structure will require attachment of OCS wires as part of the Electrification project which has the potential to disrupt the bridge crossing's park setting (i.e., indirect effects). Effects to the park setting are considered indirect.	• The existing Metrolix-owned rail bridge is being replaced with a new bridge structure (as part of a separate Metrolinx project – Lakeshore East Rail Corridor Expansion [Guildwood to Pickering]). In consideration of the bridge's removal, no direct adverse impacts to the *newly constructed* Rouge River Bridge are anticipated as a result of the proposed Electrfiication project activities. Therefore, no further mitigation is required. • The new structure will require attachment of OCS wires as part of the Electrification project which has the potential to disrupt the bridge crossing's park setting (i.e., indirect effects). Effects to the park setting are considered indirect and will therefore be addressed through preparation of a Heritage Impact Assessment during detailed design. The HIA will include MTCS consultation/review. Furthermore, it should	None	N/A	**Potential Indirect Effects:** There is potential for OCS construction activities at or near the remaining east and west approaches of the Rouge River bridge crossing as a result of the Electrficiation project; the effects of these construction activities on the approaches are considered to be indirect. . It should be noted that the east and west approaches will be modified as part of the Lakeshore East Rail Corridor Expansion Project to accommodate a new third track, requiring that the existing approaches be widened by approximately 9 metres (AECOM December 12, 2016). This work is in the design phase as of August 2017.	• There is potential for OCS construction activities at or near the remaining east and west approaches of the Rouge River bridge crossing as a result of the Electrficiation project; the effects of these construction activities on the approaches are considered to be indirect. It should be noted that the east and west approaches will be modified as part of the Lakeshore East Rail Corridor Expansion Project to accommodate a new third track, requiring that the existing approaches be widened by approximately 9 metres (AECOM December 12, 2016). This work is in the design phase as of August 2017. Accordingly, it is recommended that a HIA be completed during detailed design of the Electrification project to evaluate the significance of indirect impacts to the east and west approaches and recommend appropriate mitigation measures, as required. The need for a HIA during detailed design addressing impacts of the Electrification project on the east and west approaches of the Rouge River crossing should be based on an assessment of the condition and cultural heritage integrity of the approaches following construction activities required as part of the Lakeshore East Rail Expansion project and based on the extent and significance of anticipated indirect impacts which will be confirmed during the detailed design process. The HIA will include MTCS consultation/review.

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
					be noted that introduction of OCS infrastructure and associated indirect impacts to the park setting of the surrounding Rouge National Urban Park will be mitigated through the following measures as recommended in this report: ▪ During detailed design, efforts will be made to minimize visual effects of the OCS infrastructure as much as possible around the Rouge Beach/Marsh area along the Lakeshore East Corridor and Stouffville Corridor. ▪ The extent of vegetation removal will be confirmed during detailed design. For the purposes of the TPAP, the project team has taken a conservative approach. Further consultation and coordination for any proposed tree/vegetation removals beyond the Metrolinx ROW will be undertaken as the project's design progresses.				
	LSE-5-2 PHP	Petticoat Creek Culvert	None expected	None	N/A	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes;

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
								physical, visual, noise-related, and atmospheric elements)	• Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSE-5-3 PHP	Dunbarton Subway	None expected	None	N/A	None	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSE-5-4 Adjacent protected property	Miller Memorial Tree	Possible impacts during construction phase due to location of construction laydown site or realignment of trail	None	N/A	None	N/A	Disruption/removal of a known memorial site	• The construction laydown site should be planned to avoid this memorial tree. The tree should be protected during the course of construction by plywood tree protection hoarding, or equivalent barriers • The trail realignment should be planned to avoid this memorial tree
	SV-6-1 (portion of the park also intersects the LSE corridor	Rouge National Urban Park	No direct impacts to the heritage attributes associated with RNUP were identified as a result of OCS infrastructure. However, given that the railway corridor passes through the park, proposed infrastructure improvements may be subject to policies identified in the park management plan. In particular, policies on viewsheds and vegetation.	Potential Alteration	Consultation with park management staff at Rouge National Urban Park	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.
	LSE-7-1 Part IV OHA	Former Whitby Train Station, relocated to 1450 Henry Street	None expected	None	N/A	N/A	N/A	None, given that the identified heritage attributes are located 400 metres from the rail corridor.	N/A

Rail Corridors/ Segments	CHR	Property Name	Project Activities	Footprint Impacts		Operations and Maintenance Impacts		Construction Impacts	
				Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments	Potential Effect	Mitigation/Monitoring Commitments
	LSE-8-1 Part IV OHA	Emanuel Sleep House, 601 Victoria Street	None expected	None	N/A	N/A	N/A	Short-term disruption resulting from construction activities (i.e. introduction of construction related physical, visual, noise-related, and atmospheric elements)	• Staging areas should be selected so that they are non-invasive and avoid heritage attributes; • Pre-construction vibration studies should be carried out (if needed); and, • Post-construction landscape treatments carried out to restore pre-construction conditions.

Table 11-4 Summary of Archaeological Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effects	Mitigation Measures/Commitments	Monitoring/Commitments
Construction/installation of Hydro One Tap Locations, including ancillary components such as access roads, grounding and bonding, etc.	• Site clearing • Excavate the soil to the required depth • Install/construct building foundation • Construct gantries • Install prepackaged equipment • Install grounding and bonding • Install underground cables (feeders) within duct banks • Backfill/restore road(s), as per design	• Footprint impacts: disturb/displace potential archaeological resources at the following locations: ▪ Mimico Tap ▪ Burlington Tap ▪ preferred Allandale Tap ▪ Alternate Allandale Tap ▪ Scarborough Tap	• Stage 2 Archaeological Assessment Test Pit Survey will be undertaken as early as possible during detailed design at the following sites in advance of any construction activity or ground disturbance: ▪ Mimico Tap ▪ Burlington Tap ▪ Preferred Allandale Tap ▪ Alternate Allandale Tap ▪ Scarborough Tap	• Stage 2 Archaeological Assessment Test Pit Survey will be undertaken as early as possible during detailed design at the following sites in advance of any construction activity or ground disturbance: ▪ Mimico Tap ▪ Burlington Tap ▪ Preferred Allandale Tap ▪ Alternate Allandale Tap ▪ Scarborough Tap • Any lands affected by a change to project footprint/design will require archaeological assessment per the S & G prior to construction. • Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, alteration of the site must immediately cease; Metrolinx shall engage a licensed archaeologist to carry out archaeological fieldwork in compliance with the Ontario Heritage Act • Any person who discovers human remains must cease work and immediately notify the police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services. Engage with Indigenous communities per the S & G and any consultation agreements
Construction/installation of Traction Power Facilities, including ancillary components such as access roads, underground duct banks, grounding and bonding, etc.	• Site clearing • Excavate the soil to the required depth • Install/construct building foundation • Construct gantries • Install prepackaged equipment • Install grounding and bonding • Install underground cables (feeders) within duct banks • Backfill/restore road(s), as per design	• Footprint impacts: disturb/displace potential archaeological resources at the following locations: ▪ Mimico TPS ▪ Burlington TPS (partial area) ▪ Bramalea PS (partial area) ▪ Newmarket SWS ▪ Gilford PS ▪ Unionville PS (partial area) ▪ Lincolnville PS ▪ Durham SWS (partial area) ▪ Scarborough TPS (partial area) ▪ Maple PS (area adjacent to Hope Primitive Methodist Cemetery)	• Stage 2 Archaeological Assessment Test Pit Survey will be undertaken as early as possible during detailed design at the following sites in advance of any construction activity or ground disturbance: ▪ Mimico TPS ▪ Burlington TPS ▪ Bramalea PS ▪ Newmarket SWS ▪ Gilford PS ▪ Unionville PS (including a Stage 2 Pedestrian Survey) ▪ Lincolnville PS ▪ Durham SWS ▪ Scarborough TPS ▪ Maple PS – A Stage 3 Cemetery Investigation will be undertaken prior to construction if impacts from the project are confirmed within 10 m of cemetery boundary.	• Stage 2 Archaeological Assessment Test Pit Survey will be undertaken as early as possible during detailed design at the following sites in advance of any construction activity or ground disturbance: ▪ Mimico TPS ▪ Burlington TPS ▪ Bramalea PS ▪ Newmarket SWS ▪ Gilford PS ▪ Unionville PS (including a Stage 2 Pedestrian Survey) ▪ Lincolnville PS ▪ Durham SWS ▪ Scarborough TPS ▪ Maple PS – A Stage 3 Cemetery Investigation will be undertaken prior to construction if impacts from the project are confirmed within 10 m of cemetery boundary. • Any lands affected by a change to project footprint/design will require archaeological assessment per the S & G prior to construction. • Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, alteration of the site must immediately cease; Metrolinx shall

Project Component	Project Activities	Potential Effects	Mitigation Measures/Commitments	Monitoring/Commitments
				engage a licensed archaeologist to carry out archaeological fieldwork in compliance with the Ontario Heritage Act • Any person who discovers human remains must cease work and immediately notify the police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services. Engage with Indigenous communities per the S & G and any consultation agreements
Installation of OCS, Gantries along rail corridors	• Excavate soil • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring • Tree removals	• Footprint impacts: disturb/displace potential archaeological resources. Archaeological potential at the following locations along the rail corridors: ▪ USRC (Possible Deeply Buried Wharf/Cribbing) ▪ Barrie Corridor (West of Minet's Point Road between Essa Road and Allandale GO Station). ▪ Allandale site (BcGw-69) near Historic Allandale Station and new Allandale Waterfront GO Station ▪ Lakeshore East Corridor outside Metrolinx ROW (Rodd Avenue).	• Stage 2 Test Pit Survey will be undertaken as early as possible during detailed design at the following sites in advance of any construction activity or ground disturbance: ▪ Barrie Corridor (West of Minet's Point Road between Essa Road and Allandale GO Station). ▪ Allandale site (BcGw-69) near Historic Allandale Station and new Allandale Waterfront GO Station • USRC (Possible Deeply Buried Wharf/Cribbing) – it should be noted that Stage 2 assessment or monitoring not practical nor likely informative	• Stage 2 Test Pit Survey will be undertaken as early as possible during detailed design at the following sites in advance of any construction activity or ground disturbance: ▪ Barrie Corridor (West of Minet's Point Road between Essa Road and Allandale GO Station). ▪ Allandale site (BcGw-69) near Historic Allandale Station and new Allandale Waterfront GO Station • With respect to the Rodd Avenue area along the Lakeshore East corridor, if during Detailed Design it is determined that OCS/electrification infrastructure will be required outside of the Metrolinx owned right of way in this particular area and that subsequent ground disturbance is required within the established 20 metre buffer area (**Figure 8-14**), a Stage 3 archaeological assessment will be undertaken prior to construction. • Any lands affected by change to project footprint/design require archaeological assessment per the S & G • Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, alteration of the site must immediately cease; Metrolinx shall engage a licensed archaeologist to carry out archaeological fieldwork in compliance with the Ontario Heritage Act • Any person who discovers human remains must cease work and immediately notify the police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services. • Engage with Indigenous communities per the S & G and any consultation agreements
Bridge Modifications	• Install bridge barriers • Install OCS attachments • Install flash plates • Raise bridge • Lower tracks • Pedestrian bridge replacements	• The existing footprint of overhead and pedestrian bridges that will require modifications (e.g. track lowering) to deal with vertical clearance issues, and/or to accommodate the addition of a protective bridge barrier, that are within the disturbed OCS/Vegetation zone and do not retain archaeological potential. • For bridges identified for replacements (such as Dufferin Street, Dunn Avenue, Jameson Avenue, and Dowling Avenue pedestrian bridge, Drury Lane pedestrian bridge) due to vertical clearance issues, the portion of the existing bridge	• The existing footprint of overhead and pedestrian bridges that will require modifications (e.g. track lowering) to deal with vertical clearance issues, and/or to accommodate the addition of a protective bridge barrier, are within the disturbed OCS/Vegetation zone and do not retain archaeological potential. If during detailed design any impacts are anticipated that extend outside the OCS/Vegetation zone, then further Stage 1 and/or Stage 2 assessment will be required.	• The existing footprint of overhead and pedestrian bridges that will require modifications (e.g. track lowering) to deal with vertical clearance issues, and/or to accommodate the addition of a protective bridge barrier, are within the disturbed OCS/Vegetation zone and do not retain archaeological potential. If during detailed design any impacts are anticipated that extend outside the OCS/Vegetation zone, then further Stage 1 and/or Stage 2 assessment will be required. • For bridges identified for replacments (such as Dufferin Street, Dunn Avenue, Jameson Avenue, and Dowling Avenue pedestrian bridge, Drury Lane pedestrian bridge) due to vertical clearance

Project Component	Project Activities	Potential Effects	Mitigation Measures/Commitments	Monitoring/Commitments
	• Overhead bridge replacements[42]	footprints within the 7 metre OCS/Vegetation zone is disturbed and do not retain archaeological potential.	• For bridges identified for replacements (such as Dufferin Street, Dunn Avenue, Jameson Avenue, and Dowling Avenue pedestrian bridge, Drury Lane pedestrian bridge) due to vertical clearance issues, the portion of the existing bridge footprints within the 7 metre OCS/Vegetation zone is disturbed and do not retain archaeological potential. If during detailed design any impacts are anticipated that extend outside the disturbed OCS/Vegetation zone, then further Stage 1 and/or Stage 2 assessment will be required.	issues, the portion of the existing bridge footprints within the 7 metre OCS/Vegetation zone is disturbed and do not retain archaeological potential. If during detailed design any impacts are anticipated that extend outside the disturbed OCS/Vegetation zone, then further Stage 1 and/or Stage 2 assessment will be required. • Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, alteration of the site must immediately cease; Metrolinx shall engage a licensed archaeologist to carry out archaeological fieldwork in compliance with the Ontario Heritage Act • Any person who discovers human remains must cease work and immediately notify the police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services. • Engage with Indigenous communities per the S & G and any consultation agreements
Operation/maintenance of OCS, Operation of Taps/TPFs	• Operation of OCS • Operation of Taps/TPFs • Tree pruning/maintenance	• No potential effects associated with operation of the OCS, Taps, TPFs	• None required.	• None required.
Installation/construction of 25kV feeder routes	• Install pole foundations • Install poles • Install wiring • Install underground feeder route/cable	• No archaeological potential found along the proposed Canpa Feeder Route, Bramalea Feeder Route, Barrie Collingwood Railway Feeder Route or Scarborough Feeder Route	• No further Archaeological Assessment required/recommended along the propsed 25kV Feeder Routes	• Any lands affected by change to project footprint/design require archaeological assessment per the S & G • Should previously unknown or unassessed deeply buried archaeological resources be uncovered during development, alteration of the site must immediately cease; Metrolinx shall engage a licensed archaeologist to carry out archaeological fieldwork in compliance with the Ontario Heritage Act • Any person who discovers human remains must cease work and immediately notify the police as well as the Cemeteries Regulation Unit of the Ministry of Government and Consumer Services. • Engage with Indigenous communities per the S & G and any consultation agreements

[42] The detailed assessment of proposed bridge replacements for Dunn, Duffering, Jameson bridges and Dowling Pedestrian bridge will be assessed as part of a TPAP Addendum process.

Table 11-5 Summary of Land Use/Socio-Economic Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
Hydro One Tap Locations	• Footprint impacts	• Footprint impact (zoning conflicts) • Land Requirement	• Further coordination (which may include a series of meetings, discussions, and agreements) with municipalities and property owners will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. • Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: ▪ Air Quality Assessment Report contained in Appendix F) ▪ Noise and Vibration Modelling Reports contained in Appendix G ▪ Visual Assessment Report contained in Appendix H ▪ EMI/EMF Assessment Report contained in Appendix J • Ensure that proper fencing is erected prior to any earth moving, clearing or construction in order to prevent encroachment.	• Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible. • Periodic monitoring of fencing
Traction Power Facilities	• Footprint impacts	• Footprint impact (land use zoning conflicts) • Land Requirement • Nuisance effects (noise, vibration, temporary traffic effects, temporary easements)	• Further coordination (which may include a series of meetings, discussions, and agreements) with municipalities and property owners will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. • Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: ▪ Air Quality Assessment Report contained in Appendix F ▪ Noise and Vibration Modelling Reports contained in Appendix G ▪ Visual Assessment Report contained in Appendix H ▪ EMI/EMF Assessment Report contained in Appendix J • Ensure that proper fencing is erected prior to any earth moving, clearing or construction in order to prevent encroachment.	• Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible • Coordination/consultation with the City of Vaughan regarding final design of the Maple PS within the Block, 27 Secondary Plan • Coordination/consultation with the Town of Innisfil regarding final design of the Gilford PS facility as it relates to surrounding/propsed land use, as appropriate. • Coordination and consultation with the City of Toronto, Waterfront Toronto, Toronto and Region Conservation Authority , and other interested/affected stakeholders will be carried out as part of detailed design to determine the final design of the Don Yard PS facility in relation to the surrounding /proposed land use developments in the vicinity of the proposed PS facility site. • Coordination/consultation with the City of Barrie regarding final design of the Allandale Tap/TPS with respect to possible conflict with proposed SWM pond • Periodic monitoring of fencing • Develop Construction Management Plan and Traffic Management Plan prior to construction in consutation with local municipalities/road authorities as appropriate

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
			• Develop Construction Management Plan and Traffic Management Plan prior to construction and circulate to local municipalities/road authorities for review and discussion	
Construction of Taps & TPFs	• Site clearing • Excavation • Pour foundation • String conductor • Grade and seed • Construct gantries • Install building foundation • Install prepackaged equipment • Construct building	• Nuisance effects (noise, vibration, temporary traffic effects)	• Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: • Air Quality Assessment Report contained in Appendix F) • Noise and Vibration Modelling Reports contained in Appendix G • Visual Assessment Report contained in Appendix H • EMI/EMF Assessment Report contained in Appendix J • Ensure that proper fencing is erected prior to any earth moving, clearing or construction in order to prevent encroachment. • Staging options should be developed to minimize potential effects on local access and travel patterns where possible • Develop a Construction Management Plan Traffic Management Plan prior to construction and circulate to local municipalities/road authorities for review and discussion	• Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible • Periodic monitoring of fencing
Grounding and bonding of TPFs	• Excavate the soil to the required depth (approximately 1m) • Install grounding mats, conductors and rods, as per design • Connect the grounding system internally and with adjacent existing grounding system, where required • Backfill the grounding system, as per design • Install the junction boxes and connect grounding conductors, where required	• Nuisance effects (noise, vibration, temporary traffic effects)	• Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: ▪ Air Quality Assessment Report contained in Appendix F) ▪ Noise and Vibration Modelling Reports contained in Appendix G ▪ Visual Assessment Report contained in Appendix H ▪ EMI/EMF Assessment Report contained in Appendix J • Develop a Construction Management Plan and Traffic Management Plan prior to construction and circulate to local municipalities/road authorities for review and discussion	• Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible • Periodic monitoring of fencing
Construction of access roads for traction power facilities	• Site clearing • Road paving	• Nuisance effects (noise, vibration, temporary traffic effects)	• Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air	• Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
			Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: ▪ Air Quality Assessment Report contained in Appendix F) ▪ Noise and Vibration Modelling Reports contained in Appendix G ▪ Visual Assessment Report contained in Appendix H ▪ EMI/EMF Assessment Report contained in Appendix J • Ensure that proper fencing is erected prior to any earth moving, clearing or construction in order to prevent encroachment. • Staging options should be developed to minimize potential effects on local access and travel patterns where possible • Develop a Construction Management Plan and Traffic Management Plan prior to construction and circulate to local municipalities/road authorities for review and discussion	that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible • Periodic monitoring of fencing
Install OCS	• Excavate soil • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring • Tree removals	• Nuisance effects (noise, vibration, temporary traffic effects)	• Further coordination (which may include a series of meetings, discussions, and agreements) with municipalities and property owners will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. • Staging options should be developed to minimize potential effects on local access and travel patterns where possible • Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: ▪ Air Quality Assessment Report contained in Appendix F) ▪ Noise and Vibration Modelling Reports contained in Appendix G ▪ Visual Assessment Report contained in Appendix H ▪ EMI/EMF Assessment Report contained in Appendix J • Develop a Construction Management Plan and Traffic Management Plan prior to construction and circulate to local municipalities/road authorities for review and discussion	• Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible • Continued discussion with the City of Toronto to ensure the Proposed West Toronto Rail Path Extension alignment is not effected by construction.

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
Construction of Bridge Modifications	• Install bridge barriers • Install OCS attachments • Install flash plates • Raise bridge • Lower tracks • Replace bridges • Replace pedestrian bridges	• Nuisance effects (noise, vibration, temporary traffic effects) • Potential Temporary road closures	• Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: ▪ Air Quality Assessment Report contained in Appendix F) ▪ Noise and Vibration Modelling Reports contained in Appendix G ▪ Visual Assessment Report contained in Appendix H ▪ EMI/EMF Assessment Report contained in Appendix J • Ensure that proper fencing is erected prior to any earth moving, clearing or construction in order to prevent encroachment. • Staging options should be developed to minimize potential effects on local access and travel patterns where possible • Develop a Construction Management Pland and Traffic Management Plan prior to construction and circulate to local municipalities/road authorities for review and discussion	• The detailed assessment of potential effects relating to Dunn, Dufferin, Jameson, and Dowling bridge replacements will be addressed in further detail as part of the future TPAP Addendum. • Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible • Periodic monitoring of fencing
Installation / construction of underground duct banks	• Excavate soil via open cut method to install duct banks • Install underground cables (feeders) within duct banks • Connect feeders to main gantry • Backfill/restore road(s), as per design	• Nuisance effects (noise, vibration, temporary traffic effects)	• Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: ▪ Air Quality Assessment Report contained in Appendix F) ▪ Noise and Vibration Modelling Reports contained in Appendix G ▪ Visual Assessment Report contained in Appendix H ▪ EMI/EMF Assessment Report contained in Appendix J • Ensure that proper fencing is erected prior to any earth moving, clearing or construction in order to prevent encroachment. • Staging options should be developed to minimize potential effects on local access and travel patterns where possible • Develop a Construction Management Pland and Traffic Management Plan prior to construction and circulate to local municipalities/road authorities for review and discussion	• Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible • Periodic monitoring of fencing

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
Installation / construction of 25kV aerial feeder lines	• Install pole foundations • Install poles • Install wiring	• Nuisance effects (noise, vibration, temporary traffic effects)	• Further coordination (which may include a series of meetings, discussions, and agreements) with municipalities and property owners will be undertaken during Detailed Design to finalize design details and minimize any conflicts on adjacent uses. • Ensure that the mitigation recommendations outlined in the respective reports pertaining to Air Quality, Noise/Vibration, Visual/Aesthetics, and EMI/EMF are adhered to and implemented during Detailed Design and construction: ▪ Air Quality Assessment Report contained in Appendix F) ▪ Noise and Vibration Modelling Reports contained in Appendix G ▪ Visual Assessment Report contained in Appendix H ▪ EMI/EMF Assessment Report contained in Appendix J • Ensure that proper fencing is erected prior to any earth moving, clearing or construction in order to prevent encroachment. • Staging options should be developed to minimize potential effects on local access and travel patterns where possible • Develop a Construction Management Pland and Traffic Management Plan prior to construction and circulate to local municipalities/road authorities for review and discussion	• Additional consultation during the Detailed Design and construction phases to ensure that local businesses and properties owners are aware of construction scheduling and that staging options can be developed to minimize impacts to local access and travel patterns to the extent possible • Periodic monitoring of fencing

Table 11-6 Summary of Air Quality Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
Operation of electrified GO Trains	• N/A	• Reduction in local air contaminant concentrations • Reduction in regional contaminant and greenhouse gas emissions	• None required as the potential effect is beneficial	• None required as the potential effect is beneficial
Installation of OCS	• Excavate soil • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring • Tree removals	• By-products of combustion emissions • Production of dust emissions	• Comply with latest diesel combustion emission standards • Prepare and implement a dust management plan for construction activities based on industry best practice to mitigate impacts through the use of proper controls • Periodic watering of unpaved (non-vegetated) areas and stockpiles • Covering stockpiles with a tarp or seeded • Covering trucks hauling excess material • Reducing travel speeds • Minimizing haul distancesEfficiently staging activities • Seeding/re-vegetating exposed soils • Sweeping and/or water flushing the entrances to the construction zones • Installing silt fences around site perimeter to prevent dust migration • Application of non-chloride dust suppressants as referenced in Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities	• Regular inspection of construction work zones to ensure that dust suppression measures are being adequately applied. If dust suppression measures are not functioning properly, alternative measures shall be implemented immediately and prioritized above other construction activites
Construct Modifications to Bridges	• Install bridge barriers • Install OCS attachments • Install flash plates • Raise bridge • Lower tracks	• By-products of combustion emissions • Production of dust emissions	• Comply with latest diesel combustion emission standards • Prepare and implement a dust management plan for construction activities based on industry best practice to mitigate impacts through the use of proper controls • Periodic watering of unpaved (non-vegetated) areas and stockpiles • Covering stockpiles with a tarp or seeded • Covering trucks hauling excess material • Reducing travel speeds • Minimizing haul distancesEfficiently staging activities • Seeding/re-vegetating exposed soils • Sweeping and/or water flushing the entrances to the construction zones	• Regular inspection of construction work zones to ensure that dust suppression measures are being adequately applied. If dust suppression measures are not functioning properly, alternative measures shall be implemented immediately and prioritized above other construction activites

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			• Installing silt fences around site perimeter to prevent dust migration • Application of non-chloride dust suppressants as referenced in Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities	
Construction of Taps, Traction Power Facilities & Gantries	• Auger hole • Pour foundation • Attach structure including hardware such as insulators • String conductor • Grade and seed • Construct gantries • Site clearing • Install building foundation • Install prepackaged equipment • Construct building • Grounding and bonding	• By-products of combustion emissions • Production of dust emissions	• Comply with latest diesel combustion emission standards • Prepare and implement a dust management plan for construction activities based on industry best practice to mitigate impacts through the use of proper controls • Periodic watering of unpaved (non-vegetated) areas and stockpiles • Covering stockpiles with a tarp or seeded • Covering trucks hauling excess material • Reducing travel speeds • Minimizing haul distancesEfficiently staging activities • Seeding/re-vegetating exposed soils • Sweeping and/or water flushing the entrances to the construction zones • Installing silt fences around site perimeter to prevent dust migration • Application of non-chloride dust suppressants as referenced in Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities	• Regular inspection of construction work zones to ensure that dust suppression measures are being adequately applied. If dust suppression measures are not functioning properly, alternative measures shall be implemented immediately and prioritized above other construction activites
Grounding and bonding of TPFs	• Excavate the soil to the required depth (approximately 1m) • Install grounding mats, conductors and rods, as per design • Connect the grounding system internally and with adjacent existing grounding system, where required • Backfill the grounding system, as per design • Install the junction boxes and connect grounding conductors, where required	• By-products of combustion emissions • Production of dust emissions	• Comply with latest diesel combustion emission standards • Prepare and implement a dust management plan for construction activities based on industry best practice to mitigate impacts through the use of proper controls • Periodic watering of unpaved (non-vegetated) areas and stockpiles • Covering stockpiles with a tarp or seeded • Covering trucks hauling excess material • Reducing travel speeds • Minimizing haul distancesEfficiently staging activities • Seeding/re-vegetating exposed soils • Sweeping and/or water flushing the entrances to the construction zones	• Regular inspection of construction work zones to ensure that dust suppression measures are being adequately applied. If dust suppression measures are not functioning properly, alternative measures shall be implemented immediately and prioritized above other construction activites

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			• Installing silt fences around site perimeter to prevent dust migration • Application of non-chloride dust suppressants as referenced in Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities	
Construction of access roads for traction power facilities	• Site clearing	• By-products of combustion emissions • Production of dust emissions	• Comply with latest diesel combustion emission standards • Prepare and implement a dust management plan for construction activities based on industry best practice to mitigate impacts through the use of proper controls • Periodic watering of unpaved (non-vegetated) areas and stockpiles • Covering stockpiles with a tarp or seeded • Covering trucks hauling excess material • Reducing travel speeds • Minimizing haul distancesEfficiently staging activities • Seeding/re-vegetating exposed soils • Sweeping and/or water flushing the entrances to the construction zones • Installing silt fences around site perimeter to prevent dust migration • Application of non-chloride dust suppressants as referenced in Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities	• Regular inspection of construction work zones to ensure that dust suppression measures are being adequately applied. If dust suppression measures are not functioning properly, alternative measures shall be implemented immediately and prioritized above other construction activites
Installation/construction of underground duct banks	• Excavate soil via open cut method to install duct banks • Install underground cables (feeders) within duct banks • Connect feeders to main gantry • Backfill/restore road(s), as per design	• By-products of combustion emissions • Production of dust emissions	• Comply with latest diesel combustion emission standards • Prepare and implement a dust management plan for construction activities based on industry best practice to mitigate impacts through the use of proper controls • Periodic watering of unpaved (non-vegetated) areas and stockpiles • Covering stockpiles with a tarp or seeded • Covering trucks hauling excess material • Reducing travel speeds • Minimizing haul distancesEfficiently staging activities • Seeding/re-vegetating exposed soils • Sweeping and/or water flushing the entrances to the construction zones	• Regular inspection of construction work zones to ensure that dust suppression measures are being adequately applied. If dust suppression measures are not functioning properly, alternative measures shall be implemented immediately and prioritized above other construction activites

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			• Installing silt fences around site perimeter to prevent dust migration • Application of non-chloride dust suppressants as referenced in Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities	
• Installation/construction of 25kV aerial feeder lines	• Install pole foundations • Install poles • Install wiring	• Minimal emissions expected	• N/A	• N/A

Table 11-7 Summary of Noise and Vibration Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
Increased Electric Train Service as part of RER	• Operation of increased train service under the Electric RER scenario	• Potential increases in noise at certain receptors due to increased train service under the Electric RER Scenario	• Implement noise mitigation for locations in the study area where there will be a change in noise levels of 5dB or more (due to Electric RER service) as identified in this EPR and Appendix G. • Implement noise mitigation for locations in the study area identified as 'Retained Noise Barriers' as identified in this EPR and Appendix G. These areas will be further reviewed during detailed design. • For locations in the study area where there will be a change in noise levels of 5dB or more (due to Electric RER service) and where noise barrier locations deemed technically feasible, undertake more detailed analysis during Detailed Design to assess technical, economic, administrative and operational feasibility as per the MOEE/GO Transit Protocol for Noise and Vibration Assessment.to finalize type and location of noise mitigation along the rail corridor. • In addition to noise barriers, Metrolinx will investigate other forms of noise mitigation such as train technology, rail dampeners etc. during Detailed Design to assess feasibility • Metrolinx will continue to consult with the public during Detailed Design with respect to further assessment of noise mitigation areas. • As per the MOEE/GO Transit Protocol for Noise and Vibration Assessment, noise and vibration impacts are evaluated at lands which have been committed for (future) sensitive land uses. Committed uses beyond existing developments include: approved site plans, approved condominium plans or draft approved plans of subdivision. With respect to consideration of future/committed, the available City of Toronto data was reviewed and incorporated into the Noise modelling assessment outlined in the EPR Appendix G reports. In addition, a further screening level assessment was conducted based on the limited detail provided in the available data on planned developments provided for municipalities other than the City of Toronto. The screening level assessment was designed to flag potential planned areas of development that may experience Adjusted Noise Impacts of greater than 5 dB based on the limited information available. This assessment was completed for the Electric RER scenario only and did not include the investigation of barriers within these areas, as outlined in this EPR/Appendix G. Notwithstanding this, the reports contained in EPR Appendix G include figures showing flagged potential planned areas of (future) development that were provided by their respective municipalities. Metrolinx will use this information for consideration of noise mitigation for new planned developments (if approved by the relevant municipalities) during the detail design stage as appropriate.	• During Detailed Design, Metrolinx will investigate noise mitigation solutions further in accordance with the MOEE/GO Transit Protocol for Noise and Vibration Assessment which provides the following mitigation guidance: ▪ Mitigation should be implemented where technically feasible. At the Detailed Design phase, other considerations, such as engineering and economic feasibility should be evaluated. ▪ If deemed feasible, the mitigation measures shall ensure that the predicted sound level from the GO Transit rail project is as close to, or lower than, the rail service objective. • Metrolinx will continue to consult with the public during Detailed Design with respect to further assessment of noise mitigation areas. • As per the MOEE/GO Transit Protocol for Noise and Vibration Assessment, noise and vibration impacts are evaluated at lands which have been committed for (future) sensitive land uses. Committed uses beyond existing developments include: approved site plans, approved condominium plans or draft approved plans of subdivision. With respect to consideration of future/committed, the available City of Toronto data was reviewed and incorporated into the Noise modelling assessment outlined in the EPR Appendix G reports. In addition, a further screening level assessment was conducted based on the limited detail provided in the available data on planned developments provided for municipalities other than the City of Toronto. The screening level assessment was designed to flag potential planned areas of development that may experience Adjusted Noise Impacts of greater than 5 dB based on the limited information available. This assessment was completed for the Electric RER scenario only and did not include the investigation of barriers within these areas, as outlined in this EPR/Appendix G. Notwithstanding this, the reports contained in EPR Appendix G include figures showing flagged potential planned areas of (future) development that were provided by their respective municipalities. Metrolinx will use this information for consideration of noise mitigation for new planned developments (if approved by the relevant municipalities) during the detail design stage as appropriate.
	• Operation of increased train service under the Electric RER scenario	• Potential increases in vibration at certain receptors due to increased train service under the Electric RER Scenario	• Ballast mats, under sleeper pads or resilient fixation should be investigated during Detailed Design for receptors 40-75 metres in distance to proposed new switches or other special trackwork, or 18 metre, 20-25 metre distance to proposed new tracks	• Ballast mats, under sleeper pads or resilient fixation should be investigated during Detailed Design for receptors 40-75 metres in distance to proposed new switches or other special trackwork, or 18 metre, 20-25 metre distance to proposed new tracks

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
Taps/Traction Power Facilities	• Operation of Taps/Traction Power Facilities	• Potential increase in noise above the MOECC exclusion limit (NPCC 300) due to operation of the following TPFs: ▪ Gilford PS ▪ Scarborough TPS	• If necessary, mitigation measures such as low noise fans or barriers should be investigated for the following TPFs during Detailed Design and implemented if deemed feasible: ▪ Gilford PS ▪ Scarborough TPS	• Evaluation of more accurate sound levels for transformers and, if necessary, mitigation measures such as low noise fans or barriers should be investigated for the following TPFs during Detailed Design: ▪ Gilford PS ▪ Scarborough TPS
Construction activities including construction activities including the preparation and installation of traction power facilities; installation of OCS support foundation structures, the OCS wiring and the installation of bridge safety barriers.	• Site preparation and construction of the infrastructure • Auguring of holes or excavation with an excavator • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring via work truck along corridors • Tree removals	• Temporary increase in sound levels above ambient conditions at nearby receptor locations	• Metrolinx Community Relations staff will communicate construction work (including requirements for night time work) and respond to inquiries from residents and businesses, as appropriate; • When possible, construction should be limited to the time periods allowed by the locally applicable bylaws (generally during the daytime hours and during weekdays). Certain type of construction work can only be completed when trains are not in service (i.e., outside of business hours). Although provincial agencies such as Metrolinx and Hydro One are not subject to municipal bylaws, Metrolinx (and it's Contractor) will endeavour to adhere to these local bylaws as a best practice, where practical. As part of the electrification construction activities, nighttime work may be required. Although Metrolinx is exempt from municipal noise control by-laws that place limits on the timing of construction activity, Metrolinx (and their Contractor) will strive to adhere to such bylaws by limiting nighttime noisy activities wherever practical. • A proactive communications protocol is recommended that would advise residents in advance of nighttime construction or particularly noisy construction at any time; • All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. All construction equipment should be verified to comply with MOE NPC-115 guidelines; • Trains passing construction zones may be required to use bells and/or whistles to warn construction personnel for safety reasons. This should be minimized as much as practical while ensuring the safety of everyone involved; • Construction equipment has safety features such as backup alarms while backing up (beeping sound). This is for the protection and safety of the workers, and is legally required. Consideration should be given to the use of broadband rather than tonal backup beepers; • A more detailed vibration assessment of construction be completed when the specifics of construction equipment are finalized prior to the commencement of construction. This assessment should consider minimizing construction vibration levels, while balancing construction schedules and expediting construction activity; • Consideration should be given to monitoring of vibration during vibration intensive activities, to confirm that levels do not approach those required for structural damage;	• In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative and economic feasibility of the various alternatives;

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			• To minimize potential annoyance with construction vibration, it is recommended that minimum setback distances be maintained from nearby residences during construction activities with a significant potential to produce vibrations (such as jackhammer, large bulldozer and vibratory roller). This will ensure that nearby residences experience vibration levels of less than 0.4 mm/s, the threshold of vibration annoyance based on the US Federal Transit Administration (FTA); and • Damages to building may result when these activities occur within 15 m. It is recommended that a 15 m setback distance between the construction vibration source and nearby buildings be implemented where possible. If not possible, then the vibration levels associated with the activity should be monitored.	
Construction activities including the preparation and installation of traction power facilities; installation of OCS support foundation structures, the OCS wiring and the installation of bridge safety barriers.	• Site preparation and construction of the infrastructure • Auguring of holes or excavation with an excavator • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring via work truck along corridors • Tree removals	• Temporary increase in vibration levels above ambient conditions at nearby receptor locations during construction activities • Vibration levels have the potential to cause annoyance at nearby residences that are within 45 metres of construction activities (i.e., the vibration levels are greater than 0.4 mm/s)	• Metrolinx Community Relations staff will communicate construction work (including requirements for nighttime work) and respond to inquiries from residents and businesses; • A proactive communications protocol is implemented that would advise residents in advance of nighttime construction. • When possible, construction should be limited to the time periods allowed by the locally applicable bylaws (generally during the daytime hours and during weekdays). Certain type of construction work can only be completed when trains are not in service (i.e., outside of business hours). Although provincial agencies such as Metrolinx and Hydro One are not subject to municipal bylaws, Metrolinx (and it's Contractor) will endeavour to adhere to these local bylaws as a best practice, where practical. As part of the electrification construction activities, nighttime work may be required. Although Metrolinx is exempt from municipal noise control by-laws that place limits on the timing of construction activity, Metrolinx (and their Contractor) will strive to adhere to such bylaws by limiting nighttime noisy activities wherever practical. A proactive communications protocol is recommended that would advise residents in advance of nighttime construction or particularly noisy construction at any time; • All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. All construction equipment should be verified to comply with MOE NPC-115 guidelines; • Trains passing construction zones may be required to use bells and/or whistles to warn construction personnel for safety reasons. This should be minimized as much as practical while ensuring the safety of everyone involved; • Construction equipment has safety features such as backup alarms while backing up (beeping sound). This is for the protection and safety of the workers, and is legally required. Consideration should be given to the use of broadband rather than tonal backup beepers; • A more detailed vibration assessment of construction be completed when the specifics of construction equipment are finalized prior to the commencement of construction. This assessment should consider minimizing	• In the presence of persistent vibration complaints, Metrolinx will consider implementing a measurement program to evaluate vibration impacts. • In the presence of persistent complaints and subject to the results of a field investigation, alternative vibration control measures may be considered as required, where reasonably available.

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			construction vibration levels, while balancing construction schedules and expediting construction activity; • Consideration should be given to monitoring of vibration during vibration intensive activities, to confirm that levels do not approach those required for structural damage; • To minimize potential annoyance with construction vibration, it is recommended that minimum setback distances be maintained from nearby residences during construction activities with a significant potential to produce vibrations (such as jackhammer, large bulldozer and vibratory roller). This will ensure that nearby residences experience vibration levels of less than 0.4 mm/s, the threshold of vibration annoyance based on the US Federal Transit Administration (FTA); and • Damages to building may result when these activities occur within 15 m. It is recommended that a 15 m setback distance between the construction vibration source and nearby buildings be implemented where possible. If not possible, then the vibration levels associated with the activity should be monitored.	

Table 11-8 Summary of Visual/Aesthetics Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
Hydro One Tap Locations	• Development of the identified sites involving installation of Tap facilities	• Footprint impacts • Visual impacts affecting existing viewsheds	• As part of Detailed Design, efforts will be made to minimize visual effects as much as possible/feasible. • During detailed design, consider seeding with pollinator species and possible planting of shrubs	• Periodic inspection and maintenance to ensure planned species are thriving (if applicable)
Traction Power Substations	• Development of the identified sites involving installation of TPS facilities	• Footprint impacts • Visual impacts affecting existing viewsheds	• As part of Detailed Design, efforts will be made to minimize visual effects as much as possible. • Implement screening measures around the facility, such as structured wall or vegetative/evergreen screening, to minimize visual impacts for the Scarborough TPS. The final type/design of screening measures will be determined during detailed design. • During detailed design, undertake further review of TPS design in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible	• Periodic inspection and maintenance to ensure screening measures are in-tact • Include TPF screening mitigation requirements in the Contract documents as applicable. • During detailed design, undertake further review of TPF design in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible
Switching Stations/Paralleling Stations	• Development of the identified sites involving installation of SWS/PS facilities	• Footprint impacts • Visual impacts affecting existing viewsheds	• As part of Detailed Design, efforts will be made to minimize visual effects as much as possible/feasible. • Implement screening measures around the facility, such as structured wall or vegetative/evergreen screening, to minimize visual impacts for the following facilities: Scarborough SWS, Newmarket SWS, Maple PS, Don Yard PS, Gilford PS. The final type/design of screening measures will be determined during detailed design. • During detailed design, undertake further review of TPF design in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible	• Periodic inspection and maintenance to ensure screening measures are in-tact • Include TPF screening mitigation requirements in the Contract documents as applicable. • During detailed design, undertake further review of TPF design in relation to options for innovative site planning, where feasible, to ensure external yard and transformers are hidden to the extent possible
OCS/Tree Removals/Noise Barriers	• Installation of OCS Infrastructure, noise barriers, removal of vegetation	• Footprint impacts • The Installation of OCS will affect the viewshed especially in areas of vegetative clearing • The installation of noise barrirers will affect the viewshed especially in areas of vegetative clearing	• As part of detailed design, efforts will be made to minimize visual effects as much as possible • Placement of infrastructure in relation to supporting infrastructure such as viaducts (e.g., place OCS poles in alignment with bridge piers if possible) • The Tree Compensation Protocol requirements will entail offsetting tree loss as much as possible/feasible through planting of trees in other areas and in affected parks wherever possible; which will also help offset/minimize visual effects due to tree removal	• Periodic inspection and maintenance such as repainting degraded finishes if required • As part of detailed design, efforts will be made to minimize visual effects as much as possible • Placement of infrastructure in relation to supporting infrastructure such as viaducts (e.g., place OCS poles in alignment with bridge piers if possible) • The Tree Compensation Protocol requirements will entail offsetting tree loss as much as possible/feasible through planting of trees in other areas and in affected parks wherever possible; which will also help offset/minimize visual effects due to tree removal. • The exact locations and technical/administrative feasibility of noise barriers will need to be further reviewed during detailed design. Based on this additional analysis, the final design and location of noise barriers will be determined.

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			• The exact locations and technical/administrative feasibility of noise barriers will need to be further reviewed during detailed design. Based on this additional analysis, the final design and location of noise barriers will be determined.	
Construction activities associated with installing OCS	• Excavate soil • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring • Removal of trees and other vegetation	• Largest visual impact will be the removal of trees and other vegetation, selection and placement of poles, and installation of wiring	• Design and place OCS infrastructure to minimize its visual impact on the surrounding area where possible • Replace trees and other vegetation where feasible • Shield night lighting from surrounding areas, if used and where feasible	• Adherence to mitigation requirements
Bridges/Rail Overpass Modifications	• Install bridge barriers • Install OCS/portal attachments • Install flash plates • Lower tracks • Replace bridge • Replace pedestrian bridges	• Bridge barriers may block views or create uninviting spaces. • OCS or Portal attachments may affect existing views of rail overpasses. • Replacing bridge structure may create visual impact (The detailed assessment of potential effects will be addressed in further detail as part of the future TPAP Addendum to be completed for the Dunn, Dufferin, Jameson and Dowling bridge replacements)	• All overhead and pedestrian bridges will require bridge barriers for safety, which may affect views across the bridge. Therefore, during Detailed Design Metrolinx will determine the preferred bridge barrier designs; as part of this, barrier designs that maintain existing views will be considered and implemented where possible. In addition, a design excellence process will review options for design treatments/options for enhancing the aesthetics of bridge barriers in consultation with interested/affected municipalities as appropriate. • During Detailed Design, consider locating OCS structures (e.g., portals) away from existing bridge/rail overpass structures, where possible, to limit visibility to public viewing areas traversing corridor Place OCS support structures symmetrically on or on either side of bridges and viaducts. • Use transparent materials for bridge barriers where appropriate, if possible • Work with community/municipality for bridge replacements to determine aesthetic treatments (as part of the future TPAP Addendum to be completed to address bridge replacements)	• Include design and consultation requirements for bridge barrier design in the Contract Documents as appropriate • Adherence to Design Guidelines to be developed in consultation with Metrolinx's Design Excellence Committee • Periodic inspection and maintenance
GO Station Modifications	• Install OCS poles in station platforms and canopies	• Visual impact to passengers waiting on station platforms, or walking to the platform from surroundings	• As part of Detailed Design, efforts will be made to minimize visual effects as much as possible. • A Design Excellence process will be followed to integrate the OCS design into GO Stations to reduce the extent of visual impacts.	• Periodic inspection and maintenance
Operation/maintenance of OCS	• Operation of OCS • Tree pruning/maintenance	• Minimal temporary visual effects due to exposure of infrastructure	• No mitigation recommended	• Periodic inspection, pruning and replacement of dead plants. • Periodic inspection and maintenance such as repainting degraded finishes

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
Construction of Taps, Traction Power Facilities & Gantries	• Auger hole • Pour foundation • Attach structure including hardware such as insulators • String conductor • Grade and seed • Construct gantries • Site clearing • Install building foundation • Install prepackaged equipment • Construct building • Grounding and bonding	• Temporary visual impacts due to removal of vegetation, exposure of construction activities and night-time lighting when close to residential buildings	• Shield night lighting from surrounding areas, if used	• Adherence to mitigation requirements
Grounding and bonding of TPFs	• Excavate the soil to the required depth (approximately 1m) • Install grounding mats, conductors and rods, as per design • Connect the grounding system internally and with adjacent existing grounding system, where required • Backfill the grounding system, as per design • Install the junction boxes and connect grounding conductors, where required	• Negligible visual impact after construction is complete	• No mitigation recommended	• Adherence to mitigation requirements
Construction of access roads for traction power facilities	• Site clearing	• Exposure of views that are currently screened by existing vegetation	• Replace vegetation or add fencing where possible	• Construction management to enforce adherence to requirements in contract
Construction of underground duct banks	• Excavate soil via open cut method to install duct banks • Install underground cables (feeders) within duct banks • Connect feeders to main gantry • Backfill/restore road(s), as per design	• Exposure of views that are currently screened by existing vegetation	• Add fencing where possible	• Adherence to mitigation requirements
Construction of 25kV aerial feeder lines	• Install pole foundations • Install poles • Install wiring	• Generally negligible except where aerial wiring and poles are in residential areas where effect is moderate to high visual impact	• No mitigation recommended	• Adherence to mitigation requirements

Table 11-9 Summary of Utilities Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
Hydro One Tap Locations	• Utility conflicts	• Spatial conflict • Electrical clearance conflict	• Removal of utilities • Relocation of utilities • Reconfiguration of utilities • Burial of overhead utilities	• Amend crossing agreements • Develop and implement detailed mitigation plan • Continue to meet with the utility companies to determine risks, timing and the appropriate mitigation strategy to address potential conflicts. • Confirm utility relocations/protection required and undertake negotiations with relevant utility companies, as required. • Based on the requirements of each utility company, utilities will be relocated or protected to allow for the electrification construction works and allow trains to pass without damage; • With input from legal counsel for both contracting parties, amend existing crossing agreements or develop new crossing agreements that set out the additional cost burdens associated with de-energizing and limited operational windows as well as fines related to cable fall. • Develop a mitigation plan with each utility that includes the appropriate contractual Option (1, 2 or 3) to implement the appropriate mitigation strategy (see Utilities Impact Assessment Report included as Appendix I to this EPR). • Implement the mitigation plan through the applicable contractual parties from design through to construction.
Traction Power Facilities and ancillary components including gantries,	• Utility conflicts	• Spatial conflict • Electrical clearance conflict	• Removal of utilities • Relocation of utilities • Reconfiguration of utilities • Burial of overhead utilities	• Amend crossing agreements • Develop and implement detailed mitigation plan • Continue to meet with the utility companies to determine risks, timing and the appropriate mitigation strategy to address potential conflicts. • Confirm utility relocations/protection required based on GO Rail Network Electrification Detailed Design and undertake negotiations with relevant utility companies, as required. • Based on the requirements of each utility company, utilities will be relocated or protected to allow for the electrification construction works and allow trains to pass without damage; • With input from legal counsel for both contracting parties, amend existing crossing agreements or develop new crossing agreements that set out the additional cost burdens associated with de-energizing and limited operational windows as well as fines related to cable fall. • Develop a mitigation plan with each utility that includes the appropriate contractual Option (1, 2 or 3) to implement the appropriate mitigation strategy (see Utilities Impact Assessment Report included as Appendix I to this EPR). • Implement the mitigation plan through the applicable contractual parties from design through to construction.
OCS	• Footprint impacts/utility conflicts	• Footprint impacts/utility conflicts • Spatial conflict • Electrical clearance conflict • Electrical zone of influence conflict	• Removal of utilities • Relocation of utilities • Reconfiguration of utilities • Burial of overhead utilities	• Amend crossing agreements • Develop and implement detailed mitigation plan • Continue to meet with the utility companies to determine risks, timing and the appropriate mitigation strategy to address potential conflicts.

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
			• Electrical zone of influence effects may be mitigated through grounding and bonding or isolation.	• Confirm utility relocations/protection required based on GO Rail Network Electrification Detailed Design and undertake negotiations with relevant utility companies, as required. • Based on the requirements of each utility company, utilities will be relocated or protected to allow for the electrification construction works and allow trains to pass without damage; • With input from legal counsel for both contracting parties, amend existing crossing agreements or develop new crossing agreements that set out the additional cost burdens associated with de-energizing and limited operational windows as well as fines related to cable fall. • Develop a mitigation plan with each utility that includes the appropriate contractual Option (1, 2 or 3) to implement the appropriate mitigation strategy (see Utilities Impact Assessment Report included as Appendix I to this EPR). • Implement the mitigation plan through the applicable contractual parties from design through to construction.
Bridge Modifications	• Install bridge barriers • Install OCS attachments • Install flash plates • Raise bridge • Lower tracks	• Spatial conflict • Electrical clearance conflict • Electrical zone of influence conflict	• Removal of utilities • Relocation of utilities • Reconfiguration of utilities • Burial of overhead utilities • Further study of potential impacts associated with bridges • Electrical zone of influence effects may be mitigated through grounding and bonding or isolation.	• Amend crossing agreements • Develop and implement detailed mitigation plan
Operation/maintenance of OCS	• Operation of OCS • Tree pruning/maintenance	• Spatial conflict • Electrical clearance conflict • Electrical zone of influence conflict • Cable fall • De-energizing costs • Limited operational windows for access	• Removal of utilities • Relocation of utilities • Reconfiguration of utilities • Burial of overhead utilities • Electrical zone of influence effects may be mitigated through grounding and bonding or isolation. • Further study of potential impacts associated with bridges	• Amend crossing agreements • Develop and implement detailed mitigation plan
Grounding and bonding of TPFs	• Excavate the soil to the required depth (approximately 1m) • Install grounding mats, conductors and rods, as per design • Connect the grounding system internally and with adjacent existing grounding system, where required	• Electrical zone of influence conflict	• Electrical zone of influence effects may be mitigated through grounding and bonding or isolation.	• Monitor construction activities to ensure that works schedule is being coordinated. • Utilities affected by construction will be temporarily relocated along the roadway and railway right-of-way.

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring Commitments
	• Backfill the grounding system, as per design • Install the junction boxes and connect grounding conductors, where required			
Construction of Taps/TPFs, access roads for TPFs and underground duct banks	• Site clearing	• Spatial conflict	• Removal of utilities • Relocation of utilities • Reconfiguration of utilities • Burial of overhead utilities • Amend crossing agreements • Develop and implement detailed mitigation plan	• Monitor construction activities to ensure that works schedule is being coordinated. • Utilities affected by construction will be temporarily relocated along the roadway and railway right-of-way.
Installation/construction of 25kV aerial feeder lines	• Install pole foundations • Install poles • Install wiring	• Spatial conflict • Electrical clearance conflict • Electrical zone of influence conflict	• Removal of utilities • Relocation of utilities • Reconfiguration of utilities • Burial of overhead utilities • Electrical zone of influence effects may be mitigated through grounding and bonding or isolation. • Further study of potential impacts associated with bridges • Amend crossing agreements • Develop and implement detailed mitigation plan	• Monitor construction activities to ensure that works schedule is being coordinated. • Utilities affected by construction will be temporarily relocated along the roadway and railway right-of-way.

Table 11-10 Summary of Electromagnetic Interference/Electromagnetic Fields Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
Design and development strategy for Electromagnetic Compatibility (EMC); Prepare and Implement a Frequency Management Plan	• N/A	• N/A	• During Detailed Design, Metrolinx will prepare and implement Electromagnetic Compatibility (EMC) Control Plan, to communicate the design and development strategy for EMC general (including both ELF and EMI) and to catalogue the types of electronics that will be installed. • For both Extremely Low Frequency (ELF) Electromagnetic Fields (EMF) and Electromagnetic Interference (EMI), industry-standard mitigation measures will be applied • As per the American Public Transportation Association (APTA) Standard SS-E-010-98, the EMC Control Plan should include but not be limited to: ▪ Characterizes potential EMI sources and hazards to transit/rail operations; ▪ Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed); ▪ Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.); ▪ Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B EMF Modelling and Measurement Tools.; ▪ Includes (or references) a safety analysis and failure analysis of the transit system; ▪ Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a key input to the detailed, post-electrification EMI	• During Detailed Design, Metrolinx will prepare and implement Electromagnetic Compatibility (EMC) Control Plan, to communicate the design and development strategy for EMC general (including both ELF and EMI) and to catalogue the types of electronics that will be installed. • For both Extremely Low Frequency (ELF) Electromagnetic Fields (EMF) and Electromagnetic Interference (EMI), industry-standard mitigation measures will be applied • As per the American Public Transportation Association (APTA) Standard SS-E-010-98, the EMC Control Plan should include but not be limited to: ▪ Characterizes potential EMI sources and hazards to transit/rail operations; ▪ Considers low-cost, no-cost options, or best practices for EMI prevention, control and mitigation techniques. Examples are: posted warning signs to control access, fencing, and shielding of substations, or grade crossing access, as needed); ▪ Considers best practices in EMI susceptibility control procedures. Examples are: active or passive shielding, cathodic protection, surge protection, fail-safe circuit redesign, changed location of antennas or susceptible equipment, redesign of equipment, enclosures for equipment, etc.); ▪ Utilizes current EMC guidance and resources for transit electrification developed by EPRI, AAR and AREMA as discussed in Sec. V B EMF Modelling and Measurement Tools.; ▪ Includes (or references) a safety analysis and failure analysis of the transit system; ▪ Addresses grounding or shorting hazards, prevents, controls or mitigates as needed stray currents (earth-return currents or induced currents in metallic structures and pipelines or along the return rails (where some fraction of the current finds its way back to substation or generating station through the earth for various regions and soil conditions), and the effects of different design and construction practices on these currents; (This list of frequencies is a key input to the detailed, post-electrification EMI scans taken at each TPF and compared to required levels in EN 50121.) ▪ Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions; ▪ Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.) • A frequency management plan will be developed and implemented by Metrolinx during the Detailed Design phase. This plan is needed to capture the operating frequencies at the system engineering level from all intentional radiators in the vicinity of the railway. • Metrolinx will continue to coordinate and consult with CN, CP, and VIA as appropriate during detailed design where there are interfaces with freight/VIA territory. The following commitments will be adhered to post TPAP: ▪ Track Circuits & Grade Crossings will need to be immunized (this will be included in the provisions of the EMC Control Plan to be developed during detailed design). ○ Where track is adjacent to Metrolinx electrification

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
			scans taken at each TPF and compared to required levels in EN 50121.) ▪ Characterizes the frequency bands, spectral characteristics of ELF/EMF and RF generated noise by the pantograph-catenary contact under operating conditions; ▪ Characterizes along the right-of-way parameters (e.g., frequency spectrum, electric and magnetic field strengths, modulation system) for the wireless communications, control, and power and propulsion system (including auxiliary power for HVAC, emergency lighting and signage, public address, etc.) • A frequency management plan will be developed and implemented by Metrolinx during the Detailed Design phase. This plan is needed to capture the operating frequencies at the system engineering level from all intentional radiators in the vicinity of the railway. • Metrolinx will continue to coordinate and consult with CN, CP, and VIA as appropriate during detailed design where there are interfaces with freight/VIA territory. The following commitments will be adhered to post TPAP: • Track Circuits & Grade Crossings will need to be immunized (this will be included in the provisions of the EMC Control Plan to be developed during detailed design). ○ Where track is adjacent to Metrolinx electrification - Within Overhead Contact Line Zone (OCLZ). - Possibly beyond the OCLZ for induced effects (range will be confirmed during detailed design). ○ Where electrified track crosses over (considered within OCLZ) ○ Where electrified track abuts non-electrified track ○ Electrified track to third party owned interface locations. - Electrified track to third party unsignalled track (e.g. yards) requires TPS return. • Immunization includes compatible track circuits, impedance bonds as well as bonding & grounding for TPS currents (this will be included in the	- Within Overhead Contact Line Zone (OCLZ). - Possibly beyond the OCLZ for induced effects (range will be confirmed during detailed design). ○ Where electrified track crosses over (considered within OCLZ) ○ Where electrified track abuts non-electrified track ○ Electrified track to third party owned interface locations. - Electrified track to third party unsignalled track (e.g. yards) requires TPS return. ▪ Immunization includes compatible track circuits, impedance bonds as well as bonding & grounding for TPS currents (this will be included in the provisions of the EMC Control Plan to be developed during detailed design).

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
			provisions of the EMC Control Plan to be developed during detailed design).	
NAVCanada and Greater Toronto Airports Authority Requirements	• N/A	• N/A	• The following commitments will be adhered to during Detailed Design related to satisfying NAVCanada requirements: ▪ Consultation with NavCan will continue as part of Detailed Design phase to ensure that any required agreements, approvals or authorizations are obtained prior to project implementation. ▪ The contract documents will contain relevant requirements relating to the design of the Metrolinx electrification system in accordance with applicable legislation, codes, etc. including a requirement to demonstrate compliance through field measurements and testing under actual operating conditions, as well as remediation measures if allowable thresholds are exceeded. ▪ Further discussions will be held with GTAA and NavCanada to confirm expansion plans and potential areas of interference during Detailed Design. • The following commitments will be adhered to during Detailed Design related to satisfying Greater Toronto Airports Authority (GTAA) requirements: ▪ As part of Detailed Design, an agreement will need to be established between Metrolinx and Greater Toronto Airports Authority (GTAA) in relation to how the electrification project will be designed and implemented, and 2) final design will be prepared based on the agreement ▪ The contract document requirements will reflect that that the results of the Electromagnetic Compatibility/Electromagnetic Interference (EMC/EMI) testing shall be provided to the GTAA. ▪ Metrolinx will inform the GTAA of the proposed changes to the areas that are jointly supported with the GTAA's Emergency Services prior to finalizing the design. The denoted areas of interest will be reviewed jointly. This will be reflected in the contract document requirements. ▪ Further discussions will be held with GTAA and NavCanada to confirm expansion plans and	• The following commitments will be adhered to during Detailed Design related to satisfying NAVCanada requirements: ▪ Consultation with NavCan will continue as part of Detailed Design phase to ensure that any required agreements, approvals or authorizations are obtained prior to project implementation. ▪ The contract documents will contain relevant requirements relating to the design of the Metrolinx electrification system in accordance with applicable legislation, codes, etc. including a requirement to demonstrate compliance through field measurements and testing under actual operating conditions, as well as remediation measures if allowable thresholds are exceeded. ▪ Further discussions will be held with GTAA and NavCanada to confirm expansion plans and potential areas of interference during Detailed Design. • The following commitments will be adhered to during Detailed Design related to satisfying Greater Toronto Airports Authority (GTAA) requirements: ▪ As part of Detailed Design, an agreement will need to be established between Metrolinx and Greater Toronto Airports Authority (GTAA) in relation to how the electrification project will be designed and implemented, and 2) final design will be prepared based on the agreement ▪ The contract document requirements will reflect that that the results of the Electromagnetic Compatibility/Electromagnetic Interference (EMC/EMI) testing shall be provided to the GTAA. ▪ Metrolinx will inform the GTAA of the proposed changes to the areas that are jointly supported with the GTAA's Emergency Services prior to finalizing the design. The denoted areas of interest will be reviewed jointly. This will be reflected in the contract document requirements. • Further discussions will be held with GTAA and NavCanada to confirm expansion plans and potential areas of interference during Detailed Design.

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
			potential areas of interference during Detailed Design.	
Operation of Hydro One Tap Locations	• N/A	• Induced Current in Neighbouring Metallic Wires and Fences. • ELF EMF.	• Induced Current in Neighbouring Metallic Wires and Fences – Mitigated by proper design, e.g., grounding and shielding, and, physical separation. • ELF EMF – Mitigated through design and implementation; Verified by before-and-after measurements (before project implementation and after)	• ELF EMF should be measured post-electrification to verify measurements are within acceptable industry standards • Industry-standard practices for handling high-voltage should be followed. • During the electrification commissioning phase, overall ELF and RF emissions emanating from the GO electrified railway system as a whole will be field tested and verified to ensure EMFs are within the limits of applicable industry standards.
Operation of Traction Power Facilities	• N/A	• EMI. • Time-Varying EMFs. • Induced Current in Neighbouring Metallic Wires and Fences.	• EMI – Mitigated via EMC Control Plan. • Time-Varying EMFs – Mitigated by proper design, e.g., grounding and shielding, physical separation, and via use of ATF power systems. • Induced Current in Neighbouring Metallic Wires and Fences – Mitigated through design, e.g., grounding and shielding, and, physical separation.	• Background EMI scans at all TPF sites should be re-measured prior to project implementation to verify baseline conditions at each site outline in the EMI/EMF Baseline Conditions Report (Appendix J) • ELF EMF should be measured post-electrification at all TPF sites • Detailed EMI scans, based upon information from EMC Control Plan, should be made near completion of each traction power facility, both before and after project implementation to ensure scans are within acceptable industry standard ranges • Industry-standard practices for handling high-voltage should be followed. • During the electrification commissioning phase, overall ELF and RF emissions emanating from the GO electrified railway system as a whole will be field tested and verified to ensure EMFs are within the limits of applicable industry standards.
Installation of OCS/Construct Bridge Modifications/Construction of Taps/TPFs/Installation of Grounding and Bonding/Construction of 25kV Feeder Routes	• Excavate soil • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring • Tree removals • Excavate the soil to the required depth (approximately 1m) • Install grounding mats, conductors and rods, as per design • Connect the grounding system internally and with adjacent existing grounding system, where required • Backfill the grounding system, as per design • Install the junction boxes and connect grounding conductors, where required	• The primary construction impact for EMC would be exposure of ELF EMF to the workers. However, based on the EMI/EMF assessment along the rail corridors and at Tap/TPF sites undertaken as part of this TPAP, ELF EMF levels are substantially below occupational limits, therefore no adverse effects are anticipated.	• N/A	• N/A

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
	• Excavate soil via open cut method to install duct banks • Install underground cables (feeders) within duct banks • Connect feeders to main gantry • Backfill/restore road(s), as per design			
Construction of access roads for traction power facilities	• No EMI/EMF/EMC effects	• N/A	• N/A	• N/A
Operation of 25kV aerial feeder lines	• Operation of 25kV Feeder lines	• Time-Varying EMFs. • Induced Current in Neighbouring Metallic Wires and Fences. • Unintended Contact with High-Voltage Source. • ELF EMF.	• Time-Varying EMFs – Mitigated by proper design, e.g., grounding and shielding, physical separation. • Induced Current in Neighbouring Metallic Wires and Fences – Mitigated through design, e.g., grounding and shielding, and, physical separation. • Unintended Contact with High-Voltage Source – Mitigated by Strict adherence to industry-standard guidelines for handling live voltage sources. • ELF EMF – Mitigated through design; Verified by before-and-after measurements (before project implementation and after	• Industry-standard practices for handling high-voltage should be followed • During the electrification commissioning phase, overall ELF and RF emissions emanating from the GO electrified railway system as a whole will be field tested and verified to ensure EMFs are within the limits of applicable industry standards.
Operation of OCS	• Operation of OCS • Tree pruning/maintenance	• Time-Varying EMFs. • Induced Current in Neighbouring Metallic Wires and Fences. • Unintended Contact with High-Voltage Source.	• Time-Varying EMFs – Mitigated through design, e.g., grounding and shielding, physical separation. • Induced Current in Neighbouring Metallic Wires and Fences – Mitigated through design, e.g., grounding and shielding, and, physical separation. • Unintended Contact with High-Voltage Source – Mitigated by Strict adherence to industry-standard guidelines for handling live voltage sources.	• ELF EMF should be confirmed/re-assessed post-electrification, specifically at locations which exhibited ELF EMF levels above 10 mG post-electrification re-assessment cut-off, which include: ▪ Signal Light 138 (Segment USRC-1); ▪ Switch Machine 255 (Segment USRC-1); ▪ 3 Metres from Center of Track, near Burlington TPF site (Segment LSW-8); ▪ Burgess Veterinary Hospital (Segment LSW-8); and, ▪ Under High Voltage Lines (Segment KT-2).
Electric Rolling Stock	• Test rolling stock • Install rolling stock	• EMI. • Time-Varying EMFs. • Radiated Magnetic Fields. • ELF EMF.	• EMI – Mitigated via EMC Control Plan. • Time-Varying EMFs – Mitigated through design, e.g., grounding and shielding, physical separation. • Radiated Magnetic Fields – Mitigated through design, e.g., grounding and shielding. • ELF EMF – Mitigated through design; Verified by before-and-after measurements.	• During Detailed Design, further analysis and measurements will be carried once the electric rolling stock specifications are known in order to ensure EMI immunity and emissions compliance for the electrified GO system. • EMI, Time-Varying EMFs, Radiated Magnetic Fields, and ELF EMF should be verified both statically (while vehicle at rest) and dynamically (while vehicle moving under power). • Prior to project implementation, baseline measurements will be taken statically while vehicle is powered off and while vehicle is under power but not moving, both inside and outside the vehicle, at heights and distances mandated by EN 50121 and EN 50500. • Prior to project implementation, dynamic measurements will be taken at both selected station and/or platform location(s) and at identified EMI-sensitive sites, including Burgess Veterinary Hospital to ensure to ensure EMI levels are within acceptable industry standard ranges

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
				• During the electrification commissioning phase, overall ELF and RF emissions emanating from the GO electrified railway system as a whole will be field tested and verified to ensure EMFs are within the limits of applicable industry standards.

Table 11-11 Summary of Stormwater Management Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/Commitments	Monitoring/Commitments
Taps/Traction Power Facilities	• Footprint impacts related to installation of the Taps/TPFs	• Development/installation of Taps/Traction Power Facilities may result in potential alterations to the current storm water drainage patterns. • Development/installation of Taps/Traction Power Facilities resulting in increase in impervious area and potential to cause increase in the stormwater runoff.	• Implement the Tap/TPF site specific mitigation measures and recommendations for Stormwater management and future work as outlined in this EPR and EPR Appendix K.	• During Detailed Design, a more detailed Stormwater Management Plan and Design will be carried out and implemented by Metrolinx in accordance with the Ministry of the Environment's Stormwater Management Planning and Design Manual (2003).and will address: quantity control, erosion control, and quality control. • The stormwater management plan/design will be developed in consultation with MOECC, Municipalities (as relevant), and Conservation Authorities, as appropriate. Based on final design for electrical equipment, drainage areas and imperviousness should be reassessed and flow computations revised at Detailed Design phase. • The flow contribution to existing ditches and culverts and their capacities are not known at this stage. A firm design will be presented at Detailed Design phase, utilizing information from the survey and the municipal data to determine the capacity of the existing structures and the site runoff outfalls.
Instalation of OCS	• Excavate soil • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring • Tree removals	• Drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to installation of OCS infrastructure along the rail corridors based on the preliminary analysis undertaken as part of the conceptual design TPAP work.	• None required	• If potential environmental impacts are subsequently identified as part of detailed design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction.
Bridge modifications	• Track lowering • Bridge replacments • Pedestrian bridge replacments	• Drainage and stormwater management, quantity and drainage patterns are not anticipated to be affected due to track lowering activities based on the preliminary analysis undertaken as part of the conceptual design TPAP work.	• None required	• If potential environmental impacts are subsequently identified as part of detailed design, applicable legislation will be adhered to and all applicable environmental permits and/or approvals will be obtained prior to construction. • The detailed assessment of potential SWM/drainage effects relating to Dunn, Dufferin, Jameson, and Dowling bridge replacements will be addressed in further detail as part of the future TPAP Addendum.

Table 11-12 Summary of Groundwater Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures	Monitoring & Commitments
All project components	• All	• Potential adverse effects to groundwater and/or wells	• Refer to monitoring/commitments column	• Any/all requirements for dewatering associated with project activities including but not limited to OCS installation, TPF installation, bridge modifications etc. will be reviewed and confirmed during Detailed Design. • With respect to bridge replacements, a detailed assessment of any potential groundwater/well impacts will be completed as part of a separate EA Addendum process as outlined in the GO Rail Network Electrification EPR. • The potential impact on groundwater due to project activities is expected to be imperceptible; however, this will be further evaluated at the Detailed Design phase along with the requirement to prepare an Erosion and Sediment Control Plan and/or a Discharge/Mitigation Plan, obtain a PTTW or register the water taking on the EASR. MOECC guidance document will be consulted and/or consultation with Ministry staff as appropriate. • Irrespective of the need for a PTTW or registry of the water taking on the EASR, an adequate Erosion and Sediment Control Plan, and/or Discharge/Mitigation Plan will be prepared before construction starts for work near surface water features. • If additional potential impacts to water supply wells are identified during the Detailed Design phase, additional assessment will be carried out as appropriate, including well surveys, consultation with municipalities and other related investigative tasks. • If any potential impact to water supply wells is identified during the Detailed Design phase of the project, additional assessment may be required, including well surveys, consultation with municipalities and other related investigative tasks. • Some of the rail corridor segments and proposed facilities are located within Wellhead Protection Areas (WHPA) and/or within 500 metres municipal supply wells. It is a general conclusion that, due to the typical installation depths of municipal supply wells and the relatively small and shallow foundations required for the proposed OCS support structures, any impact from the GO Rail Network Electrification Project is considered to be highly unlikely. However, further assessment will be conducted during the Detailed Design phase of the project for any proposed OCS support structures situated within WHPA and/or close proximity of municipal supply wells, to ensure there is no impact to municipal water supplies. • For any private water supply wells that were identified as being located within the property boundaries of the proposed tap/traction power facilities, a well survey should be conducted to verify if the wells are actually present. If present, the wells should be decommissioned in accordance with Ontario Regulation 903 prior to commencement of any construction activities.
Tap Locations (Operation)	• N/A	• Contamination of groundwater due to spill of insulating oils/fluids	• Tap sites will be equipped with spill containment measures • Development of Emergency Preparedness and Spill Response Plans	• None Required

Project Component	Project Activities	Potential Effect	Mitigation Measures	Monitoring & Commitments
Traction Power Facilities (TPSs, SWSs, PSs) (Operation)	• N/A	• Contamination of groundwater due to spill of insulating oils/fluids	• TPS will be equipped with spill containment measures • Development of Emergency Preparedness and Spill Response Plans	• Develop and implement Emergency Preparedness and Spill Response Plans
Installation of OCS	• Excavate soil • Install OCS foundations at an approximate depth of 5m • Erect poles • Install wiring • Tree removals	• Temporary drawdown of groundwater due to construction dewatering • Contamination of groundwater due to spill of fuels/oils	• Irrespective of the need for a PTTW or registry of the water taking on the EASR, an adequate Erosion and Sediment Control Plan, and/or Discharge/Mitigation Plan will be prepared before construction starts for work near surface water features. • Development of Emergency Preparedness and Spill Response Plan • Implement proper equipment re-fueling procedures	• Develop and implement Emergency Preparedness and Spill Response Plans • Prepare and Implement a Dewatering Management Plan • Apply for PTTW or EASR registration if required, to be evaluated during Detailed Design. MOECC guidance document will be consulted and/or consultation with Ministry staff as appropriate.
Bridge Modifications and/or Replacements	• Install bridge barriers • Install OCS attachments • Install flash plates • Raise bridge • Lower tracks • Replace bridges • Replcae pedestrian bridges	• Temporary groundwater drawdown during subsurface bridge modifications • Contamination of groundwater due to spill of fuels/oils	• Implement appropriate equipment re-fueling procedures	• Prepare and Implement a Dewatering Management Plan • Apply for PTTW or EASR registration if required, to be evaluated during Detailed Design. MOECC guidance document will be consulted and/or consultation with Ministry staff as appropriate. • With respect to bridge replacements, a detailed assessment of any potential groundwater/well impacts will be completed as part of a separate EA Addendum process as outlined in the GO Rail Network Electrification EPR. • The detailed assessment of potential effects relating to Dunn, Dufferin, Jameson, and Dowling bridge replacements will be addressed in further detail as part of the future TPAP Addendum.
Operation/maintenance of OCS	• Tree pruning/maintenance	• Contamination of groundwater due to spill of fuels/oils	• Development of Emergency Preparedness and Spill Response Plan • Implement appropriate equipment re-fueling procedures	• Develop and implement Emergency Preparedness and Spill Response Plans
Construction of Taps/Traction Power Facilities & Gantries	• Construct gantries • Site clearing • Install building foundation • Install prepackaged equipment • Construct building • Grounding and bonding	• Temporary drawdown of groundwater due to construction dewatering • Contamination of groundwater due to spill of fuels/oils during construction • Construction conflict with existing wells within footprint (if any)	• Irrespective of the need for a PTTW or registry of the water taking on the EASR, an adequate Erosion and Sediment Control Plan, and/or Discharge/Mitigation Plan will be prepared before construction starts for work near surface water features. • Development of Emergency Preparedness and Spill Response Plan • Implement appropriate equipment re-fueling procedures • Determine if wells are present within footprint (Allandale, in particular), and decommission in accordance with O. Reg. 903	• Develop and implement Emergency Preparedness and Spill Response Plans • Prepare and Implement a Dewatering Management Plan • Apply for PTTW or EASR registration if required, to be evaluated during Detailed Design. MOECC guidance document will be consulted and/or consultation with Ministry staff as appropriate. • Well survey and well decommissioning, if necessary
Grounding and bonding of TPFs	• Excavate the soil to the required depth (approximately 1m)	• Contamination of groundwater due to spill of	• Development of Emergency Preparedness and Spill Response Plan	• Develop and implement Emergency Preparedness and Spill Response Plans

Project Component	Project Activities	Potential Effect	Mitigation Measures	Monitoring & Commitments
	• Install grounding mats, conductors and rods, as per design • Connect the grounding system internally and with adjacent existing grounding system, where required • Backfill the grounding system, as per design • Install the junction boxes and connect grounding conductors, where required	fuels/oils during construction	• Implement appropriate equipment re-fueling procedures •	
Construction of access roads for traction power facilities	• Site clearing	• Contamination of groundwater due to spill of fuels/oils during construction	• Development of Emergency Preparedness and Spill Response Plan • Implement appropriate equipment re-fueling procedures	• Develop and implement Emergency Preparedness and Spill Response Plans
Installation/construction of underground duct banks	• Excavate soil via open cut method to install duct banks • Install underground cables (feeders) within duct banks • Connect feeders to main gantry • Backfill/restore road(s), as per design	• Temporary drawdown of groundwater due to construction dewatering • Contamination of groundwater due to spill of fuels/oils during construction	• Irrespective of the need for a PTTW or registry of the water taking on the EASR, an adequate Erosion and Sediment Control Plan, and/or Discharge/Mitigation Plan will be prepared before construction starts for work near surface water features. • Development of Emergency Preparedness and Spill Response Plan • Implement appropriate equipment re-fueling procedures	• Develop and implement Emergency Preparedness and Spill Response Plans • Prepare and Implement a Dewatering Management Plan • Apply for and obtain PTTW or EASR registration if required, to be evaluated during Detailed Design. MOECC guidance document will be consulted and/or consultation with Ministry staff as appropriate.
Installation/construction of 25kV aerial feeder lines	• Install pole foundations • Install poles • Install wiring	• Temporary drawdown of groundwater due to construction dewatering • Contamination of groundwater due to spill of fuels/oils during construction	• Development of Emergency Preparedness and Spill Response Plan • Irrespective of the need for a PTTW or registry of the water taking on the EASR, an adequate Erosion and Sediment Control Plan, and/or Discharge/Mitigation Plan will be prepared before construction starts for work near surface water features. • Implement appropriate equipment re-fueling procedures	• Develop and implement Emergency Preparedness Spill Response Plans