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Appendix B3

Ontario Line Project

Lower Don Bridge and Don Yard Early Works – Noise and Vibration Early Works Report

Metrolinx

Noise and Vibration Early Works Report

Ontario Line Lower Don Bridge and Don Yard Early Works

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Project #: 60611173

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AECOM: 2015-04-13

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Executive Summary

ES.1 Ontario Line Early Works Overview and Purpose

The Ontario Line Project (the Project) is being assessed in accordance with Ontario Regulation 341/20: Ontario Line Project under the Environmental Assessment Act. Ontario Regulation 341/20: Ontario Line Project outlines a Project-specific environmental assessment process that includes an Environmental Conditions Report, Environmental Impact Assessment Report, and an opportunity for Early Works Report(s) for assessment of works that are ready to proceed in advance of the Environmental Impact Assessment Report. The Environmental Conditions Report documents the local environmental conditions of the Ontario Line Study Area and provides a preliminary description of the potential environmental impacts from the Project. Information outlined in the Environmental Conditions Report is used to inform the Early Works Report(s) and Environmental Impact Assessment Report, which study environmental impacts in further detail and confirm and refine preliminary mitigation measures identified in the Environmental Conditions Report.

Ontario Line early works are components of the Project that are proposed to proceed before the completion of the Ontario Line environmental impact assessment process. An overview of the Project is provided in **Section 1.2**. Early works are defined in Ontario Regulation 341/20: Ontario Line Project under the Environmental Assessment Act as follows:

> "any components of the Ontario Line Project that Metrolinx proposes to proceed with before the completion of the Ontario Line assessment process, such as station construction, rail corridor expansion, utility relocation or bridge replacement or expansion."

Lower Don Bridge and Don Yard early works are considered to be of strategic importance to enabling the timely implementation of the Project. The early works are being advanced where the Project interfaces with GO Expansion. Advancing early works and supporting environmental and technical studies in this area provides planning and design efficiencies for the Project and GO Expansion and facilitates the timely implementation of both.

AECOM Canada Limited (AECOM) was retained by Metrolinx and Infrastructure Ontario to complete the Ontario Line Final Lower Don Bridge and Don Yard Early Works Report for the Project. This Noise and Vibration Early Works Report (this Report) supports the Ontario Line Final Lower Don Bridge and Don Yard Early Works Report and has been

prepared for the Project to document the assessment of Lower Don Bridge and Don Yard early works (**Figure ES-1**).

The Lower Don Bridge and Don Yard early works will include:

- Construction of a new bridge, north of the existing Lakeshore East rail corridor[1] bridge over the Lower Don River that will carry the Ontario Line tracks;
- Shift of the nearby Union Station and Lakeshore East rail corridor GO tracks, including tracks on the existing rail bridge, to accommodate Ontario Line infrastructure within the Union Station Rail Corridor[2] and Don Yard;
- Modifications to the existing Lakeshore East rail corridor bridge to accommodate Lakeshore East GO track shifts to accommodate Ontario Line infrastructure; and
- Utility and signal infrastructure relocation or protection.

The Lower Don Bridge and Don Yard early works components and construction activities are further described in **Section 1.3**.

Active transportation access across the Lower Don River will be facilitated via a bridge that will provide a multi-use connection across the river. This bridge is not within the scope of these early works, and will be assessed as part of the Ontario Line Environmental Impact Assessment Report.

The purpose of this Report is to:

- Assess the temporary construction noise and vibration associated with the Lower Don Bridge and Don Yard early works; and
- Provide noise and vibration mitigation and monitoring recommendations for future work associated with the Lower Don Bridge and Don Yard early works temporary construction.

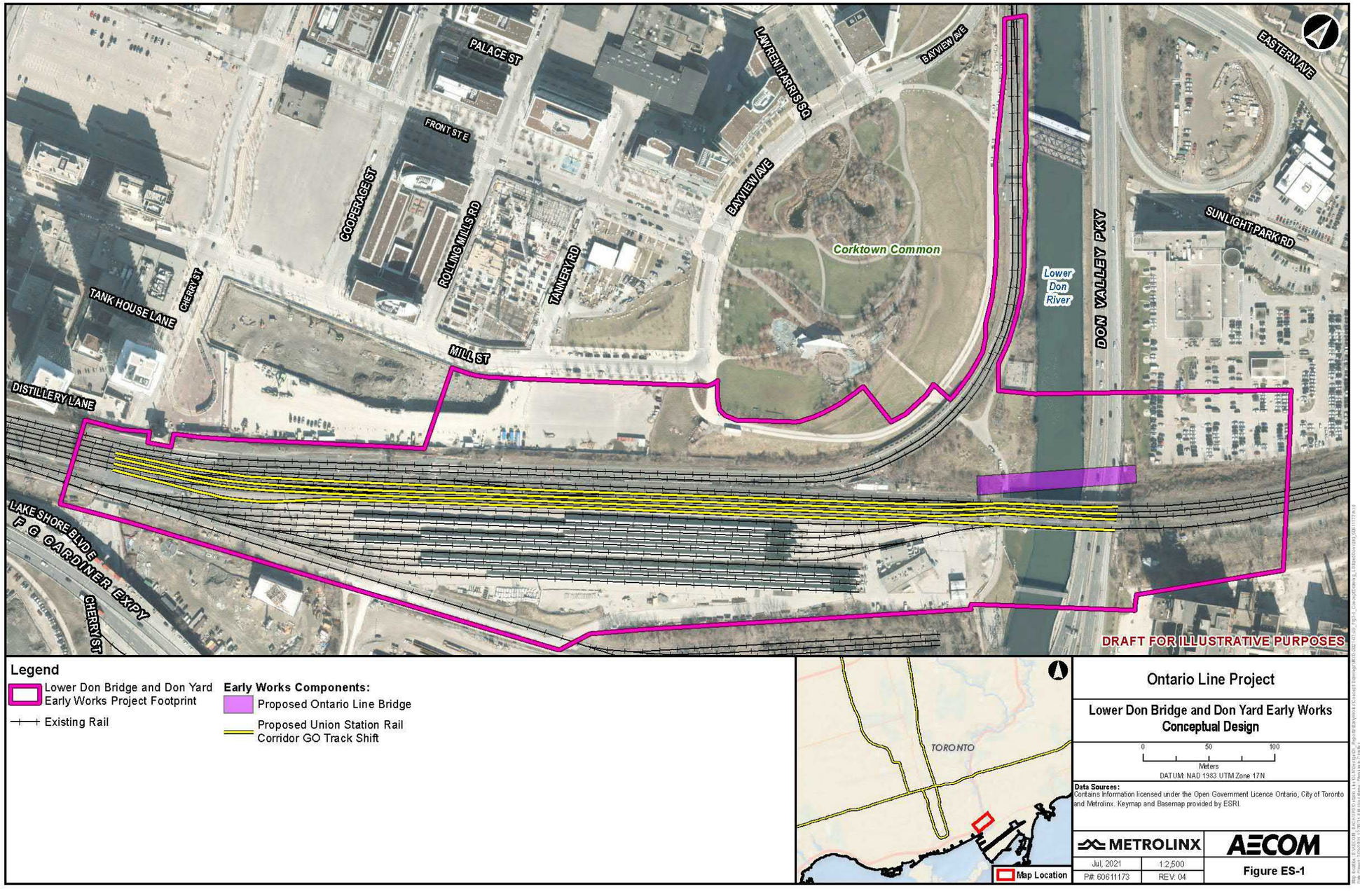
This Report supports the Ontario Line Final Lower Don Bridge and Don Yard Early Works Report prepared for Lower Don Bridge and Don Yard early works in accordance with Ontario Regulation 341/20: Ontario Line Project.

1. Lakeshore East rail corridor extends from the Lower Don River in the City of Toronto to the City of Oshawa.
2. Union Station Rail Corridor extends from approximately west of Bathurst Street to the Lower Don River in the City of Toronto.

Refer to **Section 1** of this Report for more information related to the Project and a detailed early works description.

A glossary of terminology is provided in **Appendix A**.

Figure ES-1: Lower Don Bridge and Don Yard Early Works Conceptual Design



ES.2 Methodology

This Report documents the assessment of Lower Don Bridge and Don Yard early works construction impacts related to noise and vibration. Impacts associated with the Project operations will be addressed as part of the Environmental Impact Assessment Report under a separate cover. Detailed methodology is provided in **Section 3**.

Local Environmental Conditions

AECOM has conducted baseline measurements as described in the Ontario Line Final Environmental Conditions Report (AECOM, 2020a)[3], to characterise the existing noise and vibration levels throughout the proposed Ontario Line Study Area (including areas not associated with the early works). The baseline measurements included collection of continuous noise measurements over several days at locations representative of noise sensitive receivers.

Baseline vibration measurements were not required, as the construction vibration assessment in this Report uses absolute vibration levels, which are not affected by the existing vibration levels. The majority of the early works area, existing vibration levels are expected to be below human perceptibility, except in close proximity to the existing rail lines.

Impact Assessment

Noise and vibration criteria from various sources were reviewed for applicability to the Project; sources include the City of Toronto, the Ministry of the Environment, Conservation and Parks, Metrolinx, and the United States Federal Transit Administration. Criteria from the local sources were applied and supplemented using criteria from the Federal Transit Administration where necessary. Criteria reviewed included:

- Ministry of the Environment, Conservation, and Parks Guideline NPC-115;
- Ministry of the Environment, Conservation, and Parks Guideline NPC-118;
- City of Toronto By-law 878-2019;
- Federal Transit Administration Transit Noise and Vibration Impact Assessment Manual;
- Ministry of the Environment, Conservation, and Parks Guideline NPC-119; and
- City of Toronto By-law 514-2008.

3. The Ontario Line Final Environmental Conditions Report (AECOM, 2020a) was published on November 20, 2020 in accordance with Ontario Regulation 341/20: Ontario Line Project.

A screening was conducted to determine areas which required detailed assessment of specific receivers. Noise and vibration sensitive locations surrounding the early works project sites at the Lower Don Bridge and Don Yard were selected to be representative of the worst-case (located closest to the Lower Don Bridge and Don Yard Early Works Project Footprint) points of reception and selected in accordance with Ministry of the Environment, Conservation and Parks noise and vibration guidelines. Other possible receiver locations would have lower predicted noise and vibration impacts. Noise and vibration levels were predicted in accordance with methods accepted by the Ministry of the Environment, Conservation and Parks and levels were compared against applicable criteria limits for noise and vibration, respectively. Applicable guidelines and criteria are outlined in **Section 2**.

ES.3 Local Environmental Conditions

Noise

The relevant baseline noise results representing the existing local environmental noise conditions for the areas surrounding the Lower Don Bridge and Don Yard early works are summarized in **Table ES-1**. Note that the Wardell Street monitoring location is conservatively representative of the area surrounding Lewis Street, June Callwood Way, and Saulter Street – residential area north-east of the early works location.

Vibration

Baseline vibration measurements were not required, as the construction vibration assessment in this Report uses absolute limits that do not change based upon the existing vibration levels. The local environment does not have any normally occurring sources of perceptible vibration; the most significant source of vibration near the Lower Don Bridge and Don Yard early works are the existing rail lines. Thus, for the majority of the Lower Don Bridge and Don Yard Study Area, existing vibration levels are expected to be below human perceptibility, except in close proximity to the existing rail lines.

ES.4 Potential Impacts, Mitigation Measures and Monitoring Activities

Section 5 and **Section 6** includes information related to potential impacts, mitigation measures, and monitoring activities. Potential impacts may result from early works construction activities, include annoyance, disruption of sleep and other activities, and damage to buildings and other structures due to vibration. A number of mitigation measures and monitoring activities are recommended to minimize the potential impacts during construction.

Refer to **Table ES-2** for a complete list of potential impacts, mitigation measures, and monitoring activities for the Lower Don Bridge and Don Yard early works.

Table ES-1: Relevant Baseline Noise Measurement Data

Monitoring Location	Daytime (07:00-19:00) Average $L_{eq, 1hr}$ (dBA)	Daytime (07:00-19:00) Min $L_{eq, 1hr}$ (dBA)	Daytime (07:00-19:00) Max $L_{eq, 1hr}$ (dBA)	Evening (19:00-23:00) Average $L_{eq, 1hr}$ (dBA)	Evening (19:00-23:00) Min $L_{eq, 1hr}$ (dBA)	Evening (19:00-23:00) Max $L_{eq, 1hr}$ (dBA)	Night (23:00-07:00) Average $L_{eq, 1hr}$ (dBA)	Night (23:00-07:00) Min $L_{eq, 1hr}$ (dBA)	Night (23:00-07:00) Max $L_{eq, 1hr}$ (dBA)
MO_02S Wardell Street	64	61	66	62	59	63	52	43	63
MO_03S Mill Street	64	63	65	64	65	63	58	50	66

Table ES-2: Potential Noise and Vibration Impacts, Mitigation Measures and Monitoring Activities for the Lower Don Bridge and Don Yard Early Works

Environmental Component	Potential Impacts	Mitigation Measure(s)	Monitoring Activities
Construction Noise	■ Environmental noise may cause annoyance and disturb sleep and other activities. ■ The severity of the noise effects resulting from construction projects varies, depending on: – Scale, location and complexity of the Project – Construction methods, processes and equipment deployed – Total duration of construction near sensitive noise receivers – Construction activity periods (days, hours, time period) – Number and proximity of noise-sensitive sites to construction area(s)	■ Construction noise impact mitigation measures to be considered include but are not limited to the following to meet applicable noise criteria: – Siting construction staging and laydown areas to avoid/reduce adverse impacts to sensitive receptors where feasible. – Use construction equipment compliant with noise level specifications in Ministry of Environment, Conservation, and Parks guidelines NPC-115 and NPC-118. – Keep equipment in good working order and operate with effective muffling devices. – Equipment enclosures for equipment such as generators and compressors. – Additional equipment silencers/mufflers. – Use of upgraded construction hoarding (considering requirements from Canadian Standards Association Z107.9 for noise barriers) between construction equipment and noise sensitive receivers. – Use of localized movable noise barriers/screens for specific equipment and operations. – Minimize simultaneous operation of equipment where feasible. – Implement a no idling policy on site (unless necessary for equipment operation). – Restrict construction hours where feasible: • Perform construction during daytime hours where feasible. If night time construction is necessary, the activities with the highest noise levels should be conducted during day time periods where feasible. • If construction will occur outside of normal daytime hours, inform local residents before construction of type of construction and expected duration outside of daytime hours. • Consider construction duration limits for construction near 90 Distillery Lane (night), future 125/131 Mill Street, 170 Mill Street (night), 180-190 Mill Street, future 495 Front Street East, 502 Front Street East (night), 170 Bayview Avenue (night), and 77 East Don Roadway (night). ■ Limit the number of heavy trucks on site to the minimum required. ■ Stage construction vehicles away from noise sensitive locations, if feasible. ■ Establish and apply project-specific construction noise criteria/exposure limits. ■ Undertake noise monitoring and regular reporting throughout the construction phase. Where noise level limits are exceeded, additional noise mitigation measures shall be implemented. ■ Review construction and occupation timelines for new noise sensitive development in West Don Lands. As the completion date of these new noise sensitive receivers relative to the early works construction period is not yet determined, mitigation may be adjusted based upon the new developments (unoccupied as of June 2021) construction/occupation schedule. ■ Develop a communications protocol which includes timely resolution of complaints. ■ Additional mitigation measures not listed above may be considered.	■ Noise levels will be monitored where the impact assessment indicates that noise limits may be exceeded, to identify if any additional mitigation is required and verify mitigation measures(s) effectiveness. ■ Continuous noise monitoring should be completed at each geographically distinct active construction site associated with the Project with monitor(s) located strategically to capture the worst-case construction related noise levels at receptor locations based on planned construction activities, their locations, and the number, geographic distribution and proximity of noise sensitive receptors. ■ Monitoring at locations where there are persistent complaints, as required.
Construction Vibration	■ Exposure to vibration may result in public annoyance and complaints. Vibration may also cause damage to buildings and other structures.	■ Construction vibration impact mitigation measures to be considered include but are not limited to the following to meet applicable vibration criteria: – Siting construction staging and laydown areas to avoid/reduce adverse impacts to sensitive receptors where possible. – Utilize equipment with low vibration emissions where possible. – Off-site construction of components away from sensitive areas. – Restrict construction hours where feasible: • Perform construction during daytime hours where feasible. If night time construction is necessary, the activities with the highest vibration levels should be conducted during the daytime periods where feasible. – Review vibration assessment based upon refined site staging, construction areas/equipment, and building locations prior to the commencement of construction, and update if necessary. – Review and refine the construction activities to avoid potential impacts to the Unilever Soap Factory building at 21 Don Roadway, a structure located at the car dealership at 11 Sunlight Park Road, the Cherry Street Interlocking Tower at 385	■ Monitoring will be undertaken at locations within the Zone of Influence to ensure compliance with the City of Toronto By-law 514-2008 and to identify the need for additional mitigation if required. ■ Monitoring will be undertaken to ensure compliance with other applicable vibration level limits identified, as required. ■ Monitoring will be undertaken to verify mitigation measure(s) effectiveness.

Environmental Component	Potential Impacts	Mitigation Measure(s)	Monitoring Activities
		Cherry Street, Parking structure at 70 Distillery Lane (note that the parking structure appears to extend under 370 Cherry Street).Conduct monitoring and pre-construction inspections in accordance with City of Toronto By-law 514-2008. Monitoring and preconstruction requirements can be determined by calculation of Zone of Influence of construction equipment. – Provide smooth surfaces for trucks to travel and route heavily loaded trucks away from vibration sensitives sites where possible. – Operate construction equipment on lower vibration settings where available. – Maximize distance between equipment and sensitive receivers while receivers where feasible. – Establish and apply project-specific construction vibration criteria limits. – Review the vibration limits for the Cherry Street Interlocking Tower at 385 Cherry Street. It has been noted in the Ontario Line Cultural Heritage Report (AECOM, 2020b) that the Cherry Street Interlocking Tower was built to withstand vibration; however, the design vibration limits should be confirmed by a qualified specialist during the next phases of design. – Do not operate equipment where the City of Toronto By-law 514-2008 prohibited limits are predicted to be exceeded. Alternative construction methods and/or equipment with lower vibration emissions or power settings can be used if they do not exceed the City of Toronto's prohibited vibration limits. – As Project planning and design progress, conduct a review to identify any sensitive structures/operations that require more stringent vibration limits than the limits in City of Toronto By-law 514-2008; assess requirements, review/revise vibration limits for these locations and, if necessary, develop mitigation measures. US Federal Transit Administration Report No. 0123, Transit Noise and Vibration Impact Assessment Manual (2018) could be used as a source of additional criteria. – Develop communications protocol which includes timely resolution of complaints. – Additional mitigation measures not listed above may be considered.	■ Pre-construction building inspection of the potentially impacted buildings adjacent to the early works construction sites are to be undertaken in accordance with City of Toronto By-law 514-2008. Continuous vibration monitoring along the construction site property lines closest to these structures will be initiated as warranted. ■ Monitoring at locations where there are persistent complaints, if required.

The predicted construction levels are estimates based on conservative assumptions, reference equipment levels and the Lower Don Bridge and Don Yard early works information available to date (Lower Don Bridge and Don Yard Early Works Project Footprint and construction activities). Results may vary as information on construction methods and techniques, equipment, and construction areas are refined. If project-specific noise and vibration limits are exceeded during construction, the prediction models can be used to determine which sources are causing the greatest impacts, and mitigation can be investigated for those specific sources.

Noise

Section 5 includes relevant assumptions and key inputs into the assessment of construction noise. Construction noise levels were predicted and compared against applicable criteria. Analysis of the results indicated that criteria may be exceeded, and thus mitigation measures are required.

Noise screening was conducted to determine if detailed noise predictions would be required. Results showed that there are noise sensitive receivers within the noise screening area, thus detailed noise predictions are required.

Noise predictions were conducted and indicated that noise level criteria can be exceeded at the nearest noise sensitive receivers, with mitigation measures required to meet the noise level criteria.

Mitigation measures to meet criteria are to be further refined as project planning progresses, and can include restriction on hours of operation, inclusion of upgraded construction hoarding/temporary movable barriers between construction noise sources and sensitive points of reception, enclosures and silencers. Noise monitoring may be required where noise level limits may be exceeded. See **Table ES-2** for further details.

A number of general as well as site-specific noise mitigation recommendations and monitoring strategies have been compiled and are outlined in **Section 6**.

Vibration

Section 5 includes relevant assumptions and key inputs into the assessment of construction vibration. Vibration Zones of Influence were calculated and mapped in accordance with the City of Toronto construction vibration by-law. The mapping was used to determine if any buildings would fall within areas where there is potential for building damage and vibration monitoring is expected to be required.

Analysis of the results indicated that mitigation measures are required. Mitigation measures are to be further refined and updated as project planning progresses and may

include operating equipment at lower vibration settings and using alternative construction methods.

A number of as well as site-specific vibration mitigation recommendations and monitoring strategies have been compiled and are outlined in **Section 6**. Vibration monitoring is required for structures within the Zone of Influence.

ES.5 Permits and Approvals

As noted in **Section 7**, at this time, provincial noise or vibration permits or approvals are not anticipated to be required. This will be confirmed as project planning progresses.

A construction vibration control form is typically required to accompany a building permit as per the City of Toronto By-law 514-2008. This will be confirmed during design and implementation phases of the Lower Don Bridge and Don Yard early works.

Should a building permit be required, Metrolinx will consult with the City of Toronto.

Metrolinx as a Crown agency of the Province of Ontario is exempt from certain municipal processes and requirements. In these circumstances, Metrolinx will engage with the municipalities to incorporate municipal requirements as a best practice, where practical, and may obtain associated permits and approvals.

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Appendices

1. Introduction

1.1 Purpose of the Ontario Line Early Works

The Ontario Line Project (the Project) is being assessed in accordance with Ontario Regulation 341/20: Ontario Line Project under the Environmental Assessment Act. Ontario Regulation 341/20: Ontario Line Project outlines a Project-specific environmental assessment process that includes an Environmental Conditions Report, Environmental Impact Assessment Report, and an opportunity for Early Works Report(s) for assessment of works that are ready to proceed in advance of the Environmental Impact Assessment Report. The Environmental Conditions Report documents the local environmental conditions of the Ontario Line Study Area and provides a preliminary description of the potential environmental impacts from the Project. Information outlined in the Environmental Conditions Report is used to inform the Early Works Report(s) and Environmental Impact Assessment Report, which study environmental impacts in further detail and confirm and refine preliminary mitigation measures identified in the Environmental Conditions Report.

Ontario Line early works are components of the Project that are proposed to proceed before the completion of the Ontario Line environmental impact assessment process. An overview of the Project is provided in **Section 1.2**. Early works are defined in Ontario Regulation: 341/20: Ontario Line Project under the Environmental Assessment Act as follows:

> "any components of the Ontario Line Project that Metrolinx proposes to proceed with before the completion of the Ontario Line assessment process, such as station construction, rail corridor expansion, utility relocation or bridge replacement or expansion."

Lower Don Bridge and Don Yard early works are considered to be of strategic importance to enabling the timely implementation of the Project. These early works are being advanced where the Project interfaces with GO Expansion. Advancing early works and supporting environmental and technical studies in this area provides planning and design efficiencies for the Project and GO Expansion and facilitates the timely implementation of both. Lower Don Bridge and Don Yard early works are described in detail in **Section 1.3**.

1.1.1 Purpose of this Report

AECOM Canada Limited (AECOM) was retained by Metrolinx and Infrastructure Ontario to complete the Ontario Line Lower Don Bridge and Don Yard Early Works Report for the Project. This Noise and Vibration Early Works Report (this Report) supports the Ontario Line Final Lower Don Bridge and Don Yard Early Works Report and has been prepared for the Project to document the assessment of Lower Don Bridge and Don Yard early works (**Figure 1-1**). The early works components and construction activities are described in **Section 1.3**.

The purpose of this Report is to:

- Assess the temporary construction noise and vibration impacts due to the Lower Don Bridge and Don Yard early works; and,
- Provide noise and vibration mitigation and monitoring recommendations for the Lower Don Bridge and Don Yard early works temporary construction.

This Report has been prepared in accordance with Ontario Regulation 341/20: Ontario Line Project and contains the information outlined in **Table 1-1**.

A glossary of terminology is provided in **Appendix A**.

Table 1-1: Report Contents in Accordance with Ontario Regulation 341/20: Ontario Line Project

Reg. Section	Requirement	Report Section
Section 8(2)(2)	The rationale for proceeding with the early works.	**Section 1.1**
Section 8(2)(4)	A description of the local environmental conditions at the site of the early works.	**Section 4**
Section 8(2)(6)	Metrolinx's assessment and evaluation of the impacts that the preferred method of carrying out the early works and other methods might have on the environment, and Metrolinx's criteria for assessment and evaluation of those impacts.	**Section 5**
Section 8(2)(7)	A description of any measures proposed by Metrolinx for mitigating any negative impacts that the preferred method of carrying out the early works might have on the environment.	**Section 6**
Section 8(2)(8)	A description of the means Metrolinx proposes to use to monitor or verify the effectiveness of mitigation measures proposed.	**Section 6**
Section 8(2)(9)	A description of any municipal, provincial, federal or other approvals or permits that may be required for the early works.	**Section 7**

1.2 Ontario Line Project Overview

Metrolinx, an agency of the Province of Ontario, is proceeding with the planning and development of the Ontario Line, extending from Exhibition/Ontario Place to the Ontario Science Centre in the City of Toronto.

The Project is a new approximately 15.6 kilometre subway line with connections to Line 1 (Yonge-University) subway service at Osgoode and Queen Stations, Line 2 (Bloor-Danforth) subway service at Pape Station, and Line 5 (Eglinton Crosstown) light rail transit service at the future Science Centre Station. Fifteen stations are proposed, with additional connections to three GO Transit lines (Lakeshore East, Lakeshore West and Stouffville), and the Queen, King, Bathurst, Spadina, Harbourfront, and Gerrard/Carlton streetcar routes. The Project will reduce crowding on Line 1 and provide connections to new high-order rapid transit neighbourhoods. The Project will be constructed in a dedicated right-of-way with a combination of elevated (i.e., above existing rail corridor/roadway), tunnelled (i.e., underground), and at-grade (i.e., at grade with existing rail corridor/roadway) segments at various locations.

1.3 Early Works Description

1.3.1 Project Description

The Lower Don Bridge and Don Yard early works will include:

- Construction of a new bridge, north of the existing Lakeshore East rail corridor[4] bridge over the Lower Don River that will carry the Ontario Line tracks;
- Shift of the nearby Union Station and Lakeshore East rail corridor GO tracks, including tracks on the existing rail bridge, to accommodate Ontario Line infrastructure within the Union Station Rail Corridor[5] and Don Yard;
- Modifications to the existing Lakeshore East rail corridor bridge to accommodate Lakeshore East GO track shifts to accommodate Ontario Line infrastructure; and
- Utility and signal infrastructure relocation or protection.

Rail corridor and third-party utility relocations and protection will be completed to facilitate the work described above as well as the future Ontario Line tunnel facilities.

4. Lakeshore East rail corridor extends from the Lower Don River in the City of Toronto to the City of Oshawa.
5. Union Station Rail Corridor extends from approximately west of Bathurst Street to the Lower Don River in the City of Toronto.

Utilities to be relocated include, but are not limited to, Bell 360 and existing Canadian National/GO signal underground fibre optic cables.

The Lower Don Bridge and Don Yard early works components are shown in **Figure 1-1**.

Active transportation access across the Lower Don River will be facilitated via a bridge that will provide a multi-use connection across the river. This bridge is not within the scope of these early works, and will be assessed as part of the Ontario Line Environmental Impact Assessment Report.

1.3.2 Early Works Project Footprint and Study Area

The Lower Don Bridge and Don Yard Early Works Project Footprint, shown in **Figure 1-2**, is defined as the area of direct disturbance associated with the early works construction activities, including anticipated required construction staging and laydown areas and construction access. Construction is anticipated to occur primarily within the existing Metrolinx right-of-way. The extent of lands anticipated to be temporarily impacted by construction staging/laydown and access will continue to be refined and reduced to the extent feasible as project planning progresses. The Lower Don Bridge and Don Yard Early Works Project Footprint extends from approximately 150 metres east of the Don Valley Parkway in the east to approximately 400 metres west of the Lower Don River in the west, and from south of Eastern Avenue along the Richmond Hill rail corridor to approximately 100 metres south of the Lakeshore East rail corridor.

For the purpose of this Report, the Lower Don Bridge and Don Yard Study Area, also shown in **Figure 1-2**, includes the Lower Don Bridge and Don Yard Early Works Project Footprint and an approximately 250 metre buffer based upon the night time noise screening distance.

The Lower Don Bridge and Don Yard Study Area was developed using noise and vibration screening areas which were determined by calculating the distances where the applicable criteria are predicted to be met, using conservative approach where it was assumed that all construction equipment listed in **Table 3-1** would be active. The approximately 250 metre night time noise screening area was the largest and was thus used to define the Lower Don Bridge and Don Yard Study Area.

The Lower Don Bridge and Don Yard Study Area assessed in this Report is specific to the noise and vibration impact assessment. The study areas for other environmental disciplines are outlined in the Ontario Line Final Lower Don Bridge and Don Yard Early Works Report.

1.3.3 Construction Activities

Table 1-2 provides a description of the anticipated construction activities for the Lower Don Bridge and Don Yard early works. These typical activities serve as the basis for the assessment of construction-related potential environmental impacts. These activities may be expanded, further refined, or found to be unnecessary as project planning progresses.

Table 1-2: Anticipated Construction Activities for the Ontario Line Lower Don Bridge and Don Yard Early Works

Anticipated Construction Activity	Description	Associated Equipment
Site Preparation	■ Mobilization of equipment and temporary facilities to the site. ■ Clearing and grubbing of vegetation, tree removal and protection. ■ Erection of temporary and permanent fences. ■ Installation of environmental management features (e.g., erosion and sediment controls). ■ Dewatering works.	■ Site compaction equipment and grading equipment. ■ Vegetation removal equipment. ■ Excavation equipment. ■ Haulage/dump trucks.
Site Servicing/ Removals/ Demolition	■ Relocation and/or extension of services and utilities on the site; which may include both underground and aerial services and utilities (e.g., sewers, water, electrical, communications, gas). This may also involve installation of utilities within the site. Includes utilities on the rail corridor and off the rail corridor. ■ Demolition and removal of Metrolinx owned buildings in Don Yard. ■ Removal and reinstatement of railway track.	■ Excavation equipment including backhoe, dump trucks, spoil removal equipment, jackhammers. ■ Track stabilizer. ■ Hand tools. ■ Mobile crane. ■ Flatbed truck. ■ Boom truck. ■ Spreader for track work.
Excavating and Grading	■ Excavation and grading activities may involve earth-moving activities and stockpiling, as applicable. Excavated material will be accommodated on-site on the degree practicable; however, where necessary, surplus material will be disposed of off-site at an approved facility. ■ Any off-site disposal shall be done in compliance with applicable law, including as it relates to contaminated material that may be encountered. ■ Any groundwater encountered will be managed and disposed of in accordance with applicable regulations.	■ Site compaction equipment and general grading equipment, dump trucks, soil removal equipment. ■ Groundwater pumping equipment. ■ Excavation equipment including backhoe, dump trucks, soil removal equipment, jack hammers.

Anticipated Construction Activity	Description	Associated Equipment
Construction, Rehabilitation and/or Alteration of Bridge	■ All structures will be constructed using standard civil construction techniques ■ In-water works/works below high-water mark may be required. ■ Includes grounding and bonding. ■ Pile installation, foundations, abutments, retaining walls, bridge girders, decking, backfilling, concrete demolition. ■ Driving / installing rock bolts. ■ Compaction / backfilling / grading	■ Foundation placement equipment. ■ Augured piles or rammed aggregate piers. ■ Drill rigs. ■ Mobile cranes and hoists. ■ Concrete trucks, pumps and vibrators. ■ Flatbed trucks, cranes. ■ Bulldozer and excavator. ■ Jackhammer. ■ Front end loaders. ■ Triaxle dump trucks. ■ Rock bolt equipment ■ Hydrovac equipment
Construction of Ancillary Facilities	■ Ancillary facilities may include electrical transformer/supply equipment.	■ Flatbed trucks, cranes, concrete trucks. ■ Backhoe, pavement excavation equipment. ■ Mobile cranes and hoists. ■ Concrete trucks, pumps and vibrators. ■ Office trailers, generators, temporary hygienic facilities
Temporary Track Diversion/Permanent Track Shifts	■ Grading. ■ Temporary drainage. ■ Relocation/installation of tracks, as required. ■ Temporary relocation of signals, as required. ■ Clear delineation and protection between active rail service and construction work zones. ■ Provision of GO signal overhead bridge support/ protection and temporary GO ballast track protection.	■ Site compaction equipment and general grading equipment, dump trucks, spoil removal equipment. ■ Thermal welding. ■ Tie placement (cranes, lifting equipment). ■ Ballast placement equipment. ■ Temporary concrete barriers. ■ Surfacing equipment, stabilizers, tampers.
Temporary Road / Trail / Multi-Use Path Closures	■ Temporary road/trail/multi-use path closures, as required.	■ Temporary traffic control devices such as signs, signals, barriers, traffic barrels.
Management of Stormwater	■ All precipitation falling within the site will be managed as stormwater within a designed system of collection, conveyance, retention and discharge features, as required. The system will be designed and operated in compliance with applicable standards and regulatory requirements. Surface flows within the site will be managed within the site to ensure discharge to off-site receivers (i.e., municipal storm sewers) is appropriate in terms of water quantity and quality.	■ Site compaction equipment and general grading equipment. ■ Groundwater pumping.

Figure 1-1: Lower Don Bridge and Don Yard Early Works Conceptual Design

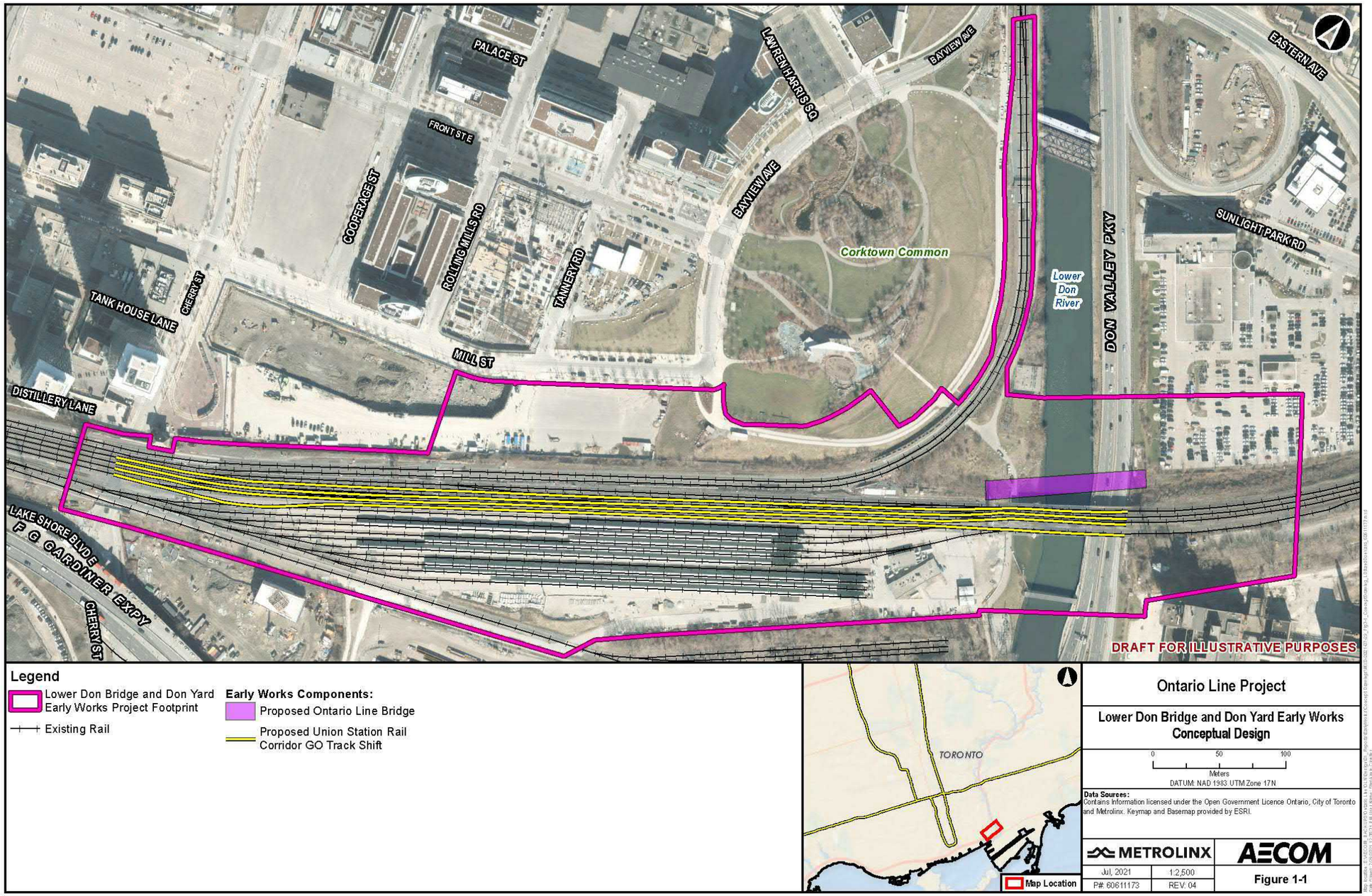
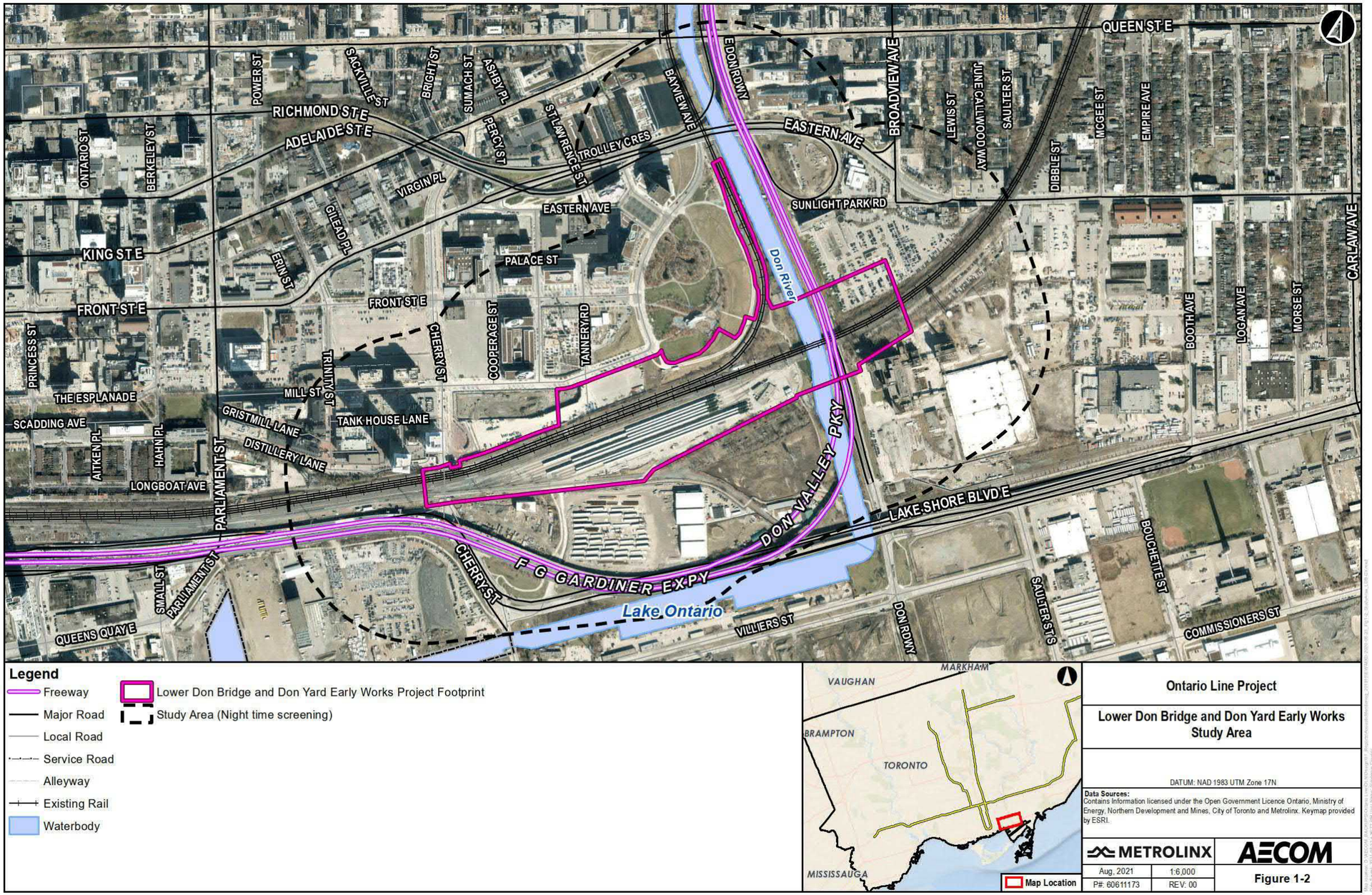


Figure 1-2: Lower Don Bridge and Don Yard Early Works Project Footprint and Lower Don Bridge and Don Yard Study Area



Legend

- Freeway
- Major Road
- Local Road
- Service Road
- Alleyway
- Existing Rail
- Waterbody
- Lower Don Bridge and Don Yard Early Works Project Footprint
- Study Area (Night time screening)

Ontario Line Project

Lower Don Bridge and Don Yard Early Works Study Area

DATUM: NAD 1983 UTM Zone 17N

Data Sources:
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Figure 1-2

2. Applicable Guidelines and Criteria

The guidelines, criteria, and municipal by-laws applicable to the early works construction noise and vibration are summarized in the subsections below.

2.1 Noise

2.1.1 Ministry of the Environment, Conservation and Parks

For construction noise, the Ministry of the Environment, Conservation, and Parks sets out noise emission standards for various types of construction equipment in their publications NPC-115 (Ministry of the Environment, 1978) and NPC-118 (Ministry of the Environment, 1978). The sound emission standards outlined in NPC-115 and NPC-118, for typical construction equipment and vehicles, are reproduced in the **Table 2-1** to **Table 2-5** below.

Table 2-1: NPC-115 Quiet Zone and Residential Area Sound Emission Standards for Excavation Equipment, Dozers, Loaders, Backhoes or Other Equipment Capable of Being used for Similar Application

Date of Manufacture	Maximum Sound Level (dBA) as determined using Publication NPC-103 – Procedures Section 6 Power Rating Less than 75 kilowatts	Maximum Sound Level (dBA) as determined using Publication NPC-103 – Procedures Section 6 Power Rating 75 kilowatts and Larger
January 1, 1979 to December 31, 1980	85	88
January 1, 1981 and after	83	85

Table 2-2: NPC-115 Sound Emission Standards for Pneumatic Pavement Breakers

Standard	Date of Manufacture	Maximum Sound Level (dBA) as measured using Publication NPC-103
Quiet Zone Sound Emission	January 1, 1979 and after	85
Residential Area Sound Emission	January 1, 1979 to December 31, 1980	90
Residential Area Sound Emission	January 1, 1981 and after	85

Table 2-3: NPC-115 Sound Emission Standards for Portable Air Compressors

Standard	Date of Manufacture	Maximum Sound Level (dBA) as measured using Publication NPC-103
Quiet Zone Sound Emission	January 1, 1979 to December 31, 1980	76
Quiet Zone Sound Emission	January 1, 1981 and after	70
Residential Area Sound Emission	January 1, 1979 and after	76

Table 2-4: NPC-115 Sound Emission Standards for Tracked Drills

Standard	Date of Manufacture	Maximum Sound Level (dBA) as measured using Publication NPC-103, Section 6
Quiet Zone and Residential Area Sound Emission	January 1, 1981 and after	100

Table 2-5: NPC-118 Sound Emission Standards for Heavy Vehicles with Governed Diesel Engines

Date of Manufacture	Maximum Sound Level (dBA) as measured using Publication NPC-103, Section 9
Prior to January 1,1979	100
January 1, 1979 and after	95

2.1.2 Municipal Guidelines

Construction noise in the City of Toronto is typically addressed using City of Toronto Noise By-law 878-2019 (City of Toronto, 2019). However, as the Project qualifies as “Government Work” as per By-law 878-2019 (exempt from By-law requirements), the Project is exempt from the City of Toronto’s Noise By-law.

2.1.3 Other Guidance

Receiver based noise level limits provide a basis for the assessment of construction noise impacts to communities from construction over extended periods of time. The United States Federal Transit Administration’s Transit Noise and Vibration Impact Assessment Manual (United States Federal Transit Administration, 2018 – referred to as the Federal Transit Administration Guide) is widely used as a reference for

construction noise and vibration impact assessment and the eight-hour criteria have been used in past Metrolinx noise impact assessments.

The average daytime criterion is defined as a rolling eight-hour (any consecutive eight hours during a time period longer than eight hours) energy average ($L_{eq, 8hr}$) over the course of the daytime, which is defined as 07:00 to 23:00 (Ministry of the Environment, 2013) for noise assessments in Ontario; this daytime noise level limit is 80 dBA. The average night time criterion is defined as the eight-hour energy average ($L_{eq, 8hr}$) during the night time, which is defined as 23:00 to 07:00 (Ministry of the Environment, 2013); this night time noise level limit is 70 dBA. These assessment criteria have been adopted for use in the Lower Don Bridge and Don Yard early works construction noise impact assessment and are summarized in **Table 2-6**.

Table 2-6: Adopted Construction Noise Assessment Criteria

Time Period	Criteria ($L_{eq, 8hr}$)
Daytime (07:00 – 23:00)	80 dBA
Night time (23:00 – 07:00)	70 dBA

2.2 Vibration

2.2.1 Ministry of the Environment, Conservation and Parks

The Ministry of the Environment, Conservation and Parks regulates vibration from blasting operations using NPC-119 (Ministry of the Environment, 1978), and impulse vibration from stationary facilities such as forging shops using NPC-207 (Ministry of the Environment, 1983). As blasting is not proposed for the Project, and NPC-207 is only applicable to long term operation of a stationary source of vibration, Ministry of the Environment, Conservation and Parks does not have any guidelines applicable to construction vibration associated with the Lower Don Bridge and Don Yard early works.

2.2.2 Municipal Guidelines

The City of Toronto regulates construction vibration using By-law 514-2008 (City of Toronto, 2008). By-law 514-2008 sets out a screening area (Zone of Influence) where vibration levels are predicted to exceed 5 millimetres per second. Should this Zone of Influence extend beyond the boundaries of the construction site, construction vibration monitoring, preconstruction surveys, and pre-construction consultation with property owners and occupants within the Zone of Influence are required. Furthermore, By-law 514-2008 defines vibration limits (prohibited levels) for various frequencies that must not be exceeded. The City of Toronto prohibited vibration levels are presented in **Table 2-7** below.

Table 2-7: City of Toronto Prohibited Vibration Levels

Frequency of Vibration (Hz)	Vibration Peak Particle Velocity (mm/s)
Less than 4	8
4 to 10	15
More than 10	25

As Project planning and design progress, other criteria/vibration limits that may apply such as the City of Toronto Specification GN117SS which includes limits for trunk sewers and bridge structures may be considered and implemented.

2.2.3 Other Guidance

Construction vibration can be a concern for felt vibration and annoyance. To review the potential for vibration to be felt, the typical threshold for vibration annoyance (0.14 millimetres per second root mean square velocity, in accordance with the Ministry of the Environment and Energy and GO Transit, 1994) for operational vibration sources was used as the basis for the review.

Buildings potentially more susceptible to vibration damage, such as structures on heritage designated or listed properties, can be a factor in the analysis of construction vibration. The Federal Transit Administration Guide includes vibration damage criteria for buildings classified as “extremely susceptible to vibration damage”. The limit is 0.12 inches per second, (equivalently 3.0 millimetres per second). This limit has been adopted for the assessment of the potential construction vibration impacts to known or potential built heritage resources (i.e. buildings/structures with known or potential heritage significance).

3. Methodology

This Report documents the assessment of Lower Don Bridge and Don Yard early works construction impacts related to noise and vibration. Impacts associated with Project operations will be addressed as part of the Environmental Impact Assessment Report, under separate cover. Noise and vibration impacts due to the construction of the early works are temporary and will cease once construction has been completed.

3.1 Local Environmental Conditions

AECOM has conducted baseline measurements as described in the Ontario Line Final Environmental Conditions Report (AECOM, 2020a)[6], to characterise the existing noise and vibration levels within the Ontario Line Study Area.

Data relevant to the Lower Don Bridge and Don Yard early works construction have been included in **Section 4** below.

Continuous noise measurements were collected over several days at locations representative of noise sensitive receivers. Noise measurements were conducted using Quest SoundPro Type 1 and 2 sound level meters. Data collected during inclement weather conditions were discounted from statistical analysis.

Baseline vibration measurements were not required, as the construction vibration assessment in this Report uses absolute limits that do not change based upon the existing vibration levels. The local environment does not have any normally occurring sources of perceptible vibration; the most significant source of vibration near the early works locations are the existing rail lines. Thus, for the majority of the Lower Don Bridge and Don Yard Study Area, existing vibration levels are expected to be below human perceptibility, except in close proximity to the existing rail lines.

3.2 Impact Assessment

The early works impact assessment and development of mitigation measures and monitoring activities considered the following:

- Lower Don Bridge and Don Yard early works components as described in **Section 1.3.1**;

6. The Ontario Line Final Environmental Conditions Report (AECOM, 2020a) was published on November 30, 2020 in accordance with Ontario Regulation 341/20: Ontario Line Project.

- The Lower Don Bridge and Don Yard Early Works Project Footprint and Lower Don Bridge and Don Yard Study Area as described in **Section 1.3.2**;
- Lower Don Bridge and Don Yard construction activities as described in **Section 1.3.3**; and,
- Local environmental conditions within the Lower Don Bridge and Don Yard Study Area as described in **Section 4**.

Noise and vibration criteria from various sources – City of Toronto, the Ministry of the Environment, Conservation and Parks, and the United States Federal Transit Administration - were reviewed for applicability to the Project. Criteria from the Federal Transit Administration Guide was used to supplement local criteria. Criteria reviewed and adopted for this assessment are summarized in **Section 2**.

Mitigation measures and monitoring activities have been recommended to mitigate the identified potential negative impacts within the Lower Don Bridge and Don Yard Study Area. The results of the impact assessment are provided in **Section 5,** and recommended mitigation measures and monitoring activities outlined in **Section 6**.

Please note that the impact assessment will be updated prior to commencement of construction using the most up-to-date information on construction methods and techniques, equipment, and refined construction areas, as required.

3.2.1 Noise

The construction noise assessment evaluated the potential impacts to the nearby noise sensitive receivers. Noise sensitive receivers are defined as properties that accommodate a dwelling unit(s), used for noise sensitive commercial purposes, sleeping facilities, or noise sensitive institutional purposes such as educational facilities.

First, a noise screening was conducted to determine if receptor-specific noise predictions were required. The noise screening was completed by determining the distances where the day or night time criteria are predicted to be met, assuming all construction equipment in **Table 3-2** was active, using a conservative approach to determine the screening distance, which assumed flat ground and no shielding or other noise attenuation effects (see **Appendix B**). The screening distances were then used to create screening areas on maps to determine if any possible sensitive receivers were located within the screening areas (see **Section 5.1**). Assessed representative receptors were selected based upon their location within the noise screening area and their proximity to the Lower Don Bridge and Don Yard Early Works Project Footprint, as receptors located further away would have lower noise impacts from the Project. The assessed representative noise receptors are further described in **Section 5.1**.

Noise predictions at selected representative receptors include the modeling of various scenarios, using detailed noise calculation algorithms which can account for building and geometric noise shielding effects, ground effects, and air attenuation. The receptor-specific noise predictions were conducted for the nearest (to the Lower Don Bridge and Don Yard Early Works Project Footprint) noise sensitive receivers (closest and highest noise exposures). Note that west of the Lower Don Bridge and Don Yard Early Works Project Footprint, there are future proposed residential mixed-use developments, the nearest of which is at 125/131 Mill Street[7]. The completion dates for the construction of the future noise sensitive receivers, and the early works construction period are not yet determined; and thus these locations have been included in the analysis.

An acoustic model using the International Organization for Standardization 9613 (International Organization for Standardization, 1996) prediction algorithms was prepared. As the construction equipment cannot all operate in the same physical position, the equipment was modelled as operating over an area closest to the assessed representative receiver. Activities that can only occur at certain locations, for example rail works and bridge construction, was modeled at those specific locations.

For the purpose of this study, a conservative approach was used where it was assumed that equipment could operate anytime.

Other assumptions include:

- Adjacent residential properties were assumed to be occupied by residents over the course of construction; and
- Ground absorption would have a negligible effect and has been set to zero.

The predicted construction noise levels are estimates based on conservative assumptions, reference equipment noise levels and the Lower Don Bridge and Don Yard early works information (Lower Don Bridge and Don Yard Early Works Project Footprint and construction activities as outlined in **Section 1.3**) available to date. Results were compared to guideline limits and mitigation recommendations were made to reduce the noise impacts. The impact assessment and assumptions shall be reviewed prior to the commencement of construction using the most up-to-date information on construction methods and techniques, equipment, and refined construction areas, and updated if required. If noise levels limits are exceeded during construction, the noise prediction model can be used to determine which noise sources are causing the greatest impacts, and mitigation can be investigated for those specific noise sources.

7. Note that there are other properties zoned for future residential/mixed use within the project footprint.

3.2.2 Vibration

Vibration receptors are defined as any structure where vibration criteria could be exceeded. The assessment of construction vibration was based on the City of Toronto's definition of Zone of Influence; the area (zone) in which vibration levels are predicted to be at, or above the screening threshold. Zone of Influence mapping determines which locations may be above the applicable criteria and where vibration controls may need to be implemented.

The Lower Don Bridge and Don Yard early works vibration Zone of Influence was calculated using the Federal Transit Administration Guide's construction vibration propagation equations to calculate the distances where the screening threshold is met. These distances define the Zone of Influence.

A conservative approach was used, where construction equipment operations within the construction areas were assumed to be unrestricted to specific areas, and the equipment with the maximum vibration levels was used as the basis of assessment. As a result, Lower Don Bridge and Don Yard early works vibration Zone of Influence is based upon the equipment with the highest vibration levels operating at the edge of the Lower Don Bridge and Don Yard Early Works Project Footprint.

Screening distances for the other applicable vibration criteria (City of Toronto By-law prohibited limit, Federal Transit Administration Guide limit for buildings extremely susceptible to building damage, and human perceptibility, discussed in **Section 2.2**) were also mapped.

Structures within the Lower Don Bridge and Don Yard Early Works Project Footprint were assumed to be the responsibility of Metrolinx and have not been included as receivers in this analysis.

The predicted construction vibration Zone of Influence are based on conservative assumptions, reference equipment vibration levels and the Lower Don Bridge and Don Yard early works information available to date (**Section 1.3**) Representative vibration receptors were identified using the Zone of Influence as described above and are further described in **Section 5.2**. Assessment results were compared to vibration criteria and mitigation recommendations are made to avoid or reduce the vibration impacts based on the calculated Zone of Influence. The impact assessment and assumptions shall be reviewed prior to the commencement of construction using the most up-to-date information on construction methods and techniques, equipment, and refined construction areas, and updated if required.

3.3 Construction Activities and Equipment

Preliminary construction activities associated with the Lower Don Bridge and Don Yard early works are provided in **Table 1-2**. Construction activities were consolidated into assessment scenarios based upon the following:

- Activities that do not have associated construction noise or vibration equipment, such as temporary road closures, have not been included in this assessment;
- Activities that occur simultaneously with other activities, such as storm water management, have been included in the assessment of the other assessed construction activities; and,
- Activities that are similar to other activities which should have similar noise and vibration impacts, such as temporary track diversion, and installation of trackwork near station, have been assessed in the same scenario.

The construction equipment listed in **Table 1-2** has also been supplemented based on past project experience with similar construction activities.

The consolidated construction site activity scenarios include:

- Site Preparation/Removals/Demolition;
- Site Services (Utility Relocation);
- Demolition;
- Excavation/Grading;
- Structure Construction;
- Bridge Span Installation; and
- Trackwork.

Construction equipment, and reference construction equipment noise and vibration source data are presented in **Table 3-1** and **Table 3-2** respectively. Exact construction equipment quantities, types, and staging will be determined in advance of construction and may vary from the tables below. Note that the rail corridor along the Don River on the east side of Corktown common was assumed to only be used to facilitate access, with only site preparation and grading occurring in this area. In addition, note that the buildings located in the Don Yard were assumed to be potentially removed or relocated; the demolition and the reconstruction in the vicinity of the existing buildings have been included in the analysis. Updates will be addressed as project planning progresses. Reference data were sourced from the Federal Transit Administration Guide and the United States Federal Highway Administration's Roadway Construction Noise Model (United States Federal Highway Administration, 2006).

Table 3-1: Assumed Construction Equipment by Activity

Equipment	Site Preparation	Site Services (utility relocation/protection)	Demolition	Excavation / Grading	Structure Construction	Bridge Span Installation	Track-Work
Auger Piling Equipment	-	-	-	-	X	-	-
Rammed Aggregate Piers	-	-	-	-	X	-	-
Backhoe	-	X	X	X	X	-	X
Chainsaw	X	-	-	-	-	-	-
Compactor (ground)	X	-	-	X	-	-	X
Compressor (air)	-	X	X	-	X	X	-
Concrete Mixer Truck	-	-	-	-	X	-	-
Concrete Pump Truck	-	-	-	-	X	-	-
Concrete Saw	-	X	X	-	-	-	-
Crane (mobile)	-	-	X	-	X	X	X
Dozer	X	-	X	X	-	-	-
Dump/ Flatbed/ Concrete Truck Movements	6 per hour	6 per hour	6 per hour	6 per hour	6 per hour	6 per hour	6 per hour
Excavator	X	X	X	X	-	-	-
Front End Loader	X	X	-	X	-	-	-
Generator	-	-	X	-	X	-	-
Grader	X	-	-	X	-	-	-
Hoe Ram	-	-	X	-	-	-	-
Jack Hammer	-	X	X	X	-	-	-
Man Lift	-	-	X	-	X	X	-
Pavement Scarifier	-	-	X	-	-	-	-
Pumps	X	-	-	X	-	-	-
Rail Saw	-	-	-		-	-	X
Roller	X	-	-	X	-	-	-
Vibratory Concrete Mixer	-	-	-	-	X	-	-
Vacuum Excavator	-	X	-	-	-	-	-
Ballast Equalizer	-	-	-	-	-	-	X
Ballast Tamper	-	-	-	-	-	-	X
Spike Driver	-	-	-	-	-	-	X
Tie Cutter	-	-	-	-	-	-	X
Tie Handler	-	-	-	-	-	-	X
Tie Inserter	-	-	-	-	-	-	X

Table 3-2: Reference Construction Equipment Data

Equipment	Reference Noise Data Sound Level at 15.24 m / 50 ft (dBA)	Reference Noise Data Acoustical Usage Factor (%)	Reference Vibration Data PPV at 7.62 m / 25 ft (mm/s)	Reference Vibration Data RMSV at 7.62 m / 25 ft (VdB ref 1 micro-inch/s)
Auger Piling Equipment	85	20	2.261	87
Rammed Aggregate Pier[1]	90	20	2.261	87
Backhoe[2]	80	40	0.076	58
Chain Saw	85	20	Negligible	Negligible
Compactor (ground)[3]	80	20	0.889	79
Compressor (air)	80	40	Negligible	Negligible
Concrete Mixer Truck	85	40	1.930	86
Concrete Pump Truck	82	20	1.930	86
Concrete Saw	90	20	Negligible	Negligible
Crane (mobile)	85	16	Negligible	Negligible
Dozer	85	40	2.261	87
Dump/Flatbed Truck	84	40	1.930	86
Excavator[2]	80	40	0.076	58
Front End Loader[2]	80	40	0.076	58
Generator	82	50	Negligible	Negligible
Grader[2]	85	40	0.076	58
Hoe Ram	90	20	2.261	87
Jack Hammer	89	20	0.889	79
Man Lift	85	20	Negligible	Negligible
Pavement Scarifier[4]	85	20	0.076	58
Pumps	77	50	Negligible	Negligible
Rail Saw[5]	90	20	Negligible	Negligible
Roller	85	20	5.334	94
Vibratory Concrete Mixer[3]	80	20	0.889	79
Vacuum Excavator	85	40	Negligible	Negligible
Ballast Equalizer[6]	82	40	0.076	58

Equipment	Reference Noise Data Sound Level at 15.24 m / 50 ft (dBA)	Reference Noise Data Acoustical Usage Factor (%)	Reference Vibration Data PPV at 7.62 m / 25 ft (mm/s)	Reference Vibration Data RMSV at 7.62 m / 25 ft (VdB ref 1 micro-inch/s)
Ballast Tamper[1]	83	40	0.076	58
Spike Driver[7]	77	20	0.889	79
Tie Cutter[8]	84	20	Negligible	Negligible
Tie Handler[9]	80	40	Negligible	Negligible
Tie Inserter[9]	85	40	Negligible	Negligible

Notes: (1) Assumed similar to hoe ram in Federal Transit Administration Guide and Roadway Construction Noise Model
(2) Assumed similar to small dozer in Federal Transit Administration Guide (vibration)
(3) Assumed similar to jack hammer in the Federal Transit Administration Guide (vibration)
(4) Assumed similar to grader/small dozer in the Federal Transit Administration Guide (vibration)
(5) Assumed similar to concrete saw
(6) Assumed similar acoustical usage factor as a grader/loader and vibration as a grader/small dozer
(7) Assumed similar acoustical usage factor and vibration impact as a jack hammer
(8) Assumed similar acoustical usage factor as a concrete saw
(9) Assumed similar acoustical usage factor as a loader

4. Local Environmental Conditions

4.1 Noise

As discussed in **Section 3.1**, data for the relevant monitoring locations are presented in **Table 4-1** with monitoring locations shown on **Figure 4-1**.

Note that the Wardell Street monitoring location is conservatively representative of the area surrounding Lewis Street, June Callwood Way, and Saulter Street – residential area north-east of the early works location.

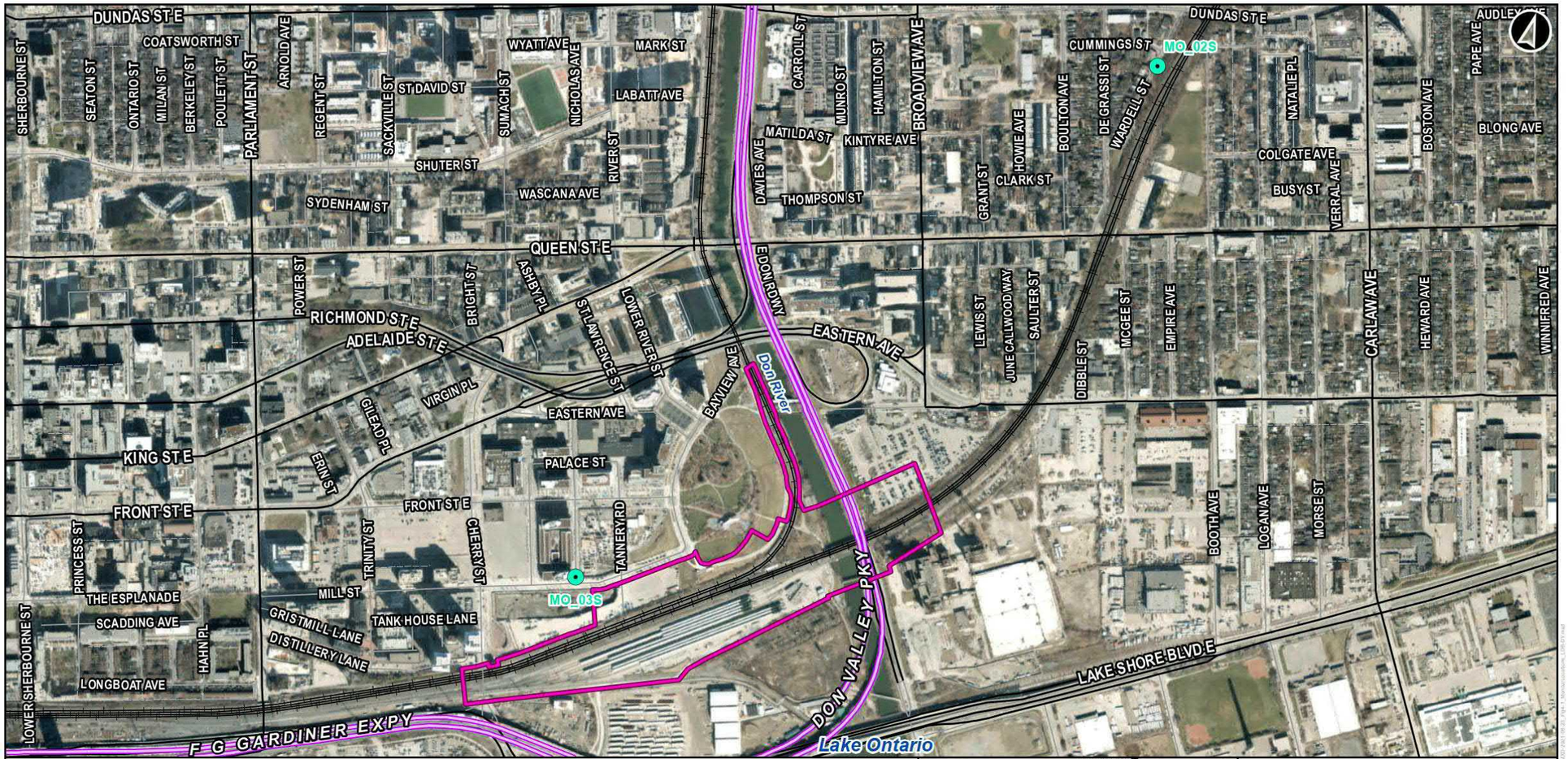
4.2 Vibration

As discussed in **Section 3.1**, baseline vibration measurements were not required as the construction vibration assessment in this Report uses absolute limits that do not change based upon the existing vibration levels.

Table 4-1: Relevant Baseline Noise Measurement Data

Monitoring Location	Daytime (07:00-19:00) Average $L_{eq, 1hr}$ (dBA)	Daytime (07:00-19:00) Min $L_{eq, 1hr}$ (dBA)	Daytime (07:00-19:00) Max $L_{eq, 1hr}$ (dBA)	Evening (19:00-23:00) Average $L_{eq, 1hr}$ (dBA)	Evening (19:00-23:00) Min $L_{eq, 1hr}$ (dBA)	Evening (19:00-23:00) Max $L_{eq, 1hr}$ (dBA)	Night (23:00-07:00) Average $L_{eq, 1hr}$ (dBA)	Night (23:00-07:00) Min $L_{eq, 1hr}$ (dBA)	Night (23:00-07:00) Max $L_{eq, 1hr}$ (dBA)
MO_02S Wardell Street	64	61	66	62	59	63	52	43	63
MO_03S Mill Street	64	63	65	64	65	63	58	50	66

Figure 4-1: Noise Monitoring Locations near the Lower Don Bridge and Don Yard Early Works Project Footprint



Legend

- Noise Measurement Location
- Freeway
- Major Road
- Local Road
- Service Road
- Alleyway
- Existing Rail
- Lower Don Bridge and Don Yard Early Works Project Footprint

Ontario Line Project

Noise Monitoring Locations near the Lower Don Bridge and Don Yard Early Works Footprint

DATUM: NAD 1983 UTM Zone 17N

Data Sources:
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Figure 4-1

5. Impact Assessment Results

Potential impacts of the noise and vibration associated with the construction of Lower Don Bridge and Don Yard early works have been assessed and are described in the following subsections.

Recommended mitigation measures and monitoring activities are presented in **Section 6**.

5.1 Noise

As discussed in **Section 3.2.1** a noise screening was conducted based upon conservative assumptions to determine if receptor-specific noise predictions are required. Noise screening mapping for Lower Don Bridge and Don Yard early works is presented on **Figure 5-1**. Results of the noise screening show that a number of noise sensitive receivers are within the screening distance, necessitating receptor-specific noise predictions.

The nearest representative noise sensitive receivers are:

- 90 Distillery Lane (Mixed-use Residential);
- 170 Mill Street (Residential);
- 502 Front Street East (Residential);
- 170 Bayview Avenue (Mixed-use Residential);
- 20 Trolley Crescent (Residential);
- 77 East Don Roadway (Mixed-use Residential);
- 68 Broadview Avenue (Residential);
- 9 Lewis Street (Residential);
- 125/131 Mill Street (Future Mixed-use Residential)
- 180-190 Mill Street (Mixed-use Residential); and
- 495 Front Street East (Future Mixed-use Residential).

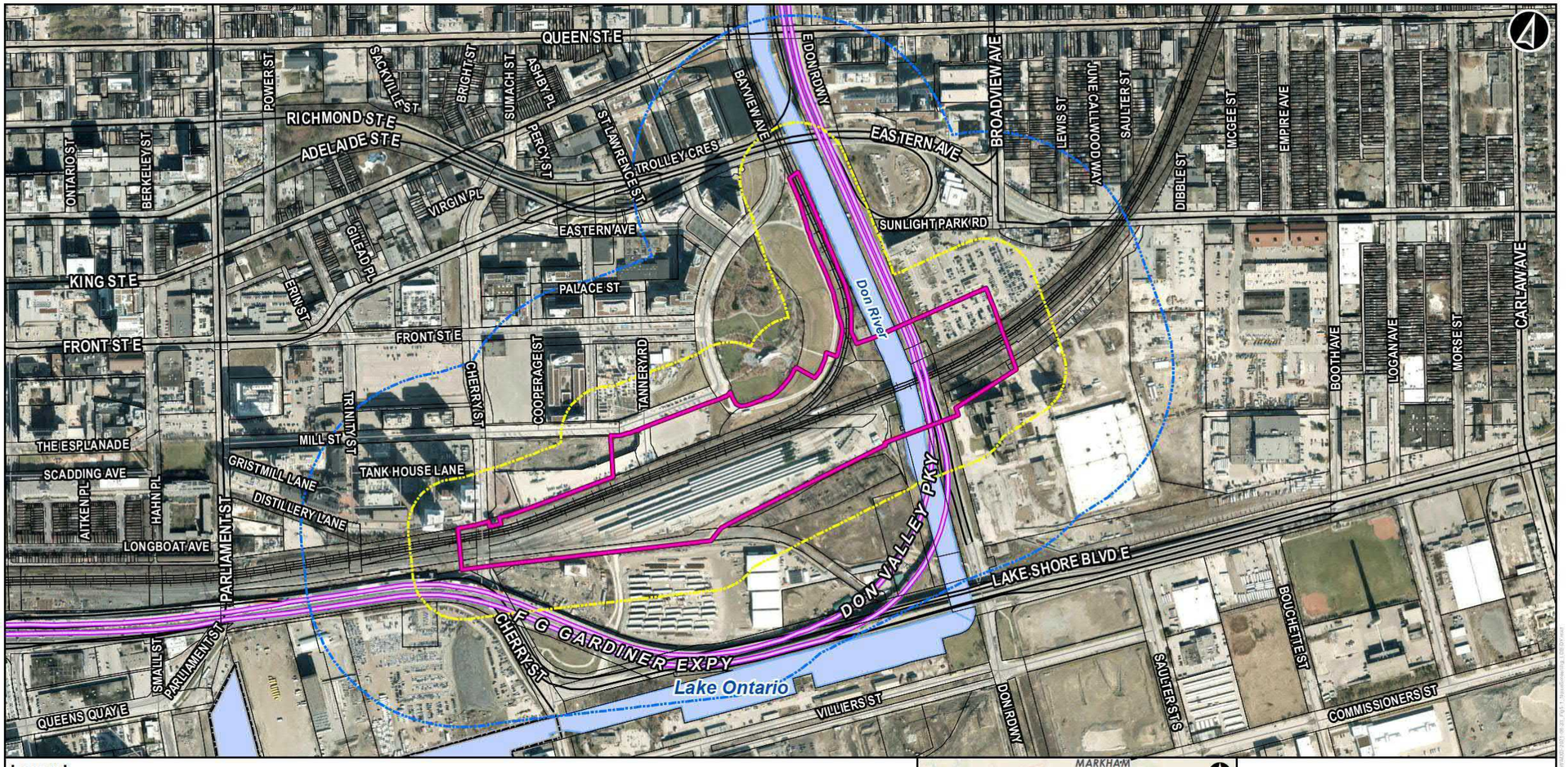
Potential noise sensitive receivers further away will have lower construction noise exposures.

The Lower Don Bridge and Don Yard Early Works Project Footprint is otherwise surrounded by commercial, industrial, and park lands, none of which are considered noise sensitive. The predicted noise levels from the construction of the Lower Don Bridge and Don Yard early works are presented in **Table 5-1**.

Table 5-1: Construction Noise Prediction Results

Representative Receiver	Assessment Criteria (day L_{eq8hr}/ night $L_{eq,8hr}$)	Predicted $L_{eq, 8hr}$ [dBA] Site Preparation	Predicted $L_{eq, 8hr}$ [dBA] Site Services (utility relocation/ protection)	Predicted $L_{eq, 8hr}$ [dBA] Demolition	Predicted $L_{eq, 8hr}$ [dBA] Excavation/ Grading	Predicted $L_{eq, 8hr}$ [dBA] Structure Construction	Predicted $L_{eq, 8hr}$ [dBA] Bridge Span Installation	Predicted $L_{eq, 8hr}$ [dBA] Trackwork
90 Distillery Lane (residential/ mixed use)	80/70	78	78	80	78	54	41	78
125/131 Mill Street (future residential)	80/70	81	82	83	82	67	53	80
170 Mill Street (residential)	80/70	77	78	79	78	63	48	75
180-190 Mill Street (residential/ mixed use)	80/70	80	80	82	80	63	45	75
495 Front Street East (future residential)	80/70	81	81	83	81	69	57	76
502 Front Street East (residential)	80/70	73	73	74	74	68	57	71
170 Bayview Avenue (residential/ mixed use)	80/70	74	66	67	74	65	56	65
20 Trolley Crescent (residential)	80/70	70	50	51	70	62	53	59
77 East Don Roadway (residential/ mixed use)	80/70	71	62	63	72	63	53	61
68 Broadview Avenue (residential)	80/70	68	66	67	68	63	54	66
9 Lewis Street (residential)	80/70	64	64	65	65	63	54	65

Figure 5-1: Noise Screening for the Lower Don Bridge and Don Yard Early Works Project Footprint



Results in the above table indicate that, without mitigation, the noise levels at the majority, but not all, of the assessed noise sensitive locations are predicted to be above the night time noise criterion during most construction scenarios. The daytime noise assessment criterion is predicted to be exceeded during some construction scenarios at 180-190 Mill Street, as well as the future 125/131 Mill Street and the future 495 Front Street East, should those future developments be occupied during early works construction.

Construction activities taking place at the bridge (such as bridge span installation, and structure construction) as well as the works associated with the structures at the Don Yard are predicted to be below the night time noise assessment criterion.

Recommendations to reduce the noise impacts are presented in **Section 6**.

5.2 Vibration

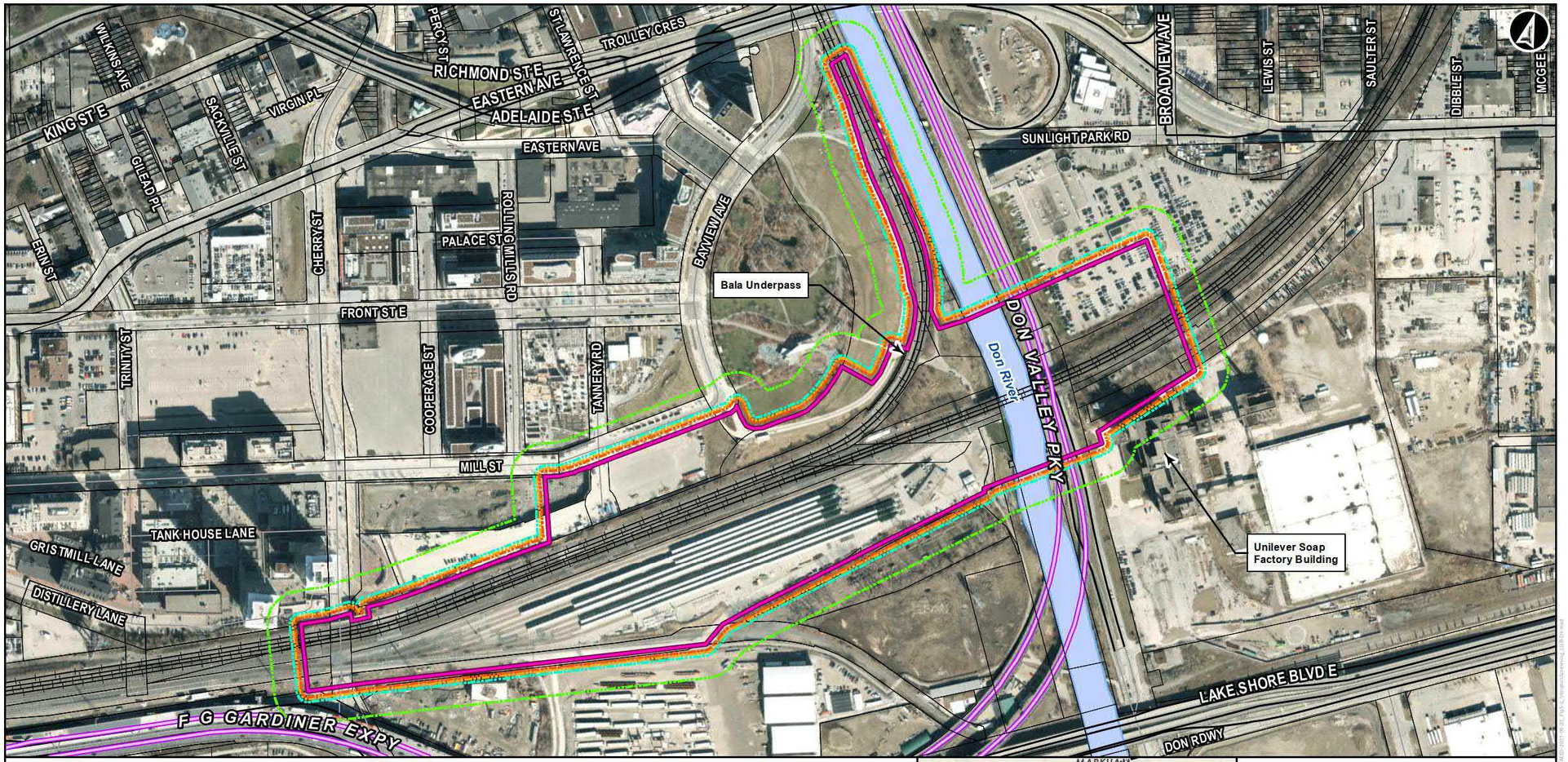
The construction equipment with the greatest potential impact for this project is the vibratory roller, and thus the screening distances calculated were based on the vibratory roller. The screening distances are:

- For perceptible vibration (annoyance) 0.14 mm/s (RMSV) – 33 metres;
- For buildings extremely susceptible to vibration damage 3.0 mm/s – 11.1 metres;
- City of Toronto Screening 5.0 millimetres per second – 7.9 metres; and
- City of Toronto Prohibited Limit 8.0 millimetres per second – 5.8 metres.

Mapping of the vibration screening distances in **Figure 5-2** shows that, without mitigation, construction vibration levels are expected to exceed the City of Toronto prohibited limit at:

- The Unilever Soap Factory Building located at 21 Don Roadway (Open Space and Employment Industrial);
- A structure located at the car dealership at 11 Sunlight Park Road (Commercial, one-storey small building immediately north of the project footprint boundary);
- The Cherry Street Interlocking Tower at 385 Cherry Street (infrastructure/ railway structure); and
- A portion of the parking structure at 70 Distillery Lane (note that the parking structure appears to extend under 370 Cherry Street – Mixed-use Residential).

Figure 5-2: Vibration Screening for the Lower Don Bridge and Don Yard Early Works Project Footprint



A detailed review of expected vibration levels (with finalized construction areas and equipment) with respect to these structures is required as project planning progresses.

Perceptible vibration is likely at:

- 70 Distillery Lane (Mixed-use Residential);
- 180-190 Mill Street (Mixed-use Residential);
- the Cherry Street Interlocking Tower at 385 Cherry Street (infrastructure/railway structure);
- Unilever Soap Factory Building located at 21 Don Roadway (Open Space and Employment Industrial); and
- Various structures at car dealership located at 11 Sunlight Park Road as shown on **Figure 5-2** (Commercial).

The Cherry Street Interlocking Tower at 385 Cherry Street is a known built heritage resource. It has been noted in the Ontario Line Cultural Heritage Report (AECOM, 2020b) that the Cherry Street Interlocking Tower was built to withstand vibration; however, the design vibration limits should be confirmed by a qualified specialist during the next phases of design.

There are no other structures or properties that are known or potential built heritage resources within the screening distance.

Note that there are future planned residential/mixed-use residential buildings at 125/131 Mill Street, and 495 Front Street East[8], some of which may fall within the Zone of Influence for perceptible vibration and/or the City of Toronto Prohibited Limit if they are constructed/completed before the Lower Don Bridge and Don Yard early works construction is completed. A review of the timing of the construction of these buildings and their layouts with respect to the Lower Don Bridge and Don Yard early works construction is required as planning progresses.

8. Note that there are other future planned residential locations within the Lower Don Bridge and Don Yard Early Works Project Footprint. These have not been assessed as they are assumed to be constructed after the Lower Don Bridge and Don Yard early works are completed.

6. Potential Impacts, Mitigation Measures and Monitoring Activities

In accordance with Section 8(2)(6), 8(2)7 and 8(2)8 of Ontario Regulation 341/20: Ontario Line Project, this section describes the potential impacts, mitigation measures, and monitoring activities to verify the effectiveness of mitigation measures associated with the Lower Don Bridge and Don Yard early works.

The results of the above assessment indicate that mitigation and monitoring will be required. Recommended mitigation measures and monitoring activities to be carried forward and refined (as required as project planning progresses) are summarized below. Additional mitigation measures may be considered as project planning progresses. Note that noise and vibration impacts due to the construction of the Lower Don Bridge and Don Yard early works are temporary and will cease once construction has been completed. A summary of potential impacts, mitigation measures, commitments, and monitoring activities to verify mitigation measure effectiveness for this Project is provided in **Table 6-1**.

6.1 Mitigation Measures - General Recommendations

General mitigation recommendations are typical measures applicable to most construction projects and include best practices to decrease potential impacts. Preliminary recommendations to be further refined and updated in the next phases of design are described in the subsections below.

6.1.1 Noise

Mitigation measures to be investigated as project planning progresses for construction noise levels to meet the applicable criteria include but are not limited to the following:

- Comply with applicable noise guidelines from the Ministry of the Environment, Conservation, and Parks including NPC-115 and NPC-118;
- Operate construction equipment during daytime hours and avoid night time operations where feasible, in an effort to minimize the potential for complaints;
- If construction will occur outside of normal daytime hours, inform local residents of the type of construction and expected duration outside of daytime hours prior to commencing work;

- Use of upgraded construction hoarding (considering requirements from Canadian Standards Association Z107.9, Standard for Certification of Noise Barriers) between construction equipment and noise sensitive receivers;
- Evaluate acoustic enclosures for equipment such as generators and compressors;
- Use of localized noise barriers for specific equipment and operations;
- Minimize simultaneous operation of equipment where possible;
- Implement a no idling policy on site (unless necessary for equipment operation);
- Use of broadband back up signals instead of tonal backup signals; and,
- Arrange site to avoid vehicle traveling in reverse if possible.

Re-evaluation of mitigation requirements should be completed as project planning progresses to account for design and construction method updates.

6.1.2 Vibration

Mitigation measures to be investigated during the next phases of design for construction vibration levels to meet applicable criteria include but are not limited to the following:

- Update vibration assessment based upon finalized site staging, construction operational areas, and building locations, as required; location and number of buildings within the Zone of Influence may change. Zone of Influence mapping was based upon a vibratory roller. The associated Zone of Influence setback distances could decrease, if equipment with lower vibration emissions is used;
- Update vibration assessment for sensitive infrastructure in vicinity of Lower Don Bridge and Don Yard Early Works Project Footprint, as required;
- Conduct monitoring and preconstruction inspections in accordance with City of Toronto By-law 514-2008. Monitoring and preconstruction requirements can be determined by the distance between the construction equipment operation area and sensitive receivers;
- Provide smooth surfaces for trucks to travel;
- Operate during daytime where possible;
- Route heavily loaded trucks away from vibration sensitive sites where possible;

- Manage the sequence of construction phases such as demolition, earth-moving, and ground-impacting operations to not occur in the same period, to the extent possible;
- Operate construction equipment on lower vibration settings where available;
- Maximize distance between equipment and sensitive receivers where possible; and,
- Do not operate equipment at setback distances less than the prohibited Zone of Influence. Use alternative means of construction within these distances that result in vibration levels below the City of Toronto's prohibited vibration limits. Note that Zone of Influence was calculated based upon generic equipment. Equipment with lower vibration emissions, or power settings, can be used provided that vibration levels do not exceed the City of Toronto's prohibited vibration limits.

Re-evaluation of mitigation requirements should be completed as project planning progresses to account for design and construction methodology updates.

6.2 Mitigation Measures - Site Specific Recommendations

Mitigation recommendations specific to the Lower Don Bridge and Don Yard early works, to be further refined and updated as planning progresses, are described in **Section 6.2.1** and **Section 6.2.2** below.

6.2.1 Noise

Mitigation measures will be investigated and updated as planning progresses for construction noise levels to be below applicable criteria limits. The following noise mitigation measures should be considered to decrease the construction noise impacts:

- Consider construction daytime work shift duration limits for the construction closest to 180-190 Mill Street and the future noise sensitive buildings if they are occupied during the Lower Don Bridge and Don Yard early works (125/131 Mill Street and 495 Front Street East);
- Use temporary movable noise screens for the loudest construction activities;
- Refine assessment when additional details of construction activities are available.
- Consider construction duration limits during night time; and

- As construction noise impacts requiring mitigation are predicted for future noise sensitive development in the West Don Lands (125/131 Mill Street and 495 Front Street East), review construction and occupation timelines for these buildings with respect to the early works construction. As the completion date of these new noise sensitive receivers relative to the early works construction period is not yet determined, mitigation may be adjusted based upon these developments (unoccupied as of October 2020) construction/occupation schedule.

6.2.2 Vibration

Mitigation measures to be further refined and updated as project planning progresses, for construction vibration levels to be below applicable criteria limits, include:

- Review and refine the construction activities taking place in the vicinity of the Unilever Soap Factory Building, the car dealership at 11 Sunlight Park Road, the Cherry Street Interlocking Tower at 385 Cherry Street, and the parking structure located at 70 Distillery Lane. Mitigation and monitoring requirements could potentially be removed for some of these structures if the updated vibration impact assessment indicates that the applicable vibration limits are not anticipated to be exceeded.
- The Cherry Street Interlocking Tower at 385 Cherry Street is a known built heritage resource. It has been noted in the Ontario Line Cultural Heritage Report (AECOM, 2020b) that the Cherry Street Interlocking Tower was built to withstand vibration; however, the design vibration limits of the Cherry Street Interlocking Tower should be confirmed by a qualified specialist during the next phases of design.
- Review the estimated completion/construction dates for future planned structures adjacent to the Lower Don Bridge and Don Yard Early Works Project Footprint. Mitigation and monitoring requirements could potentially be removed if these structures are not yet built. Update assessment for these structures should their construction proceed or be completed prior to/during the Lower Don Bridge and Don Yard early works. The future planned structures are located at 125/131 Mill Street and 495 Front Street East[9].

[9] Note that there are other future planned residential locations within the Lower Don Bridge and Don Yard Early Works Project Footprint. These have not been assessed as they are assumed to be constructed after the Lower Don Bridge and Don Yard early works.

6.3 Potential Impacts, Mitigation Measures and Monitoring Activities Summary

Table 6-1 below presents a summary of potential impacts, mitigation measures and monitoring activities to verify mitigation measure effectiveness.

Table 6-1: Potential Noise and Vibration Impacts, Mitigation Measures and Monitoring Activities for the Lower Don Bridge and Don Yard Early Works

Environmental Component	Potential Impacts	Mitigation Measure(s)	Monitoring Activities
Construction Noise	■ Environmental noise may cause annoyance and disturb sleep and other activities. ■ The severity of the noise effects resulting from construction projects varies, depending on: – Scale, location and complexity of the Project – Construction methods, processes and equipment deployed – Total duration of construction near sensitive noise receivers – Construction activity periods (days, hours, time period) – Number and proximity of noise-sensitive sites to construction area(s)	■ Construction noise impact mitigation measures to be considered include but are not limited to the following to meet applicable noise criteria: – Siting construction staging and laydown areas to avoid/reduce adverse impacts to sensitive receptors where feasible. – Use construction equipment compliant with noise level specifications in Ministry of Environment, Conservation, and Parks guidelines NPC-115 and NPC-118. – Keep equipment in good working order and operate with effective muffling devices. – Equipment enclosures for equipment such as generators and compressors. – Additional equipment silencers/mufflers. – Use of upgraded construction hoarding (considering requirements from Canadian Standards Association Z107.9 for noise barriers) between construction equipment and noise sensitive receivers. – Use of localized movable noise barriers/screens for specific equipment and operations. – Minimize simultaneous operation of equipment where feasible. – Implement a no idling policy on site (unless necessary for equipment operation). – Restrict construction hours where feasible: • Perform construction during daytime hours where feasible. If night time construction is necessary, the activities with the highest noise levels should be conducted during day time periods where feasible. • If construction will occur outside of normal daytime hours, inform local residents before construction of type of construction and expected duration outside of daytime hours. • Consider construction duration limits for construction near 90 Distillery Lane (night), future 125/131 Mill Street, 170 Mill Street (night), 180-190 Mill Street, future 495 Front Street East, 502 Front Street East (night) 170 Bayview Avenue (night), and 77 East Don Roadway (night). – Limit the number of heavy trucks on site to the minimum required. – Stage construction vehicles away from noise sensitive locations, if feasible. – Establish and apply project-specific construction noise criteria/exposure limits. – Undertake noise monitoring and regular reporting throughout the construction phase. Where noise level limits are exceeded, additional noise mitigation measures shall be implemented. – Review construction and occupation timelines for new noise sensitive development in West Don Lands. As the completion date of these new noise sensitive receivers relative to the early works construction period is not yet determined, mitigation may be adjusted based upon the new developments (unoccupied as of June 2021) construction/occupation schedule. – Develop a communications protocol which includes timely resolution of complaints. – Additional mitigation measures not listed above may be considered.	■ Noise levels will be monitored where the impact assessment indicates that noise limits may be exceeded, to identify if any additional mitigation is required and verify mitigation measures(s) effectiveness. ■ Continuous noise monitoring should be completed at each geographically distinct active construction site associated with the Project with monitor(s) located strategically to capture the worst-case construction related noise levels at receptor locations based on planned construction activities, their locations, and the number, geographic distribution and proximity of noise sensitive receptors. ■ Monitoring at locations where there are persistent complaints, as required.
Construction Vibration	■ Exposure to vibration may result in public annoyance and complaints. Vibration may also cause damage to buildings and other structures.	■ Construction vibration impact mitigation measures to be considered include but are not limited to the following to meet applicable vibration criteria: – Siting construction staging and laydown areas to avoid/reduce adverse impacts to sensitive receptors where possible. – Utilize equipment with low vibration emissions where possible. – Off-site construction of components away from sensitive areas. – Restrict construction hours where feasible: • Perform construction during daytime hours where feasible. If night time construction is necessary, the activities with the highest vibration levels should be conducted during the daytime periods where feasible.	■ Monitoring will be undertaken at locations within the Zone of Influence to ensure compliance with the City of Toronto By-law 514-2008 and to identify the need for additional mitigation if required. ■ Monitoring will be undertaken to ensure compliance with other applicable vibration level limits identified, as required. ■ Monitoring will be undertaken to verify mitigation measure(s) effectiveness.

Environmental Component	Potential Impacts	Mitigation Measure(s)	Monitoring Activities
		– Review vibration assessment based upon refined site staging, construction areas/equipment, and building locations prior to the commencement of construction, and update if necessary. – Review and refine the construction activities to avoid potential impacts to the Unilever Soap Factory building at 21 Don Roadway, a structure located at the car dealership at 11 Sunlight Park Road, the Cherry Street Interlocking Tower at 385 Cherry Street, Parking structure at 70 Distillery Lane (note that the parking structure appears to extend under 370 Cherry Street).Conduct monitoring and pre-construction inspections in accordance with City of Toronto By-law 514-2008. Monitoring and preconstruction requirements can be determined by calculation of Zone of Influence of construction equipment. – Provide smooth surfaces for trucks to travel and route heavily loaded trucks away from vibration sensitives sites where possible. – Operate construction equipment on lower vibration settings where available. – Maximize distance between equipment and sensitive receivers while receivers where feasible. – Establish and apply project-specific construction vibration criteria limits. – Review the vibration limits for the Cherry Street Interlocking Tower at 385 Cherry Street. It has been noted in the Ontario Line Cultural Heritage Report (AECOM, 2020b) that the Cherry Street Interlocking Tower was built to withstand vibration; however, the design vibration limits should be confirmed by a qualified specialist during the next phases of design. – Do not operate equipment where the City of Toronto By-law 514-2008 prohibited limits are predicted to be exceeded. Alternative construction methods and/or equipment with lower vibration emissions or power settings can be used if they do not exceed the City of Toronto's prohibited vibration limits. – As Project planning and design progress, conduct a review to identify any sensitive structures/operations that require more stringent vibration limits than the limits in City of Toronto By-law 514-2008; assess requirements, review/revise vibration limits for these locations and, if necessary, develop mitigation measures. US Federal Transit Administration Report No. 0123, Transit Noise and Vibration Impact Assessment Manual (2018) could be used as a source of additional criteria. – Develop communications protocol which includes timely resolution of complaints. – Additional mitigation measures not listed above may be considered.	▪ Pre-construction building inspection of the potentially impacted buildings adjacent to the early works construction sites are to be undertaken in accordance with City of Toronto By-law 514-2008. Continuous vibration monitoring along the construction site property lines closest to these structures will be initiated as warranted. ▪ Monitoring at locations where there are persistent complaints, if required.

7. Permits and Approvals

At this time, provincial noise or vibration permits or approvals are not anticipated to be required for the Lower Don Bridge and Don Yard early works. This will be confirmed as project planning progresses.

A construction vibration control form is typically required to accompany a building permit as per the City of Toronto By-law 514-2008. This will be confirmed during the design and implementation phases of the Lower Don Bridge and Don Yard early works.

Should a building permit be required, Metrolinx will consult with the City of Toronto.

Metrolinx as a Crown agency of the Province of Ontario is exempt from certain municipal processes and requirements. In these circumstances, Metrolinx will engage with the municipalities to incorporate municipal requirements as a best practice, where practical, and may obtain associated permits and approvals.

8. References

AECOM, 2020a:
Ontario Line Final Environmental Conditions Report. Prepared for Metrolinx.

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Ontario Line Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment: Prepared for Mextrolinx.

City of Toronto, 2019:
By-law 878-2019 (Noise) – Municipal Code 591, June 2019.

City of Toronto, 2008:
By-law 514-2008 (Construction Vibration) – Municipal Code 363.

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ISO 9613-2: Acoustics - Attenuation of Sound during Propagation Outdoors Part 2: General Method of Calculation

Ministry of the Environment and Energy (MOEE) and GO Transit, 1994:
MOEE/Go Transit Noise and Vibration Protocol.

Ontario Ministry of the Environment, 1978:
Publication NPC-115: Construction Equipment.

Ontario Ministry of the Environment, 1978:
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Ontario Ministry of the Environment, 1978:
Publication NPC-119: Blasting.

Ontario Ministry of the Environment, 1983:
Publication NPC-207: Impulse Vibration in Residential Buildings.

United States Federal Highway Administration, 2006:
Roadway Construction Noise Model.

United States Federal Transit Administration, 2018:
Transit Noise and Vibration Impact Assessment Manual, September

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Appendix A

Terminology

Appendix A. Terminology

Term	Definition
Sound	Pressure wave travelling through a medium, such as air.
Noise	Unwanted sound.
Acoustics	The science of sound propagation and transmission.
Vibration	Oscillation of a parameter that defines the motion of a mechanical system.
Decibel, dB	A logarithmic ratio, not strictly a unit, used to describe sound levels. For sound pressure, the reference level is 20 micro pascals (threshold of hearing).
Frequency	The rate at which an event is repeated. Measured in Hertz (Hz), where 1 Hz = 1 oscillation/sec. Normal human hearing extends over a range of frequencies from about 20 Hz to about 20 kHz.
Octave Band	A band of frequencies where the upper limiting frequency is twice the lower limiting frequency. Octave bands are identified by their centre-frequencies. The octave bands standardized for acoustic measurements include those centred at 31.5, 63, 125, 250, 500, 1000, 2000, 4000, and 8000 Hz.
A-Weighting Network, dBA	A frequency weighting network intended to represent the variation in the ear's ability to hear different frequencies. Overall sound levels calculated or measured using the A-weighting network are indicated by dBA rather than dB.
Sound Pressure Level (SPL, L_p)	A measurement of instantaneous sound pressure and equal to 10 times the logarithm (base 10) of the ratio of the instantaneous sound pressure of a sound divided by the reference sound pressure of 20 µPa (0 dB). Reported and measured in decibels (dB or dBA).
L_{eq} - "Equivalent sound level"	Value of a constant sound pressure level which would result in the same total sound energy as would the measured time-varying sound pressure level over equivalent time duration. The $L_{eq, 1hr,}$ for example, describes the equivalent continuous sound level over a 1-hour period.
Peak Particle Velocity (PPV)	The peak signal value of an oscillating vibration velocity waveform. Can be expressed in mm/s.
Root Mean Square Velocity (RMSV)	The square root of the mean-square value of an oscillating vibration velocity waveform, where the mean-square value is obtained by squaring the value of amplitudes at each instant in time and then averaging these values over the sample time.
Vibration Decibel, VdB	A logarithmic ratio, not strictly a unit, used to describe felt vibration.

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Appendix B

Example Calculation

Receiver
Name: (untitled)
ID: 90 Distilery Lane
X: 316318.03 m
Y: 4834510.71 m
Z: 126.40 m

Area Source, ISO 9613, Name: "", ID: "track_Don2_trk"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	316364.18	4834478.44	81.62	0	DEN	1000	91.4	10.7	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.7
2	316360.79	4834473.87	82.26	0	DEN	1000	91.4	21.2	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	67.2
3	316350.31	4834467.17	82.71	0	DEN	1000	91.4	19.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	66.0
4	316343.13	4834465.73	82.37	0	DEN	1000	91.4	16.7	0.0	0.0	0.0	47.6	0.2	-3.0	0.0	0.0	0.0	0.0	0.0	63.2
5	316333.20	4834458.11	83.06	0	DEN	1000	91.4	16.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	62.9
6	316361.77	4834476.60	81.78	1	DEN	1000	91.4	18.6	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	56.9
10	316355.29	4834470.22	82.52	1	DEN	1000	91.4	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	60.5
15	316342.86	4834463.36	82.83	1	DEN	1000	91.4	18.1	0.0	0.0	0.0	53.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	57.4
22	316331.37	4834456.92	83.14	1	DEN	1000	91.4	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	54.8
28	316328.57	4834455.31	83.22	1	DEN	1000	91.4	11.8	0.0	0.0	0.0	52.8	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	51.9
33	316363.47	4834468.47	83.40	0	DEN	1000	91.4	13.0	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	58.5
34	316344.47	4834457.61	83.40	0	DEN	1000	91.4	20.2	0.0	0.0	0.0	48.3	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	66.0
42	316334.08	4834449.93	83.40	0	DEN	1000	91.4	20.2	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	65.6
51	316348.96	4834462.20	83.40	0	DEN	1000	91.4	16.9	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	62.9
58	316326.42	4834449.27	83.40	0	DEN	1000	91.4	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	60.9
67	316349.96	4834461.01	83.40	1	DEN	1000	91.4	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	56.9
74	316360.72	4834467.05	83.40	1	DEN	1000	91.4	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	53.8
81	316336.44	4834453.32	83.40	1	DEN	1000	91.4	21.3	0.0	0.0	0.0	53.3	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	60.8
91	316329.29	4834446.94	83.40	1	DEN	1000	91.4	16.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	56.8
99	316334.15	4834452.08	83.40	1	DEN	1000	91.4	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	60.2

Area Source, ISO 9613, Name: "", ID: "track_Don2_railsaw"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
122	316364.18	4834478.44	80.22	0	DEN	1000	86.6	10.7	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.8
130	316360.79	4834473.87	80.86	0	DEN	1000	86.6	21.2	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	62.3
148	316350.31	4834467.17	81.31	0	DEN	1000	86.6	19.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	61.0
156	316343.13	4834465.73	80.97	0	DEN	1000	86.6	16.7	0.0	0.0	0.0	47.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	58.3
162	316333.20	4834458.11	81.66	0	DEN	1000	86.6	16.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	58.0
171	316361.77	4834476.60	80.38	1	DEN	1000	86.6	18.6	0.0	0.0	0.0	54.5	0.6	-3.0	0.0	0.0	0.0	0.0	1.0	52.1
183	316355.29	4834470.22	81.12	1	DEN	1000	86.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	55.7
191	316342.86	4834463.36	81.43	1	DEN	1000	86.6	18.1	0.0	0.0	0.0	53.6	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	52.6
204	316331.37	4834456.92	81.74	1	DEN	1000	86.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	50.0
210	316328.57	4834455.31	81.82	1	DEN	1000	86.6	11.8	0.0	0.0	0.0	52.9	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	47.1
220	316363.47	4834468.47	82.00	0	DEN	1000	86.6	13.0	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	53.6
228	316344.47	4834457.61	82.00	0	DEN	1000	86.6	20.2	0.0	0.0	0.0	48.4	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	61.1
233	316334.08	4834449.93	82.00	0	DEN	1000	86.6	20.2	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	60.7
242	316348.96	4834462.20	82.00	0	DEN	1000	86.6	16.9	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	58.0
265	316326.42	4834449.27	82.00	0	DEN	1000	86.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.0
266	316349.96	4834461.01	82.00	1	DEN	1000	86.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	52.1
274	316360.72	4834467.05	82.00	1	DEN	1000	86.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	49.0
282	316336.44	4834453.32	82.00	1	DEN	1000	86.6	21.3	0.0	0.0	0.0	53.4	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	56.0
307	316329.29	4834446.24	82.00	1	DEN	1000	86.6	15.6	0.0	0.0	0.0	53.1	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	50.6
314	316329.28	4834448.79	82.00	1	DEN	1000	86.6	11.3	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.4
322	316334.15	4834452.08	82.00	1	DEN	1000	86.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	55.4

Area Source, ISO 9613, Name: "", ID: "track_Don2_tinsert"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
339	316364.18	4834478.44	80.22	0	DEN	1000	84.6	10.7	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	49.8
347	316360.79	4834473.87	80.86	0	DEN	1000	84.6	21.2	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	60.3
363	316350.31	4834467.17	81.31	0	DEN	1000	84.6	19.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	59.1
364	316343.13	4834465.73	80.97	0	DEN	1000	84.6	16.7	0.0	0.0	0.0	47.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.3

Area Source, ISO 9613, Name: "", ID: "track_Don2_tinsert"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
365	316333.20	4834458.11	81.66	0	DEN	1000	84.6	16.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.0
373	316361.77	4834476.60	80.38	1	DEN	1000	84.6	18.6	0.0	0.0	0.0	54.5	0.6	-3.0	0.0	0.0	0.0	0.0	1.0	50.1
374	316355.29	4834470.22	81.12	1	DEN	1000	84.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	53.7
375	316342.86	4834463.36	81.43	1	DEN	1000	84.6	18.1	0.0	0.0	0.0	53.6	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	50.6
382	316331.37	4834456.92	81.74	1	DEN	1000	84.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.0
389	316328.57	4834455.31	81.82	1	DEN	1000	84.6	11.8	0.0	0.0	0.0	52.9	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.1
400	316363.47	4834468.47	82.00	0	DEN	1000	84.6	13.0	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.6
401	316344.47	4834457.61	82.00	0	DEN	1000	84.6	20.2	0.0	0.0	0.0	48.4	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	59.1
409	316334.08	4834449.93	82.00	0	DEN	1000	84.6	20.2	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	58.8
418	316348.96	4834462.20	82.00	0	DEN	1000	84.6	16.9	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.0
431	316326.42	4834449.27	82.00	0	DEN	1000	84.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.0
439	316349.96	4834461.01	82.00	1	DEN	1000	84.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	50.1
477	316360.72	4834467.05	82.00	1	DEN	1000	84.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	47.0
484	316336.44	4834453.32	82.00	1	DEN	1000	84.6	21.3	0.0	0.0	0.0	53.4	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	54.0
492	316329.29	4834446.24	82.00	1	DEN	1000	84.6	15.6	0.0	0.0	0.0	53.1	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.6
500	316329.28	4834448.79	82.00	1	DEN	1000	84.6	11.3	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	44.4
508	316334.15	4834452.08	82.00	1	DEN	1000	84.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	53.4

Area Source, ISO 9613, Name: "", ID: "track_Don2_tamper"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
512	316364.18	4834478.44	81.62	0	DEN	1000	82.6	10.7	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	47.9
519	316360.79	4834473.87	82.26	0	DEN	1000	82.6	21.2	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	58.4
520	316350.31	4834467.17	82.71	0	DEN	1000	82.6	19.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	57.2
521	316343.13	4834465.73	82.37	0	DEN	1000	82.6	16.7	0.0	0.0	0.0	47.6	0.2	-3.0	0.0	0.0	0.0	0.0	0.0	54.4
522	316333.20	4834458.11	83.06	0	DEN	1000	82.6	16.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.1
530	316361.77	4834476.60	81.78	1	DEN	1000	82.6	18.6	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.1
537	316355.29	4834470.22	82.52	1	DEN	1000	82.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	51.7
543	316342.86	4834463.36	82.83	1	DEN	1000	82.6	18.1	0.0	0.0	0.0	53.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.6
557	316331.37	4834456.92	83.14	1	DEN	1000	82.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.0
565	316328.57	4834455.31	83.22	1	DEN	1000	82.6	11.8	0.0	0.0	0.0	52.8	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	43.1
629	316363.47	4834468.47	83.40	0	DEN	1000	82.6	13.0	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	49.7
636	316344.47	4834457.61	83.40	0	DEN	1000	82.6	20.2	0.0	0.0	0.0	48.3	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	57.2
643	316334.08	4834449.93	83.40	0	DEN	1000	82.6	20.2	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.8
649	316348.96	4834462.20	83.40	0	DEN	1000	82.6	16.9	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.1
660	316326.42	4834449.27	83.40	0	DEN	1000	82.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	52.1
662	316349.96	4834461.01	83.40	1	DEN	1000	82.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.1
670	316360.72	4834467.05	83.40	1	DEN	1000	82.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.0
683	316336.44	4834453.32	83.40	1	DEN	1000	82.6	21.3	0.0	0.0	0.0	53.3	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	52.0
695	316329.29	4834446.94	83.40	1	DEN	1000	82.6	16.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.0
704	316334.15	4834452.08	83.40	1	DEN	1000	82.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	51.4

Area Source, ISO 9613, Name: "", ID: "track_Don2_equal"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
585	316364.18	4834478.44	81.62	0	DEN	1000	81.6	10.7	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	46.9
586	316360.79	4834473.87	82.26	0	DEN	1000	81.6	21.2	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	57.4
587	316350.31	4834467.17	82.71	0	DEN	1000	81.6	19.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.2
588	316343.13	4834465.73	82.37	0	DEN	1000	81.6	16.7	0.0	0.0	0.0	47.6	0.2	-3.0	0.0	0.0	0.0	0.0	0.0	53.4
595	316333.20	4834458.11	83.06	0	DEN	1000	81.6	16.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	53.1
597	316361.77	4834476.60	81.78	1	DEN	1000	81.6	18.6	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	47.1
598	316355.29	4834470.22	82.52	1	DEN	1000	81.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	50.7
605	316342.86	4834463.36	82.83	1	DEN	1000	81.6	18.1	0.0	0.0	0.0	53.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	47.6
611	316331.37	4834456.92	83.14	1	DEN	1000	81.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.0
619	316328.57	4834455.31	83.22	1	DEN	1000	81.6	11.8	0.0	0.0	0.0	52.8	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	42.1
864	316363.47	4834468.47	83.40	0	DEN	1000	81.6	13.0	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	48.7
872	316344.47	4834457.61	83.40	0	DEN	1000	81.6	20.2	0.0	0.0	0.0	48.3	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.2
879	316334.08	4834449.93	83.40	0	DEN	1000	81.6	20.2	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	55.8
887	316348.96	4834462.20	83.40	0	DEN	1000	81.6	16.9	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	53.1
891	316326.42	4834449.27	83.40	0	DEN	1000	81.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.1
898	316349.96	4834461.01	83.40	1	DEN	1000	81.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	47.1
906	316360.72	4834467.05	83.40	1	DEN	1000	81.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	44.0
907	316336.44	4834453.32	83.40	1	DEN	1000	81.6	21.3	0.0	0.0	0.0	53.3	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	51.0
915	316329.29	4834446.94	83.40	1	DEN	1000	81.6	16.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	47.0

Area Source, ISO 9613, Name: "", ID: "track_Don2_equal"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
924	316334.15	4834452.08	83.40	1	DEN	1000	81.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	50.4

Area Source, ISO 9613, Name: "", ID: "track_Don2_tiecut"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
705	316364.18	4834478.44	80.22	0	DEN	1000	80.6	10.7	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	45.8
712	316360.79	4834473.87	80.86	0	DEN	1000	80.6	21.2	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.3
720	316350.31	4834467.17	81.31	0	DEN	1000	80.6	19.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	55.0
733	316343.13	4834465.73	80.97	0	DEN	1000	80.6	16.7	0.0	0.0	0.0	47.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	52.3
741	316333.20	4834458.11	81.66	0	DEN	1000	80.6	16.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	52.0
748	316361.77	4834476.60	80.38	1	DEN	1000	80.6	18.6	0.0	0.0	0.0	54.5	0.6	-3.0	0.0	0.0	0.0	0.0	1.0	46.1
756	316355.29	4834470.22	81.12	1	DEN	1000	80.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	49.7
764	316342.86	4834463.36	81.43	1	DEN	1000	80.6	18.1	0.0	0.0	0.0	53.6	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.6
770	316331.37	4834456.92	81.74	1	DEN	1000	80.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	44.0
778	316328.57	4834455.31	81.82	1	DEN	1000	80.6	11.8	0.0	0.0	0.0	52.9	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	41.1
1068	316363.47	4834468.47	82.00	0	DEN	1000	80.6	13.0	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	47.6
1072	316344.47	4834457.61	82.00	0	DEN	1000	80.6	20.2	0.0	0.0	0.0	48.4	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	55.1
1076	316334.08	4834449.93	82.00	0	DEN	1000	80.6	20.2	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.7
1078	316348.96	4834462.20	82.00	0	DEN	1000	80.6	16.9	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	52.0
1081	316326.42	4834449.27	82.00	0	DEN	1000	80.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	50.0
1086	316349.96	4834461.01	82.00	1	DEN	1000	80.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.1
1089	316360.72	4834467.05	82.00	1	DEN	1000	80.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	43.0
1092	316336.44	4834453.32	82.00	1	DEN	1000	80.6	21.3	0.0	0.0	0.0	53.4	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	50.0
1094	316329.29	4834446.24	82.00	1	DEN	1000	80.6	15.6	0.0	0.0	0.0	53.1	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	44.6
1107	316329.28	4834448.79	82.00	1	DEN	1000	80.6	11.3	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	40.4
1125	316334.15	4834452.08	82.00	1	DEN	1000	80.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	49.4

Area Source, ISO 9613, Name: "", ID: "track_Don2_crane"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
782	316364.18	4834478.44	81.62	0	DEN	1000	80.6	10.7	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	45.9
790	316360.79	4834473.87	82.26	0	DEN	1000	80.6	21.2	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	56.4
797	316350.31	4834467.17	82.71	0	DEN	1000	80.6	19.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	55.2
811	316343.13	4834465.73	82.37	0	DEN	1000	80.6	16.7	0.0	0.0	0.0	47.6	0.2	-3.0	0.0	0.0	0.0	0.0	0.0	52.4
823	316333.20	4834458.11	83.06	0	DEN	1000	80.6	16.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	52.1
830	316361.77	4834476.60	81.78	1	DEN	1000	80.6	18.6	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.1
841	316355.29	4834470.22	82.52	1	DEN	1000	80.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	49.7
842	316342.86	4834463.36	82.83	1	DEN	1000	80.6	18.1	0.0	0.0	0.0	53.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.6
849	316331.37	4834456.92	83.14	1	DEN	1000	80.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	44.0
856	316328.57	4834455.31	83.22	1	DEN	1000	80.6	11.8	0.0	0.0	0.0	52.8	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	41.1
1156	316363.47	4834468.47	83.40	0	DEN	1000	80.6	13.0	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	47.7
1159	316344.47	4834457.61	83.40	0	DEN	1000	80.6	20.2	0.0	0.0	0.0	48.3	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	55.2
1161	316334.08	4834449.93	83.40	0	DEN	1000	80.6	20.2	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.8
1162	316348.96	4834462.20	83.40	0	DEN	1000	80.6	16.9	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	52.1
1165	316326.42	4834449.27	83.40	0	DEN	1000	80.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	50.1
1167	316349.96	4834461.01	83.40	1	DEN	1000	80.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.1
1171	316360.72	4834467.05	83.40	1	DEN	1000	80.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	43.0
1175	316336.44	4834453.32	83.40	1	DEN	1000	80.6	21.3	0.0	0.0	0.0	53.3	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	50.0
1180	316329.29	4834446.94	83.40	1	DEN	1000	80.6	16.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.0
1184	316334.15	4834452.08	83.40	1	DEN	1000	80.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	49.4

Area Source, ISO 9613, Name: "", ID: "track_Don4_trk"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
932	316522.40	4834590.01	82.07	0	DEN	1000	91.4	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	55.9
938	316508.02	4834573.77	82.82	0	DEN	1000	91.4	23.3	0.0	0.0	0.0	57.2	0.7	-3.0	0.0	0.0	0.0	0.0	0.0	59.7
942	316512.84	4834579.65	82.54	0	DEN	1000	91.4	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	45.6
947	316522.38	4834584.62	82.79	0	DEN	1000	91.4	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	49.6

Area Source, ISO 9613, Name: "", ID: "track_Don2_thandle"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
956	316364.18	4834478.44	81.62	0	DEN	1000	79.6	10.7	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	44.9
963	316360.79	4834473.87	82.26	0	DEN	1000	79.6	21.2	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	55.4

Area Source, ISO 9613, Name: "", ID: "track_Don2_thandle"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
964	316350.31	4834467.17	82.71	0	DEN	1000	79.6	19.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.2
965	316343.13	4834465.73	82.37	0	DEN	1000	79.6	16.7	0.0	0.0	0.0	47.6	0.2	-3.0	0.0	0.0	0.0	0.0	0.0	51.4
966	316333.20	4834458.11	83.06	0	DEN	1000	79.6	16.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.1
974	316361.77	4834476.60	81.78	1	DEN	1000	79.6	18.6	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.1
983	316355.29	4834470.22	82.52	1	DEN	1000	79.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.7
990	316342.86	4834463.36	82.83	1	DEN	1000	79.6	18.1	0.0	0.0	0.0	53.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.6
996	316331.37	4834456.92	83.14	1	DEN	1000	79.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	43.0
1004	316328.57	4834455.31	83.22	1	DEN	1000	79.6	11.8	0.0	0.0	0.0	52.8	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	40.1
1257	316363.47	4834468.47	83.40	0	DEN	1000	79.6	13.0	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	46.7
1261	316344.47	4834457.61	83.40	0	DEN	1000	79.6	20.2	0.0	0.0	0.0	48.3	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.2
1289	316334.08	4834449.93	83.40	0	DEN	1000	79.6	20.2	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	53.8
1297	316348.96	4834462.20	83.40	0	DEN	1000	79.6	16.9	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.1
1300	316326.42	4834449.27	83.40	0	DEN	1000	79.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	49.1
1318	316349.96	4834461.01	83.40	1	DEN	1000	79.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.1
1321	316360.72	4834467.05	83.40	1	DEN	1000	79.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	42.0
1325	316336.44	4834453.32	83.40	1	DEN	1000	79.6	21.3	0.0	0.0	0.0	53.3	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	49.0
1327	316329.29	4834446.94	83.40	1	DEN	1000	79.6	16.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.0
1332	316334.15	4834452.08	83.40	1	DEN	1000	79.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.4

Area Source, ISO 9613, Name: "", ID: "track_Don2_back"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1017	316364.18	4834478.44	81.62	0	DEN	1000	79.6	10.7	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	44.9
1021	316360.79	4834473.87	82.26	0	DEN	1000	79.6	21.2	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	55.4
1025	316350.31	4834467.17	82.71	0	DEN	1000	79.6	19.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.2
1031	316343.13	4834465.73	82.37	0	DEN	1000	79.6	16.7	0.0	0.0	0.0	47.6	0.2	-3.0	0.0	0.0	0.0	0.0	0.0	51.4
1034	316333.20	4834458.11	83.06	0	DEN	1000	79.6	16.7	0.0	0.0	0.0	47.9	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.1
1038	316361.77	4834476.60	81.78	1	DEN	1000	79.6	18.6	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.1
1040	316355.29	4834470.22	82.52	1	DEN	1000	79.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.7
1043	316342.86	4834463.36	82.83	1	DEN	1000	79.6	18.1	0.0	0.0	0.0	53.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.6
1047	316331.37	4834456.92	83.14	1	DEN	1000	79.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	43.0
1049	316328.57	4834455.31	83.22	1	DEN	1000	79.6	11.8	0.0	0.0	0.0	52.8	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	40.1
1202	316363.47	4834468.47	83.40	0	DEN	1000	79.6	13.0	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	46.7
1206	316344.47	4834457.61	83.40	0	DEN	1000	79.6	20.2	0.0	0.0	0.0	48.3	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	54.2
1211	316334.08	4834449.93	83.40	0	DEN	1000	79.6	20.2	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	53.8
1216	316348.96	4834462.20	83.40	0	DEN	1000	79.6	16.9	0.0	0.0	0.0	48.1	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.1
1219	316326.42	4834449.27	83.40	0	DEN	1000	79.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	49.1
1226	316349.96	4834461.01	83.40	1	DEN	1000	79.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.1
1229	316360.72	4834467.05	83.40	1	DEN	1000	79.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	42.0
1234	316336.44	4834453.32	83.40	1	DEN	1000	79.6	21.3	0.0	0.0	0.0	53.3	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	49.0
1237	316329.29	4834446.94	83.40	1	DEN	1000	79.6	16.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.0
1240	316334.15	4834452.08	83.40	1	DEN	1000	79.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	48.4

Area Source, ISO 9613, Name: "", ID: "track_Don2_comp"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1343	316364.18	4834478.44	80.22	0	DEN	1000	76.6	10.7	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	41.7
1346	316360.79	4834473.87	80.86	0	DEN	1000	76.6	21.2	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	52.3
1348	316350.31	4834467.17	81.31	0	DEN	1000	76.6	19.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.0
1351	316343.13	4834465.73	80.97	0	DEN	1000	76.6	16.7	0.0	0.0	0.0	47.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	48.3
1378	316333.20	4834458.11	81.66	0	DEN	1000	76.6	16.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	48.0
1382	316361.77	4834476.60	80.38	1	DEN	1000	76.6	18.6	0.0	0.0	0.0	54.5	0.6	-3.0	0.0	0.0	0.0	0.0	1.0	42.0
1384	316355.29	4834470.22	81.12	1	DEN	1000	76.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.7
1385	316342.86	4834463.36	81.43	1	DEN	1000	76.6	18.1	0.0	0.0	0.0	53.6	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	42.6
1387	316331.37	4834456.92	81.74	1	DEN	1000	76.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	40.0
1388	316328.57	4834455.31	81.82	1	DEN	1000	76.6	11.8	0.0	0.0	0.0	52.9	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	37.1
1398	316363.47	4834468.47	82.00	0	DEN	1000	76.6	13.0	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	43.6
1401	316344.47	4834457.61	82.00	0	DEN	1000	76.6	20.2	0.0	0.0	0.0	48.4	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	51.1
1404	316334.08	4834449.93	82.00	0	DEN	1000	76.6	20.2	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	50.7
1407	316348.96	4834462.20	82.00	0	DEN	1000	76.6	16.9	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	48.0
1409	316326.42	4834449.27	82.00	0	DEN	1000	76.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	46.0
1413	316349.96	4834461.01	82.00	1	DEN	1000	76.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	42.1
1417	316360.72	4834467.05	82.00	1	DEN	1000	76.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	39.0
1420	316336.44	4834453.32	82.00	1	DEN	1000	76.6	21.3	0.0	0.0	0.0	53.4	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	46.0

Area Source, ISO 9613, Name: "", ID: "track_Don2_comp"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1423	316329.29	4834446.24	82.00	1	DEN	1000	76.6	15.6	0.0	0.0	0.0	53.1	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	40.6
1427	316329.28	4834448.79	82.00	1	DEN	1000	76.6	11.3	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	36.4
1430	316334.15	4834452.08	82.00	1	DEN	1000	76.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	45.4

Area Source, ISO 9613, Name: "", ID: "track_Don4_railsaw"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1464	316522.40	4834590.01	80.67	0	DEN	1000	86.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	51.1
1492	316508.02	4834573.77	81.42	0	DEN	1000	86.6	23.3	0.0	0.0	0.0	57.2	0.8	-3.0	0.0	0.0	0.0	0.0	0.0	54.9
1515	316512.84	4834579.65	81.14	0	DEN	1000	86.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	40.8
1534	316522.38	4834584.62	81.39	0	DEN	1000	86.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	44.8

Area Source, ISO 9613, Name: "", ID: "track_Don2_back"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1554	316364.18	4834478.44	80.22	0	DEN	1000	73.6	10.7	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	38.8
1557	316360.79	4834473.87	80.86	0	DEN	1000	73.6	21.2	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	49.3
1560	316350.31	4834467.17	81.31	0	DEN	1000	73.6	19.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	48.0
1562	316343.13	4834465.73	80.97	0	DEN	1000	73.6	16.7	0.0	0.0	0.0	47.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	45.3
1564	316333.20	4834458.11	81.66	0	DEN	1000	73.6	16.7	0.0	0.0	0.0	48.0	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	45.0
1568	316361.77	4834476.60	80.38	1	DEN	1000	73.6	18.6	0.0	0.0	0.0	54.5	0.6	-3.0	0.0	0.0	0.0	0.0	1.0	39.1
1570	316355.29	4834470.22	81.12	1	DEN	1000	73.6	21.9	0.0	0.0	0.0	54.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	42.7
1572	316342.86	4834463.36	81.43	1	DEN	1000	73.6	18.1	0.0	0.0	0.0	53.6	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	39.6
1578	316331.37	4834456.92	81.74	1	DEN	1000	73.6	14.9	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	37.0
1581	316328.57	4834455.31	81.82	1	DEN	1000	73.6	11.8	0.0	0.0	0.0	52.9	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	34.1
1749	316363.47	4834468.47	82.00	0	DEN	1000	73.6	13.0	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	40.6
1753	316344.47	4834457.61	82.00	0	DEN	1000	73.6	20.2	0.0	0.0	0.0	48.4	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	48.1
1756	316334.08	4834449.93	82.00	0	DEN	1000	73.6	20.2	0.0	0.0	0.0	48.7	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	47.7
1759	316348.96	4834462.20	82.00	0	DEN	1000	73.6	16.9	0.0	0.0	0.0	48.2	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	45.0
1762	316326.42	4834449.27	82.00	0	DEN	1000	73.6	15.4	0.0	0.0	0.0	48.6	0.3	-3.0	0.0	0.0	0.0	0.0	0.0	43.0
1765	316349.96	4834461.01	82.00	1	DEN	1000	73.6	18.1	0.0	0.0	0.0	54.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	39.1
1768	316360.72	4834467.05	82.00	1	DEN	1000	73.6	15.5	0.0	0.0	0.0	54.5	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	36.0
1770	316336.44	4834453.32	82.00	1	DEN	1000	73.6	21.3	0.0	0.0	0.0	53.4	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	43.0
1771	316329.29	4834446.24	82.00	1	DEN	1000	73.6	15.6	0.0	0.0	0.0	53.1	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	37.6
1772	316329.28	4834448.79	82.00	1	DEN	1000	73.6	11.3	0.0	0.0	0.0	53.0	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	33.4
1777	316334.15	4834452.08	82.00	1	DEN	1000	73.6	20.5	0.0	0.0	0.0	53.2	0.5	-3.0	0.0	0.0	0.0	0.0	1.0	42.4

Area Source, ISO 9613, Name: "", ID: "track_Don4_tinsert"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1606	316522.40	4834590.01	80.67	0	DEN	1000	84.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	49.1
1622	316508.02	4834573.77	81.42	0	DEN	1000	84.6	23.3	0.0	0.0	0.0	57.2	0.8	-3.0	0.0	0.0	0.0	0.0	0.0	52.9
1633	316512.84	4834579.65	81.14	0	DEN	1000	84.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	38.8
1652	316522.38	4834584.62	81.39	0	DEN	1000	84.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	42.8

Area Source, ISO 9613, Name: "", ID: "track_Don1_trk"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1685	316708.38	4834730.59	81.13	0	DEN	1000	91.4	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	47.0
1725	316697.76	4834717.36	81.78	0	DEN	1000	91.4	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	47.6

Area Source, ISO 9613, Name: "", ID: "track_Don4_tamper"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1810	316522.40	4834590.01	82.07	0	DEN	1000	82.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	47.1
1828	316508.02	4834573.77	82.82	0	DEN	1000	82.6	23.3	0.0	0.0	0.0	57.2	0.7	-3.0	0.0	0.0	0.0	0.0	0.0	50.9
1838	316512.84	4834579.65	82.54	0	DEN	1000	82.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	36.8
1860	316522.38	4834584.62	82.79	0	DEN	1000	82.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	40.8

Area Source, ISO 9613, Name: "", ID: "track_Don4_equal"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1886	316522.40	4834590.01	82.07	0	DEN	1000	81.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	46.1
1907	316508.02	4834573.77	82.82	0	DEN	1000	81.6	23.3	0.0	0.0	0.0	57.2	0.7	-3.0	0.0	0.0	0.0	0.0	0.0	49.9

Area Source, ISO 9613, Name: "", ID: "track_Don4_equal"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1924	316512.84	4834579.65	82.54	0	DEN	1000	81.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	35.8
1948	316522.38	4834584.62	82.79	0	DEN	1000	81.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	39.8

Area Source, ISO 9613, Name: "", ID: "track_Don4_tiecut"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1977	316522.40	4834590.01	80.67	0	DEN	1000	80.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	45.1
2043	316508.02	4834573.77	81.42	0	DEN	1000	80.6	23.3	0.0	0.0	0.0	57.2	0.8	-3.0	0.0	0.0	0.0	0.0	0.0	48.9
2063	316512.84	4834579.65	81.14	0	DEN	1000	80.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	34.8
2086	316522.38	4834584.62	81.39	0	DEN	1000	80.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	38.8

Area Source, ISO 9613, Name: "", ID: "track_Don4_crane"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2012	316522.40	4834590.01	82.07	0	DEN	1000	80.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	45.1
2106	316508.02	4834573.77	82.82	0	DEN	1000	80.6	23.3	0.0	0.0	0.0	57.2	0.7	-3.0	0.0	0.0	0.0	0.0	0.0	48.9
2122	316512.84	4834579.65	82.54	0	DEN	1000	80.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	34.8
2133	316522.38	4834584.62	82.79	0	DEN	1000	80.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	38.8

Area Source, ISO 9613, Name: "", ID: "track_Don1_railsaw"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2163	316708.38	4834730.59	79.73	0	DEN	1000	86.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	42.2
2248	316697.76	4834717.36	80.38	0	DEN	1000	86.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	42.8

Area Source, ISO 9613, Name: "", ID: "track_Don4_thandle"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2186	316522.40	4834590.01	82.07	0	DEN	1000	79.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	44.1
2270	316508.02	4834573.77	82.82	0	DEN	1000	79.6	23.3	0.0	0.0	0.0	57.2	0.7	-3.0	0.0	0.0	0.0	0.0	0.0	47.9
2296	316512.84	4834579.65	82.54	0	DEN	1000	79.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	33.8
2308	316522.38	4834584.62	82.79	0	DEN	1000	79.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	37.8

Area Source, ISO 9613, Name: "", ID: "track_Don4_back"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2214	316522.40	4834590.01	82.07	0	DEN	1000	79.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	44.1
2327	316508.02	4834573.77	82.82	0	DEN	1000	79.6	23.3	0.0	0.0	0.0	57.2	0.7	-3.0	0.0	0.0	0.0	0.0	0.0	47.9
2343	316512.84	4834579.65	82.54	0	DEN	1000	79.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	33.8
2357	316522.38	4834584.62	82.79	0	DEN	1000	79.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	37.8

Area Source, ISO 9613, Name: "", ID: "track_Don3_trk"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2391	317031.14	4834989.85	82.03	0	DEN	1000	91.4	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	38.5
2436	317020.52	4834976.63	82.03	0	DEN	1000	91.4	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	38.6

Area Source, ISO 9613, Name: "", ID: "track_Don1_tinsert"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2456	316708.38	4834730.59	79.73	0	DEN	1000	84.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	40.3
2472	316697.76	4834717.36	80.38	0	DEN	1000	84.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	40.8

Area Source, ISO 9613, Name: "", ID: "track_Don4_comp"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2500	316522.40	4834590.01	80.67	0	DEN	1000	76.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	41.1
2526	316508.02	4834573.77	81.42	0	DEN	1000	76.6	23.3	0.0	0.0	0.0	57.2	0.8	-3.0	0.0	0.0	0.0	0.0	0.0	44.9
2542	316512.84	4834579.65	81.14	0	DEN	1000	76.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	30.7
2558	316522.38	4834584.62	81.39	0	DEN	1000	76.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	34.8

Area Source, ISO 9613, Name: "", ID: "track_Don1_tamper"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2580	316708.38	4834730.59	81.13	0	DEN	1000	82.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	38.3
2610	316697.76	4834717.36	81.78	0	DEN	1000	82.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	38.8

Area Source, ISO 9613, Name: "", ID: "track_Don1_equal"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2638	316708.38	4834730.59	81.13	0	DEN	1000	81.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	37.3
2667	316697.76	4834717.36	81.78	0	DEN	1000	81.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	37.8

Area Source, ISO 9613, Name: "", ID: "track_Don3_railsaw"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2689	317031.14	4834989.85	80.63	0	DEN	1000	86.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	33.7
2876	317020.52	4834976.63	80.63	0	DEN	1000	86.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	33.9

Area Source, ISO 9613, Name: "", ID: "track_Don1_tiecut"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2714	316708.38	4834730.59	79.73	0	DEN	1000	80.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	36.2
2799	316697.76	4834717.36	80.38	0	DEN	1000	80.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	36.8

Area Source, ISO 9613, Name: "", ID: "track_Don1_crane"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2739	316708.38	4834730.59	81.13	0	DEN	1000	80.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	36.2
2838	316697.76	4834717.36	81.78	0	DEN	1000	80.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	36.8

Area Source, ISO 9613, Name: "", ID: "track_Don4_back"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2763	316522.40	4834590.01	80.67	0	DEN	1000	73.6	25.1	0.0	0.0	0.0	58.0	0.8	-3.0	0.0	0.0	4.8	0.0	0.0	38.1
2894	316508.02	4834573.77	81.42	0	DEN	1000	73.6	23.3	0.0	0.0	0.0	57.2	0.8	-3.0	0.0	0.0	0.0	0.0	0.0	41.9
2913	316512.84	4834579.65	81.14	0	DEN	1000	73.6	14.1	0.0	0.0	0.0	57.5	0.8	-3.0	0.0	0.0	4.6	0.0	0.0	27.8
2923	316522.38	4834584.62	81.39	0	DEN	1000	73.6	18.7	0.0	0.0	0.0	57.9	0.8	-3.0	0.0	0.0	4.7	0.0	0.0	31.8

Area Source, ISO 9613, Name: "", ID: "track_Don1_back"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2953	316708.38	4834730.59	81.13	0	DEN	1000	79.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	35.3
3038	316697.76	4834717.36	81.78	0	DEN	1000	79.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	35.8

Area Source, ISO 9613, Name: "", ID: "track_Don1_thandle"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2980	316708.38	4834730.59	81.13	0	DEN	1000	79.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	35.3
3011	316697.76	4834717.36	81.78	0	DEN	1000	79.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	35.8

Area Source, ISO 9613, Name: "", ID: "track_Don3_tinsert"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3064	317031.14	4834989.85	80.63	0	DEN	1000	84.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	31.7
3090	317020.52	4834976.63	80.63	0	DEN	1000	84.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	31.9

Area Source, ISO 9613, Name: "", ID: "track_Don3_tamper"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3113	317031.14	4834989.85	82.03	0	DEN	1000	82.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	29.7
3176	317020.52	4834976.63	82.03	0	DEN	1000	82.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	29.9

Area Source, ISO 9613, Name: "", ID: "track_Don1_comp"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3131	316708.38	4834730.59	79.73	0	DEN	1000	76.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	32.2
3154	316697.76	4834717.36	80.38	0	DEN	1000	76.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	32.8

Area Source, ISO 9613, Name: "", ID: "track_Don3_equal"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3221	317031.14	4834989.85	82.03	0	DEN	1000	81.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	28.7
3247	317020.52	4834976.63	82.03	0	DEN	1000	81.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	28.9

Area Source, ISO 9613, Name: "", ID: "track_Don3_tiecut"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3278	317031.14	4834989.85	80.63	0	DEN	1000	80.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	27.7
3331	317020.52	4834976.63	80.63	0	DEN	1000	80.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	27.9

Area Source, ISO 9613, Name: "", ID: "track_Don3_crane"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3306	317031.14	4834989.85	82.03	0	DEN	1000	80.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	27.7
3360	317020.52	4834976.63	82.03	0	DEN	1000	80.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	27.8

Area Source, ISO 9613, Name: "", ID: "track_Don3_thandle"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3391	317031.14	4834989.85	82.03	0	DEN	1000	79.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	26.7
3515	317020.52	4834976.63	82.03	0	DEN	1000	79.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	26.9

Area Source, ISO 9613, Name: "", ID: "track_Don3_back"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3413	317031.14	4834989.85	82.03	0	DEN	1000	79.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	26.7
3484	317020.52	4834976.63	82.03	0	DEN	1000	79.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	26.9

Area Source, ISO 9613, Name: "", ID: "track_Don1_back"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3431	316708.38	4834730.59	79.73	0	DEN	1000	73.6	25.1	0.0	0.0	0.0	64.1	1.6	-3.0	0.0	0.0	6.7	0.0	0.0	29.2
3455	316697.76	4834717.36	80.38	0	DEN	1000	73.6	25.0	0.0	0.0	0.0	63.8	1.6	-3.0	0.0	0.0	6.5	0.0	0.0	29.8

Area Source, ISO 9613, Name: "", ID: "track_Don3_comp"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3544	317031.14	4834989.85	80.63	0	DEN	1000	76.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	23.7
3566	317020.52	4834976.63	80.63	0	DEN	1000	76.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	23.8

Area Source, ISO 9613, Name: "", ID: "track_Don3_back"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3593	317031.14	4834989.85	80.63	0	DEN	1000	73.6	25.1	0.0	0.0	0.0	69.7	3.1	-3.0	0.0	0.0	8.2	0.0	0.0	20.7
3611	317020.52	4834976.63	80.63	0	DEN	1000	73.6	24.9	0.0	0.0	0.0	69.5	3.1	-3.0	0.0	0.0	8.1	0.0	0.0	20.9

Job Name:	Ontario Line Early Works
Job Number:	60611173
Date:	17-Jul-20
Title:	Noise Screening
Description:	Noise Screening Calcs - Assuming Augured piling

ref dist (m) 15.24

Equipment	reference (dBA)	usage factor	Calc to PWL	Incorp - Usage factor
Auger Piling Equipme	85	20	116.6	109.7
Rammed Aggregate I	90	20	121.6	114.7
Backhoe2	80	40	111.6	107.7
Chain Saw	85	20	116.6	109.7
Compactor (ground)	80	20	111.6	104.7
Compressor (air)	80	40	111.6	107.7
Concrete mixer truck	85	40	116.6	112.7
Concrete pump truck	82	20	113.6	106.7
Concrete saw	90	20	121.6	114.7
Crane (mobile)	85	16	116.6	108.7
Dozer	85	40	116.6	112.7
Dump/flatbed truck	84	40	115.6	111.7
Excavator2	80	40	111.6	107.7
Front end loader2	80	40	111.6	107.7
Generator	82	50	113.6	110.6
Grader2	85	40	116.6	112.7
Hoe Ram	90	20	121.6	114.7
Jack Hammer	89	20	120.6	113.7
Man Lift	85	20	116.6	109.7
Pavement Scarifier4	85	20	116.6	109.7
Pumps	77	50	108.6	105.6
Rail Saw5	90	20	121.6	114.7
Roller	85	20	116.6	109.7
Vibratory Concrete M	80	20	111.6	104.7
Vacuum Excavator	85	40	116.6	112.7
Ballast Equalizer6	82	40	113.6	109.7
Ballast Tamper1	83	40	114.6	110.7
Spike Driver7	77	20	108.6	101.7
Tie Cutter8	84	20	115.6	108.7
Tie Handler9	80	40	111.6	107.7
Tie Inserter9	85	40	116.6	112.7
			Total (dBA)	125.9
			Dist for 80 dBA (m)	78.3
			Dist for 70 dBA (m)	247.5

Job Name: Ontario Line Early Works
Job Number: 60611173
Date: 5-Mar-21

Title: Vibration Zone of Influence

Description: Vibration Zone of Influence Inputs and Parameters

$$PPV = PPV_{ref} * \left(\frac{D_{ref}}{D}\right)^{1.5}$$
$$D = D_{ref} * \left(\frac{PPV_{ref}}{PPV}\right)^{2/3}$$

$$L_v = L_{v,ref} - 30 \log\left(\frac{D}{D_{ref}}\right)$$
$$D = D_{ref} * 10^{\frac{L_{v,ref} - L_v}{30}}$$

$$L_v = 20 \log\left(\frac{v_{rms}}{v_{ref}}\right)$$

Reference Vibration Levels

	Reference PPV				Lv,ref				
	Dref		PPV		Dref			Vref	
Equipment	ft	m	in/sec	mm/s	ft	m	Lv,ref	in	mm
Auger Pile	25	7.62	0.089	2.261	25	7.62	87	0.000001	0.0000254
Rammed Aggregate Pier	25	7.62	0.089	2.261	25	7.62	87	0.000001	0.0000254
Backhoe	25	7.62	0.003	0.076	25	7.62	58	0.000001	0.0000254
Ground compactor	25	7.62	0.035	0.889	25	7.62	79	0.000001	0.0000254
concrete mix truck	25	7.62	0.076	1.930	25	7.62	86	0.000001	0.0000254
Concrete pump truck	25	7.62	0.076	1.930	25	7.62	86	0.000001	0.0000254
Dozer	25	7.62	0.089	2.261	25	7.62	87	0.000001	0.0000254
Dump/flatbed truck	25	7.62	0.076	1.930	25	7.62	86	0.000001	0.0000254
excavator	25	7.62	0.003	0.076	25	7.62	58	0.000001	0.0000254
front end loader	25	7.62	0.003	0.076	25	7.62	58	0.000001	0.0000254
grader	25	7.62	0.003	0.076	25	7.62	58	0.000001	0.0000254
hoe ram	25	7.62	0.089	2.261	25	7.62	87	0.000001	0.0000254
jack hammer	25	7.62	0.035	0.889	25	7.62	79	0.000001	0.0000254
pavement scarifier	25	7.62	0.003	0.076	25	7.62	58	0.000001	0.0000254
roller	25	7.62	0.210	5.334	25	7.62	94	0.000001	0.0000254
Ballast equalizer	25	7.62	0.003	0.076	25	7.62	58	0.000001	0.0000254
ballast tamper	25	7.62	0.089	2.261	25	7.62	87	0.000001	0.0000254
spike driver	25	7.62	0.035	0.889	25	7.62	79	0.000001	0.0000254

Job Name: Ontario Line Early Works
Job Number: 60611173
Date: 5-Mar-21

Title: Vibration Zone of Influence

Description: Bylaw 514

Zone of Influence - Bylaw 514

Equipment	8.0 mm/s		5.0 mm/s		3.0 mm/s	
	m	ft	m	ft	m	ft
Auger Pile	3.3	10.8	4.5	14.6	6.2	20.5
Rammed Aggregate Pier	3.3	10.8	4.5	14.6	6.2	20.5
Backhoe	0.3	1.1	0.5	1.5	0.7	2.1
Ground compactor	1.8	5.8	2.4	7.8	3.4	11.0
concrete mix truck	3.0	9.7	4.0	13.2	5.6	18.4
Concrete pump truck	3.0	9.7	4.0	13.2	5.6	18.4
Dozer	3.3	10.8	4.5	14.6	6.2	20.5
Dump/flatbed truck	3.0	9.7	4.0	13.2	5.6	18.4
excavator	0.3	1.1	0.5	1.5	0.7	2.1
front end loader	0.3	1.1	0.5	1.5	0.7	2.1
grader	0.3	1.1	0.5	1.5	0.7	2.1
hoe ram	3.3	10.8	4.5	14.6	6.2	20.5
jack hammer	1.8	5.8	2.4	7.8	3.4	11.0
pavement scarifier	0.3	1.1	0.5	1.5	0.7	2.1
roller	5.8	19.1	7.9	25.9	11.1	36.3
Ballast equalizer	0.3	1.1	0.5	0.0	0.7	2.1
ballast tamper	3.3	10.8	4.5	0.3	6.2	20.5
spike driver	1.8	5.8	2.4	0.1	3.4	11.0

Job Name:	Ontario Line Early Works
Job Number:	60611173
Date:	5-Mar-21
Title:	Vibration Zone of Influence
Description:	Vibration Zone of Influence Calculation - 0.14 mm/s

Zone of Influence - 0.14 mm/s

Equipment	Lv,criteria for calc	Zone of influence m	ft
Auger Pile	74.8258864	19	64
Rammed Aggregate Pier	74.8258864	19	64
Backhoe	74.8258864	2	7
Ground compactor	74.8258864	10	34
Dump/flatbed truck	74.8258864	18	59
excavator	74.8258864	2	7
front end loader	74.8258864	2	7
grader	74.8258864	2	7
hoe ram	74.8258864	19	64
jack hammer	74.8258864	10	34
pavement scarifier	74.8258864	2	7
roller	74.8258864	33	109
Ballast equalizer	74.8258864	2	7
ballast tamper	74.8258864	19	64
spike driver	74.8258864	10	34