

**Environmental Noise Feasibility
Assessment
Proposed Residential Development -
670 Niagara Street, Welland**

2786966 Ontario Inc.



BURNSIDE

**Environmental Noise Feasibility
Assessment
Proposed Residential Development -
670 Niagara Street, Welland**

2786966 Ontario Inc.

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**September 2024
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Environmental Noise Feasibility Assessment
Proposed Residential Development - 670 Niagara Street, Welland
September 2024

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September 2024

Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained by 2786966 Ontario Inc. to prepare an Environmental Noise Feasibility Assessment for 670 Niagara Mixed Use Apartment Development. The property is located at 418 – 430 Aqueduct Street and 650 – 678 Niagara Street, Welland, Ontario.

The only significant road traffic noise source is Niagara Street. Sound levels from Niagara Street were modelled based on the future traffic volumes. The resulting future sound levels were compared to the applicable Ministry of the Environment, Conservation and Parks (MECP) limits in order to determine whether any noise control measures are required.

There are no rail traffic noise sources of concern within 300 m of the development.

The development is located 2.8 km from the active sections of the Welland Canal which serves small cargo ships of 225.5 m or less. The canal was not considered a major potential noise source due to the distance setback.

The subject development is not located within the NEF / NEP noise contours of any airports. Therefore, aircraft noise is not considered a significant noise source for this development.

The assessment revealed that transportation noise mitigation measures are required for the development. Required measures include:

- Requirement for the installation of central air conditioning.
- Warning clause Type D for potential purchasers.

Sound levels at the newly developed lots will meet the MECP noise guideline requirements after all suggested noise mitigation measures listed above are implemented.

The nearby stationary noise sources of concern to the development include Chuck's Roadhouse, Desjardins, McDonalds, Meridian, and Midas commercial properties which contain various stationary noise sources such as HVAC units, truck deliveries, vehicles idling at the drive-thru, drive-thru speaker, and pneumatic tools. Sound levels from these sources were modelled based on previous Burnside measurements and proxy data using conservative assumptions. The resulting future sound levels were compared to the applicable MECP limits for a Class 1 Area in order to determine whether any noise control measures are required. The ambient noise conditions predicted for the proposed development were also considered.

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The assessment revealed that the stationary sound levels at all points of reception on the proposed development are below MECP limits; therefore, no external stationary noise mitigation measures are required.

The proposed development will contain stationary noise sources with potential to impact noise sensitive land uses in the vicinity, including the proposed development itself. The proposed stationary noise sources include garage exhaust fans, water cooled chillers, residential air conditioning units, and emergency generators. Sound levels from these sources were modelled based on manufacturer sound emission data of similar sources or conservative Burnside assumptions. The resulting future sound levels were compared to the applicable MECP limits for a Class 1 Area in order to determine whether any noise control measures are required. The ambient noise conditions predicted for the proposed development were also considered for some points of reception.

The assessment revealed that the stationary sound levels from the proposed sources within the development, at some points of reception on the proposed development are above the MECP limits; therefore, internal stationary noise mitigation measures will be required.

The required measures include:

- Reduction of 30 dB on the garage exhaust fans (specific measures to be determined during detailed design).
- Reduction of 20 dB for the water-cooled chillers assumed to be located in the mechanical penthouses (specific measures to be determined during the detailed design).
- Reduction of 16 dB for the emergency generators assumed to be located in the mechanical penthouses (specific measures to be determined during the detailed design).

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by 2786966 Ontario Inc. to prepare an Environmental Noise Feasibility Assessment for the new 670 Niagara Mixed Use Apartment Development. The property is located at 418 – 430 Aqueduct Street and 650 – 678 Niagara Street, Welland, Ontario.

The purpose of this assessment is to examine potential noise impacts relating to the proposed mixed-use development along Niagara Street, Welland.

1.1 Objective

This report has been prepared in support of the new 670 Niagara Mixed Use Apartment Development. This report will be included in a submission for the Zoning By-law Amendment. The potential noise impacts and ambient noise were modelled using the Ministry of the Environment, Conservation and Parks (MECP) accepted calculation method for road traffic noise assessment, TNM. Sound levels were predicted based on 20-year future traffic forecast¹ for Niagara Street (see Table 2). The potential noise impacts were evaluated by comparing predicted sound levels at the representative points of reception with the MECP sound level limits.

1.2 Study Area

The proposed 670 Niagara Mixed Use Apartment Development is located on Niagara Street near Aqueduct Street in Welland, Ontario. The site location map is provided in Figure 1.

The proposed development is in an area currently zoned by the City of Welland as Single Detached Dwelling – First Density Zone (bylaw 2667).

The Site Plan is shown in Figure 2. The area zoning map is shown in Figure 3.

2.0 Applicable Noise Criteria

2.1 MECP Noise Policies

Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300) is the MECP Publication which provides advice, sound level limits and guidance that maybe used when land use planning decisions are made under the Planning Act, and the Niagara Escarpment Planning and Development Act. This guidance is for land use planning authorities, developers and consultants. It is intended

¹ 25-year traffic projection as 2018 traffic counts were used.

to minimize the potential conflict between proposed noise sensitive land uses and sources of noise emissions.

2.1.1 Transportation Noise

2.1.1.1 Outdoor Living Areas

NPC-300 indicates that the sound level should be assessed in an outdoor living area (OLA). Where the noise exceeds the applicable sound level limits, mitigation measures may be required. Noise control measures are not required if the sound level estimated in the OLA is 55 dBA or less during the daytime hours.

NPC-300 indicates that if the 16-hour equivalent sound level in the OLA is between 55 dBA and 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA; otherwise, a warning clause Type A should be issued. If the sound level in the OLA is greater than 60 dBA, noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B.

2.1.1.2 Plane of a Window

If the sound level in the plane of a bedroom or living / dining room window is between 55 dBA and 65 dBA during daytime or between 50 dBA and 60 dBA during nighttime, the dwelling should be designed with a provision for the installation of central air conditioning in the future. Warning clause Type C is also recommended. If the sound level in the plane of a bedroom or living / dining room window is greater than 65 dBA during daytime or 60 dBA during nighttime, installation of central air conditioning should be implemented with a warning clause Type D.

The location and installation of any required outdoor air conditioning devices must comply with the MECP's publication: Residential Air Conditioning Devices (NPC-216). NPC-216 requires that the sound levels of the condensing units not exceed the maximum sound level of 55 dBA² at the neighbour's closest point of reception. Applicable points of reception are defined as the closest window or ground based outdoor living areas. Air conditioning units with a maximum Air-conditioning Refrigeration Institute (ARI) standard sound rating of greater than 7.6 Bels are also prohibited.

² 55 dBA is permissible for new land use developments when air conditioning is a mandatory requirement.

2.1.1.3 Indoor Living Areas

For road noise, the indoor sound level limit is 45 dBA for living / dining areas at any time and during daytime in the sleeping quarters. The sound level in the sleeping quarters should not exceed 40 dBA during nighttime.

2.1.2 Stationary Noise

The applicable stationary noise criteria are dependent on the Class Area as well as the ambient sound levels present at each point of reception. The applicable criteria are the greater of the exclusion limits, provided in the MECP tables in Appendix B, or the lowest hourly ambient sound level predicted for a given point of reception.

The proposed 670 Niagara Mixed Use Apartment Development is located in an urban Class 1 Area.

The MECP criteria for the outdoor receptors considered in this report are 50 dBA from 07:00 – 23:00.

The MECP criteria for the plane of window receptors considered in this report are 50 dBA between 07:00 – 23:00 and 45 dBA between 23:00 – 07:00.

MECP tables showing all criteria for all Classes of Urban Areas and all time periods are shown in Appendix B.

2.2 Regional and Municipal Policies

In addition to the preceding MECP noise criteria from NPC-300, the proposed development is also subject to the following regional and municipal requirements. Recommendations and requirements which go beyond the MECP's NPC-300 have been listed below:

Niagara Region's Regional Road Traffic Noise Control Policy PW5.NO1.0:

- Prediction of Regional Road noise shall be based on a 20-year traffic forecast.
- Niagara Street is classified as a Regional Road.

3.0 Transportation Noise Sources and Receptors

3.1 Road Noise Sources

The road traffic noise source assessed for the potential impact on the new 670 Niagara Mixed Use Apartment Development is Niagara Street.

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Traffic volume data was received as maximum hourly from the Regional Municipality of Niagara (Niagara Region). To be conservative, the maximum hourly values were used in this assessment. The maximum hourly traffic count was multiplied by a factor of 10 to approximate an AADT. The traffic volumes are presented in Table 1. The road traffic data provided to Burnside for this report is included in Appendix A.

From the Niagara Region's traffic counts it was observed that the traffic is comprised of 2% trucks. It was assumed that medium trucks and heavy trucks each make up 1% of the total road traffic.

The day-night traffic volume was split 90% / 10% as per the STAMSON Technical Document recommendation for regional roads.

The current posted speed limit is 50 km/h on Niagara Street. It was considered to remain the same within the next 20 years.

3.2 Rail Noise Sources

There are no railway traffic noise sources of concern to the development as there are no railways located within 300 m of the proposed development.

3.3 Canal Noise Sources

The development is located 2.8 km from the active sections of the Welland Canal which serves small cargo ships of 225.5 m or less. The canal was not considered a major potential noise source due to the distance setback.

3.4 Aircraft Noise Sources

The subject development is not located within the NEF / NEP noise contours of any airports. Therefore, aircraft noise is not considered a significant noise source for this development.

3.5 Transportation Noise Receptors

The proposed 670 Niagara Mixed Use Apartment Development was assigned a single plane of an open window point of reception per building. The predictable worst-case location of the western façade was selected. Sound levels at all other plane of window receptors will be at or below the sound levels at these representative receptors. The point of reception was evaluated at a variety of floors and the worst case is reported, which is generally the first floor.

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The proposed 670 Niagara Mixed Use Apartment Development also contains three common OLA points of reception. These building rooftop terraces are the intended areas for a quiet enjoyment of the outdoors and were included in the assessment.

There are several elevated terraces and residential ground based private OLAs within the proposed development as well. However, 2786966 Ontario Inc. has advised Burnside that no private terraces or balconies will be greater than 4 m in depth. Therefore, none of the proposed balconies of the mixed-use development require a noise assessment under NPC-300.

4.0 Transportation Noise Impact Assessment

4.1 Methodology

Sound levels associated with road traffic predicted with TNM (Traffic Noise Model) prediction method of the FTA built into the Predictor 3D noise modeling program. TNM recommends that all receptors be within 150 m of the source. Outside of this range the traffic prediction becomes less accurate due to errors in the ground attenuation.

Sound levels were adjusted to match a test calculation using the MECP traffic noise prediction model ORNAMENT, implemented through the STAMSON (version 5.04) computer program. The model calculates expected sound levels based on road traffic, distance to receptor, receptor height, and topographical features. In order to predict sound levels from road traffic, STAMSON requires:

- Source to receiver distance – between 15 m and 500 m.
- Minimum traffic volume – 40 vehicles per hour.
- Minimum vehicle speed – 50 km/h.

A number of assumptions were used in the noise model:

- The road gradient was assumed to be 0%.
- Road pavement was assumed as a standard asphalt surface.
- Flat / gentle slope topography was selected.
- Intermediate surface was assumed to be reflective.

Outdoor Living Area (OLA) points of assessment were taken at the centre of the OLA area as per NPC-300's requirements for elevated terraces. The calculation height for OLAs is 1.5 m above the ground level of the OLA. Plane of Windows points of assessment were taken at the building façade and 75 m above the grade, representing the 25th floor – the highest occupied floor.

4.2 Predicted Sound Levels – Plane of Window

Following the methodology presented above, Burnside has predicted sound levels at each of the five buildings. These results are summarized in Table 3. A sample modeling printout is included in Appendix C.

Based on the calculations, all units in Buildings B and C are required to have air conditioning and warning clause Type D, as the predicted sound levels are above 65 dBA during the daytime and / or 60 dBA during the nighttime.

Based on the calculations, all units in Buildings A are required to have provision for air conditioning and warning clause Type C, as the predicted sound levels are between 65 dBA and 55 dBA during the daytime and / or 60 dBA and 50 dBA during the nighttime. However, as provision for air conditioning to be installed by the owner in the future is not practical in condominium buildings practically this means that air conditioning is required for Building A as well. If air conditioning is provided in Building A then the warning clause should be changed from Type C to Type D.

The townhouse units will have separate HVAC units from the main buildings. The location and installation of the outdoor air conditioning devices should comply with the sound level limits of the MECP's Publication NPC-216. In order to ensure compliance with NPC-216, a qualified Acoustical Consultant should be retained to determine an appropriate air conditioner location and maximum allowable Bel ratings for each of the units listed above.

4.3 Predicted Sound Levels – Outdoor Living Areas

Following the methodology presented in Section 4.1, Burnside has considered OLA sound levels at the three common OLA receptors which are the only OLA being assessed for the development. These results are summarized in Table 3. It was determined that due to the design of the buildings the OLAs are well shielded from each of the towers of the development itself.

Based on these observations an acoustic barrier is not required for the proposed development, as the predicted unmitigated sound levels will be at or under the MECP objective sound level of 55 dBA during the daytime.

4.4 Predicted Sound Levels – Indoor Living Areas

If the daytime sound levels at the plane of window exceed 65 dBA or the nighttime sound levels at the plane of window exceed 60 dBA, a preliminary building component assessment is required to ensure a building can be designed so that indoor sound levels

comply with the applicable indoor noise criteria of 45 dBA for living areas during the day and 40 dBA during the nighttime for bedrooms.

The predicted maximum Plane of Window sound levels of 67 dBA daytime and 61 dBA nighttime were used alongside conservative design assumptions³ to determine the required minimum Sound Transmission Class (STC) of the window and wall components. Using these inputs, it was determined that the minimum required window STC is 27 for living areas and 27 for bedrooms. These STC levels are attainable with window designs that are commonly available; therefore, constructing a compliant design should not be an issue. The minimum required exterior door STC is 25 for living areas and 25 for a bedroom balcony. The minimum required wall STC is 31 for living areas and 31 for bedrooms, which will not be a problem with standard construction methods. A sample STC calculation is provided in Appendix C. These minimum STC requirements only apply to units which have a requirement for air conditioning, as listed in Section 4.2. For all other units standard Sound Transmission Class (STC) window and wall designs will be acceptable.

5.0 Stationary Noise Sources and Receptors

5.1 Internal Stationary Noise

Internal stationary noise is defined as the on-site stationary noise of the proposed development. The potential impact of internal stationary noise is assessed at neighbouring noise sensitive land uses and at noise sensitive locations within the proposed development itself, if appropriate.

5.1.1 Internal Stationary Noise Sources

The proposed development is assumed to contain the sources of stationary noise listed below and shown in Figure 5.

- Water Cooled Chillers: EX053, EX54, EX057, EX058:
 - The details of the cooling systems are not known at this time. Preliminary details include that the mechanical systems will be located inside the mechanical penthouses of each building, and therefore it is presumed a water-cooled chiller will be used. The cooling demand is assumed to be 1 ton per 400 ft².
- Building A has 14,837 m² (159,704ft²) of Gross Floor Area (GFA)
- Building B has 47,113 m² (507,120 ft²) of GFA.
- Building C has 31,737 m² (341,614.22ft²) of GFA.

³ Calculator based on "Controlling Sound Transmission into Buildings, NRCC 1985"

- This results in 400 tons for Building A, 634 tons for Building B per tower, and 854 tons for Building C. As the townhouses are cooled separately the preceding tonnage estimates are therefore overestimations.
- Burnside has manufacture's sound data for a water-cooled chillers of 425 ton. This chiller has a sound power of 101 dBA. This noise source is assumed to be located in the middle of a mechanical penthouse. A 10 dB reduction is applied to account for the noise being contained in the mechanical penthouse and only being emitted through vents and other openings. This sound level is assumed for the unit at Building A (EX054). Doubling this number to 850 tons is appropriate for Building C, which gives a sound power of 104 dBA (EX054).
- Burnside has manufacture's sound data for a water-cooled chillers of 350 ton. This chiller has a sound power of 97 dBA. Doubling these units results in tonnages of 700 which is appropriate for Building B (EX053 and EX057). The effect of doubling the sound power is an addition of 3 dB. The effect of tripling the sound power level is an addition of 4.8 dB. Therefore, the anticipated sound power levels would be 100 dBA for Building B. These noise sources are assumed to be located in the middle of a mechanical penthouse. A 10 dB reduction is applied to account for the noise being contained in the mechanical penthouse and only being emitted through vents and other openings.
- Burnside has manufacture's sound data for a water-cooled chillers of 425 ton. This chiller has a sound power of 100 dBA. This noise source is assumed to be located in the middle of a mechanical penthouse. A 10 dB reduction is applied to account for the noise being contained in the mechanical penthouse and only being emitted through vents and other openings.
- Building A, B and C: Emergency Generators: EX052, EX055, EX056, and EX059
 - The details are not known at this time, therefore conservative preliminary estimates were used. A sound power level of 100 dBA has been assumed with a 10 dB reduction from being located inside a penthouse mechanical suite.
 - The units are assumed to operate for a full hour during the day when testing operations would take place. Emergency operations of the generator are exempt from further assessment.
- Building A, B and C: Garage Exhaust Fans: EX060, EX061, EX062
 - Buildings' A and B parking garage is 14,495 m² with space for 451 vehicles. Building's C garage is 9,030 m² with space for 206 vehicles. OBC-12 requires a ventilation rate of 3.9 L/s/m² (8.264 CFM/m²) for the ventilation of an enclosed garage. Therefore, a total of 119,786 CFM and 74,623 CFM is required to ventilate the proposed garages, respectively. The locations and number of exhaust shafts are not known at this time. To be conservative a single exhaust shaft per garage is assumed per building. Each exhaust shaft fan was assumed to operate full time during day, evening, and night.
 - Burnside has manufacturer's sound data for a Garage Exhaust Fan with a total CFM of 30,900. The sound power is 92.6 dBA for this fan. Each exhaust shaft

requires two fans of this type to exceed the minimum ventilation requirements. Therefore, the sound power of the exhaust fans in total for each shaft is 95.6 dBA, which includes a 3 dB addition to account for the doubling of the source. This is appropriate for Building A and B's garage exhausts EX061 & EX062. For Building C's garage three fans would be needed, this requires a 4.8 dB addition for the tripling of the source for a total of 97.4 dBA.

- These measurements are based on an exhaust fan with a 5/8 in. of water gauge static pressure.
- As the locations were not known at the time of this report Burnside has selected locations within the garage footprint that were closer to other major noise sources but also in a location where a shaft would typically be located.

5.1.2 Internal Stationary Noise Points of Reception

The proposed 670 Niagara Mixed Use Apartment Development is in proximity to the following noise sensitive land uses:

- Low density residential located on Gadsby Avenue: POR17 – POR21.
- Low density residential located on Hilda Street: POR22 – POR23.
- Low density residential located on Niagara Street: POR24 – POR26.

A POR was assigned for every third dwelling. Each POR has an accompanying Outdoor Point of Reception (OPOR). The OPOR was located up to 30 m from the dwelling in the direction of the major noise sources.

The internal stationary noise has potential to impact the dwellings located within the development itself as well. POR01 to POR16 are included to ensure compliant noise levels within the development itself.

5.2 External Stationary Noise

External stationary noise is defined as the off-site stationary noise with potential to impact the proposed development. The potential impact of external stationary noise is assessed at all worst-case predictable noise sensitive locations within the proposed development itself.

5.2.1 External Stationary Noise Sources

The proposed 670 Niagara Mixed Use Apartment Development is in proximity to the following noise sources. The source locations are shown in Figure 12.

- Group 1: NAPA AUTOPRO – Service Plus Auto: 655 Niagara Street
 - Located 35 m west of the proposed development
 - Noise sources:

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- EX033 and EX034: Pneumatic Gun
 - Source Type: Point source
 - Sound Power Level: 101.7 dBA
 - Sound Power Level Reference: United States Centre for Disease Control worst case measured level - See Appendix F
 - Operating Time: 20 minutes per hour during daytime only⁴
 - Source Height: 1.5 m
- Group 2: Chuck's Roadhouse Bar and Grill: 647 Niagara Street
 - Located 40 m west of the proposed development
 - Noise sources:
 - EX027 and EX028: 20-ton HVAC units
 - Source Type: Point source
 - Sound Power Level: 86.5 dBA
 - Sound Power Level Reference: Manufacture's data of similar equipment - See Appendix F
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
 - EX029, EX031 and EX032: Exhaust Fans
 - Source Type: Point source
 - Sound Power Level: 88.7 dBA
 - Sound Power Level Reference: Burnside measurement of similar equipment at a different facility.
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
 - EX030: 10-ton HVAC unit
 - Source Type: Point source
 - Sound Power Level: 87.1 dBA
 - Sound Power Level Reference: Manufacture's data of similar equipment - See Appendix F
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
- Group 3: Centre de services Desjardins Welland: 637 – 641 Niagara Street
 - Located 45 m west of the proposed development
 - Noise sources:
 - EX021, EX023 – EX026: 5-ton HVAC units
 - Source Type: Point source
 - Sound Power Level: 78.5 dBA

⁴ Discussed operation patterns with manager of facility on April 26, 2021. Agreed to a conservative worst case hourly estimate of 2 Bays operating tire changes using pneumatic guns for 20 minutes each.

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- Sound Power Level Reference: Manufacture's data of similar equipment - See Appendix F
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
- EX022: Exhaust Fan
 - Source Type: Point source
 - Sound Power Level: 88.7 dBA
 - Sound Power Level Reference: Burnside measurement of similar equipment at a different facility - See Appendix F
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
- Group 4: McDonald's: 631 Niagara Street
 - Located 60 m west of the proposed development
 - Noise sources:
 - EX001, EX009 and EX011: 5-ton HVAC units
 - Source Type: Point source
 - Sound Power Level: 78.5 dBA
 - Sound Power Level Reference: Manufacture's data of similar equipment - See Appendix F
 - Operating Time: 60 minutes per hour during the day, 45 minutes per hour during the evening and 30 minutes per hour during the night.
 - Source Height: 1.5 m above roof
 - EX002, EX003 and EX007: 10-ton HVAC units
 - Source Type: Point source
 - Sound Power Level: 87.1 dBA
 - Sound Power Level Reference: Manufacture's data of similar equipment - See Appendix F
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
 - EX004, EX005, EX006, EX008, EX010 and EX012: Exhaust Fans
 - Source Type: Point source
 - Sound Power Level: 88.7 dBA
 - Sound Power Level Reference: Burnside measurement of similar equipment at a different facility - See Appendix F.
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
 - EX013: Drive-thru Speaker
 - Source Type: Point source
 - Sound Power Level: 78.8 dBA
 - Sound Power Level Reference: Engineering White Paper Study - See Appendix F.
 - Operating Time: 60 minutes per hour during day, evening and night

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- Source Height: 1.5 m
 - EX014 – EX017, EX019 and EX020: Idling Drive-thru Cars
 - Source Type: Point source
 - Sound Power Level: 81.1 dBA
 - Sound Power Level Reference: Burnside average of measurements of various personal vehicles - See Appendix F
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m
 - EX018: Refrigerated Delivery Truck Idle
 - Source Type: Point source
 - Sound Power Level: 98.8 dBA
 - Sound Power Level Reference: Burnside measurement of similar equipment at a different facility - See Appendix F
 - Operating Time: 60 minutes per hour during daytime only
 - Source Height: 2.4 m
- Group 5: Meridian Credit Union
 - Located 38 m south-west of the proposed development
 - Noise sources:
 - EX035: 5-ton HVAC unit
 - Source Type: Point source
 - Sound Power Level: 78.5 dBA
 - Sound Power Level Reference: Manufacture's data of similar equipment - See Appendix F
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
 - EX036 and EX037: 10-ton HVAC units
 - Source Type: Point source
 - Sound Power Level: 87.1 dBA
 - Sound Power Level Reference: Manufacture's data of similar equipment - See Appendix F
 - Operating Time: 60 minutes per hour during day, evening and night
 - Source Height: 1.5 m above roof
 - EX038: Exhaust Fan
 - Source Type: Point source
 - Sound Power Level: 88.7 dBA
 - Sound Power Level Reference: Burnside measurement of similar equipment at a different facility.

5.2.2 External Stationary Noise Points of Reception

The impact of all the commercial facilities described above have been assessed for their impact on the proposed 670 Niagara Mixed Use Apartment Development. The following worst-case predictable points of reception were selected for the analysis:

- POR01: South-west corner of Building C.
- POR02: West façade of Building B nearest to the NAPA Auto stationary noise sources.
- POR03: West façade of Building B nearest to the Chuck's Roadhouse Bar and Grill stationary noise sources.
- POR04: North-west façade of Building A nearest to the Centre de services Desjardins Welland stationary noise sources.
- POR05: South-west corner of Building A nearest to the McDonald's and Meridian Credit Union stationary noise sources.

6.0 Stationary Noise Impact Assessment

6.1 Methodology

Sound levels associated with stationary noise are predicted with Predictor V2020.0 3D noise modeling software. Predictor follows the ISO 9613/2 method of sound level calculation as implemented in the ISO 17534-3 Quality Assurance standard.

The following settings are used:

- Calculation height: 4.5 m
- Default Ground attenuation Factor: 0 – Fully reflective
- No Barrier effect for direct sight – Active
- D_{max} According to ISO 9613 – Active
- Avoid overestimating barrier effect – Active
- Terrain model: Use full DTM
- Temperature: 283.15 K
- Pressure: 101.33 kPa
- Air humidity: 70%

6.2 Predicted Ambient Sound Levels and Applicable Criteria

Ambient sound levels were predicted with MECF traffic noise prediction model ORNAMENT, implemented through the STAMSON (version 5.04) computer program. The model calculates expected sound levels based on the lowest hour road traffic, distance to receptor, receptor height, and topographical features.

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The hourly traffic data provided to Burnside for this report is included in Appendix A. AADT was determined by multiplying the worst case hourly by 10, which is an accepted approximation of AADT.

Sample ambient sound level modeling printout is included in Appendix C.

The ambient sound levels were determined for each point of reception and are shown in Table 4.

The proposed 670 Niagara is located in a Class 1 Area. Therefore, the applicable sound level criteria for stationary noise are presented in Table 5.

6.3 Predicted Internal Stationary Sound Levels

The predicted internal stationary sound levels of the proposed development onto the neighboring noise sensitive land uses and noise sensitive locations within the development itself are presented in Table 6. The table shows that certain receptors have exceedances.

The unmitigated internal stationary noise contours are presented for day, evening, and night in Figure 6, Figure 7, and Figure 8 respectively. All contours are calculated at a height of 4.5 m.

Therefore, as the unmitigated internal stationary sound levels are not compliant with the applicable sound level criteria for all PORs, mitigation is required.

6.4 Predicted Mitigated Internal Stationary Sound Levels

At this stage in the design of the development many internal stationary noise sources have preliminary information. Therefore, when considering mitigation Burnside considered the numeric sound level reductions that were necessary for compliance at the most impactful sources causing the exceedances.

It was determined that with a 20 dB reduction to both the water-cooled chiller and emergency generator noise sources (8 total) compliance with the standards could be achieved. An additional 10 dB reduction is assumed due to these sources being located inside of the buildings. The garage exhaust shafts were determined to require a 30 dB reduction for compliance. Burnside determined that these reductions at each of these sources is feasible with the application of noise mitigation such as silencers, and acoustic absorption materials or through the specification of lower sound emitting equipment than has been assumed for this preliminary assessment.

With these mitigation measures included the internal stationary sound levels were reassessed. The results of this mitigated assessment are shown in Table 7, which indicates that compliance is now met.

The mitigated internal stationary noise contours are presented for day, evening, and night in Figure 9, Figure 10, and Figure 11 respectively. All contours are calculated at a height of 4.5 m.

Therefore, with the inclusion of the mitigation measures described above the internal stationary sound levels will be compliant with the applicable sound level criteria for all PORs.

6.5 Predicted External Stationary Sound Levels

The predicted external stationary sound levels of the neighbouring stationary sources onto the proposed development are presented in Table 8. The unmitigated external stationary noise contours are presented for day, evening, and night in Figure 13, Figure 14, and Figure 15, respectively. Note that these contours include the results of all five groups of stationary sources from neighbouring businesses together. Whereas compliance is done by group not cumulatively.

Therefore, as the unmitigated external stationary sound levels are compliant with the applicable sound level criteria for all PORs, mitigation is not required.

7.0 Noise Mitigation Measures

Based on the predicted sound levels it was determined that noise mitigation measures are required for some units within this Mixed Use Apartment Development. The required measures are discussed below and summarized in Table 9.

7.1 Ventilation Requirements

All units are required to have air conditioning and warning clause Type D. This assumes that Building A will be provided with air conditioning instead of just the required provision for air conditioning.

7.2 Acoustic Barrier Requirements

All units in the proposed 670 Niagara Mixed Use Apartment Development do not require any acoustic barriers.

7.3 STC Requirements

All units in the proposed development will achieve the minimum MECP indoor sound levels by incorporating standard requirements for the exterior walls as per the Ontario Building Code. The windows required to meet the minimum MECP indoor sound level are of a commonly available STC rating. Minimum ratings for windows are discussed in Section 4.4, which are applicable to all dwellings requiring AC (listed in Section 7.1).

7.4 Internal Stationary Noise Mitigation Requirements

The assessment of the proposed 670 Niagara's internal stationary sources determined that the following noise mitigation measures will be required to meet the applicable MECP noise standards:

- Reduction of 30 dB worth of noise mitigation measures for each garage exhaust shaft.
- Reduction of 20 dB worth of noise mitigation measures for each water-cooled chiller and emergency generator located in the mechanical penthouses. Such that the total indoor to outdoor reduction is 30 dB.

As discussed in Section 6.4, mitigation may take the form of a lower sound emission equipment being specified, a silencer or absorptive material being installed in the shafts / outlets, or a gas monitoring system for the garage.

A Detailed Environmental Noise Assessment should be undertaken prior to the Site Plan Approval. At this time the details of the garage exhaust and water-cooled chillers are likely to be known, and a more detailed analysis can confirm the exact mitigation measures required.

7.5 External Stationary Noise Mitigation Requirements

The assessment of the nearby stationary noise sources to the proposed 670 Niagara determined that the impacts of all groups of stationary sources complied with the applicable MECP noise standards without mitigation.

8.0 Implementation Procedures

The following implementation procedures are recommended to ensure that each requirement of this study is implemented at the correct stage of the development process:

- Prior to the Site Plan Approval an Acoustical Consultant should be retained to conduct a Detailed Environmental Noise Assessment. A Detailed Environmental Noise Assessment requires proposed building locations and a proposed grading plan

to be completed. The recommendations of this Environmental Noise Feasibility Assessment are preliminary estimates to ensure the viability of the proposed development. A Detailed Environmental Noise Assessment will finalize most of the acoustic requirements of the development.

- Prior to Issuance of Building Permit an Acoustical Consultant should be retained to assess or determine the locations and Bel ratings of air conditioning units for compliance with NPC-216. Improperly installed air conditioning units can result in the developer being required to install acoustic jackets, relocate or fully replace any noncomplying units in order to receive a certification of completion for the development's acoustic requirements (if required by the Municipality). NPC-216 applies to all air conditioners, even when voluntarily installed by the developer.
- In Section 4.4 the minimum required window STC was estimated to be STC 27 daytime (living areas) and STC 27 nighttime (bedrooms) for the most exposed façade of the development. Without further analysis these minimum requirements apply to all windows of dwellings in which air conditioning is required in the subject development. Further refinement of the window STC requirements is possible when the proposed room and window configurations are finalized. The proponent may retain a qualified acoustic consultant to perform a detailed window STC assessment of the design. The conclusions of a detailed window STC assessment would supersede the preliminary estimates presented in this report. However, this additional assessment is not required, as the proponent may rely upon the conservative estimates presented in this report. A detailed window STC assessment is typically only requested in instances where the minimum STC estimate creates a large cost burden if applied to the whole development.
- Prior to occupancy, the development should be certified by a qualified Acoustics Engineer for compliance with the requirements of the Detailed Environmental Noise Assessment.

9.0 Conclusion

The results of 670 Niagara Mixed Use Apartment Development Environmental Noise Feasibility Assessment demonstrate that if all noise mitigation measures prescribed in Table 9 are implemented, sound levels at all developed lots will meet the Ministry of the Environment, Conservation and Parks noise guideline requirements. The Implementation Procedures of Section 8.0 should be followed carefully to ensure that no requirements of the noise study are overlooked during the development and construction process.

10.0 References

Computer Program STAMSON Version 5.04. Ministry of the Environment, Conservation and Parks.

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Environmental Noise Guideline. Stationary and Transportation Sources – Approval and Planning. Publication NPC-300. Ministry of the Environment, Conservation and Parks, August 2013 (released October 21, 2013).

Ontario Building Code. Ministry of Municipal Affairs and Housing, 2012.

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ORNAMENT – Ontario Road Noise Analysis Method for Environment and Transportation. Technical Document. Ministry of the Environment, Conservation and Parks, October 1989.



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Tables

Tables

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Table 1: 2018 Road Traffic Volumes

Road	Maximum AADT Traffic			
	Total	# of Light Vehicles	# of Medium Trucks	# of Heavy Trucks
Niagara Street Total	20,310	19,904	203	203

Table 2: 20-year Predicted Road Traffic Volumes (2043)

Road	Maximum AADT Traffic			
	Total	# of Light Vehicles	# of Medium Trucks	# of Heavy Trucks
Niagara Street	38,595	37,823	386	386

Table 3: Predicted Daytime and Nighttime Sound Levels for the Forecasted 20-Year Traffic Volumes

Receptor ID	Building	Area	Distance (m)	Predicted Sound Levels (dBA)	
				Daytime	Nighttime
POR01	Building C	PofW	17	67	61
		OLA	60	- no direct exposure	-
POR02	Building B	PofW	23	66	59
		OLA	70	no direct exposure	-
POR03	Building B	PofW	31	65	58
		OLA	-	-	-
POR04	Building A	PofW	40	64	57
		OLA	85	no direct exposure	-
POR05	Building A	PofW	47	63	56
POR14	Building D	PofW	150	45	39
POR15	Building E	PofW	155	45	39

Notes:

- Outdoor Living Area (OLA) points of assessment were taken:
 - 3 m from the building façade;
 - 1.5 m above grade; and
 - aligned with the midpoint of the subject façade.
- Plane of Window (PofW) points of assessment were taken:
 - at the building façade; and at least 4.5 m above grade.

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Table 4: Predicted Ambient Sound Levels

POR #	Time of Day	Ambient Sound Level
POR01	Daytime	64 dBA
	Evening	62 dBA
	Nighttime	54 dBA
POR02	Daytime	64 dBA
	Evening	62 dBA
	Nighttime	54 dBA
POR03	Daytime	63 dBA
	Evening	61 dBA
	Nighttime	52 dBA
POR04	Daytime	63 dBA
	Evening	60 dBA
	Nighttime	52 dBA
POR05	Daytime	60 dBA
	Evening	58 dBA
	Nighttime	49 dBA

Table 5: Applicable Stationary Sound Level Criteria

POR #	Time of Day	Ambient Sound Level	NPC-300 Exclusion Limit	Applicable Sound Level Criteria
POR01	Daytime	64 dBA	50 dBA	64 dBA
	Evening	62 dBA	50 dBA	62 dBA
	Nighttime	54 dBA	45 dBA	54 dBA
POR02	Daytime	64 dBA	50 dBA	64 dBA
	Evening	62 dBA	50 dBA	62 dBA
	Nighttime	54 dBA	45 dBA	54 dBA
POR03	Daytime	63 dBA	50 dBA	63 dBA
	Evening	61 dBA	50 dBA	61 dBA
	Nighttime	52 dBA	45 dBA	52 dBA
POR04	Daytime	63 dBA	50 dBA	63 dBA
	Evening	60 dBA	50 dBA	60 dBA
	Nighttime	52 dBA	45 dBA	52 dBA
POR05	Daytime	60 dBA	50 dBA	60 dBA
	Evening	58 dBA	50 dBA	58 dBA
	Nighttime	49 dBA	45 dBA	49 dBA
POR06	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA

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POR #	Time of Day	Ambient Sound Level	NPC-300 Exclusion Limit	Applicable Sound Level Criteria
POR07	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR08	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR09	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR10	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR11	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR12	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR13	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR14	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR15	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR16	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR17	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR18	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR19	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA

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POR #	Time of Day	Ambient Sound Level	NPC-300 Exclusion Limit	Applicable Sound Level Criteria
	Nighttime	-	45 dBA	45 dBA
POR20	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR21	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR22	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR23	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR24	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR25	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR26	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
OPOR01	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR02	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR04	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR17	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR18	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR19	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR20	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR21	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA

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POR #	Time of Day	Ambient Sound Level	NPC-300 Exclusion Limit	Applicable Sound Level Criteria
OPOR22	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR23	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR24	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR25	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
OPOR26	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA

Table 6: Predicted Internal Stationary Sound Levels (Unmitigated)

POR #	Time of Day	Impact	Criteria	Compliance?
POR01	Daytime	67 dBA	64 dBA	No
	Evening	67 dBA	62 dBA	No
	Nighttime	67 dBA	54 dBA	No
POR02	Daytime	72 dBA	64 dBA	No
	Evening	72 dBA	62 dBA	No
	Nighttime	72 dBA	54 dBA	No
POR03	Daytime	58 dBA	63 dBA	Yes
	Evening	54 dBA	61 dBA	Yes
	Nighttime	54 dBA	52 dBA	No
POR04	Daytime	57 dBA	63 dBA	No
	Evening	56 dBA	60 dBA	No
	Nighttime	56 dBA	52 dBA	No
POR05	Daytime	78 dBA	60 dBA	No
	Evening	78 dBA	58 dBA	No
	Nighttime	78 dBA	49 dBA	No
POR06	Daytime	58 dBA	50 dBA	No
	Evening	58 dBA	50 dBA	No
	Nighttime	58 dBA	45 dBA	No
POR07	Daytime	57 dBA	50 dBA	No
	Evening	52 dBA	50 dBA	No
	Nighttime	52 dBA	45 dBA	No
POR08	Daytime	55 dBA	50 dBA	No
	Evening	51 dBA	50 dBA	No
	Nighttime	51 dBA	45 dBA	No

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POR #	Time of Day	Impact	Criteria	Compliance?
POR09	Daytime	44 dBA	50 dBA	No
	Evening	42 dBA	50 dBA	No
	Nighttime	42 dBA	45 dBA	No
POR10	Daytime	59 dBA	50 dBA	No
	Evening	57 dBA	50 dBA	No
	Nighttime	57 dBA	45 dBA	No
POR11	Daytime	55 dBA	50 dBA	No
	Evening	50 dBA	50 dBA	No
	Nighttime	50 dBA	45 dBA	No
POR12	Daytime	56 dBA	50 dBA	No
	Evening	46 dBA	50 dBA	No
	Nighttime	46 dBA	45 dBA	No
POR13	Daytime	59 dBA	50 dBA	No
	Evening	58 dBA	50 dBA	No
	Nighttime	58 dBA	45 dBA	No
POR14	Daytime	52 dBA	50 dBA	No
	Evening	51 dBA	50 dBA	No
	Nighttime	51 dBA	45 dBA	No
POR15	Daytime	46 dBA	50 dBA	Yes
	Evening	41 dBA	50 dBA	Yes
	Nighttime	41 dBA	45 dBA	Yes
POR16	Daytime	46 dBA	50 dBA	Yes
	Evening	43 dBA	50 dBA	Yes
	Nighttime	43 dBA	45 dBA	Yes
POR17	Daytime	49 dBA	50 dBA	Yes
	Evening	47 dBA	50 dBA	Yes
	Nighttime	47 dBA	45 dBA	No
POR18	Daytime	48 dBA	50 dBA	Yes
	Evening	46 dBA	50 dBA	Yes
	Nighttime	46 dBA	45 dBA	No
POR19	Daytime	50 dBA	50 dBA	Yes
	Evening	48 dBA	50 dBA	Yes
	Nighttime	48 dBA	45 dBA	No
POR20	Daytime	45 dBA	50 dBA	Yes
	Evening	40 dBA	50 dBA	Yes
	Nighttime	40 dBA	45 dBA	Yes
POR21	Daytime	45 dBA	50 dBA	Yes
	Evening	42 dBA	50 dBA	Yes
	Nighttime	42 dBA	45 dBA	Yes
POR22	Daytime	53 dBA	50 dBA	No

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POR #	Time of Day	Impact	Criteria	Compliance?
	Evening	52 dBA	50 dBA	No
	Nighttime	52 dBA	45 dBA	No
POR23	Daytime	60 dBA	50 dBA	No
	Evening	60 dBA	50 dBA	No
	Nighttime	60 dBA	45 dBA	No
POR24	Daytime	56 dBA	50 dBA	No
	Evening	56 dBA	50 dBA	No
	Nighttime	56 dBA	45 dBA	No
POR25	Daytime	53 dBA	50 dBA	Yes
	Evening	53 dBA	50 dBA	Yes
	Nighttime	53 dBA	45 dBA	No
POR26	Daytime	42 dBA	50 dBA	Yes
	Evening	37 dBA	50 dBA	Yes
	Nighttime	37 dBA	45 dBA	Yes
OPOR01	Daytime	52 dBA	50 dBA	No
	Evening	51 dBA	50 dBA	No
OPOR02	Daytime	51 dBA	50 dBA	No
	Evening	47 dBA	50 dBA	Yes
OPOR04	Daytime	46 dBA	50 dBA	Yes
	Evening	46 dBA	50 dBA	Yes
OPOR17	Daytime	47 dBA	50 dBA	Yes
	Evening	45 dBA	50 dBA	Yes
OPOR18	Daytime	50 dBA	50 dBA	Yes
	Evening	49 dBA	50 dBA	Yes
OPOR19	Daytime	51 dBA	50 dBA	No
	Evening	51 dBA	50 dBA	No
OPOR20	Daytime	44 dBA	50 dBA	Yes
	Evening	39 dBA	50 dBA	Yes
OPOR21	Daytime	41 dBA	50 dBA	Yes
	Evening	38 dBA	50 dBA	Yes
OPOR22	Daytime	53 dBA	50 dBA	No
	Evening	51 dBA	50 dBA	No
OPOR23	Daytime	65 dBA	50 dBA	No
	Evening	65 dBA	50 dBA	No
OPOR24	Daytime	59 dBA	50 dBA	Yes
	Evening	59 dBA	50 dBA	Yes
OPOR25	Daytime	55 dBA	50 dBA	Yes
	Evening	55 dBA	50 dBA	Yes
OPOR26	Daytime	42 dBA	50 dBA	Yes
	Evening	37 dBA	50 dBA	Yes

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Table 7: Predicted Internal Stationary Sound Levels (Mitigated)

POR #	Time of Day	Impact	Criteria	Compliance?
POR01	Daytime	44 dBA	64 dBA	Yes
	Evening	36 dBA	62 dBA	Yes
	Nighttime	36 dBA	54 dBA	Yes
POR02	Daytime	48 dBA	64 dBA	Yes
	Evening	35 dBA	62 dBA	Yes
	Nighttime	35 dBA	54 dBA	Yes
POR03	Daytime	49 dBA	63 dBA	Yes
	Evening	33 dBA	61 dBA	Yes
	Nighttime	33 dBA	52 dBA	Yes
POR04	Daytime	44 dBA	63 dBA	Yes
	Evening	35 dBA	60 dBA	Yes
	Nighttime	35 dBA	52 dBA	Yes
POR05	Daytime	48 dBA	60 dBA	Yes
	Evening	48 dBA	58 dBA	Yes
	Nighttime	48 dBA	49 dBA	Yes
POR06	Daytime	30 dBA	50 dBA	Yes
	Evening	28 dBA	50 dBA	Yes
	Nighttime	28 dBA	45 dBA	Yes
POR07	Daytime	50 dBA	50 dBA	Yes
	Evening	32 dBA	50 dBA	Yes
	Nighttime	32 dBA	45 dBA	Yes
POR08	Daytime	46 dBA	50 dBA	Yes
	Evening	31 dBA	50 dBA	Yes
	Nighttime	31 dBA	45 dBA	Yes
POR09	Daytime	33 dBA	50 dBA	Yes
	Evening	22 dBA	50 dBA	Yes
	Nighttime	22 dBA	45 dBA	Yes
POR10	Daytime	48 dBA	50 dBA	Yes
	Evening	36 dBA	50 dBA	Yes
	Nighttime	36 dBA	45 dBA	Yes
POR11	Daytime	47 dBA	50 dBA	Yes
	Evening	29 dBA	50 dBA	Yes
	Nighttime	29 dBA	45 dBA	Yes
POR12	Daytime	46 dBA	50 dBA	Yes
	Evening	26 dBA	50 dBA	Yes
	Nighttime	26 dBA	45 dBA	Yes
POR13	Daytime	43 dBA	50 dBA	Yes
	Evening	35 dBA	50 dBA	Yes

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POR #	Time of Day	Impact	Criteria	Compliance?
POR14	Nighttime	35 dBA	45 dBA	Yes
	Daytime	37 dBA	50 dBA	Yes
	Evening	21 dBA	50 dBA	Yes
	Nighttime	21 dBA	45 dBA	Yes
POR15	Daytime	35 dBA	50 dBA	Yes
	Evening	21 dBA	50 dBA	Yes
	Nighttime	21 dBA	45 dBA	Yes
POR16	Daytime	35 dBA	50 dBA	Yes
	Evening	23 dBA	50 dBA	Yes
	Nighttime	23 dBA	45 dBA	Yes
POR17	Daytime	36 dBA	50 dBA	Yes
	Evening	21 dBA	50 dBA	Yes
	Nighttime	21 dBA	45 dBA	Yes
POR18	Daytime	36 dBA	50 dBA	Yes
	Evening	20 dBA	50 dBA	Yes
	Nighttime	20 dBA	45 dBA	Yes
POR19	Daytime	36 dBA	50 dBA	Yes
	Evening	20 dBA	50 dBA	Yes
	Nighttime	20 dBA	45 dBA	Yes
POR20	Daytime	35 dBA	50 dBA	Yes
	Evening	19 dBA	50 dBA	Yes
	Nighttime	19 dBA	45 dBA	Yes
POR21	Daytime	35 dBA	50 dBA	Yes
	Evening	21 dBA	50 dBA	Yes
	Nighttime	21 dBA	45 dBA	Yes
POR22	Daytime	38 dBA	50 dBA	Yes
	Evening	26 dBA	50 dBA	Yes
	Nighttime	26 dBA	45 dBA	Yes
POR23	Daytime	35 dBA	50 dBA	Yes
	Evening	30 dBA	50 dBA	Yes
	Nighttime	30 dBA	45 dBA	Yes
POR24	Daytime	31 dBA	50 dBA	Yes
	Evening	27 dBA	50 dBA	Yes
	Nighttime	27 dBA	45 dBA	Yes
POR25	Daytime	30 dBA	50 dBA	Yes
	Evening	26 dBA	50 dBA	Yes
	Nighttime	26 dBA	45 dBA	Yes
POR26	Daytime	32 dBA	50 dBA	Yes
	Evening	16 dBA	50 dBA	Yes
	Nighttime	16 dBA	45 dBA	Yes

Environmental Noise Feasibility Assessment
Proposed Residential Development - 670 Niagara Street, Welland
September 2024

POR #	Time of Day	Impact	Criteria	Compliance?
OPOR01	Daytime	40 dBA	50 dBA	Yes
	Evening	28 dBA	50 dBA	Yes
OPOR02	Daytime	42 dBA	50 dBA	Yes
	Evening	27 dBA	50 dBA	Yes
OPOR04	Daytime	31 dBA	50 dBA	Yes
	Evening	21 dBA	50 dBA	Yes
OPOR17	Daytime	35 dBA	50 dBA	Yes
	Evening	21 dBA	50 dBA	Yes
OPOR18	Daytime	35 dBA	50 dBA	Yes
	Evening	22 dBA	50 dBA	Yes
OPOR19	Daytime	33 dBA	50 dBA	Yes
	Evening	22 dBA	50 dBA	Yes
OPOR20	Daytime	34 dBA	50 dBA	Yes
	Evening	19dBA	50 dBA	Yes
OPOR21	Daytime	30 dBA	50 dBA	Yes
	Evening	17 dBA	50 dBA	Yes
OPOR22	Daytime	40 dBA	50 dBA	Yes
	Evening	26 dBA	50 dBA	Yes
OPOR23	Daytime	36 dBA	50 dBA	Yes
	Evening	35 dBA	50 dBA	Yes
OPOR24	Daytime	33 dBA	50 dBA	Yes
	Evening	30 dBA	50 dBA	Yes
OPOR25	Daytime	31 dBA	50 dBA	Yes
	Evening	27 dBA	50 dBA	Yes
OPOR26	Daytime	31 dBA	50 dBA	Yes
	Evening	15 dBA	50 dBA	Yes

Table 8: Predicted External Stationary Sound Levels (Unmitigated)

POR #	Time of Day	Group 1 (dBA)	Group 2 (dBA)	Group 3 (dBA)	Group 4 (dBA)	Group 5 (dBA)	Criteria	Compliance
POR01	Daytime	56	45	39	48	39	64 dBA	Yes
	Evening	-	45	39	44	39	62 dBA	Yes
	Nighttime	-	45	39	43	39	54 dBA	Yes
POR02	Daytime	55	48	42	49	33	64 dBA	Yes
	Evening	-	48	42	46	33	62 dBA	Yes
	Nighttime	-	48	42	46	33	54 dBA	Yes
POR03	Daytime	39	49	43	51	37	63 dBA	Yes
	Evening	-	49	43	47	37	61 dBA	Yes
	Nighttime	-	49	43	47	37	52 dBA	Yes

Environmental Noise Feasibility Assessment
Proposed Residential Development - 670 Niagara Street, Welland
September 2024

POR #	Time of Day	Group 1 (dBA)	Group 2 (dBA)	Group 3 (dBA)	Group 4 (dBA)	Group 5 (dBA)	Criteria	Compliance
POR04	Daytime	37	50	44	52	42	63 dBA	Yes
	Evening	-	50	44	49	42	60 dBA	Yes
	Nighttime	-	50	44	49	42	52 dBA	Yes
POR05	Daytime	36	49	43	52	44	60 dBA	Yes
	Evening	-	49	43	49	44	58 dBA	Yes
	Nighttime	-	49	43	49	44	49 dBA	Yes

Table 9: Minimum Noise Mitigation Measures

Receptor ID	Building	Air Conditionin ¹	Exterior Wall ²	Window STC Rating ²	Acoustic Barrier Height (m) ³	Warning Clause ⁴
POR01	Building C	Required	31 ⁶	27 ⁷	-	D
POR02, POR03	Building B	Required	31 ⁶	27 ⁷	-	D
POR04, POR05	Building A	Provision for Adding	31 ⁶	27 ⁷	-	C (D instead if AC Provided)
POR14, POR15	Building D	-	standard	standard	-	-
POR16	Building E	-	standard	standard	-	-

Notes:

1. "Provision for adding" means that building must be built so that the occupant can install conditioning in the future, at their discretion. Required means that the building must be built with central air conditioning installed.
2. STC – Sound Transmission Class rating. STC values are based upon the assumption that all wall and window areas are 80% and 30%, respectively, of the corresponding room floor area.
3. Height of acoustic barrier with no gap's underneath or in the wall.
4. Notification to potential purchaser of a potential annoyance due to an existing source of environmental noise. Warning clauses should be included in agreements of Offers of Purchase and Sale.
5. An acoustic barrier is optional and if not installed, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.
6. Achievable using standard construction methods.
7. Minimum window STC unless detailed window STC analysis is undertaken by a qualified acoustic consultant.



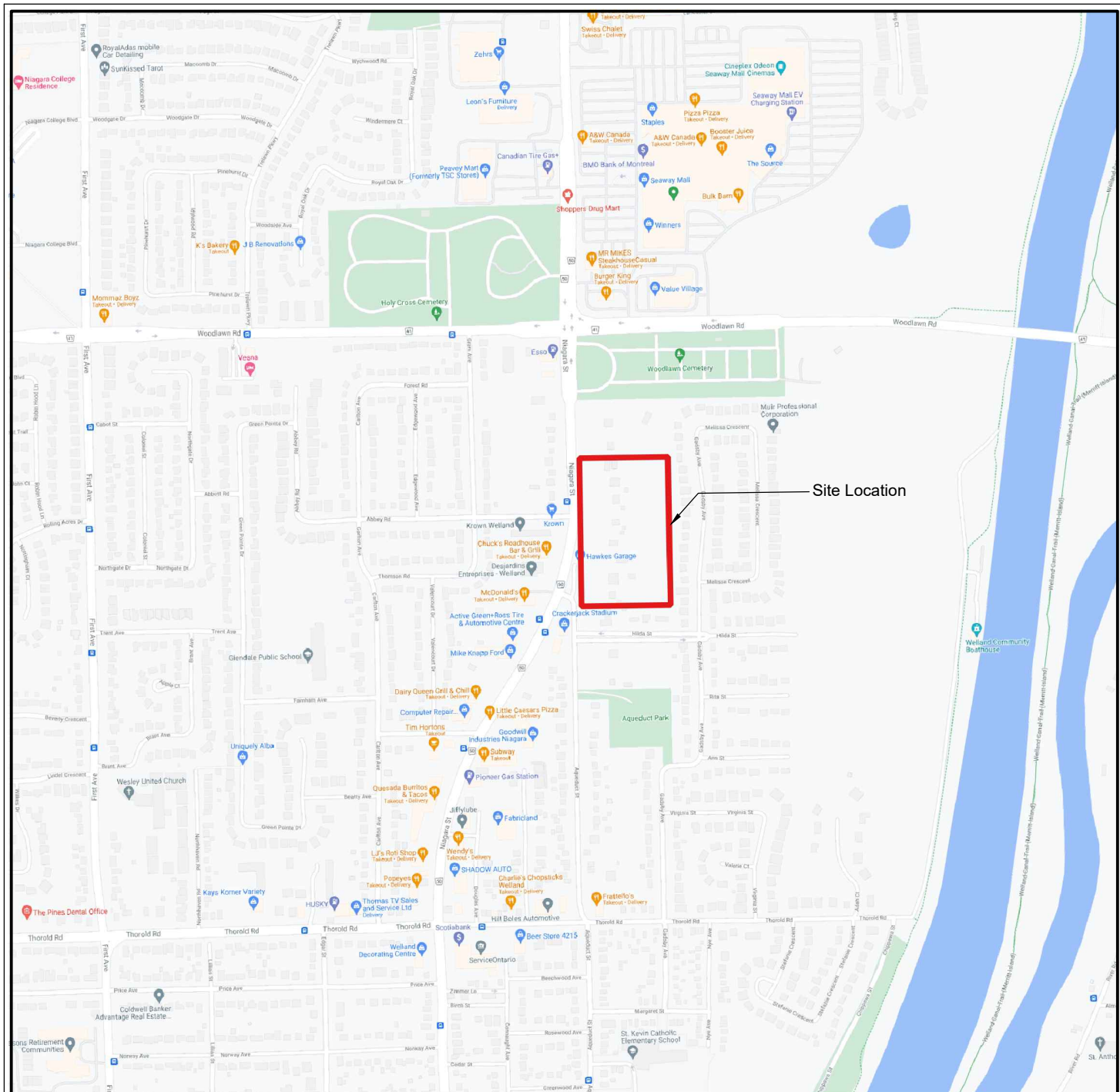
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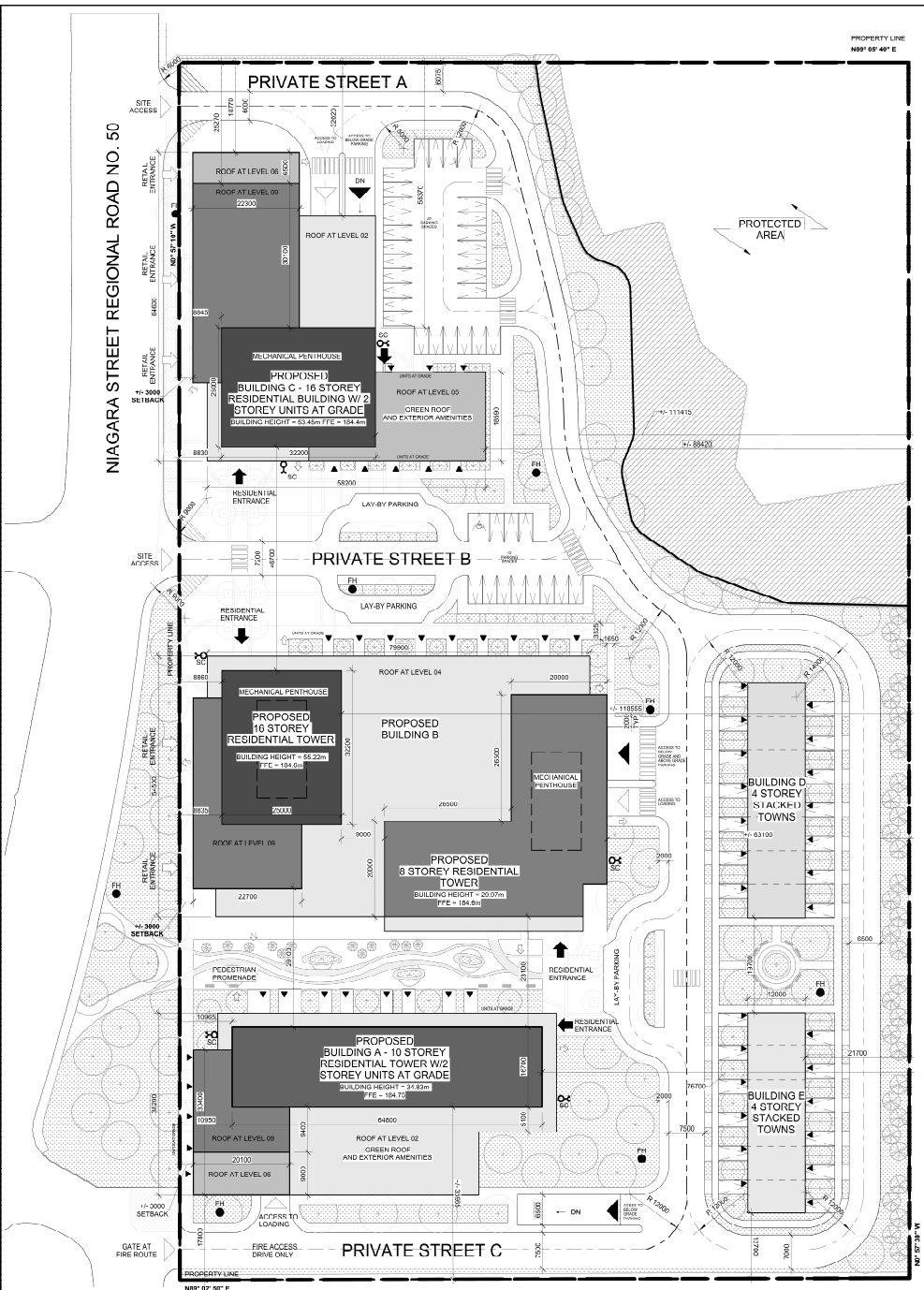


Figures

Figures



			
Client			
2786966 Ontario Inc.			
Figure Title			
Site Location Map			
670 Niagara Street			
Drawn	Checked	Date	Figure No. 1
BM	HW	August 2021	
Scale		Project No.	
1:10,000		300052233.0000	



PROJECT LOGO

TRUE NORTH

CONSTRUCTION NORTH

KEY PLAN

3. Released for Permitting 2024-08-20
2. Released for Bidding 2024-08-17
1. Released for Review 2024-08-17

REVISIONS

DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE PROJECT MANAGER. ONLY PROJECT MANAGER MUST BE USED. THE CONTRACTOR MUST CHECK THE DIMENSIONS ON SITE. THE DRAWING IS PROTECTED BY COPYRIGHT. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS.

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905.926.6700
www.mccallumsather.com

LOCAL

CONSULTANTS

PROJECT
WELLAND DEVELOPMENT

670 Niagara Street, Welland, ON.

DRAWING TITLE
SITE PLAN

DRAWN BY: DW DATE: 17/11/2023
CHECKED BY: MC SCALE:

PROJECT NO: **23029**

DRAWING NO: **A100**



Figure Title

Site Plan

670 Niagara Street

Client

2786966 Ontario Inc.

Drawn

BM
Scale
N/A

Checked

HW

Date

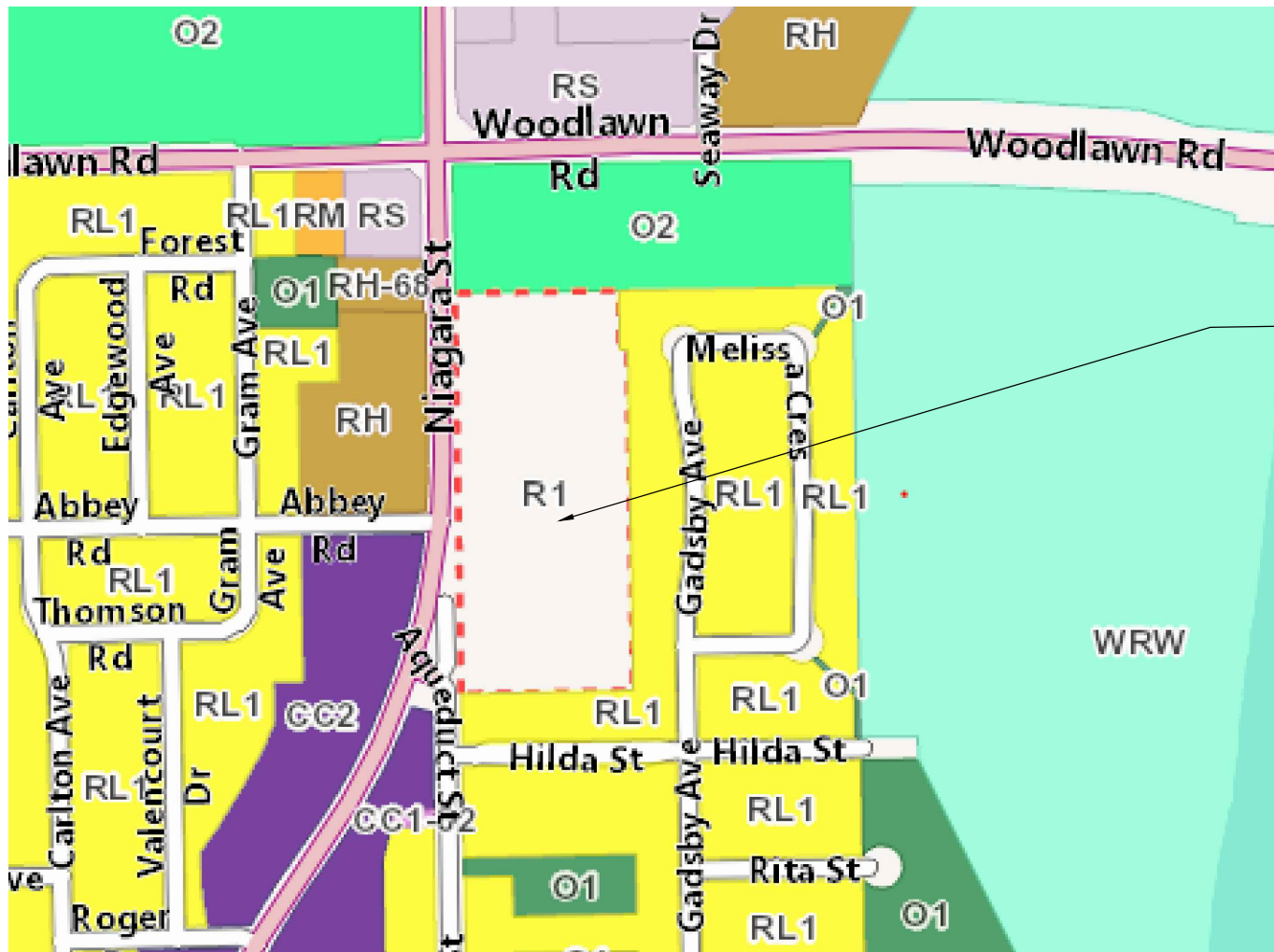
September 2024

Project No.

300052233.0000

Figure No.

2



Site Location



Figure Title

Zoning Map **670 Niagara Street**

Client

2786966 Ontario Inc.

Drawn

BM

Scale

N/A

Checked

HW

Date

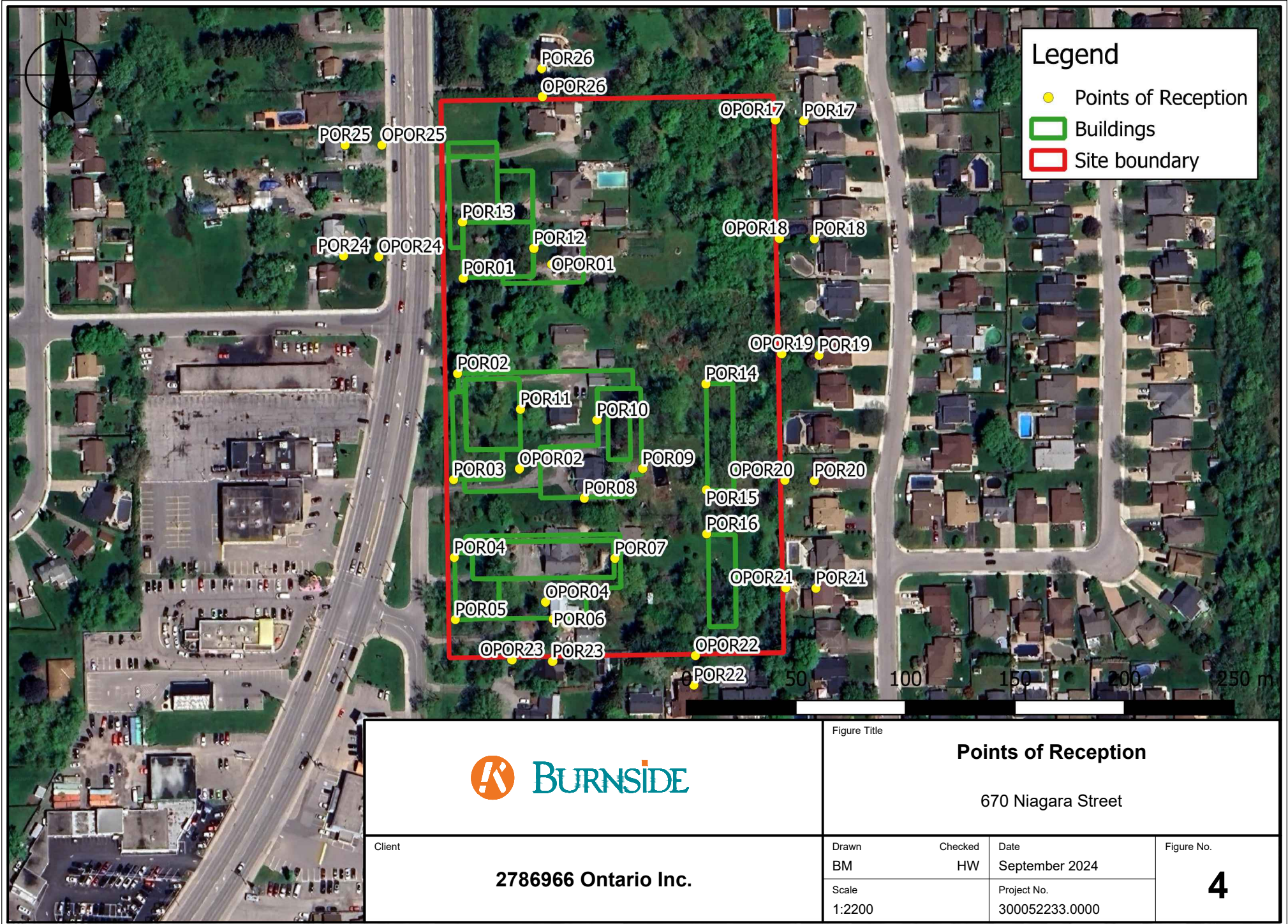
August 2021

Project No.

300052233.0000

Figure No.

3



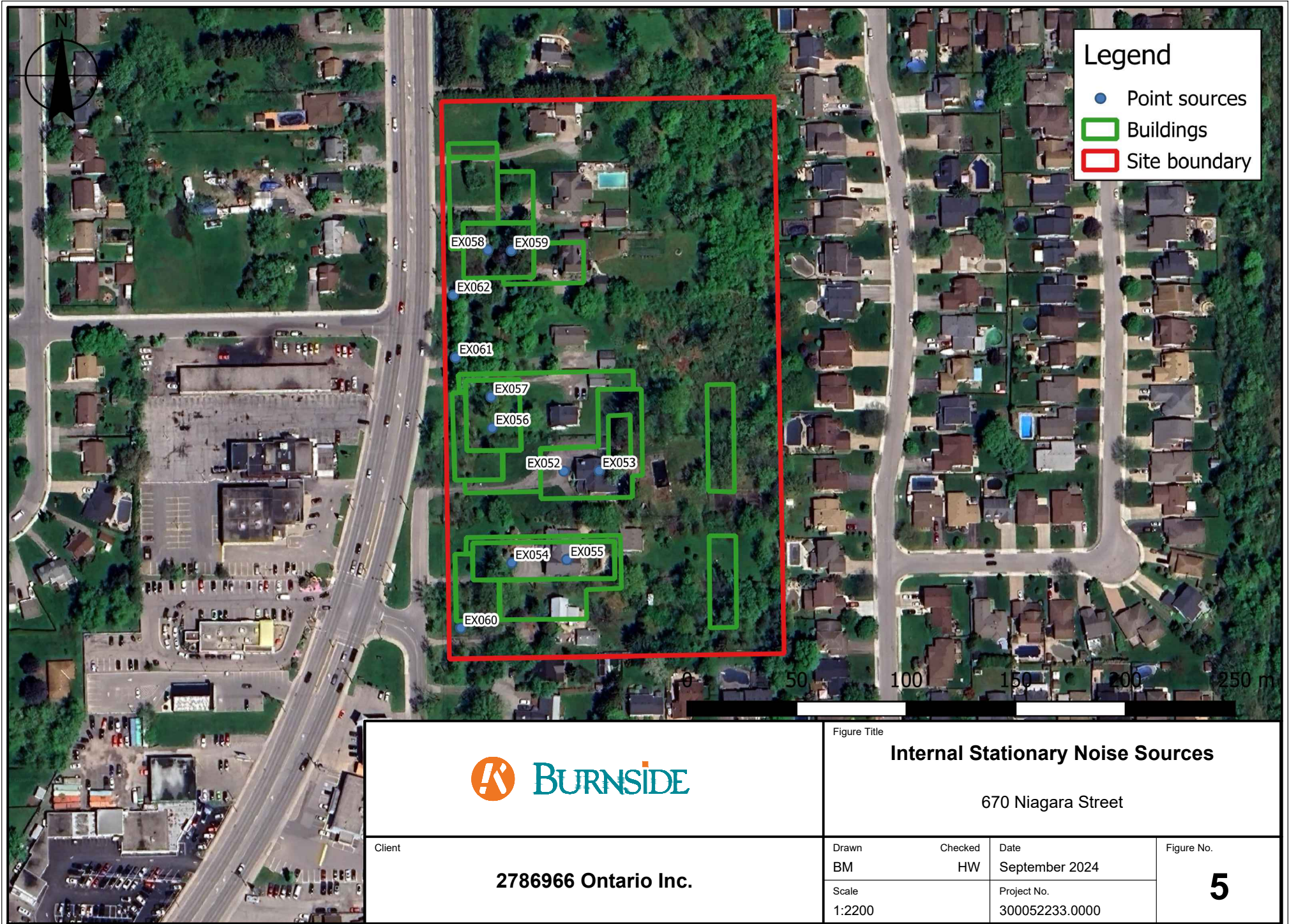


Figure 6: Unmitigated Daytime Internal Stationary Noise
Unmitigated Model - Internal Stationary - Sept 2024 update

12 Sep 2024, 13:45

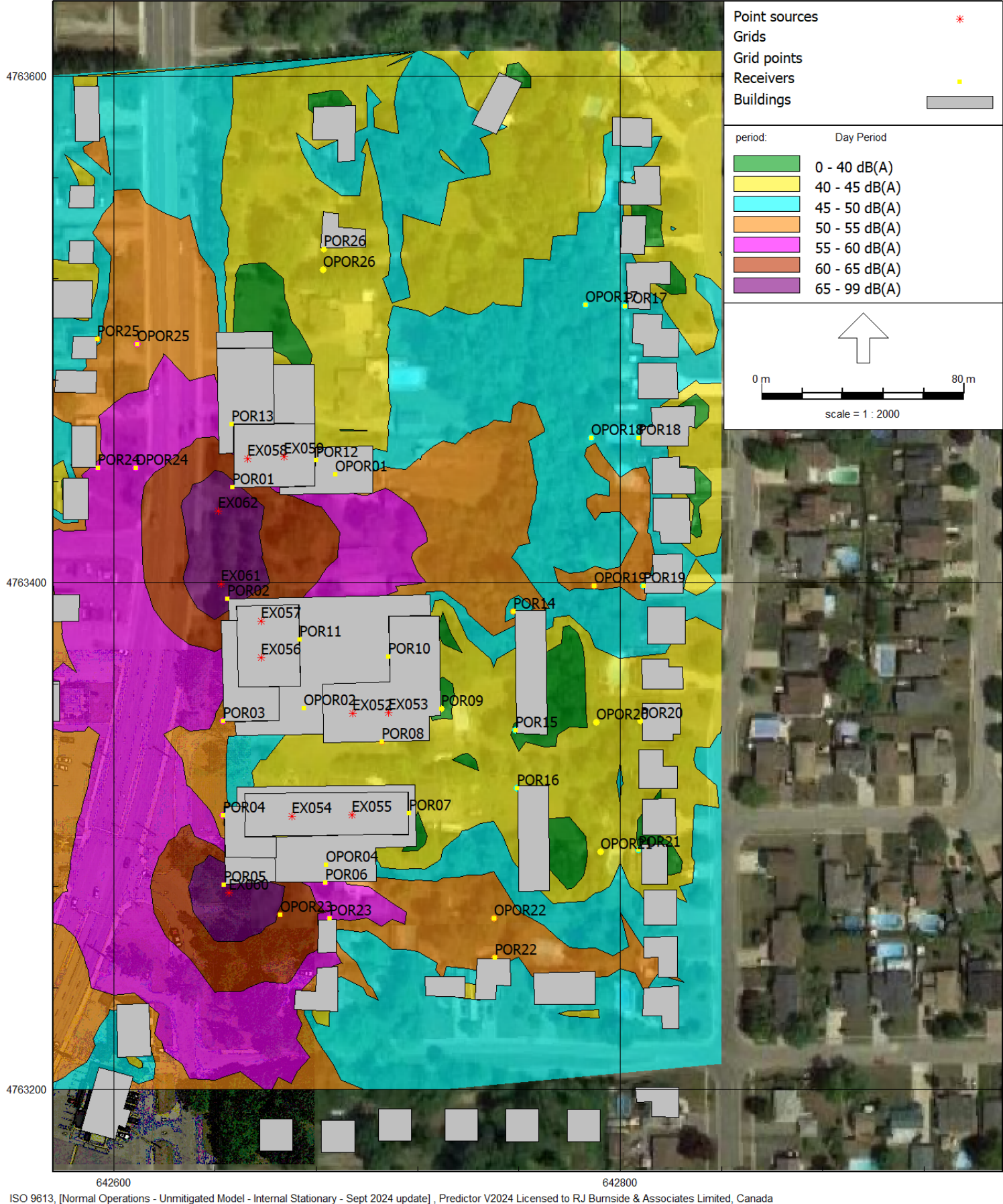


Figure 7: Unmitigated Evening Internal Stationary Noise
Unmitigated Model - Internal Stationary - Sept 2024 update
12 Sep 2024, 13:45

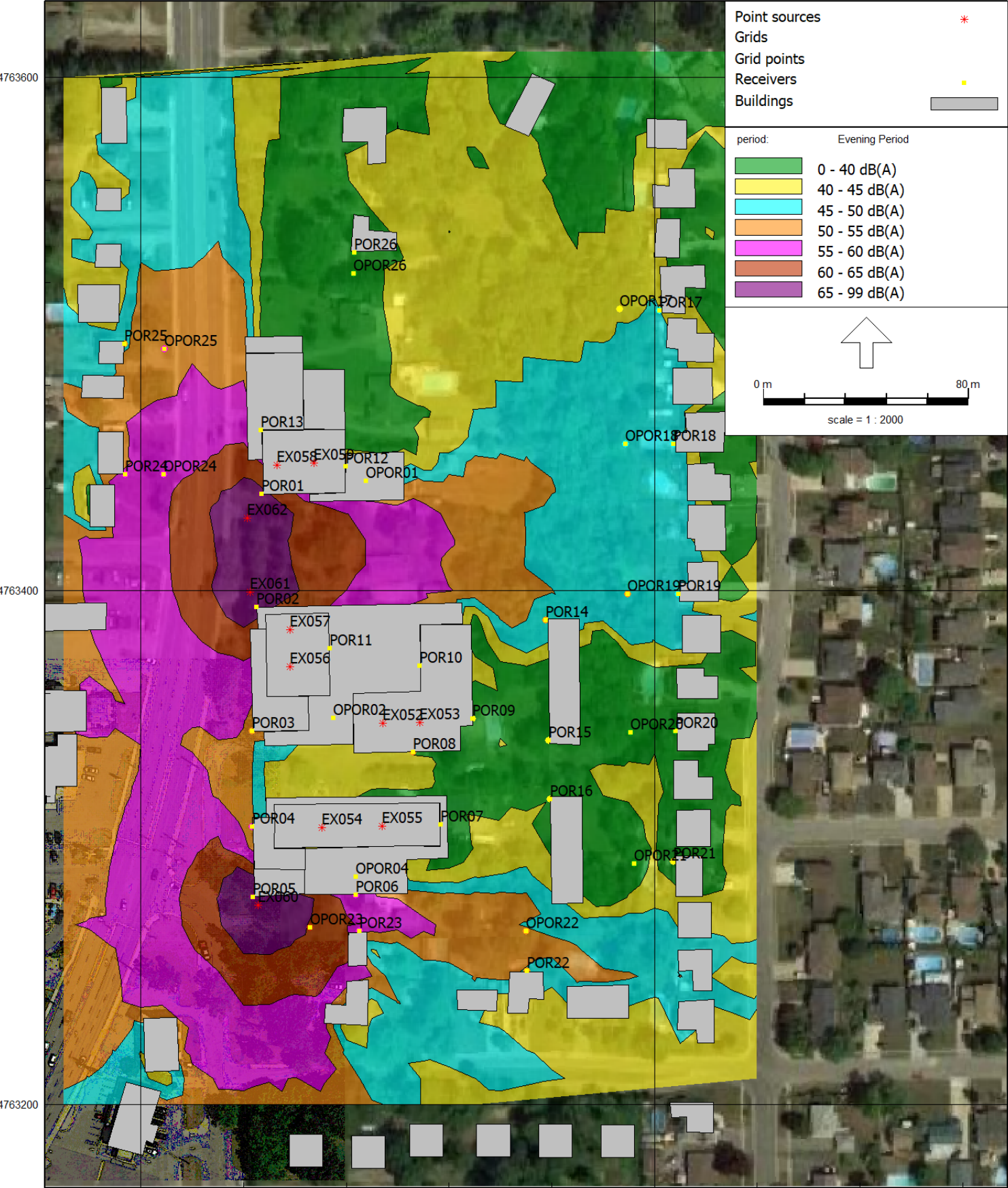


Figure 8: Unmitigated Nighttime Internal Stationary Noise

Unmitigated Model - Internal Stationary - Sept 2024 update

12 Sep 2024, 13:46

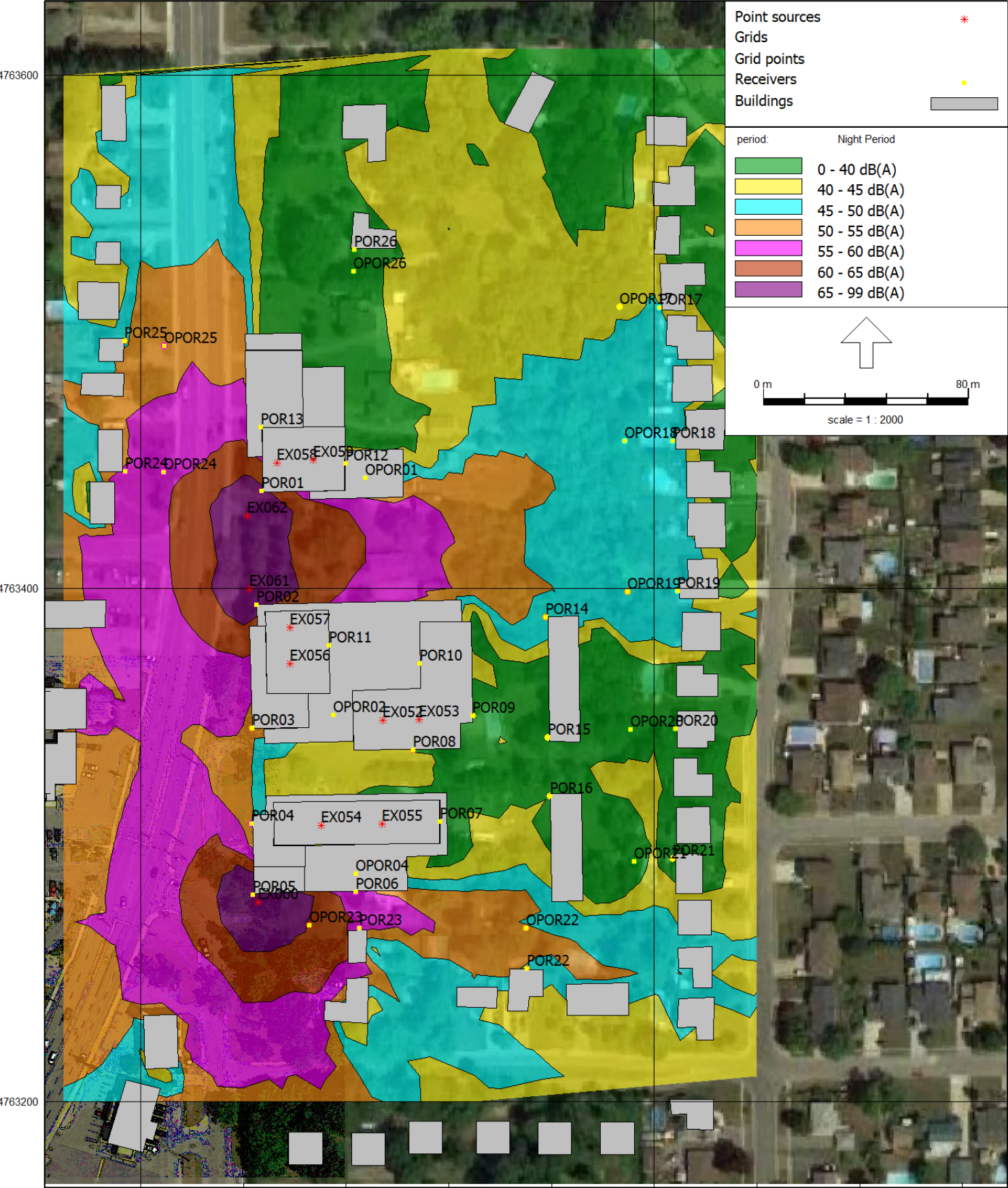


Figure 9: Mitigated Daytime Internal Stationary Noise
Mitigated Model - Internal Stationary - Sept 2024 update
12 Sep 2024, 13:41



Figure 10: Mitigated Evening Internal Stationary Noise
Mitigated Model - Internal Stationary - Sept 2024 update
12 Sep 2024, 13:43

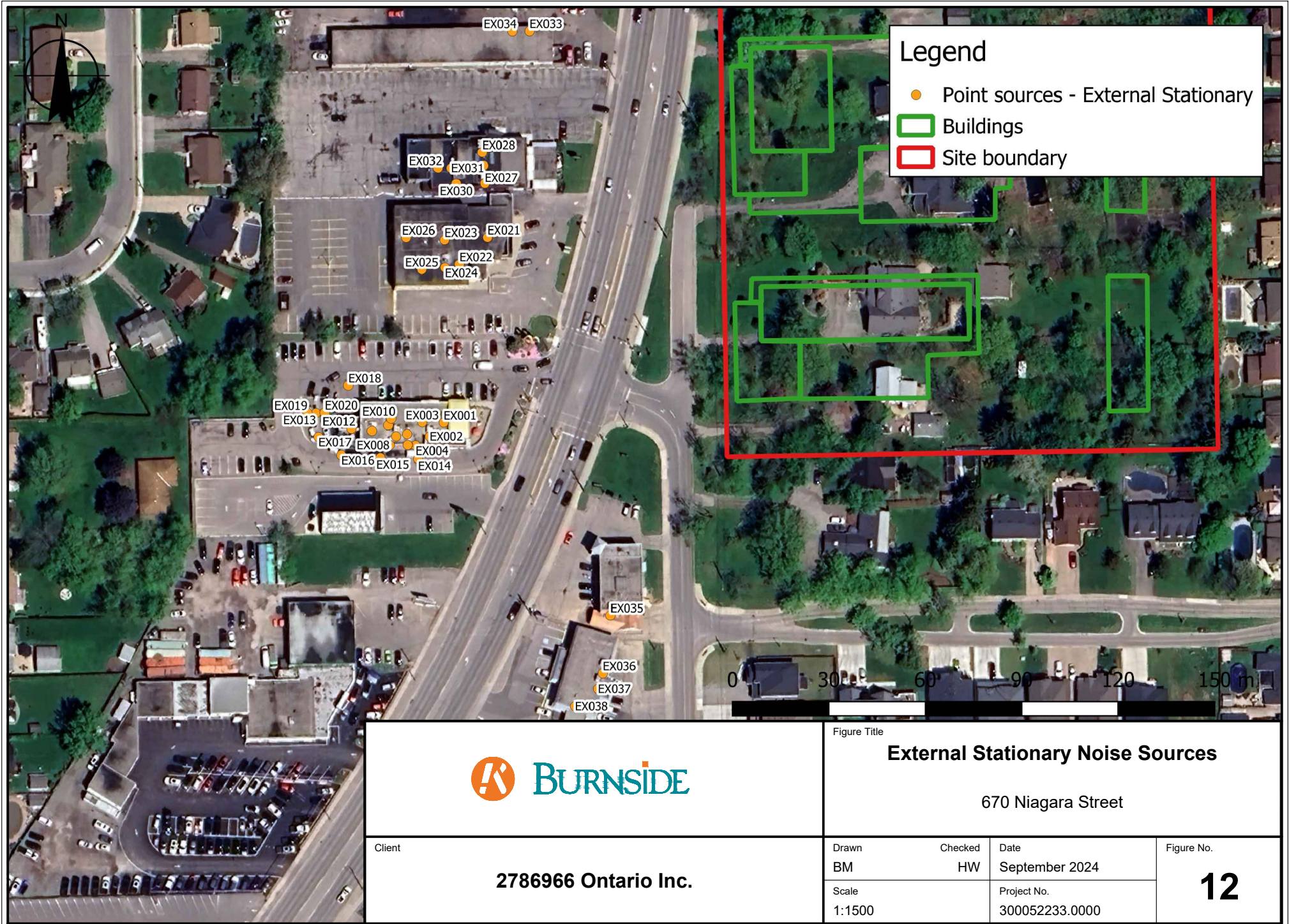


Figure 11: Mitigated Nighttime Internal Stationary Noise

Mitigated Model - Internal Stationary - Sept 2024 update

12 Sep 2024, 13:44





RJ Burnside & Associates Limited, Canada

12 Sep 2024, 14:00

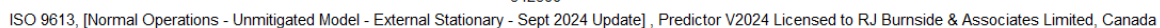
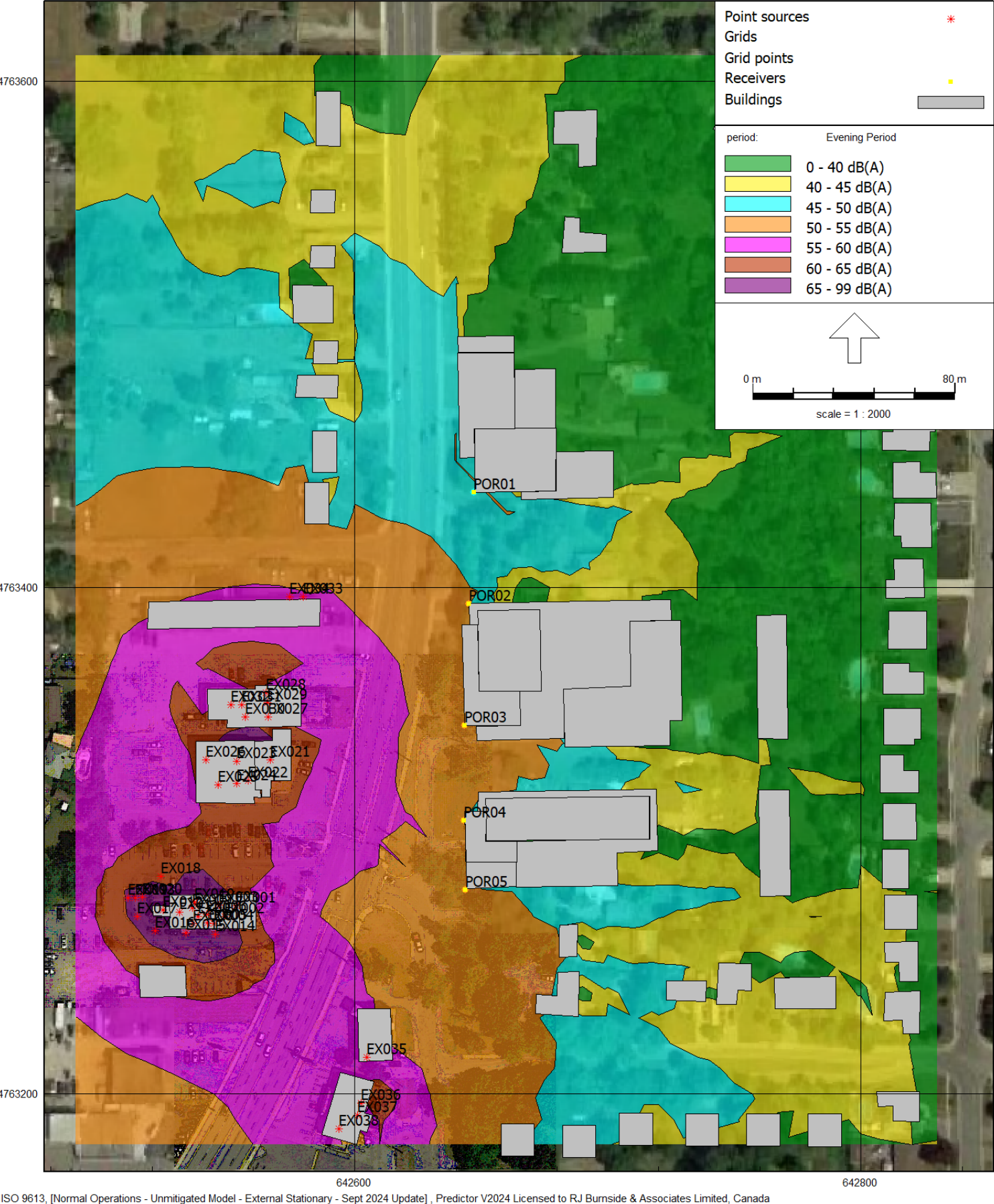
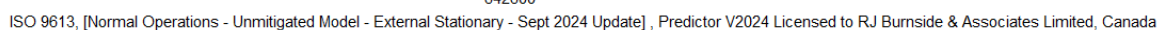


Figure 14: Unmitigated Evening External Stationary Noise
Unmitigated Model - External Stationary - Sept 2024 Update
12 Sep 2024, 14:01



RJ Burnside & Associates Limited, Canada

12 Sep 2024, 14:01





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Appendix A

Traffic Data

Environmental Noise Feasibility Assessment
Proposed Residential Development - 670 Niagara Street, Welland
September 2024

APPENDIX A

Summary of the Traffic Data:

Road	Niagara Street
Location	At Aqueduct Street
2018 Hourly Traffic PM Peak	2,031
2018 Daily Traffic	20,310
Assumed growth rate	2.5%
20-Year future Hour Traffic (2041)	3,584
20-Year future Daily Traffic (2041)	35,839
No. of Lanes	4 + centre turning lane
Posted Speed	50 km/h
Trucks (Med/Heavy)	1%/1%
Day/Night Split	90%/10%
Directional Split (North/South)	50%/50%

Location..... Aqueduct Street @ Niagara Street

GeoID..... 00291

Municipality. WELLAND

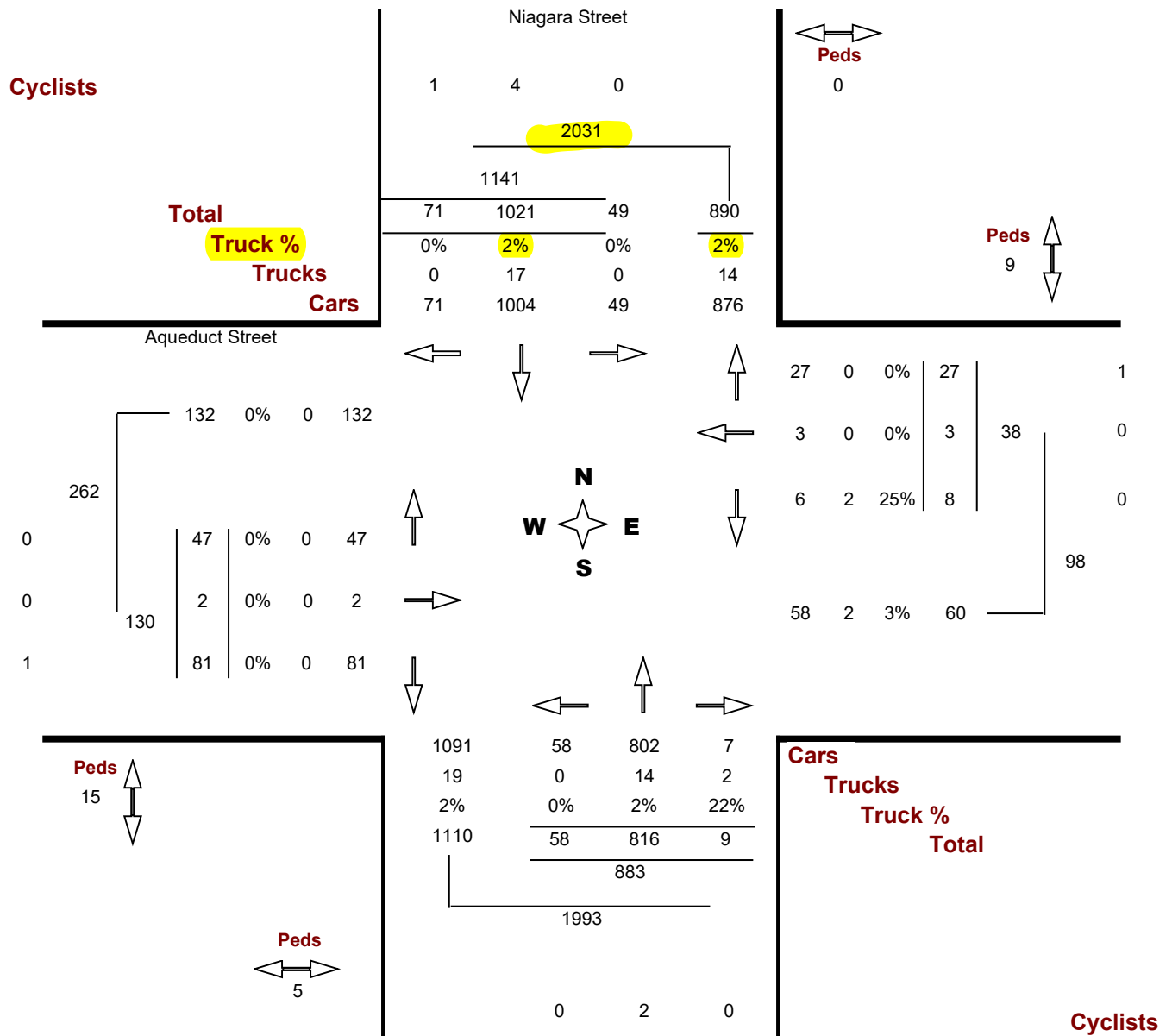
Count Date. Thursday, 11 October, 2018

Traffic Cont.

Count Time. 03:00 PM — 06:00 PM

Major Dir..... North south

Peak Hour.. 04:15 PM — 05:15 PM





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Appendix B

MECP Sound Level Limits

APPENDIX B

Warning Clauses - Transportation Sources

Type A

“Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.”

Type B

“Purchasers/tenants are advised that despite the inclusion of noise mitigation features in the development and within the building units, sound levels due to increasing road traffic (rail traffic) (air traffic) may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment.”

Type C

“This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.”

Type D

“This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.”

Warning Clauses - Stationary Sources

Type E

“Purchasers/tenants are advised that due to the proximity of the adjacent industry (facility) (utility), noise from the industry (facility) (utility) may at times be audible.”

Environmental Noise Feasibility Assessment
Proposed Residential Development - 670 Niagara Street, Welland
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Warning Clauses – Class 4 Area Notification

Type F

“Purchasers/tenants are advised that sound levels due to the adjacent industry (facility) (utility) are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed.”

Environmental Noise Feasibility Assessment
Proposed Residential Development - 670 Niagara Street, Welland
September 2024

Table B-1: Sound Level Limit for Outdoor Living Areas – Road and Rail

Time Period	$L_{eq}(16)(dBA)$
16-hour, 07:00 – 23:00	55

Table B-2: Indoor Sound Level Limits – Road and Rail

Type of Space	Time Period	L_{eq} (dBA)	
		Road	Rail
Living / dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living / dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
Sleeping quarters	23:00 – 07:00	40	35

Table B-3: Road Noise Control Measures – Outdoor Living Areas

Sound Levels	Measures
≤ 55 dBA	Noise control measures may not be required.
> 55 dBA and ≤ 60 dBA	Noise control measures may be applied, otherwise warning clause Type A.
> 60 dBA	Noise control measures should be implemented to reduce the levels to 55 dBA, otherwise warning clause Type B.

Table B-4: Plane of a Window – Ventilation Requirements
Daytime Period, 07:00 – 23:00 Hours

Sound Levels	Measures
≤ 55 dBA	Noise control measures may not be required.
> 55 dBA and ≤ 65 dBA	The dwelling should be designed with a provision of for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.
> 65 dBA	Installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2.

Environmental Noise Feasibility Assessment
Proposed Residential Development - 670 Niagara Street, Welland
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**Table B-5: Plane of a Window – Ventilation Requirements
Nighttime Period, 23:00 – 07:00 Hours**

Sound Levels	Measures
≤ 50 dBA	Noise control measures may not be required.
> 50 dBA and ≤ 60 dBA	The dwelling should be designed with a provision of for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.
> 60 dBA	Installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2.

Table B-6: Indoor Living Areas – Building Components

Sound Levels	Measures
> 60 dBA nighttime > 65 dBA daytime	Building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2. The acoustical performance of the building components (windows, doors and walls) should be specified.

Table B-7: MECP Table C-5 of NPC-300: Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA) Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50 dBA	50 dBA	45 dBA	55 dBA
19:00 – 23:00	50 dBA	45 dBA	40 dBA	55 dBA

Table B-8: MECP Table C-6 of NPC-300: Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA) Plane of Window of Noise Sensitive Spaces

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50 dBA	50 dBA	45 dBA	60 dBA
19:00 – 23:00	50 dBA	50 dBA	40 dBA	60 dBA
23:00 – 07:00	45 dBA	45 dBA	40 dBA	55 dBA

Environmental Noise Feasibility Assessment
Proposed Residential Development - 670 Niagara Street, Welland
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Table B-9: MECP Table C-7 of NPC-300: Exclusion Limit Values of Impulsive Sound Level (LLM, dBAI) Outdoor Points of Reception

Time of Day	Actual number of impulses in Period of one hour	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 23:00	9 or more	50	50	45	55
07:00 – 23:00	7 to 8	55	55	50	60
07:00 – 23:00	5 to 6	60	60	55	65
07:00 – 23:00	4	65	65	60	70
07:00 – 23:00	3	70	70	65	75
07:00 – 23:00	2	75	75	70	80
07:00 – 23:00	1	80	80	75	85

Table B-10: MECP Table C-8 of NPC-300: Exclusion Limit Values of Impulsive Sound Level (LLM, dBAI) Plane of Window – Noise Sensitive Spaces (Day / Night)

Actual number of impulses in Period of one hour	Class 1 Area (7:00-23:00) / (23:00-7:00)	Class 2 Area (7:00-23:00) / (23:00-7:00)	Class 3 Area (7:00-19:00) / (19:00-7:00)	Class 4 Area (7:00-23:00) / (23:00-7:00)
9 or more	50/45	50/45	45/40	60/55
7 to 8	55/50	55/50	50/45	65/60
5 to 6	60/55	60/55	55/50	70/65
4	65/60	65/60	60/55	75/70
3	70/65	70/65	65/60	80/75
2	75/70	75/70	70/65	85/80
1	80/75	80/75	75/70	90/85



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Appendix C

Sample Transportation Noise Modeling Printouts

STAMSON 5.0 NORMAL REPORT Date: 12-09-2024 13:49:08
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bldgcpow.te Time Period: Day/Night 16/8 hours
Description: Building C POW Calculation

Road data, segment # 1: Niagara S (day/night)

Car traffic volume : 34041/3782 veh/TimePeriod *
Medium truck volume : 347/39 veh/TimePeriod *
Heavy truck volume : 347/39 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 20310
Percentage of Annual Growth : 2.50
Number of Years of Growth : 26.00
Medium Truck % of Total Volume : 1.00
Heavy Truck % of Total Volume : 1.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Niagara S (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 17.00 / 17.00 m
Receiver height : 75.00 / 27.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑
Results segment # 1: Niagara S (day)

Source height = 1.00 m

ROAD (0.00 + 67.36 + 0.00) = 67.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	67.90	0.00	-0.54	0.00	0.00	0.00	0.00	67.36

Segment Leq : 67.36 dBA

Total Leq All Segments: 67.36 dBA

↑

Results segment # 1: Niagara S (night)

Source height = 1.00 m

ROAD (0.00 + 60.85 + 0.00) = 60.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
--------	--------	-------	--------	-------	-------	-------	-------	-------	-------	--------

-90	90	0.00	61.39	0.00	-0.54	0.00	0.00	0.00	0.00	60.85
-----	----	------	-------	------	-------	------	------	------	------	-------

Segment Leq : 60.85 dBA

Total Leq All Segments: 60.85 dBA

↑

TOTAL Leq FROM ALL SOURCES (DAY): 67.36

(NIGHT): 60.85

↑

↑

Road/Segment Name	Select Road Type	Time	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Min Day	Min Eve	Min Night
POR01	City Street - 50 km/hr	Count	96	65	51	49	55	139	359	595	1068	849	715	528	730	648	810	939	1029	910	668	522	522	349	329	158	528	329	49
		%	0.79%	0.53%	0.42%	0.40%	0.45%	1.14%	2.95%	4.88%	8.77%	6.97%	5.87%	4.33%	5.99%	5.32%	6.65%	7.71%	8.45%	7.47%	5.48%	4.28%	4.28%	2.86%	2.70%	1.30%	4.33%	2.70%	0.40%
POR02	City Street - 50 km/hr	Count	96	65	51	49	55	139	359	595	1068	849	715	528	730	648	810	939	1029	910	668	522	522	349	329	158	528	329	49
		%	0.79%	0.53%	0.42%	0.40%	0.45%	1.14%	2.95%	4.88%	8.77%	6.97%	5.87%	4.33%	5.99%	5.32%	6.65%	7.71%	8.45%	7.47%	5.48%	4.28%	4.28%	2.86%	2.70%	1.30%	4.33%	2.70%	0.40%
POR03	City Street - 50 km/hr	Count	96	65	51	49	55	139	359	595	1068	849	715	528	730	648	810	939	1029	910	668	522	522	349	329	158	528	329	49
		%	0.79%	0.53%	0.42%	0.40%	0.45%	1.14%	2.95%	4.88%	8.77%	6.97%	5.87%	4.33%	5.99%	5.32%	6.65%	7.71%	8.45%	7.47%	5.48%	4.28%	4.28%	2.86%	2.70%	1.30%	4.33%	2.70%	0.40%
POR04	City Street - 50 km/hr	Count	96	65	51	49	55	139	359	595	1068	849	715	528	730	648	810	939	1029	910	668	522	522	349	329	158	528	329	49
		%	0.79%	0.53%	0.42%	0.40%	0.45%	1.14%	2.95%	4.88%	8.77%	6.97%	5.87%	4.33%	5.99%	5.32%	6.65%	7.71%	8.45%	7.47%	5.48%	4.28%	4.28%	2.86%	2.70%	1.30%	4.33%	2.70%	0.40%
POR05	City Street - 50 km/hr	Count	96	65	51	49	55	139	359	595	1068	849	715	528	730	648	810	939	1029	910	668	522	522	349	329	158	528	329	49
		%	0.79%	0.53%	0.42%	0.40%	0.45%	1.14%	2.95%	4.88%	8.77%	6.97%	5.87%	4.33%	5.99%	5.32%	6.65%	7.71%	8.45%	7.47%	5.48%	4.28%	4.28%	2.86%	2.70%	1.30%	4.33%	2.70%	0.40%

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Road/Segment Name	24 Hour Leq (dBA)	Time	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Min Day	Min Eve	Min Night
POR01	63.92	1hr Leq	57	55	54	54	54	58	62	65	67	66	65	64	65	65	66	67	67	66	65	64	64	62	62	59	64	62	54
POR02	63.92	1hr Leq	57	55	54	54	54	58	62	65	67	66	65	64	65	65	66	67	67	66	65	64	64	62	62	59	64	62	54
POR03	62.61	1hr Leq	55	54	53	52	53	57	61	63	66	65	64	63	64	64	65	65	66	65	64	63	63	61	61	58	63	61	52
POR04	62.34	1hr Leq	55	53	52	52	53	57	61	63	66	65	64	63	64	63	64	65	65	65	64	62	62	61	60	57	63	60	52
POR05	59.50	1hr Leq	52	51	50	49	50	54	58	60	63	62	61	60	61	61	62	62	63	62	61	60	60	58	58	54	60	58	49

STAMSON 5.0 NORMAL REPORT Date: 12-09-2024 13:48:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: pow1amb.te Time Period: 24 hours
Description: POR1 Ambient Calculation

Road data, segment # 1: Niagara S

Car traffic volume : 11260 veh/TimePeriod *
Medium truck volume : 115 veh/TimePeriod *
Heavy truck volume : 115 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Niagara S

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 19.00 m
Receiver height : 27.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Road data, segment # 2: Niagara N

Car traffic volume : 11260 veh/TimePeriod *
Medium truck volume : 115 veh/TimePeriod *
Heavy truck volume : 115 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: Niagara N

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 19.00 m
Receiver height : 27.70 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

↑

Results segment # 1: Niagara S

Source height = 1.00 m

ROAD (0.00 + 60.31 + 0.00) = 60.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	61.34	0.00	-1.03	0.00	0.00	0.00	0.00	60.31

Segment Leq : 60.31 dBA

↑

Results segment # 2: Niagara N

Source height = 1.00 m

ROAD (0.00 + 60.31 + 0.00) = 60.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	61.34	0.00	-1.03	0.00	0.00	0.00	0.00	60.31

Segment Leq : 60.31 dBA

Total Leq All Segments: 63.32 dBA

↑

TOTAL Leq FROM ALL SOURCES: 63.32

↑

↑

Required Sound Transmission Class (STC) Calculation - Nighttime

Predicted Outdoor sound level (dBA)	61
Required indoor sound level (dBA)	40
Room Absorption	Intermediate
Noise spectrum type	D - Mixed Road traffic, C
Sound comes from	0 to 90
Room floor area (m2)	30
Total area of wall that is receiving sound (m2)	22
Area of that wall that is window (in wall above) (m2)	6
Area of 2nd wall that is a door (m2)	2
Wall component category	d. Sealed thick window
Window component category	b. Double exterior door
Door component category	a. Single exterior door
Reflection from the building (adjustment to predicted noise) (dB)	3

1 Outdoor sound level (dBA)	64	
Indoor sound level (dBA)	40	
2 Sound comes from (deg angle)	0 to 90	
	<i>Correction from Table 2 (dB)</i>	0
Required noise reduction (dB)		24

Wall component:

3 % of Surface area impacted by noise source (%)	72.7	
	<i>Correction from Table 3 (dB)</i>	1
4 Wall Component area (m2)	16	
Room floor area (m2)	30	
Wall Component area (% floor area)	53.33	
Room absorption category	Intermediate	
	<i>Correction from Table 4 (dB)</i>	-2
5 Noise spectrum type (see Figure 1)	D	
Wall Component category (Table 5)	d	
	<i>Correction from Table 5 (dB)</i>	7
Wall Required STC 30		

Window component:

3 % of Surface area impacted by noise source (%)	27.3	
	<i>Correction from Table 3 (dB)</i>	6
4 Window Component area (m2)	6	
Room floor area (m2)	30	
Window Component area (% floor area)	20	
Room absorption category	Intermediate	
	<i>Correction from Table 4 (dB)</i>	-6
5 Noise spectrum type (see Figure 1)	D	
Window Component category (Table 5)	b	
	<i>Correction from Table 5 (dB)</i>	2
Window Required STC 26		

Door component:

3 % of Surface area impacted by noise source (%)	9.1	
	<i>Correction from Table 3 (dB)</i>	10
4 Door Component area (m2)	2	
Room floor area (m2)	30	
Door Component area (% floor area)	6.67	
Room absorption category	Intermediate	
	<i>Correction from Table 4 (dB)</i>	-11
5 Noise spectrum type (see Figure 1)	D	
Door Component category (Table 5)	a	
	<i>Correction from Table 5 (dB)</i>	1
Door Required STC 24		

Source:

Controlling Sound Transmission into Buildings, NRCC 1985

L:\Reference Docs\Noise\Controlling Sound Transmission into Building - NRCC - 1985.pdf

Required Sound Transmission Class (STC) Calculation - Daytime

Predicted Outdoor sound level (dBA)	67
Required indoor sound level (dBA)	45
Room Absorption	Intermediate
Noise spectrum type	D - Mixed Road traffic, C
Sound comes from	0 to 90
Room floor area (m2)	30
Total area of wall that is receiving sound (m2)	22
Area of that wall that is window (in wall above) (m2)	6
Area of 2nd wall that is a door (m2)	2
Wall component category	d. Sealed thick window
Window component category	b. Double exterior door
Door component category	a. Single exterior door
Reflection from the building (adjustment to predicted noise) (dB)	3

1 Outdoor sound level (dBA)	70	
Indoor sound level (dBA)	45	
2 Sound comes from (deg angle)	0 to 90	
	Correction from Table 2 (dB)	0
Required noise reduction (dB)		25

Wall component:

3 % of Surface area impacted by noise source (%)	72.7	
	Correction from Table 3 (dB)	1
4 Wall Component area (m2)	16	
Room floor area (m2)	30	
Wall Component area (% floor area)	53.33	
Room absorption category	Intermediate	
	Correction from Table 4 (dB)	-2
5 Noise spectrum type (see Figure 1)	D	
Wall Component category (Table 5)	d	
	Correction from Table 5 (dB)	7
	Wall Required STC	31

Window component:

3 % of Surface area impacted by noise source (%)	27.3	
	Correction from Table 3 (dB)	6
4 Window Component area (m2)	6	
Room floor area (m2)	30	
Window Component area (% floor area)	20	
Room absorption category	Intermediate	
	Correction from Table 4 (dB)	-6
5 Noise spectrum type (see Figure 1)	D	
Window Component category (Table 5)	b	
	Correction from Table 5 (dB)	2
	Window Required STC	27

Door component:

3 % of Surface area impacted by noise source (%)	9.1	
	Correction from Table 3 (dB)	10
4 Door Component area (m2)	2	
Room floor area (m2)	30	
Door Component area (% floor area)	6.67	
Room absorption category	Intermediate	
	Correction from Table 4 (dB)	-11
5 Noise spectrum type (see Figure 1)	D	
Door Component category (Table 5)	a	
	Correction from Table 5 (dB)	1
	Door Required STC	25

Source:

Controlling Sound Transmission into Buildings, NRCC 1985

L:\Reference Docs\Noise\Controlling Sound Transmission into Building - NRCC - 1985.pdf



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix D

Sample Internal Stationary Noise Modeling Printouts

R.J. Burnside
Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Type	DI	DI_Horz
EX057	Water Cooled Chiller 0- Building B	3.00	48.00	Relative to Objects	Normal point source	none	0
EX058	Water Cooled Chiller - Building B	3.00	48.00	Relative to Objects	Normal point source	none	0
EX056	Emergency Generator - Building B	3.00	48.00	Relative to Objects	Normal point source	none	0
EX059	EX059	3.00	48.00	Relative to Objects	Normal point source	none	0
EX054	Water Cooled Chiller 0- Building A	3.00	30.00	Relative to Objects	Normal point source	none	0
EX055	Emergency Generator - Building A	3.00	30.00	Relative to Objects	Normal point source	none	0
EX053	Water Cooled Chiller 0- Building B	3.00	24.00	Relative to Objects	Normal point source	none	0
EX052	Emergency Generator - Building A	3.00	24.00	Relative to Objects	Normal point source	none	0
EX060	Garage Exhaust	0.00	0.00	Relative	Normal point source	none	0
EX061	Garage Exhaust	0.00	0.00	Relative	Normal point source	none	0
EX062	Garage Exhaust	0.00	0.00	Relative	Normal point source	none	0

R.J. Burnside
Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	DI_Vert	DI (0)	DI (10)	DI (20)	DI (30)	DI (40)	DI (50)	DI (60)	DI (70)	DI (80)	DI (90)	DI (100)	DI (110)	DI (120)
EX057	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX058	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX056	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX059	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX054	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX055	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX053	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX052	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX060	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX061	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX062	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Model:

Mitigated Model - Internal Stationary - Sept 2024 update

Group:

Normal Operations - Site

Listing of:

(main group)

Point sources, for method Industrial noise - ISO 9613

Name	DI (130)	DI (140)	DI (150)	DI (160)	DI (170)	DI (180)	Ca (D)	Ca (E)	Ca (N)	Weighting	No refl.	No building
EX057	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX058	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX056	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX059	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX054	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX055	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX053	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX052	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX060	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX061	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX062	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No

R.J. Burnside
Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	No	ind.site	Lw 31	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 31	Red 63	Red 125	Red 250
EX057		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX058		No	--	--	--	--	104.00	--	--	--	--	0.00	0.00	0.00	0.00
EX056		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX059		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX054		No	--	--	--	--	101.00	--	--	--	--	0.00	0.00	0.00	0.00
EX055		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX053		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX052		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX060		No	--	--	--	--	97.40	--	--	--	--	0.00	0.00	0.00	0.00
EX061		No	--	--	--	--	95.60	--	--	--	--	0.00	0.00	0.00	0.00
EX062		No	--	--	--	--	95.60	--	--	--	--	0.00	0.00	0.00	0.00

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
EX057	30.00	0.00	0.00	0.00	0.00
EX058	30.00	0.00	0.00	0.00	0.00
EX056	16.00	0.00	0.00	0.00	0.00
EX059	10.00	0.00	0.00	0.00	0.00
EX054	30.00	0.00	0.00	0.00	0.00
EX055	16.00	0.00	0.00	0.00	0.00
EX053	30.00	0.00	0.00	0.00	0.00
EX052	16.00	0.00	0.00	0.00	0.00
EX060	30.00	0.00	0.00	0.00	0.00
EX061	30.00	0.00	0.00	0.00	0.00
EX062	30.00	0.00	0.00	0.00	0.00

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Grids, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	DeltaX	DeltaY
Grid		4.50	0.00	10	10

R.J. Burnside
Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Receivers, for method Industrial noise - ISO 9613

Name	Desc.	Terrain L	HDef.	Height A	Height B	Height C	Height D	Height E	Height F	Façade
POR01		0.00	Relative	3.00	6.00	12.00	24.00	36.00	46.50	Yes
POR02		0.00	Relative	1.50	7.50	20.00	45.00	--	--	Yes
POR03		0.00	Relative	1.50	7.50	20.00	45.00	--	--	Yes
POR04		0.00	Relative	1.50	7.50	18.00	24.00	30.00	--	Yes
POR05		0.00	Relative	1.50	7.50	18.00	--	--	--	Yes
POR16		0.00	Relative	1.50	10.50	--	--	--	--	Yes
POR15		0.00	Relative	1.50	10.50	--	--	--	--	Yes
POR14		0.00	Relative	1.50	10.50	--	--	--	--	Yes
POR24		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR25		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR26		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR17		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR18		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR19		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR20		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR21		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR22		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR23		0.00	Relative	1.50	4.50	--	--	--	--	Yes
OPOR24		0.00	Relative	1.50	--	--	--	--	--	No
OPOR25		0.00	Relative	1.50	--	--	--	--	--	No
OPOR26		0.00	Relative	1.50	--	--	--	--	--	No
OPOR17		0.00	Relative	1.50	--	--	--	--	--	No
OPOR18		0.00	Relative	1.50	--	--	--	--	--	No
OPOR19		0.00	Relative	1.50	--	--	--	--	--	No
OPOR20		0.00	Relative	1.50	--	--	--	--	--	No
OPOR21		0.00	Relative	1.50	--	--	--	--	--	No
OPOR22		0.00	Relative	1.50	--	--	--	--	--	No
OPOR23		0.00	Relative	1.50	--	--	--	--	--	No
POR06		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR07		0.00	Relative	1.50	7.50	18.00	24.00	30.00	--	Yes
POR08		0.00	Relative	1.50	7.50	22.00	--	--	--	Yes
POR09		0.00	Relative	1.50	7.50	22.00	--	--	--	Yes
POR10		0.00	Relative	1.50	7.50	22.00	--	--	--	Yes
POR11		0.00	Relative	--	9.00	20.00	45.00	--	--	Yes
POR12		0.00	Relative	--	--	--	24.00	36.00	46.50	Yes
POR13		0.00	Relative	--	--	--	--	36.00	46.50	Yes
OPOR01		0.00	Relative	16.50	--	--	--	--	--	No
OPOR02		0.00	Relative	13.50	--	--	--	--	--	No
OPOR04		0.00	Relative	7.50	--	--	--	--	--	No

R.J. Burnside Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Function	Bld.type	Floating	Refl. 31	Refl. 63	Refl. 125	Refl. 250
		4.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		5.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		3.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		5.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		4.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		3.00	0.00	Relative			No	0.80	0.80	0.80	0.80
7		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
8		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
7		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
8		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
9		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
10		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
11		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
12		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
13		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
14		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
15		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		0.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	18.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	30.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	48.00	0.00	Relative			No	0.80	0.80	0.80	0.80

R.J. Burnside
Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Refl. 500	Refl. 1k	Refl. 2k	Refl. 4k	Refl. 8k
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
7	0.80	0.80	0.80	0.80	0.80
8	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
7	0.80	0.80	0.80	0.80	0.80
8	0.80	0.80	0.80	0.80	0.80
9	0.80	0.80	0.80	0.80	0.80
10	0.80	0.80	0.80	0.80	0.80
11	0.80	0.80	0.80	0.80	0.80
12	0.80	0.80	0.80	0.80	0.80
13	0.80	0.80	0.80	0.80	0.80
14	0.80	0.80	0.80	0.80	0.80
15	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80

R.J. Burnside
Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Function	Bld.type	Floating	Refl. 31	Refl. 63	Refl. 125	Refl. 250
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	24.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	48.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	15.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	18.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		27.00	0.00	Relative			No	0.80	0.80	0.80	0.80

Model: Mitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Refl. 500	Refl. 1k	Refl. 2k	Refl. 4k	Refl. 8k
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Type	DI	DI_Horz
EX057	Water Cooled Chiller 0- Building B	3.00	48.00	Relative to Objects	Normal point source	none	0
EX058	Water Cooled Chiller - Building B	3.00	48.00	Relative to Objects	Normal point source	none	0
EX056	Emergency Generator - Building B	3.00	48.00	Relative to Objects	Normal point source	none	0
EX059	EX059	3.00	48.00	Relative to Objects	Normal point source	none	0
EX054	Water Cooled Chiller 0- Building A	3.00	30.00	Relative to Objects	Normal point source	none	0
EX055	Emergency Generator - Building A	3.00	30.00	Relative to Objects	Normal point source	none	0
EX053	Water Cooled Chiller 0- Building B	3.00	24.00	Relative to Objects	Normal point source	none	0
EX052	Emergency Generator - Building A	3.00	24.00	Relative to Objects	Normal point source	none	0
EX060	Garage Exhaust	0.00	0.00	Relative	Normal point source	none	0
EX061	Garage Exhaust	0.00	0.00	Relative	Normal point source	none	0
EX062	Garage Exhaust	0.00	0.00	Relative	Normal point source	none	0

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	DI_Vert	DI (0)	DI (10)	DI (20)	DI (30)	DI (40)	DI (50)	DI (60)	DI (70)	DI (80)	DI (90)	DI (100)	DI (110)	DI (120)
EX057	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX058	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX056	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX059	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX054	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX055	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX053	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX052	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX060	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX061	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX062	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	DI (130)	DI (140)	DI (150)	DI (160)	DI (170)	DI (180)	Ca (D)	Ca (E)	Ca (N)	Weighting	No refl.	No building
EX057	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX058	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX056	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX059	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX054	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX055	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX053	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX052	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX060	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX061	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX062	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	No	ind.site	Lw 31	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 31	Red 63	Red 125	Red 250
EX057		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX058		No	--	--	--	--	104.00	--	--	--	--	0.00	0.00	0.00	0.00
EX056		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX059		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX054		No	--	--	--	--	101.00	--	--	--	--	0.00	0.00	0.00	0.00
EX055		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX053		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX052		No	--	--	--	--	100.00	--	--	--	--	0.00	0.00	0.00	0.00
EX060		No	--	--	--	--	97.40	--	--	--	--	0.00	0.00	0.00	0.00
EX061		No	--	--	--	--	95.60	--	--	--	--	0.00	0.00	0.00	0.00
EX062		No	--	--	--	--	95.60	--	--	--	--	0.00	0.00	0.00	0.00

R.J. Burnside
Unmitigated Internal Stationary Noise

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
EX057	10.00	0.00	0.00	0.00	0.00
EX058	10.00	0.00	0.00	0.00	0.00
EX056	10.00	0.00	0.00	0.00	0.00
EX059	0.00	0.00	0.00	0.00	0.00
EX054	10.00	0.00	0.00	0.00	0.00
EX055	10.00	0.00	0.00	0.00	0.00
EX053	10.00	0.00	0.00	0.00	0.00
EX052	10.00	0.00	0.00	0.00	0.00
EX060	0.00	0.00	0.00	0.00	0.00
EX061	0.00	0.00	0.00	0.00	0.00
EX062	0.00	0.00	0.00	0.00	0.00

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Grids, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	DeltaX	DeltaY
Grid		4.50	0.00	10	10

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Receivers, for method Industrial noise - ISO 9613

Name	Desc.	Terrain L	HDef.	Height A	Height B	Height C	Height D	Height E	Height F	Façade
POR01		0.00	Relative	3.00	6.00	12.00	24.00	36.00	46.50	Yes
POR02		0.00	Relative	1.50	7.50	20.00	45.00	--	--	Yes
POR03		0.00	Relative	1.50	7.50	20.00	45.00	--	--	Yes
POR04		0.00	Relative	1.50	7.50	18.00	24.00	30.00	--	Yes
POR05		0.00	Relative	1.50	7.50	18.00	--	--	--	Yes
POR16		0.00	Relative	1.50	10.50	--	--	--	--	Yes
POR15		0.00	Relative	1.50	10.50	--	--	--	--	Yes
POR14		0.00	Relative	1.50	10.50	--	--	--	--	Yes
POR24		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR25		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR26		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR17		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR18		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR19		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR20		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR21		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR22		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR23		0.00	Relative	1.50	4.50	--	--	--	--	Yes
OPOR24		0.00	Relative	1.50	--	--	--	--	--	No
OPOR25		0.00	Relative	1.50	--	--	--	--	--	No
OPOR26		0.00	Relative	1.50	--	--	--	--	--	No
OPOR17		0.00	Relative	1.50	--	--	--	--	--	No
OPOR18		0.00	Relative	1.50	--	--	--	--	--	No
OPOR19		0.00	Relative	1.50	--	--	--	--	--	No
OPOR20		0.00	Relative	1.50	--	--	--	--	--	No
OPOR21		0.00	Relative	1.50	--	--	--	--	--	No
OPOR22		0.00	Relative	1.50	--	--	--	--	--	No
OPOR23		0.00	Relative	1.50	--	--	--	--	--	No
POR06		0.00	Relative	1.50	4.50	--	--	--	--	Yes
POR07		0.00	Relative	1.50	7.50	18.00	24.00	30.00	--	Yes
POR08		0.00	Relative	1.50	7.50	22.00	--	--	--	Yes
POR09		0.00	Relative	1.50	7.50	22.00	--	--	--	Yes
POR10		0.00	Relative	1.50	7.50	22.00	--	--	--	Yes
POR11		0.00	Relative	--	9.00	20.00	45.00	--	--	Yes
POR12		0.00	Relative	--	--	--	24.00	36.00	46.50	Yes
POR13		0.00	Relative	--	--	--	--	36.00	46.50	Yes
OPOR01		0.00	Relative	16.50	--	--	--	--	--	No
OPOR02		0.00	Relative	13.50	--	--	--	--	--	No
OPOR04		0.00	Relative	7.50	--	--	--	--	--	No

R.J. Burnside

Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
 Normal Operations - Site
 Group: (main group)
 Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Function	Bld.type	Floating	Refl. 31	Refl. 63	Refl. 125	Refl. 250
		4.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		5.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		3.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		5.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		4.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		3.00	0.00	Relative			No	0.80	0.80	0.80	0.80
7		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
8		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
7		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
8		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
9		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
10		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
11		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
12		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
13		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
14		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
15		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		0.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	18.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	30.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	48.00	0.00	Relative			No	0.80	0.80	0.80	0.80

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Refl. 500	Refl. 1k	Refl. 2k	Refl. 4k	Refl. 8k
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
7	0.80	0.80	0.80	0.80	0.80
8	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
7	0.80	0.80	0.80	0.80	0.80
8	0.80	0.80	0.80	0.80	0.80
9	0.80	0.80	0.80	0.80	0.80
10	0.80	0.80	0.80	0.80	0.80
11	0.80	0.80	0.80	0.80	0.80
12	0.80	0.80	0.80	0.80	0.80
13	0.80	0.80	0.80	0.80	0.80
14	0.80	0.80	0.80	0.80	0.80
15	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Function	Bld.type	Floating	Refl. 31	Refl. 63	Refl. 125	Refl. 250
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	24.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	48.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	15.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	18.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		27.00	0.00	Relative			No	0.80	0.80	0.80	0.80

R.J. Burnside
Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - Internal Stationary - Sept 2024 update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Refl. 500	Refl. 1k	Refl. 2k	Refl. 4k	Refl. 8k
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80

R.J. Burnside

Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
 Normal Operations - Site
 Group: (main group)
 Listing of: Point sources, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Type	DI	DI_Horz
EX001	5 ton HVAC	1.50	5.00	Relative to Objects	Normal point source	none	0
EX002	10 ton HVAC	1.50	5.00	Relative to Objects	Normal point source	none	0
EX003	10 ton HVAC	1.50	5.00	Relative to Objects	Normal point source	none	0
EX004	Exhaust Fan	1.50	5.00	Relative to Objects	Normal point source	none	0
EX005	Exhaust Fan	1.50	5.00	Relative to Objects	Normal point source	none	0
EX006	Exhaust Fan	1.50	5.00	Relative to Objects	Normal point source	none	0
EX007	10 ton HVAC	1.50	5.00	Relative to Objects	Normal point source	none	0
EX008	Exhaust Fan	1.50	5.00	Relative to Objects	Normal point source	none	0
EX009	5 Ton HVAC	1.50	5.00	Relative to Objects	Normal point source	none	0
EX010	Exhaust Fan	1.50	5.00	Relative to Objects	Normal point source	none	0
EX011	5 ton HVAC	1.50	5.00	Relative to Objects	Normal point source	none	0
EX012	Exhaust Fan	1.50	4.00	Relative to Objects	Normal point source	none	0
EX013	Drive Thru Speaker	1.50	0.00	Relative to Objects	Normal point source	none	0
EX014	Drive Thru Car Idle 1	1.00	0.00	Absolute	Normal point source	none	0
EX015	Drive Thru Car Idle 2	1.00	0.00	Absolute	Normal point source	none	0
EX016	Drive Thru Car Idle 3	1.00	0.00	Absolute	Normal point source	none	0
EX017	Drive Thru Car Idle 4	1.00	0.00	Absolute	Normal point source	none	0
EX018	Refridgerated Delivery Truck Idle	2.40	0.00	Absolute	Normal point source	none	0
EX019	Drive Thru Car Idle 6	1.00	0.00	Absolute	Normal point source	none	0
EX020	Drive Thru Car Idle 5	1.00	0.00	Absolute	Normal point source	none	0
EX021	5 ton HVAC unit	1.50	3.00	Relative to Objects	Normal point source	none	0
EX022	Exhaust Fan	1.50	6.00	Relative to Objects	Normal point source	none	0
EX023	5 ton HVAC unit	1.50	6.00	Relative to Objects	Normal point source	none	0
EX024	5 ton HVAC unit	1.50	6.00	Relative to Objects	Normal point source	none	0
EX025	5 ton HVAC unit	1.50	6.00	Relative to Objects	Normal point source	none	0
EX026	5 ton HVAC unit	1.50	6.00	Relative to Objects	Normal point source	none	0
EX027	20 ton HVAC unit	1.50	5.00	Relative to Objects	Normal point source	none	0
EX028	20 ton HVAC unit	1.50	5.00	Relative to Objects	Normal point source	none	0
EX029	Exhaust Fan	1.50	5.00	Relative to Objects	Normal point source	none	0
EX030	10 Ton HVAC	1.50	5.00	Relative to Objects	Normal point source	none	0
EX031	Exhaust Fan	1.50	5.00	Relative to Objects	Normal point source	none	0
EX032	Exhaust Fan	1.50	5.00	Relative to Objects	Normal point source	none	0
EX034	Pnuematic Gun	1.50	0.00	Relative	Normal point source	none	0
EX033	Pnuematic Gun	1.50	0.00	Relative	Normal point source	none	0
EX035	5 Ton HVAC	1.50	6.00	Relative to Objects	Normal point source	none	0
EX036	10 Ton HVAC	1.50	6.00	Relative to Objects	Normal point source	none	0
EX037	10 Ton HVAC	1.50	6.00	Relative to Objects	Normal point source	none	0
EX038	Exhaust Fan	1.50	6.00	Relative to Objects	Normal point source	none	0

R.J. Burnside

Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
 Normal Operations - Site
 Group: (main group)
 Listing of: Point sources, for method Industrial noise - ISO 9613

Name	DI_Vert	DI (0)	DI (10)	DI (20)	DI (30)	DI (40)	DI (50)	DI (60)	DI (70)	DI (80)	DI (90)	DI (100)	DI (110)	DI (120)
EX001	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX002	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX003	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX004	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX005	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX006	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX007	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX008	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX009	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX010	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX011	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX012	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX013	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX014	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX015	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX016	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX017	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX018	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX019	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX020	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX021	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX022	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX023	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX024	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX025	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX026	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX027	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX028	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX029	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX030	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX031	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX032	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX034	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX033	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX035	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX036	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX037	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EX038	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
Normal Operations - Site
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613

Name	DI (130)	DI (140)	DI (150)	DI (160)	DI (170)	DI (180)	Ca (D)	Ca (E)	Ca (N)	Weighting	No refl.	No building
EX001	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1.25	3.01	A	No	No
EX002	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1.25	3.01	A	No	No
EX003	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1.25	3.01	A	No	No
EX004	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX005	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX006	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX007	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1.25	3.01	A	No	No
EX008	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX009	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1.25	3.01	A	No	No
EX010	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX011	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1.25	3.01	A	No	No
EX012	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX013	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX014	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX015	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX016	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX017	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX018	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No
EX019	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX020	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX021	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX022	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX023	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX024	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX025	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX026	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX027	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX028	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX029	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX030	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX031	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX032	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX034	0.0	0.0	0.0	0.0	0.0	0.0	4.81	--	--	A	No	No
EX033	0.0	0.0	0.0	0.0	0.0	0.0	4.81	--	--	A	No	No
EX035	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX036	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX037	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No
EX038	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	A	No	No

R.J. Burnside

Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
 Normal Operations - Site
 Group: (main group)
 Listing of: Point sources, for method Industrial noise - ISO 9613

Name	No ind.site	Lw 31	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 31	Red 63
EX001	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX002	No	--	60.80	69.10	76.00	81.70	82.20	79.60	76.30	71.80	0.00	0.00
EX003	No	--	60.80	69.10	76.00	81.70	82.20	79.60	76.30	71.80	0.00	0.00
EX004	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX005	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX006	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX007	No	--	60.80	69.10	76.00	81.70	82.20	79.60	76.30	71.80	0.00	0.00
EX008	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX009	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX010	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX011	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX012	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX013	No	--	--	--	--	78.75	--	--	--	--	0.00	0.00
EX014	No	47.40	56.40	61.30	65.20	72.20	75.40	77.60	70.70	65.70	0.00	0.00
EX015	No	47.40	56.40	61.30	65.20	72.20	75.40	77.60	70.70	65.70	0.00	0.00
EX016	No	47.40	56.40	61.30	65.20	72.20	75.40	77.60	70.70	65.70	0.00	0.00
EX017	No	47.40	56.40	61.30	65.20	72.20	75.40	77.60	70.70	65.70	0.00	0.00
EX018	No	--	71.50	81.30	86.00	92.00	95.90	91.40	81.60	70.20	0.00	0.00
EX019	No	47.40	56.40	61.30	65.20	72.20	75.40	77.60	70.70	65.70	0.00	0.00
EX020	No	47.40	56.40	61.30	65.20	72.20	75.40	77.60	70.70	65.70	0.00	0.00
EX021	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX022	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX023	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX024	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX025	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX026	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX027	No	--	69.40	71.40	75.60	81.00	81.70	79.10	74.20	65.20	0.00	0.00
EX028	No	--	69.40	71.40	75.60	81.00	81.70	79.10	74.20	65.20	0.00	0.00
EX029	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX030	No	--	60.80	69.10	76.00	81.70	82.20	79.60	76.30	71.80	0.00	0.00
EX031	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX032	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00
EX034	No	--	--	--	--	101.70	--	--	--	--	0.00	0.00
EX033	No	--	--	--	--	101.70	--	--	--	--	0.00	0.00
EX035	No	--	59.40	68.60	71.90	72.80	72.40	69.20	63.80	58.20	0.00	0.00
EX036	No	--	60.80	69.10	76.00	81.70	82.20	79.60	76.30	71.80	0.00	0.00
EX037	No	--	60.80	69.10	76.00	81.70	82.20	79.60	76.30	71.80	0.00	0.00
EX038	No	--	--	--	--	88.70	--	--	--	--	0.00	0.00

R.J. Burnside

Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
 Normal Operations - Site
 Group: (main group)
 Listing of: Point sources, for method Industrial noise - ISO 9613

Name	Red 125	Red 250	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
EX001	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX002	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX003	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX004	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX005	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX006	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX007	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX008	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX009	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX010	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX011	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX012	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX013	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX014	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX015	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX016	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX017	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX018	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX019	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX020	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX021	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX022	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX023	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX024	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX025	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX026	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX027	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX028	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX029	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX030	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX031	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX032	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX034	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX033	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX035	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX036	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX037	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EX038	0.00	0.00	0.00	0.00	0.00	0.00	0.00

R.J. Burnside

Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
 Normal Operations - Site
 Group: (main group)
 Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Function	Bld.type	Floating	Refl. 31	Refl. 63	Refl. 125	Refl. 250
		4.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		5.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		3.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		5.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		4.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		3.00	0.00	Relative			No	0.80	0.80	0.80	0.80
7		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
8		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
2		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
7		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
8		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
9		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
10		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
11		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
12		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
13		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
14		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
15		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
16		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
17		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
1		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
3		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
4		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
5		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
6		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		0.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	18.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	30.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	48.00	0.00	Relative			No	0.80	0.80	0.80	0.80

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Refl. 500	Refl. 1k	Refl. 2k	Refl. 4k	Refl. 8k
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
7	0.80	0.80	0.80	0.80	0.80
8	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
2	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
7	0.80	0.80	0.80	0.80	0.80
8	0.80	0.80	0.80	0.80	0.80
9	0.80	0.80	0.80	0.80	0.80
10	0.80	0.80	0.80	0.80	0.80
11	0.80	0.80	0.80	0.80	0.80
12	0.80	0.80	0.80	0.80	0.80
13	0.80	0.80	0.80	0.80	0.80
14	0.80	0.80	0.80	0.80	0.80
15	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
16	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
17	0.80	0.80	0.80	0.80	0.80
1	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
3	0.80	0.80	0.80	0.80	0.80
4	0.80	0.80	0.80	0.80	0.80
5	0.80	0.80	0.80	0.80	0.80
6	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	HDef.	Function	Bld.type	Floating	Refl. 31	Refl. 63	Refl. 125	Refl. 250
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	12.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	24.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	27.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	6.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	48.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	15.00	0.00	Relative			No	0.80	0.80	0.80	0.80
0	0	18.00	0.00	Relative			No	0.80	0.80	0.80	0.80
		27.00	0.00	Relative			No	0.80	0.80	0.80	0.80

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
Normal Operations - Site
Group: (main group)
Listing of: Buildings, for method Industrial noise - ISO 9613

Name	Refl. 500	Refl. 1k	Refl. 2k	Refl. 4k	Refl. 8k
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80
0	0.80	0.80	0.80	0.80	0.80

R.J. Burnside
Unmitigated External Stationary Noise

Model: Unmitigated Model - External Stationary - Sept 2024 Update
Normal Operations - Site
Group: (main group)
Listing of: Receivers, for method Industrial noise - ISO 9613

Name	Desc.	Terrain L	HDef.	Height A	Height B	Height C	Height D	Height E	Height F	Façade
POR01		0.00	Relative	3.00	6.00	12.00	24.00	36.00	48.00	Yes
POR02		0.00	Relative	1.50	7.50	20.00	45.00	--	--	Yes
POR03		0.00	Relative	1.50	7.50	20.00	45.00	--	--	Yes
POR04		0.00	Relative	1.50	7.50	18.00	24.00	30.00	--	Yes
POR05		0.00	Relative	1.50	7.50	18.00	24.00	30.00	--	Yes

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development

Model: Unmitigated Model - External Stationary - Sept 2024 Update
Normal Operations - Site
Group: (main group)
Listing of: Grids, for method Industrial noise - ISO 9613

Name	Desc.	Height	Terrain L	DeltaX	DeltaY
		4.50	0.00	10	10



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix E

Sample External Stationary Noise Modeling Printouts

R.J. Burnside Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Report: Table of Results
Model: Mitigated Model - Internal Stationary - Sept 2024 update
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
OPOR01_A		--	642687.63	4763442.75	16.50	40.0	27.5	27.5	40.0
OPOR02_A		--	642675.13	4763350.55	13.50	42.3	26.7	26.7	42.3
OPOR04_A		--	642683.90	4763288.68	7.50	30.6	18.8	18.8	30.6
OPOR17_A		--	642786.53	4763509.61	1.50	35.0	21.2	21.2	35.0
OPOR18_A		--	642788.71	4763457.14	1.50	35.4	21.6	21.6	35.4
OPOR19_A		--	642789.74	4763398.69	1.50	33.1	21.8	21.8	33.1
OPOR20_A		--	642790.76	4763344.84	1.50	34.0	18.6	18.6	34.0
OPOR21_A		--	642792.30	4763293.56	1.50	30.3	16.7	16.7	30.3
OPOR22_A		--	642750.25	4763267.41	1.50	39.7	25.7	25.7	39.7
OPOR23_A		--	642665.86	4763268.80	1.50	35.8	34.6	34.6	35.8
OPOR24_A		--	642608.92	4763445.27	1.50	32.5	29.7	29.7	32.5
OPOR25_A		--	642609.31	4763494.20	1.50	30.5	26.8	26.8	30.5
OPOR26_A		--	642682.89	4763523.48	1.50	31.5	15.4	15.4	31.5
POR01_A		--	642647.07	4763437.68	3.00	39.4	37.5	37.5	39.4
POR01_B		--	642647.07	4763437.68	6.00	40.2	36.9	36.9	40.2
POR01_C		--	642647.07	4763437.68	12.00	39.1	35.3	35.3	39.1
POR01_D		--	642647.07	4763437.68	24.00	40.1	33.5	33.5	40.1
POR01_E		--	642647.07	4763437.68	36.00	42.4	33.0	33.0	42.4
POR01_F		--	642647.07	4763437.68	46.50	44.0	35.9	35.9	44.0
POR02_A		--	642645.13	4763393.59	1.50	42.1	41.5	41.5	42.1
POR02_B		--	642645.13	4763393.59	7.50	39.7	38.7	38.7	39.7
POR02_C		--	642645.13	4763393.59	20.00	38.6	34.2	34.2	38.6
POR02_D		--	642645.13	4763393.59	45.00	47.6	34.6	34.6	47.6
POR03_A		--	642643.44	4763345.47	1.50	29.3	22.0	22.0	29.3
POR03_B		--	642643.44	4763345.47	7.50	30.9	22.1	22.1	30.9
POR03_C		--	642643.44	4763345.47	20.00	41.5	28.9	28.9	41.5
POR03_D		--	642643.44	4763345.47	45.00	49.4	32.9	32.9	49.4
POR04_A		--	642643.31	4763308.10	1.50	25.9	23.2	23.2	25.9
POR04_B		--	642643.31	4763308.10	7.50	25.8	22.5	22.5	25.8
POR04_C		--	642643.31	4763308.10	18.00	28.3	22.9	22.9	28.3
POR04_D		--	642643.31	4763308.10	24.00	29.2	23.4	23.4	29.2
POR04_E		--	642643.31	4763308.10	30.00	44.4	34.9	34.9	44.4
POR05_A		--	642643.64	4763280.64	1.50	47.5	47.5	47.5	47.5
POR05_B		--	642643.64	4763280.64	7.50	41.0	41.0	41.0	41.0
POR05_C		--	642643.64	4763280.64	18.00	36.7	34.4	34.4	36.7
POR06_A		--	642683.73	4763281.67	1.50	29.5	28.0	28.0	29.5
POR06_B		--	642683.73	4763281.67	4.50	30.0	27.9	27.9	30.0
POR07_A		--	642716.74	4763309.02	1.50	--	--	--	--
POR07_B		--	642716.74	4763309.02	7.50	28.0	12.8	12.8	28.0
POR07_C		--	642716.74	4763309.02	18.00	33.0	22.3	22.3	33.0
POR07_D		--	642716.74	4763309.02	24.00	33.4	22.5	22.5	33.4
POR07_E		--	642716.74	4763309.02	30.00	49.6	31.8	31.8	49.6
POR08_A		--	642706.02	4763337.05	1.50	33.6	19.2	19.2	33.6
POR08_B		--	642706.02	4763337.05	7.50	36.5	22.0	22.0	36.5
POR08_C		--	642706.02	4763337.05	22.00	45.5	30.9	30.9	45.5
POR09_A		--	642729.36	4763350.21	1.50	28.3	16.9	16.9	28.3
POR09_B		--	642729.36	4763350.21	7.50	27.6	16.3	16.3	27.6
POR09_C		--	642729.36	4763350.21	22.00	32.5	21.7	21.7	32.5
POR10_A		--	642708.65	4763370.68	1.50	--	--	--	--
POR10_B		--	642708.65	4763370.68	7.50	--	--	--	--
POR10_C		--	642708.65	4763370.68	22.00	48.3	35.6	35.6	48.3
POR11_B		--	642673.53	4763377.62	9.00	--	--	--	--
POR11_C		--	642673.53	4763377.62	20.00	46.7	29.4	29.4	46.7
POR11_D		--	642673.53	4763377.62	45.00	46.5	29.5	29.5	46.5

All shown dB values are A-weighted

R.J. Burnside Mitigated Internal Stationary Noise

Aqueduct and Niagara Development

Report: Table of Results
Model: Mitigated Model - Internal Stationary - Sept 2024 update
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
POR12_D		--	642679.91	4763448.49	24.00	39.6	25.8	25.8	39.6
POR12_E		--	642679.91	4763448.49	36.00	40.7	24.6	24.6	40.7
POR12_F		--	642679.91	4763448.49	46.50	46.2	25.9	25.9	46.2
POR13_E		--	642646.79	4763462.53	36.00	34.7	26.4	26.4	34.7
POR13_F		--	642646.79	4763462.53	46.50	42.4	34.9	34.9	42.4
POR14_A		--	642757.84	4763388.56	1.50	35.2	22.1	22.1	35.2
POR14_B		--	642757.84	4763388.56	10.50	36.8	21.5	21.5	36.8
POR15_A		--	642758.77	4763341.72	1.50	28.4	15.4	15.4	28.4
POR15_B		--	642758.77	4763341.72	10.50	35.2	20.8	20.8	35.2
POR16_A		--	642759.46	4763318.88	1.50	28.8	17.4	17.4	28.8
POR16_B		--	642759.46	4763318.88	10.50	35.3	22.6	22.6	35.3
POR17_A		--	642802.12	4763509.16	1.50	36.0	21.8	21.8	36.0
POR17_B		--	642802.12	4763509.16	4.50	35.8	21.0	21.0	35.8
POR18_A		--	642807.34	4763457.24	1.50	35.0	20.5	20.5	35.0
POR18_B		--	642807.34	4763457.24	4.50	36.3	19.9	19.9	36.3
POR19_A		--	642809.30	4763398.78	1.50	34.6	20.2	20.2	34.6
POR19_B		--	642809.30	4763398.78	4.50	36.0	20.0	20.0	36.0
POR20_A		--	642808.32	4763345.23	1.50	34.0	18.8	18.8	34.0
POR20_B		--	642808.32	4763345.23	4.50	34.6	19.4	19.4	34.6
POR21_A		--	642807.34	4763294.61	1.50	34.0	19.7	19.7	34.0
POR21_B		--	642807.34	4763294.61	4.50	34.6	21.4	21.4	34.6
POR22_A		--	642750.48	4763251.81	1.50	35.4	26.2	26.2	35.4
POR22_B		--	642750.48	4763251.81	4.50	37.8	26.1	26.1	37.8
POR23_A		--	642685.30	4763267.49	1.50	34.1	29.8	29.8	34.1
POR23_B		--	642685.30	4763267.49	4.50	34.9	30.0	30.0	34.9
POR24_A		--	642593.98	4763445.44	1.50	31.2	27.4	27.4	31.2
POR24_B		--	642593.98	4763445.44	4.50	30.8	27.3	27.3	30.8
POR25_A		--	642593.73	4763496.18	1.50	30.1	26.6	26.6	30.1
POR25_B		--	642593.73	4763496.18	4.50	30.2	26.3	26.3	30.2
POR26_A		--	642683.25	4763531.69	1.50	32.0	15.9	15.9	32.0
POR26_B		--	642683.25	4763531.69	4.50	32.2	16.0	16.0	32.2

All shown dB values are A-weighted

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development - Group 1

Report: Table of Results
Model: Unmitigated Model - External Stationary - Sept 2024 Update
LAeq: total results for receivers
Group: 1. Midas
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
POR01_A		--	642647.07	4763437.68	3.00	56.1	--	--	60.9
POR01_B		--	642647.07	4763437.68	6.00	56.0	--	--	60.9
POR01_C		--	642647.07	4763437.68	12.00	56.0	--	--	60.8
POR01_D		--	642647.07	4763437.68	24.00	55.7	--	--	60.5
POR01_E		--	642647.07	4763437.68	36.00	55.3	--	--	60.1
POR01_F		--	642647.07	4763437.68	48.00	54.8	--	--	59.6
POR02_A		--	642645.13	4763393.59	1.50	55.1	--	--	59.9
POR02_B		--	642645.13	4763393.59	7.50	55.1	--	--	59.9
POR02_C		--	642645.13	4763393.59	20.00	54.8	--	--	59.6
POR02_D		--	642645.13	4763393.59	45.00	53.6	--	--	58.4
POR03_A		--	642643.44	4763345.47	1.50	38.7	--	--	43.5
POR03_B		--	642643.44	4763345.47	7.50	40.3	--	--	45.1
POR03_C		--	642643.44	4763345.47	20.00	40.9	--	--	45.7
POR03_D		--	642643.44	4763345.47	45.00	43.2	--	--	48.0
POR04_A		--	642643.31	4763308.10	1.50	34.9	--	--	39.7
POR04_B		--	642643.31	4763308.10	7.50	36.2	--	--	41.0
POR04_C		--	642643.31	4763308.10	18.00	36.6	--	--	41.4
POR04_D		--	642643.31	4763308.10	24.00	36.8	--	--	41.6
POR04_E		--	642643.31	4763308.10	30.00	37.1	--	--	41.9
POR05_A		--	642643.64	4763280.64	1.50	33.8	--	--	38.6
POR05_B		--	642643.64	4763280.64	7.50	36.0	--	--	40.8
POR05_C		--	642643.64	4763280.64	18.00	36.4	--	--	41.2
POR05_D		--	642643.64	4763280.64	24.00	34.6	--	--	39.4
POR05_E		--	642643.64	4763280.64	30.00	34.8	--	--	39.6

All shown dB values are A-weighted

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development - Group 2

Report: Table of Results
Model: Unmitigated Model - External Stationary - Sept 2024 Update
LAeq: total results for receivers
Group: 2. Chuck's
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
POR01_A		--	642647.07	4763437.68	3.00	45.5	45.5	45.5	45.5
POR01_B		--	642647.07	4763437.68	6.00	45.5	45.5	45.5	45.5
POR01_C		--	642647.07	4763437.68	12.00	45.5	45.5	45.5	45.5
POR01_D		--	642647.07	4763437.68	24.00	45.4	45.4	45.4	45.4
POR01_E		--	642647.07	4763437.68	36.00	45.2	45.2	45.2	45.2
POR01_F		--	642647.07	4763437.68	48.00	45.0	45.0	45.0	45.0
POR02_A		--	642645.13	4763393.59	1.50	47.9	47.9	47.9	47.9
POR02_B		--	642645.13	4763393.59	7.50	47.8	47.8	47.8	47.8
POR02_C		--	642645.13	4763393.59	20.00	47.7	47.7	47.7	47.7
POR02_D		--	642645.13	4763393.59	45.00	47.1	47.1	47.1	47.1
POR03_A		--	642643.44	4763345.47	1.50	48.9	48.9	48.9	48.9
POR03_B		--	642643.44	4763345.47	7.50	48.8	48.8	48.8	48.8
POR03_C		--	642643.44	4763345.47	20.00	48.7	48.7	48.7	48.7
POR03_D		--	642643.44	4763345.47	45.00	48.0	48.0	48.0	48.0
POR04_A		--	642643.31	4763308.10	1.50	47.9	47.9	47.9	47.9
POR04_B		--	642643.31	4763308.10	7.50	47.7	47.7	47.7	47.7
POR04_C		--	642643.31	4763308.10	18.00	47.7	47.7	47.7	47.7
POR04_D		--	642643.31	4763308.10	24.00	47.6	47.6	47.6	47.6
POR04_E		--	642643.31	4763308.10	30.00	49.5	49.5	49.5	49.5
POR05_A		--	642643.64	4763280.64	1.50	49.4	49.4	49.4	49.4
POR05_B		--	642643.64	4763280.64	7.50	48.8	48.8	48.8	48.8
POR05_C		--	642643.64	4763280.64	18.00	48.8	48.8	48.8	48.8
POR05_D		--	642643.64	4763280.64	24.00	46.2	46.2	46.2	46.2
POR05_E		--	642643.64	4763280.64	30.00	46.1	46.1	46.1	46.1

All shown dB values are A-weighted

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development - Group 3

Report: Table of Results
Model: Unmitigated Model - External Stationary - Sept 2024 Update
LAeq: total results for receivers
Group: 3. Desjardins
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
POR01_A		--	642647.07	4763437.68	3.00	38.9	38.9	38.9	38.9
POR01_B		--	642647.07	4763437.68	6.00	38.7	38.7	38.7	38.7
POR01_C		--	642647.07	4763437.68	12.00	39.0	39.0	39.0	39.0
POR01_D		--	642647.07	4763437.68	24.00	38.9	38.9	38.9	38.9
POR01_E		--	642647.07	4763437.68	36.00	38.7	38.7	38.7	38.7
POR01_F		--	642647.07	4763437.68	48.00	38.5	38.5	38.5	38.5
POR02_A		--	642645.13	4763393.59	1.50	41.8	41.8	41.8	41.8
POR02_B		--	642645.13	4763393.59	7.50	41.3	41.3	41.3	41.3
POR02_C		--	642645.13	4763393.59	20.00	41.3	41.3	41.3	41.3
POR02_D		--	642645.13	4763393.59	45.00	40.7	40.7	40.7	40.7
POR03_A		--	642643.44	4763345.47	1.50	43.4	43.4	43.4	43.4
POR03_B		--	642643.44	4763345.47	7.50	43.4	43.4	43.4	43.4
POR03_C		--	642643.44	4763345.47	20.00	43.3	43.3	43.3	43.3
POR03_D		--	642643.44	4763345.47	45.00	42.4	42.4	42.4	42.4
POR04_A		--	642643.31	4763308.10	1.50	43.5	43.5	43.5	43.5
POR04_B		--	642643.31	4763308.10	7.50	43.5	43.5	43.5	43.5
POR04_C		--	642643.31	4763308.10	18.00	43.4	43.4	43.4	43.4
POR04_D		--	642643.31	4763308.10	24.00	43.3	43.3	43.3	43.3
POR04_E		--	642643.31	4763308.10	30.00	43.7	43.7	43.7	43.7
POR05_A		--	642643.64	4763280.64	1.50	42.9	42.9	42.9	42.9
POR05_B		--	642643.64	4763280.64	7.50	42.6	42.6	42.6	42.6
POR05_C		--	642643.64	4763280.64	18.00	42.5	42.5	42.5	42.5
POR05_D		--	642643.64	4763280.64	24.00	42.4	42.4	42.4	42.4
POR05_E		--	642643.64	4763280.64	30.00	42.1	42.1	42.1	42.1

All shown dB values are A-weighted

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development - Group 4

Report: Table of Results
Model: Unmitigated Model - External Stationary - Sept 2024 Update
LAeq: total results for receivers
Group: 4. McDonalds
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
POR01_A		--	642647.07	4763437.68	3.00	44.7	43.7	43.4	44.7
POR01_B		--	642647.07	4763437.68	6.00	44.7	42.8	42.4	44.7
POR01_C		--	642647.07	4763437.68	12.00	45.5	43.2	42.9	45.5
POR01_D		--	642647.07	4763437.68	24.00	48.1	43.3	43.0	48.1
POR01_E		--	642647.07	4763437.68	36.00	48.0	43.2	43.0	48.0
POR01_F		--	642647.07	4763437.68	48.00	47.9	43.2	42.9	47.9
POR02_A		--	642645.13	4763393.59	1.50	48.7	46.3	46.0	48.7
POR02_B		--	642645.13	4763393.59	7.50	48.1	45.1	44.8	48.1
POR02_C		--	642645.13	4763393.59	20.00	50.8	45.3	45.0	50.8
POR02_D		--	642645.13	4763393.59	45.00	50.8	47.4	47.1	50.8
POR03_A		--	642643.44	4763345.47	1.50	51.1	47.3	47.0	51.1
POR03_B		--	642643.44	4763345.47	7.50	50.9	47.3	46.9	50.9
POR03_C		--	642643.44	4763345.47	20.00	50.8	47.2	46.9	50.8
POR03_D		--	642643.44	4763345.47	45.00	50.2	46.9	46.6	50.2
POR04_A		--	642643.31	4763308.10	1.50	50.7	46.1	45.8	50.7
POR04_B		--	642643.31	4763308.10	7.50	51.7	48.6	48.3	51.7
POR04_C		--	642643.31	4763308.10	18.00	51.7	48.5	48.2	51.7
POR04_D		--	642643.31	4763308.10	24.00	51.6	48.5	48.1	51.6
POR04_E		--	642643.31	4763308.10	30.00	52.4	49.3	49.0	52.4
POR05_A		--	642643.64	4763280.64	1.50	50.5	45.5	45.1	50.5
POR05_B		--	642643.64	4763280.64	7.50	52.1	49.1	48.8	52.1
POR05_C		--	642643.64	4763280.64	18.00	51.9	48.9	48.6	51.9
POR05_D		--	642643.64	4763280.64	24.00	51.9	48.9	48.6	51.9
POR05_E		--	642643.64	4763280.64	30.00	51.8	48.8	48.5	51.8

All shown dB values are A-weighted

R.J. Burnside
Unmitigated External Stationary Noise

Aqueduct and Niagara Development - Group 5

Report: Table of Results
Model: Unmitigated Model - External Stationary - Sept 2024 Update
LAeq: total results for receivers
Group: 5. Meridian
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
POR01_A		--	642647.07	4763437.68	3.00	39.1	39.1	39.1	39.1
POR01_B		--	642647.07	4763437.68	6.00	38.1	38.1	38.1	38.1
POR01_C		--	642647.07	4763437.68	12.00	37.7	37.7	37.7	37.7
POR01_D		--	642647.07	4763437.68	24.00	37.7	37.7	37.7	37.7
POR01_E		--	642647.07	4763437.68	36.00	35.6	35.6	35.6	35.6
POR01_F		--	642647.07	4763437.68	48.00	35.6	35.6	35.6	35.6
POR02_A		--	642645.13	4763393.59	1.50	32.8	32.8	32.8	32.8
POR02_B		--	642645.13	4763393.59	7.50	31.2	31.2	31.2	31.2
POR02_C		--	642645.13	4763393.59	20.00	31.2	31.2	31.2	31.2
POR02_D		--	642645.13	4763393.59	45.00	39.8	39.8	39.8	39.8
POR03_A		--	642643.44	4763345.47	1.50	36.9	36.9	36.9	36.9
POR03_B		--	642643.44	4763345.47	7.50	39.9	39.9	39.9	39.9
POR03_C		--	642643.44	4763345.47	20.00	39.9	39.9	39.9	39.9
POR03_D		--	642643.44	4763345.47	45.00	39.6	39.6	39.6	39.6
POR04_A		--	642643.31	4763308.10	1.50	41.2	41.2	41.2	41.2
POR04_B		--	642643.31	4763308.10	7.50	44.7	44.7	44.7	44.7
POR04_C		--	642643.31	4763308.10	18.00	44.7	44.7	44.7	44.7
POR04_D		--	642643.31	4763308.10	24.00	42.1	42.1	42.1	42.1
POR04_E		--	642643.31	4763308.10	30.00	42.1	42.1	42.1	42.1
POR05_A		--	642643.64	4763280.64	1.50	40.7	40.7	40.7	40.7
POR05_B		--	642643.64	4763280.64	7.50	44.3	44.3	44.3	44.3
POR05_C		--	642643.64	4763280.64	18.00	44.2	44.2	44.2	44.2
POR05_D		--	642643.64	4763280.64	24.00	44.1	44.1	44.1	44.1
POR05_E		--	642643.64	4763280.64	30.00	44.0	44.0	44.0	44.0

All shown dB values are A-weighted

R.J. Burnside Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Report: Table of Results
Model: Unmitigated Model - Internal Stationary - Sept 2024 update
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
OPOR01_A		--	642687.63	4763442.75	16.50	52.2	50.8	50.8	52.2
OPOR02_A		--	642675.13	4763350.55	13.50	50.7	46.9	46.9	50.7
OPOR04_A		--	642683.90	4763288.68	7.50	46.0	45.5	45.5	46.0
OPOR17_A		--	642786.53	4763509.61	1.50	47.0	44.8	44.8	47.0
OPOR18_A		--	642788.71	4763457.14	1.50	49.9	48.7	48.7	49.9
OPOR19_A		--	642789.74	4763398.69	1.50	51.4	50.9	50.9	51.4
OPOR20_A		--	642790.76	4763344.84	1.50	44.3	39.2	39.2	44.3
OPOR21_A		--	642792.30	4763293.56	1.50	41.2	37.5	37.5	41.2
OPOR22_A		--	642750.25	4763267.41	1.50	53.1	51.4	51.4	53.1
OPOR23_A		--	642665.86	4763268.80	1.50	64.5	64.5	64.5	64.5
OPOR24_A		--	642608.92	4763445.27	1.50	59.3	59.2	59.2	59.3
OPOR25_A		--	642609.31	4763494.20	1.50	55.3	55.2	55.2	55.3
OPOR26_A		--	642682.89	4763523.48	1.50	41.6	36.6	36.6	41.6
POR01_A		--	642647.07	4763437.68	3.00	67.3	67.3	67.3	67.3
POR01_B		--	642647.07	4763437.68	6.00	66.7	66.7	66.7	66.7
POR01_C		--	642647.07	4763437.68	12.00	64.9	64.9	64.9	64.9
POR01_D		--	642647.07	4763437.68	24.00	62.2	62.0	62.0	62.2
POR01_E		--	642647.07	4763437.68	36.00	60.6	60.0	60.0	60.6
POR01_F		--	642647.07	4763437.68	46.50	60.0	59.3	59.3	60.0
POR02_A		--	642645.13	4763393.59	1.50	71.5	71.5	71.5	71.5
POR02_B		--	642645.13	4763393.59	7.50	68.6	68.6	68.6	68.6
POR02_C		--	642645.13	4763393.59	20.00	63.7	63.7	63.7	63.7
POR02_D		--	642645.13	4763393.59	45.00	60.7	58.5	58.5	60.7
POR03_A		--	642643.44	4763345.47	1.50	51.0	50.9	50.9	51.0
POR03_B		--	642643.44	4763345.47	7.50	50.3	50.1	50.1	50.3
POR03_C		--	642643.44	4763345.47	20.00	53.2	52.0	52.0	53.2
POR03_D		--	642643.44	4763345.47	45.00	58.0	54.2	54.2	58.0
POR04_A		--	642643.31	4763308.10	1.50	52.9	52.9	52.9	52.9
POR04_B		--	642643.31	4763308.10	7.50	52.1	52.0	52.0	52.1
POR04_C		--	642643.31	4763308.10	18.00	51.7	51.7	51.7	51.7
POR04_D		--	642643.31	4763308.10	24.00	51.5	51.4	51.4	51.5
POR04_E		--	642643.31	4763308.10	30.00	57.1	56.2	56.2	57.1
POR05_A		--	642643.64	4763280.64	1.50	77.5	77.5	77.5	77.5
POR05_B		--	642643.64	4763280.64	7.50	71.0	71.0	71.0	71.0
POR05_C		--	642643.64	4763280.64	18.00	64.2	64.2	64.2	64.2
POR06_A		--	642683.73	4763281.67	1.50	57.9	57.9	57.9	57.9
POR06_B		--	642683.73	4763281.67	4.50	57.8	57.8	57.8	57.8
POR07_A		--	642716.74	4763309.02	1.50	--	--	--	--
POR07_B		--	642716.74	4763309.02	7.50	38.5	36.3	36.3	38.5
POR07_C		--	642716.74	4763309.02	18.00	44.6	42.6	42.6	44.6
POR07_D		--	642716.74	4763309.02	24.00	44.8	42.7	42.7	44.8
POR07_E		--	642716.74	4763309.02	30.00	57.4	51.9	51.9	57.4
POR08_A		--	642706.02	4763337.05	1.50	43.1	40.1	40.1	43.1
POR08_B		--	642706.02	4763337.05	7.50	45.8	42.4	42.4	45.8
POR08_C		--	642706.02	4763337.05	22.00	54.6	51.0	51.0	54.6
POR09_A		--	642729.36	4763350.21	1.50	39.7	38.1	38.1	39.7
POR09_B		--	642729.36	4763350.21	7.50	38.9	37.2	37.2	38.9
POR09_C		--	642729.36	4763350.21	22.00	43.6	42.0	42.0	43.6
POR10_A		--	642708.65	4763370.68	1.50	--	--	--	--
POR10_B		--	642708.65	4763370.68	7.50	--	--	--	--
POR10_C		--	642708.65	4763370.68	22.00	58.8	56.7	56.7	58.8
POR11_B		--	642673.53	4763377.62	9.00	--	--	--	--
POR11_C		--	642673.53	4763377.62	20.00	54.5	49.7	49.7	54.5
POR11_D		--	642673.53	4763377.62	45.00	55.0	49.6	49.6	55.0

All shown dB values are A-weighted

R.J. Burnside Unmitigated Internal Stationary Noise

Aqueduct and Niagara Development

Report: Table of Results
Model: Unmitigated Model - Internal Stationary - Sept 2024 update
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	Group	X	Y	Height	Day	Evening	Night	Li
POR12_D		--	642679.91	4763448.49	24.00	49.5	46.2	46.2	49.5
POR12_E		--	642679.91	4763448.49	36.00	50.2	45.2	45.2	50.2
POR12_F		--	642679.91	4763448.49	46.50	56.2	46.3	46.3	56.2
POR13_E		--	642646.79	4763462.53	36.00	54.2	53.7	53.7	54.2
POR13_F		--	642646.79	4763462.53	46.50	58.7	57.8	57.8	58.7
POR14_A		--	642757.84	4763388.56	1.50	52.0	51.4	51.4	52.0
POR14_B		--	642757.84	4763388.56	10.50	50.8	49.7	49.7	50.8
POR15_A		--	642758.77	4763341.72	1.50	39.2	36.6	36.6	39.2
POR15_B		--	642758.77	4763341.72	10.50	45.6	41.0	41.0	45.6
POR16_A		--	642759.46	4763318.88	1.50	40.4	38.6	38.6	40.4
POR16_B		--	642759.46	4763318.88	10.50	46.1	42.8	42.8	46.1
POR17_A		--	642802.12	4763509.16	1.50	48.6	46.8	46.8	48.6
POR17_B		--	642802.12	4763509.16	4.50	47.9	45.7	45.7	47.9
POR18_A		--	642807.34	4763457.24	1.50	48.1	46.2	46.2	48.1
POR18_B		--	642807.34	4763457.24	4.50	47.7	44.9	44.9	47.7
POR19_A		--	642809.30	4763398.78	1.50	49.5	48.3	48.3	49.5
POR19_B		--	642809.30	4763398.78	4.50	48.8	46.9	46.9	48.8
POR20_A		--	642808.32	4763345.23	1.50	44.4	39.2	39.2	44.4
POR20_B		--	642808.32	4763345.23	4.50	44.8	39.8	39.8	44.8
POR21_A		--	642807.34	4763294.61	1.50	44.7	40.0	40.0	44.7
POR21_B		--	642807.34	4763294.61	4.50	45.2	41.6	41.6	45.2
POR22_A		--	642750.48	4763251.81	1.50	53.7	53.3	53.3	53.7
POR22_B		--	642750.48	4763251.81	4.50	52.9	51.9	51.9	52.9
POR23_A		--	642685.30	4763267.49	1.50	59.5	59.5	59.5	59.5
POR23_B		--	642685.30	4763267.49	4.50	59.5	59.4	59.4	59.5
POR24_A		--	642593.98	4763445.44	1.50	56.3	56.3	56.3	56.3
POR24_B		--	642593.98	4763445.44	4.50	55.8	55.7	55.7	55.8
POR25_A		--	642593.73	4763496.18	1.50	53.4	53.3	53.3	53.4
POR25_B		--	642593.73	4763496.18	4.50	52.2	52.1	52.1	52.2
POR26_A		--	642683.25	4763531.69	1.50	42.0	36.9	36.9	42.0
POR26_B		--	642683.25	4763531.69	4.50	42.3	36.8	36.8	42.3

All shown dB values are A-weighted



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix F

Noise Data References



Turn to the experts

Product Data

WeatherMaster® Single Packaged Rooftop

3 to 5 Nominal Tons

ecoblue™  technology



48/50GC**04, 05, 06

48GC: Single-Package Gas Heating/Electric Cooling Rooftop Units

50GC: Electric Cooling Rooftop Units with Optional Electric Heat
with Puron® Refrigerant (R-410A)

SOUND RATINGS TABLE

48/50GC UNIT	COOLING STAGES	OUTDOOR SOUND (dB) AT 60 Hz								
		A-WEIGHTED	63	125	250	500	1000	2000	4000	8000
M04	2	79	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3
M05	2	79	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3
M06	2	79	85.6	84.7	80.5	76.0	72.4	68.0	62.8	59.3

LEGEND

dB — Decibel

Sound Power is reported in dB but converted to dBA before
use in noise model.

NOTES:

1. Outdoor sound data is measured in accordance with AHRI.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of “average” human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI.



Product Data

WeatherMaker®

Electric Cooling Packaged Rooftop Units

18.17 to 42.5 kW (5 to 12.5 Nominal Tons)

Used for 10T HVAC units



50TC Sizes 07-16
Packaged Rooftop Electric Cooling Units
50 Hz

AHRI COOLING RATING TABLE

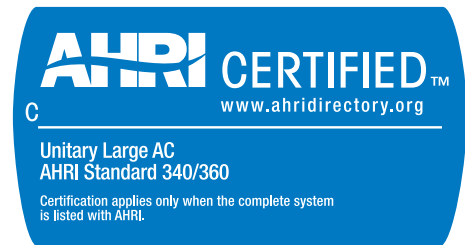
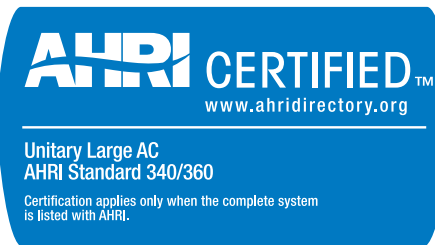
50TC-	COOLING STAGES	NET CAPACITY		EER	IPLV	NOMINAL AIRFLOW	
		kW	Btuh			L/s	CFM
A07	1	18.17	62,000	11.75	N/A	708	1500
D08	2	21.48	73,300	12.30	13.4	849	1800
D09	2	23.94	81,700	12.00	13.3	1062	2250
D12	2	30.01	102,400	12.10	13.8	1416	3000
D14	2	33.98	116,000	11.12	11.7	1416	3000
D16	2	42.49	145,000	11.00	11.5	2360	5000

LEGEND

AHRI — Air Conditioning, Heating, and Refrigeration Institute
ASHRAE — American Society of Heating, Refrigerating, and Air Conditioning Engineers
EER — Energy Efficiency Ratio
IPLV — Integrated Part Load Value

NOTES:

1. Tested in accordance with AHRI Standard 340/360, as appropriate.
2. Ratings are based on:
Cooling Standard: 27°C (80°F) db, 19°C (67°F) wb indoor air temp and 35°C (95°F) db outdoor air temp.
IPLV Standard: 27°C (80°F) db, 19°C (67°F) wb indoor air temp and 27°C (80°F) db outdoor air temp.
3. All 50TC units comply with ASHRAE 90.1 Energy Standard for minimum SEER and EER requirements.



MINIMUM-MAXIMUM AIRFLOW RATINGS L/s (CFM)

50TC-	COOLING		ELECTRIC HEATER	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
A07	708 (1500)	1180 (2500)	708 (1500)	1180 (2500)
D08	850 (1800)	1416 (3000)	850 (1800)	1416 (3000)
D09	991 (2100)	1652 (3500)	991 (2100)	1652 (3500)
D12	1062 (2250)	1770 (3750)	1062 (2250)	1770 (3750)
D14	1416 (3000)	2326 (5000)	1416 (3000)	2326 (5000)
D16	2124 (4500)	3540 (7500)	2124 (4500)	3540 (7500)

→ SOUND PERFORMANCE TABLE

50TC-	COOLING STAGES	OUTDOOR SOUND (dB)								
		A-Weighted	63	125	250	500	1000	2000	4000	8000
A07	1	78	88.8	81.8	76.9	74.4	73.3	69.8	66.3	62.7
D08	2	82	85.8	84.3	80.5	78.7	76.4	72.7	68.3	65.1
D09	2	82	88.6	85.0	81.6	79.5	77.4	74.1	71.0	66.3
D12	2	82	89.0	83.1	80.5	78.5	75.5	71.6	69.6	69.3
D14	2	87	87.0	85.2	84.6	84.9	82.2	78.4	75.3	72.9
D16	2	87	87.0	85.2	84.6	84.9	82.2	78.4	75.3	72.9

LEGEND

dB — Decibel

NOTES:

1. Outdoor sound data is measured in accordance with AHRI.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.
3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of "average" human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI.

Sound Power is reported in dB but converted to dBA before use in noise model.



Turn to the experts

Product Data

WeatherMaker® Single Package Rooftop Heat Pump Units 15 and 20 Nominal Tons



Unit shown with
economizer and
power exhaust.

50TCQ 17 and 24 with Puron® (R-410A) Refrigerant

AHRI COOLING RATINGS — 2-STAGE COOLING

COOLING MODE							
50TCQ	COOLING STAGES	NOM. CAPACITY (TONS)	NET COOLING CAPACITY (Btuh)	TOTAL POWER (kW)	EER	IEER WITH SINGLE SPEED INDOOR MOTOR	IEER WITH 2-SPEED INDOOR MOTOR
D17	2	15	172,000	15.9	10.8	11.5	12.0
D24	2	20	232,000	21.9	10.6	11.1	12.0

HEATING MODE				
50TCQ	HEATING, LOW (Btuh)		HEATING, HIGH (Btuh)	
	CAPACITY (Btuh)	COP	CAPACITY (Btuh)	COP
D17	103,000	2.4	166,000	3.3
D24	136,000	2.3	220,000	3.3

LEGEND

AHRI — Air-Conditioning, Heating and Refrigeration Institute
ASHRAE — American Society of Heating, Refrigerating and Air-Conditioning Engineers
COP — Coefficient of Performance
EER — Energy Efficiency Ratio
IECC — International Energy Conservation Code
IEER — Integrated Energy Efficiency

NOTES:

1. Rated and certified under AHRI Standard 340/360, as appropriate.
2. Ratings are based on:
Cooling Standard: 80°F (27°C) db, 67°F (19°C) wb indoor air temp and 95°F db outdoor air temp.
IEER Standard: A measure that expresses cooling part load EER efficiency for commercial unitary air conditioning and heat pump equipment on the basis of weighted operation at various load capacities.
3. All 50TCQ units meet the DOE-2018 (Department of Energy), ASHRAE 90.1-2016 and IECC-2015 minimum efficiency requirements when equipped with the SAV™ (staged air volume) option.

SOUND PERFORMANCE

50TCQ MODEL SIZE	COOLING STAGES	OUTDOOR SOUND (dB) AT 60 Hz									
		A-Wgt	AHRI 370 Rating	63	125	250	500	1000	2000	4000	8000
17	2	84.1	84	92.2	83.9	80.4	81.8	78.7	76.5	72.2	65.4
24	2	86.5	87	95.6	87.5	84.2	84.2	81.7	77.9	73.2	66.3

LEGEND

dB — Decibel

NOTES:

1. Outdoor sound data is measured in accordance with AHRI standard 370.
2. Measurements are expressed in terms of sound power. Do not compare these values to sound pressure values because sound

pressure depends on specific environmental factors which normally do not match individual applications. Sound power values are independent of the environment and therefore more accurate.

3. A-weighted sound ratings filter out very high and very low frequencies, to better approximate the response of the "average" human ear. A-weighted measurements for Carrier units are taken in accordance with AHRI standard 370.

Sound Power is reported in dB but converted to dBA before use in noise model.

Drive-Thru Sound Levels

Some municipalities have adopted regulations aimed at controlling the acoustic noise levels in residential and (or) commercial areas. These regulations are of particular importance to drive-thru operators because the drive-thru is viewed as a source of noise. The noise originates both from the vehicles themselves and from the drive-thru communications system. This white paper addresses common questions related to sound from the communications system.

Note: Because every site is different and each municipality has its own regulations, HME is unable to make specific recommendations for compliance or give any assurance that any particular system configuration will comply with any given regulations. Statements made in this paper should be taken as general guidelines, but to ensure compliance, the site planner should retain the services of a qualified acoustic consultant equipped to make the necessary measurements.

In the drive-thru, the primary source of sound other than the vehicles is often the drive-thru communications system. Outbound audio includes the order taker's voice and any sound provided by the message repeater. The outbound audio is delivered by the speaker and must be loud enough to be clearly heard by the customer over the noise of the customer's vehicle, any local traffic and other ambient background noises in the area. However, if it is too loud, the sound can be objectionable to neighbors or even violate specific regulations.

HME base stations are equipped with a feature known as Automatic Volume Control or "AVC" which can be used to reduce the outbound sound pressure level based on ambient noise. When AVC is active, the outbound level is reduced to a level that is 15 dB above the ambient noise level at the speaker post microphone, but it **never** increases the level above what would be heard with AVC turned off. This feature can considerably reduce the SPL during quiet periods and may help in satisfying local requirements.

Sound levels are measured in units of dB SPL and usually include a frequency variable weight referred to as "A Weighting". For this reason, the units are frequently written as "dBA SPL" and that notation will be used throughout this paper. The sound pressure level from a speaker decreases as the distance away increases. However, it can be difficult to predict how much reduction will actually occur. For a single point sound source like an alarm bell hanging in air, the SPL drops approximately 6 dB every time the distance from the source doubles. Thus if one starts one foot away, the level will be 36 dB lower when one is 64 feet away. Unfortunately, speakers are neither single point sources nor are they hanging in air. Rather, speakers are mounted in a variety of different type enclosures. Further, the building, the ground and even other cars in proximity all effect the sound's direction and decay rate. All of this tends to make the sound more directional and the decay rate less predictable.

This paper provides some "typical" measurements taken outdoors under specific circumstances. These measurements can be used as a guide for what levels might occur in a drive-through installation. These measurements were taken using "pink noise", a type of noise frequently used for acoustic testing, at levels simulating the loudest speech expected from an order taker.

All typical measurements provided here were taken using the following equipment:

- Base station: HME ION IQ set to factory default levels
- Communicator: HME COM6000
- Speaker: HME SP10
- Speaker post: Texas Digital model 107150

Memo

Re: Drive-Thru Sound Pressure Levels From the Menu Board or Speaker Post

The sound pressure levels from the menu board or speaker post are as follows:

1. Sound pressure level (SPL) contours (A weighted) were measured on a typical HME SPP2 speaker post. The test condition was for pink noise set to 84 dBA at 1 foot in front of the speaker. All measurements were conducted outside with the speaker post placed 8 feet from a non-absorbing building wall and at an oblique angle to the wall. These measurements should not be construed to guarantee performance with any particular speaker post in any particular environment. They are typical results obtained under the conditions described above.

2. The SPL levels are presented for different distances from the speaker post:

Converted to Sound
Power using $Q = 4$

Distance from the Speaker (Feet)	SPL (dBA)
1 foot	84 dBA
2 feet	78 dBA
4 feet	72 dBA
8 feet	66 dBA
16 feet	60 dBA
32 feet	54 dBA

3. The above levels are based on factory recommended operating levels, which are preset for HME components and represent the optimum level for drive-thru operations in the majority of the installations.

Also, HME incorporates automatic volume control (AVC) into many of our Systems. AVC will adjust the outbound volume based on the outdoor, ambient noise level. When ambient noise levels naturally decrease at night, AVC will reduce the outbound volume on the system. See below for example:

Distance from Outside Speaker	Decibel Level of standard system with 45 dB of outside noise <u>without</u> AVC	Decibel level of standard system with 45 dB of outside noise <u>with</u> AVC active
1 foot	84 dBA	60 dBA
2 feet	78 dBA	54 dBA
4 feet	72 dBA	48 dBA
8 feet	66 dBA	42 dBA
16 feet	60 dBA	36 dBA

If there are any further questions regarding this issue please contact HME customer service at 1-800-848-4468.

Thank you for your interest in HME's products.

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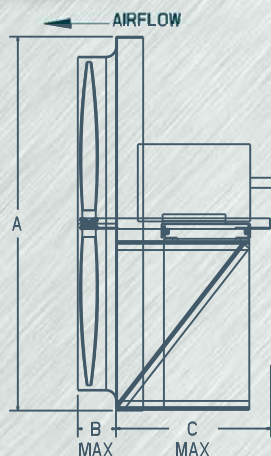
These fans are typically used for low pressure applications with little or no duct work. The XB series is designed and constructed for efficient and economical operation at low speeds and low noise levels. These fans are used for exhaust applications.
For supply applications, please see next page.

FEATURES

- Heavy gauge steel fan panel with deep spun and flared venturi for maximum efficiency.
- Heavy gauge welded steel motor and bearing supports.
- Heavy duty cast iron pillow block bearings.
- TEFC motors are standard.



DIMENSIONS



MODEL	BLADE DIAMETER	A X A SQUARE	B	C (BELT DRIVE MOTOR FRAME)	
				56 - 184	213 - 286
XB24	24"	29.625"	4.0"	18"	--
XB30	30"	35.625"	4.5"	18"	--
XB36	36"	41.625"	5.0"	18"	28"
XB42	42"	47.625"	5.0"	18"	28"
XB48	48"	53.625"	5.0"	18"	28"
XB54	54"	59.657"	5.5"	18"	28"
XB60	60"	67.657"	6.0"	18"	28"

	MODEL #	SINGLE PHASE	THREE PHASE	WEIGHT (LBS.)	RPM	H.P.	dBA @ 5 ft.	CFM @ STATIC PRESSURE					
								0"	1/8"	1/4"	3/8"	1/2"	5/8"
24"	XB24T10033	XB24T30033*		115	670	1/3	61	4643	4038	2488	-	-	-
	XB24T10050	XB24T30050*		115	805	1/2	65	5578	5112	4405	2934	-	-
	XB24T10075	XB24T30075*		115	925	3/4	70	6410	6030	5526	4731	3354	-
	XB24T10100	XB24T30100*		133	1040	1.0	73	7207	6883	6457	5930	5143	3793
30"	XB30T10033	XB30T30033*		128	470	1/3	59	6658	4717	1948	-	-	-
	XB30T10050	XB30T30050*		129	565	1/2	63	8004	6689	4298	2119	-	-
	XB30T10075	XB30T30075*		129	640	3/4	66	9067	8014	6073	4220	2203	-
	XB30T10100	XB30T30100*		148	715	1.0	69	10129	9223	7790	5688	4248	2452
36"	XB36T10150	XB36T30150*		129	830	1.5	73	11758	11032	10045	8530	6647	5543
	XB36T10050	XB36T30050*		161	410	1/2	59	9854	7547	3560	-	-	-
	XB36T10075	XB36T30075*		160	460	3/4	63	11056	9197	5120	2876	-	-
	XB36T10100	XB36T30100*		180	515	1.0	67	12378	10847	7976	4784	2740	-
42"	XB42T10150	XB42T30150*		160	605	1.5	71	14541	13394	11542	8258	5859	4122
	XB42T10200	XB42T30200*		203	675	2.0	73	16223	15195	13750	11831	8029	6506
	XB42T10075	XB42T30075*		211	330	3/4	58	11755	8579	3357	-	-	-
	XB42T10100	XB42T30100*		230	390	1.0	63	13892	11596	5764	3462	-	-
48"	XB48T10150	XB48T30150*		207	465	1.5	68	16564	14700	12037	6386	4670	-
	XB48T10200	XB48T30200*		248	510	2.0	71	18167	16479	14514	9114	6418	4770
	XB48T10300	XB48T30300*		264	590	3.0	75	21016	19579	18030	15887	10630	7882
	XB48T10100	XB48T30100*		257	330	1.0	63	18658	14895	7243	3301	-	-
54"	XB54T10150	XB54T30150*		236	380	1.5	67	21485	18589	12083	7263	3754	-
	XB54T10200	XB54T30200*		281	425	2.0	70	24030	21457	17737	10447	7459	4205
	XB54T10300	XB54T30300*		290	485	3.0	74	27422	25190	22472	18073	11634	9008
	XB54T10500	XB54T30500*		312	585	5.0	80	33076	31236	29331	26834	23759	17330
60"	XB60T10150	XB60T30150*		316	310	1.5	65	24281	20657	10405	5754	2747	-
	XB60T10200	XB60T30200*		359	345	2.0	68	26593	23275	15740	8821	5199	2455
	XB60T10300	XB60T30300*		370	400	3.0	72	30832	28008	24336	14731	10317	6921
	XB60T10500	XB60T30500*		380	475	5.0	76	36613	34384	31798	28018	19368	13736
60"	XB60T10750	XB60T30750*		492	545	7.5	81	42009	40171	37818	35727	31930	24931
	XB60T10150	XB60T30150*		363	275	1.5	64	28093	23231	12618	6346	3157	-
	XB60T10200	XB60T30200*		405	300	2.0	66	30647	26162	17561	9965	5469	2822
	XB60T10300	XB60T30300*		416	345	3.0	70	35244	31470	27438	16612	11289	7142
60"	XB60T10500	XB60T30500*		430	420	5.0	76	42906	40193	36504	33232	23610	17734
	XB60T10750	XB60T30750*		539	485	7.5	81	49546	47400	44167	41266	38377	30896

For three phase motors, substitute "*" with "M" for 208-230/460 volt or "P" for 575 volt
Fan blades tested in accordance with AMCA standard 210, figure 12
dBA ratings shown are measured at 0" static pressure and should be used as a guideline only

OPTIONS

For fan complete with cabinet/guard and shutter, substitute "T" with CBS
For fan complete with front sleeve and shutter, substitute "T" with SLS
For fan with rear sleeve and back guard, substitute "T" with SLB

For a complete listing of all available options, see page 9.



CBS



SLS



SLB

Bio Agri Mix-Herbert
SOURCE Des: Truck idling (700rpm)
SOURCE TYP: Spherical

Engine idling

Table A-G1.010: Sound Power Calculations for NS02-HT

1

DJA Project No.: 95827

						Adjust Lpf Levels for Background Noise								Lwf	Calculate Sound Power Levels with no Mitigation		
Lw Technique: Spherical, Parallelepiped, or Area	Point 1	Point 2	Point 3	Point 4	# of Points	Average Lpf	Average Lpf	Bckgnd Noise	Bckgnd Noise	Delta L	Delta L >3 Check	Correction K1	Corrected Avg Lpf	(from Col a) (dB)	Power Ratio	Adjustment for Weighting 'A'	LwfA (from Lwf)
Spherical	Radius (m)	Radius (m)	Radius (m)	Radius (m)		L"p	L"pA	L"p	L"pA	L"p - L"p			K3= 000				
(Hz)	15.00				15.0000								Col a	1			
	Lpfi in dB	Lpfi in dB	Lpfi in dB	Lpfi in dB		(dB)	(dBA)	(dB)	(dBA)	(dB)		(dB)	(dB)	2	Wi/Wo	(dB)	(dBA)
	f045	f047	f049														
63	65.6	66.9	66.2		3	66.24	40.04		-26.20	66.24	yes	0.00	66.24	97.7	5.888E+09	-26.2	71.5
125	66.2	65.8	65.8		3	65.93	49.83		-16.10	65.93	yes	0.00	65.93	97.4	5.495E+09	-16.1	81.3
250	63.2	62.8	63.3		3	63.13	54.53		-8.60	63.13	yes	0.00	63.13	94.6	2.884E+09	-8.6	86.0
500	64.2	63.4	63.6		3	63.71	60.51		-3.20	63.71	yes	0.00	63.71	95.2	3.311E+09	-3.2	92.0
1,000	64.8	63.9	64.3		3	64.38	64.38		0.00	64.38	yes	0.00	64.38	95.9	3.890E+09	0.0	95.9
2,000	59.2	58.6	58.3		3	58.74	59.94		1.20	58.74	yes	0.00	58.74	90.2	1.047E+09	1.2	91.4
4,000	49.2	48.2	49.8		3	49.11	50.11		1.00	49.11	yes	0.00	49.11	80.6	1.148E+08	1.0	81.6
8,000	39.1	38.3	41.4		3	39.81	38.71		-1.10	39.81	yes	0.00	39.81	71.3	1.349E+07	-1.1	70.2
Overall	72.2	72.0	72.0	0.0	3.0	72.1	67.3	0.0	0.0	72.1			72.1	103.5	2.265E+10	19.95	98.8
Overall dBA	67.7	66.9	67.2	0.0		chk above =									0.0	chk above =	

chk above =

0.0

chk above =

Delta L > 3 Check	
yes	If the value of this column is yes for a given frequency band then results will show strict adherence to ISO 3746
warn	If the value of this column is warn for a given frequency band then results will not be in strict adherence to ISO 3746

Directivity Table Lp-Lp average in dB at Hz									
Direction	32	63	125	250	500	1,000	2,000	4,000	8,000
0		-0.6	0.3	0.1	0.4	0.4	0.5	0.0	-0.7
15									
30									
45									
60									
75									
90									
105									
120									
135									
150									
165									
180									

Reference Box Dimensions			
L	Length	L1 (m)	0.54
W	Width	L2 (m)	0.54
H	Height	L3 (m)	0.4
		2 x do	
One Ref Plane		do	0.55
Two Ref Plane		do	0.72
Three Ref Plane		do	0.86
		1 Ref Plane 2 Ref Plane	
Measurement distance (m)	d' actual	0.00	0.00
L	Length (m)	a	0.27
W	Length (m)	b	0.27
H	Length (m)	c	0.40
	Area (m ²)	S	1.16
L	Area Long Side	2ac	0.216
	Area Top	2a*2b	0.292
W	Area Front or Back	2b*c	0.216
	Sums		1.16

Used for Noise Data of a Pneumatic Tools.

Data available for download at:
<https://www.cdc.gov/niosh/data/datasets/rd-1005-2014-0/default.html>

NIOSH Health Hazard Evaluation Program Noise Measurement Database

NIOSH Dataset RD-1005-2014-0

December 2015

This noise database was developed to provide researchers and other interested stakeholders with noise measurement results that the National Institute for Occupational Safety and Health (NIOSH) has collected during health hazard evaluation (HHE) surveys from 1996 through 2013. HHEs are requested by employees or their representatives, or employers, to help learn whether health hazards are present at their workplace. The scope of HHEs varies based on the requestors' concerns and the NIOSH project officers' professional judgment. Only noise measurement results are included in this database; however, many HHEs include evaluation of exposures other than noise. Individual HHE reports are published on the NIOSH website. When available, the database provides a direct link to the HHE report for each of the noise measurement results.

The noise database contains workplace noise measurement results from 77 HHE reports, including over 808 personal noise exposure measurements and 582 area noise measurements. It also includes the following information: U.S. state or territory; Occupational Safety and Health Administration (OSHA) region; National Occupational Research Agenda (NORA) sector; North American Industry Classification System (NAICS) code; facility description; type of dosimeter or sound level meter used; whether a hearing conservation program was in place; whether a hearing protection was used; whether octave band data was collected; job title; noise-generating activities; location of noise measurements; start and end date for site visit; type (full-shift, partial-shift, or task-based) and duration of noise measurement; type of noise (continuous, impulsive, or intermittent); exposure to ototoxic chemicals; and results in decibels A-weighted (dBA) and percent dose according to OSHA and NIOSH noise measurement criteria. This database is an ongoing project and will be updated at least yearly to add the most recent HHE noise measurement data.

Download Data

- Area Sampling 
- Personal Sampling 
- Company Information 
- Combined Noise Dataset 
- Data Dictionary 

Noise Measurement Methods

All noise measurements were collected by NIOSH investigators as part of a health hazard evaluation. Data were extracted from the final report and, in some cases, augmented from investigator's records. Administrative and observational information was extracted from the final report. The Health Hazard Evaluation Program has an extensive internal review process for its reports. Data entered into the database underwent a 10 percent random check to ensure accurate entry.

For personal noise exposure monitoring, NIOSH investigators used noise integrating dosimeters (Type 2). Dosimeters were typically set up to simultaneously integrate noise using three different criteria to compare noise measurement results with the Occupational Safety and Health Administration (OSHA) permissible exposure limit, the OSHA action level (AL), and NIOSH recommended exposure limit (REL). For area noise measurements and octave band noise frequency measurements, NIOSH investigators used integrating sound level meters (Type 1 or Type 2) and octave band noise frequency analyzers. View detailed descriptions of the methods .

Name	Description
HHE No.	Corresponds to the health hazard evaluation (HHE) number of the report.
Hyperlink	If hyperlink to report not included, HHE report can be requested by e-mailing HHERequestHelp@cdc.gov.
OSHA Region	Identifies Occupational Safety and Health Administration (OSHA) region where facility located. OSHA has 10 regions. Each region includes two or more states or territories. (https://www.osha.gov/html/RAmap.html)
State	Identifies the U.S. state or territory where the facility was located.
NAICS Code	The North American Industry Classification System (NAICS) code for the facility. The NAICS code is the standard used to classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. (http://www.census.gov/eos/www/naics/)
NORA Sector	The NIOSH National Occupational Research Agenda (NORA) sector for the facility. NIOSH has aggregated the 20 sectors defined by NAICS into 10 NORA sectors. (http://www.cdc.gov/niosh/nora/default.html)
Facility description	Brief description of the type of work done at the facility.
Dosimeter	The manufacturer and model of noise dosimeter used to integrate and measure noise exposures during HHE.
Sound level meter	The manufacturer and model of sound level meter used to measure noise levels or octave band noise frequency levels.
HCP (Y/N/U)	Hearing conservation program? ("Y" = yes, "N" = no, "U" = unknown)
Octave band (Y/N)	Did NIOSH measured octave band noise frequency during the HHE? ("Y" = yes, "N" = no)
Hearing protection	Manufacturer(s) and brand(s) of hearing protection used by employees at the facility.
Area/Department	Work area or department where monitored employee worked.
Job Title	Job title of monitored employee.
Noise-generating activities	Brief description of work activities or work processes that generated noise exposures for monitored employee.
Start date	Start date (mm/dd/yyyy) for noise monitoring.
End date	End date (mm/dd/yyyy) for noise monitoring.
# of samples	Number of dosimeter measurements.
FS/PS/T	Indicates whether the duration of dosimetry monitoring was full-shift "FS" (7 hours or more); partial-shift "PS" (less than 7 hours); or a task-sample "T" (sample collected only during a specific task (typically partial-shift).
Duration (hh:mm)	Actual duration of noise dosimetry monitoring (hours and minutes).
OSHA PEL (dBA)	Time-weighted average noise measurement results collected using OSHA Permissible Exposure Limit (PEL) criterion (5 dB exchange rate, 90 dB threshold) for comparison to the OSHA's full shift (8-hour) PEL limit of 90 dBA.
OSHA PEL (%)	Time-weighted average noise measurement results, collected using OSHA PEL criterion, expressed as percent dose rather than dBA. Dose was calculated using the formula: $\text{Dose (\%)} = [10^{((\text{TWA(dBA)} - 90)/16.61)} * 100]$. A dose of $\geq$ to 100% means the OSHA PEL was exceeded.
OSHA AL (dBA)	Time-weighted average noise measurement results collected using OSHA AL criterion (5 dB exchange rate, 80 dB threshold) for comparison to the U.S. OSHA's

	full shift (8-hour) action level of 85 dBA.
OSHA AL (%)	Time-weighted average noise measurement results, collected using OSHA AL criterion, expressed as percent dose rather than dBA. Dose was calculated using the formula: $\text{Dose (\%)} = [10^{((\text{TWA(dBA)}-90)/16.61)} * 100]$. A dose of $\geq$ to 50% means the OSHA action level was exceeded.
NIOSH REL (dBA)	Time-weighted average noise measurement results collected using NIOSH Recommended Exposure Limit (REL) criterion (3 dB exchange rate, 80 dB threshold) for comparison to the NIOSH full shift (8-hour) REL of 85 dBA.
NIOSH REL (%)	Time-weighted average noise measurement results, collected using NIOSH REL criterion, expressed as percent dose rather than dBA. Dose was calculated using the formula: $\text{Dose (\%)} = [10^{((\text{TWA(dBA)}-85)/10.00)} * 100]$. A dose of $\geq$ to 100% means the NIOSH recommended exposure limit was exceeded.
Leq (dBA)	Time-weighted average noise measurement results collected using Leq criterion (3 dB exchange rate, 0 dB threshold). Leq is defined as the level of a steady sound which has the same A-weighted sound energy as the time-varying sound.
Leq (%)	Time-weighted average noise measurement results, collected using Leq criterion, expressed as percent dose rather than dBA. Dose was calculated using the formula: $\text{Dose (\%)} = [10^{((\text{TWA(dBA)}-85)/10.00)} * 100]$.
HPU (Y/N/U)	Hearing protection use ("Y" = yes, "N" = no, or "U" = unknown)
Noise type (C/IMP/I)	Types of noise ("C" = continuous, "IMP" = impulsive, or "I" = intermittent)
Exp. ototoxic chems. (Y/N/U)	Exposure of monitored workers to ototoxic chemicals ("Y" = yes, "N" = no, or "U" = unknown).
Sound level (dBA)	Sound level [dBA (decibels, A-scale)] measured during HHE.
Sound level min. (dBA)	Minimum sound level [dBA (decibels, A-scale)] measured during HHE when a range of sound levels were reported.
Sound level max. (dBA)	Maximum sound level [dBA (decibels, A-scale)] measured during HHE when a range of sound levels were reported.
Peak min. (dB)	Minimum peak sound level [decibels (dB), unweighted] when a range of peak levels were reported.
Peak max. (dB)	Maximum peak sound levels [decibels (dB), unweighted] when a range of peak levels were reported.

NOTE: An "X" in database field means that no data was available or collected for that HHE.

HHE No.	Area/Department	Job Title	Noise-generating activities	# of samples	FS/PS/T	Duration (hh:mm)	NIOSH REL (dBA)	NIOSH REL (%)
2007-0235	Maintenance shop	AFD mechanic	½" impactor gun, priming, and air vacuum pump	X	FS	10:04	84.9	97.1
2007-0235	Maintenance shop	AFD mechanic	½" impactor gun, priming, and air vacuum pump	X	FS	9:54	77.3	16.9
2007-0235	Maintenance shop	AFD mechanic	½" impactor gun, priming, and air vacuum pump	X	FS	9:58	89.2	263.0
2007-0235	Maintenance shop	AFD mechanic	½" impactor gun, priming, and air vacuum pump	X	FS	11:03	82.8	59.6
2007-0235	Maintenance shop	AFD mechanic	½" impactor gun, priming, and air vacuum pump	X	FS	10:04	96.3	1351.5
2007-0235	Maintenance shop	AFD mechanic	½" impactor gun, priming, and air vacuum pump	X	FS	10:00	101.7	4631.3
2007-0235	Maintenance shop	AFD mechanic	½" impactor gun, priming, and air vacuum pump	X	FS	10:06	85.4	110.2
2007-0235	Maintenance shop	AFD mechanic	½" impactor gun, priming, and air vacuum pump	X	FS	9:53	85.5	112.7

Data from the US government's CDC.

Full excel chart available for download at: <https://www.cdc.gov/niosh/data/datasets/rd-1005-2014-0/default.html>

NIOSH REL (Recommended Exposure Limit) is obtained in a similar fashion to Leq as seen in the definitions in the preceding pages. There is typically around a 1 dB difference between NIOSH REL and Leq levels for measurements which reported both formats. This potential difference is acoustically insignificant.

The Impactor Gun measurements did not have reported Leq Levels so the NIOSH REL levels were relied upon.

To be conservative the worst case NIOSH REL level was selected to be used in the noise model. (highlighted yellow).

Individual dBA						Source Col in Table Cxx:												
Table Name	INDIRECT' Base	SOURCE TYP:	ID	Name	Weighting	Data Source	32Hz (dB)	63hz (dB)	125Hz (dB)	250Hz(dB)	500Hz(dB)	1000Hz(dB)	2000Hz(dB)	4000Hz(dB)	8000Hz(dB)	Overall (dB)		
Table C001	'Table C001'!	Spherical	EX001	2008 Toyota Yaris at 5.0 m	A	Meter	44.5	55.9	62.4	61.0	63.1	62.8	68.0	69.9	69.8	75.2		
Table C003	'Table C003'!	Spherical	EX003	2005 Ford Freestar	A	Meter	41.2	51.3	61.1	67.9	64.9	70.5	71.4	67.4	62.2	76.3		
Table C004	'Table C004'!	Spherical	EX004	2019 Dodge Caravan	A	Meter	43.8	61.5	64.7	66.1	72.9	76.1	73.8	71.0	62.6	80.3		
Table C005	'Table C005'!	Spherical	EX005	2007 Toyota Camry	A	Meter	48.6	50.6	55.2	66.4	77.5	80.6	83.9	74.6	67.3	86.6		
Table C006	'Table C006'!	Spherical	EX006	2012 Toyota Camry	A	Meter	51.3	50.9	55.8	58.1	63.4	67.2	65.9	61.7	54.0	71.6		
Insert all rows above this row						Insert all rows above this row												
Individual W/m2																		
Table Name	INDIRECT' Base	SOURCE TYP:	ID	Name	Weighting	Data Source	32Hz (dB)	63hz (dB)	125Hz (dB)	250Hz(dB)	500Hz(dB)	1000Hz(dB)	2000Hz(dB)	4000Hz(dB)	8000Hz(dB)	Overall (dB)		
Table C001	'Table C001'!	Spherical	EX001	2008 Toyota Yaris at 5.0 m	A	Meter	28175.3	390599.1	1741556.2	1257937.2	2048963.1	1886666.6	6263954.1	9691215.8	9547861.9			
Table C003	'Table C003'!	Spherical	EX003	2005 Ford Freestar	A	Meter	13299.3	133964.2	1285058.9	6176213.5	3089822.2	11297795.6	13771018.8	5486256.7	1656153.2			
Table C004	'Table C004'!	Spherical	EX004	2019 Dodge Caravan	A	Meter	24165.9	1428889.5	2947264.6	4058081.2	19426534.9	40336205.0	23920875.7	12732225.9	1836159.5			
Table C005	'Table C005'!	Spherical	EX005	2007 Toyota Camry	A	Meter	72716.6	114007.4	334587.1	4338954.3	56526298.6	115769186.4	243226171.5	28989109.4	5378764.7			
Table C006	'Table C006'!	Spherical	EX006	2012 Toyota Camry	A	Meter	135023.6	123384.8	380084.3	638315.5	2194412.5	5250508.0	3866452.7	1478199.9	252113.8			
Insert all rows above this row						Insert all rows above this row												
							32Hz (dB)	63hz (dB)	125Hz (dB)	250Hz(dB)	500Hz(dB)	1000Hz(dB)	2000Hz(dB)	4000Hz(dB)	8000Hz(dB)			
Sum total W/m2							273380.6	2190845.0	6688551.1	16469501.7	83286031.3	174540361.6	291048472.7	58377007.8	18671053.1			
Average dBA							47.4	56.4	61.3	65.2	72.2	75.4	77.6	70.7	65.7	81.1		

Table C04: Sound Power Cal

SOURCE ID: EF-1
Significant: Yes
Table #: 4
Description: Exhaust Fan
Measurement Weighting: A
Output Weighting: A
SOURCE TYP: Spherical
Sphere 1/ 2
Tonal Indicator:
Data Source: Meter
Enabled: 1

Model #: LGH180H4BS1J
71.8 Maximum Measured Value
71.8 Minimum Measured Value
1.0 See below

Relevant: 1 1

SourceCol

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LW Technique: Spherical, Intensity, Parallelepiped, or Area	Point 1	Point 2	Point 3	Point 4	Point 5	# of Points	Background				Chk Correction	Lwf (dBA)	Adjustment for Weighting from 'A' to 'A'	LwFA (from Lwf)	Octave Sound Power
	Radius (m)	Radius (m)	Radius (m)	Radius (m)	Radius (m)		Average Lpf	Bckgnd Noise	Delta L	Delta L >3 Check	Correction K1	Corrected Avg Lpf			
Spherical	Radius (m)	Radius (m)	Radius (m)	Radius (m)	Radius (m)		L'p	L"p	L'p - L"p						
(Hz)	2.800	2.800	2.800	2.800	2.800	2.8						Col a	1		
Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)		(dBA)	(dBA)	(dB)		(dB)	(dBA)	2	(dB)	(dBA)
FileID	Walmart005														
Comment															
12.5										wam					
16										wam					
20										wam					
25										wam					
32										wam					
40										wam					
50										wam					
63										wam					
80										wam					
100										wam					
125										wam					
160										wam					
200										wam					
250										wam					
315										wam					
400										wam					
500	71.8					1	71.82		71.82	yes		71.82	88.7	88.7	88.70
630										wam					
800										wam					
1,000										wam					
1,250										wam					
1,600										wam					
2,000										wam					
2,500										wam					
3,150										wam					
4,000										wam					
5,000										wam					
6,300										wam					
8,000										wam					
10,000										wam					
12,500										wam					
16,000										wam					
20,000										wam					
Overall (dB)	71.8					1.0	71.8					71.8	88.7	88.7	88.7

