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CANADA'S BEST MANAGED COMPANIES Platinum member

Thundering Waters Secondary Plan

Niagara Falls, Ontario

Air Quality, Noise and Vibration Feasibility Assessment Version 2.0

RWDI #1600158
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1. INTRODUCTION

RWDI AIR Inc. (RWDI) was retained by GR(CAN) Investment Co., Ltd. to conduct an Air Quality, Noise and Vibration Feasibility Assessment for the Thundering Waters Secondary Plan development located in Niagara Falls, Ontario. This report builds on the previous Land Use Compatibility Assessment dated November 6, 2015 and looks at the feasibility of the proposed development in relation to the existing land uses in the study area. The report has been updated for the revised master plan dated May 2016.

2. PROJECT BACKGROUND

The Thundering Waters Secondary Plan was initiated by the City of Niagara Falls, Region of Niagara, and the Niagara Peninsula Conservation Authority to understand the opportunities and constraints for the planning and development of the study area. The Land Use Compatibility Assessment dated November 6, 2015 looked at the proposed development in relation to the existing land uses in the study area. A summary of the resulting recommendations are noted below and a copy of the report is attached as Appendix A.

- Review the identified Class III industries to see if a Class II re-classification might be warranted, and the potential area of influence reduced.
- Conduct detailed air quality, noise and vibration assessments for identified industries within buffer regions.
- Confirm through detailed studies the mitigation required to build on sensitive land uses near in the buffer regions is possible, and if there are areas where
- Complete a detailed rail and vibration study and recommend mitigation requirements.

This report has been prepared to provide guidance to the Secondary Plan process and the subsequent development of any policy or zoning by-law amendments.

3. REVIEW OF CLASS III INDUSTRIES

The Land Use Compatibility Assessment reviewed the location of the subject lands and the existing land uses in the surrounding areas. Existing industries were identified and classified according to the MOECC D-Series Guidelines.

The facilities of interest were reviewed in further detail under the feasibility assessment to better understand their operations and determine whether the Class III designation was appropriate. The results of this review are summarized in Table 1 below.

Table 1: Summary of Previous Class III Facility Influencing Thundering Waters Development

Company Name	Company Address	Results of D-Series Re-Classification
Modern Mosaics	8620 Oakwood Drive	Class II
Montgomery Brothers Construction / Landscape Materials	8550 Oakwood Drive	Class II
Avid Growing Systems	8100 Dorchester Road	Class II
Palfinger Inc.	7942 Dorchester Road	Class II
Chemtrade Logistics Inc.	6300 Oldfield Road	Class III
Quality Ready Mix	6224 Progress Street	Class III

The location of each of these facilities of interest, relative to the subject lands, is presented in Figure 1.

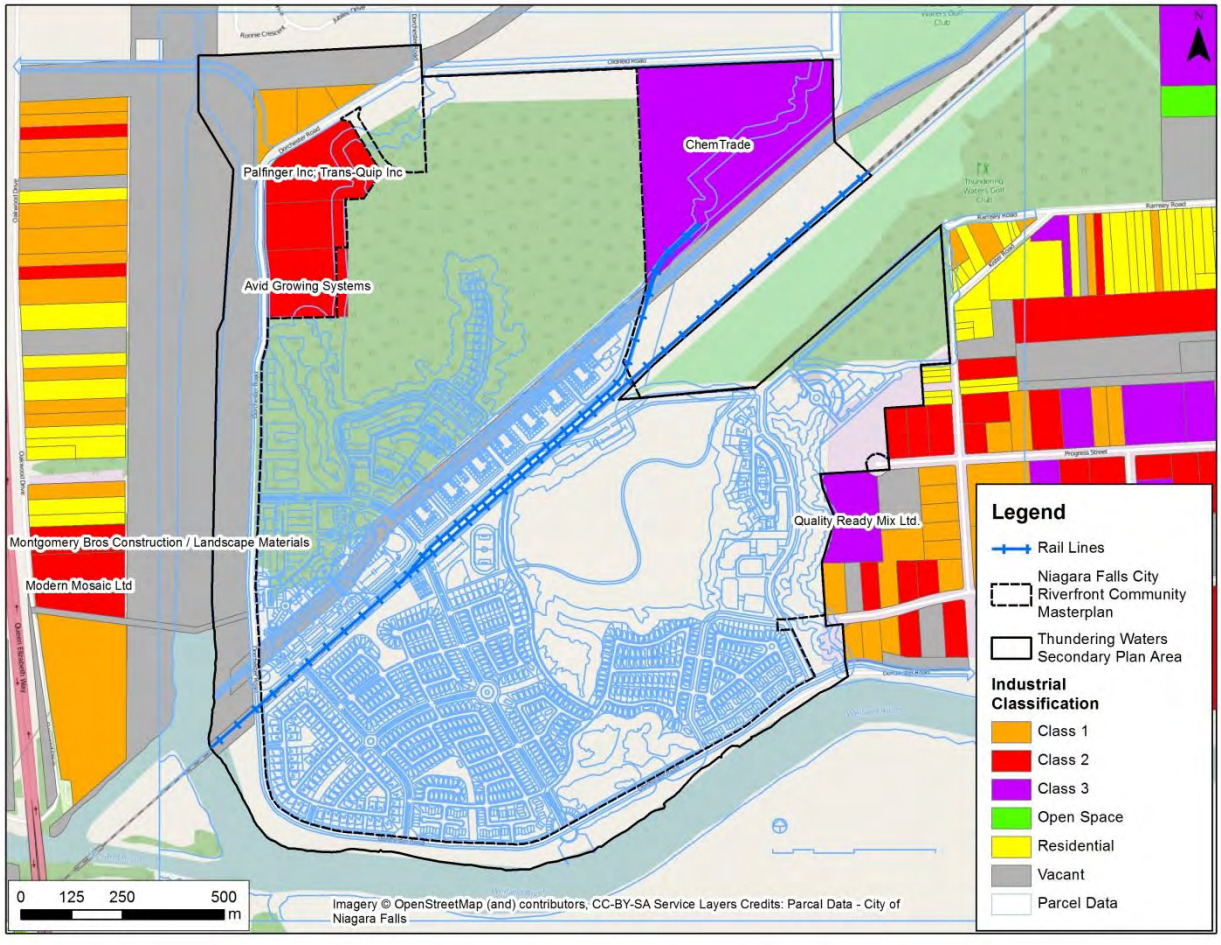

Figure 1: Facilities of Interest

The industrial classifications in Table 1 above were used to determine the potential areas of influence and recommended minimum setback distances from each property to sensitive land uses. Facilities whose potential areas of influence impose on the Thundering Water lands were identified and advanced to a more in depth assessment, as outlined in the next section.

4. AIR QUALITY, NOISE, AND VIBRATION ASSESSMENTS

Air quality, noise and vibration assessments were completed for the identified industries. Available preliminary design information at the time of this assessment was used for the studies. The master plan, dated May 2016 was used for this assessment and is shown in Figure 2.

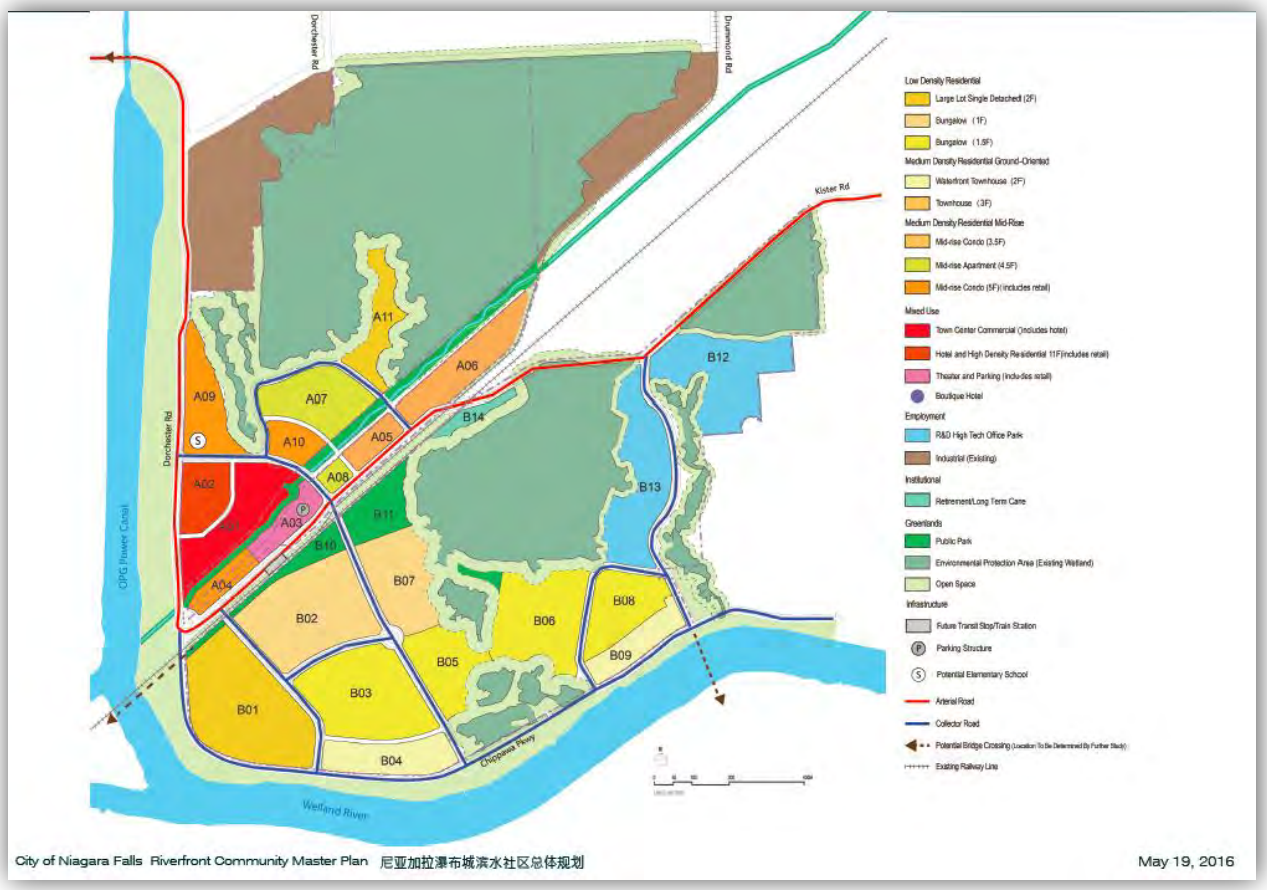

Figure 2: Master Plan (May 2016)

4.1 Applicable Guidelines

This environmental air quality (AQ), noise and vibration (N&V) assessments considered the following applicable guidelines:

- MOECC Land Use Compatibility D-Series Guidelines (MOECC, 1995);

- MOECC Regulation 419/05 Air Pollution – Local Air Quality.
- MOECC Environmental Noise Guideline NPC-300, Stationary and Transportation Sources – Approval and Planning (MOECC, 2013);
- Guidelines for New Development in Proximity to Railway Operations, by the Railway Association of Canada (RAC, 2013); and
- Canadian Pacific Railway Industrial Spur Line Requirements (CP, received in January 2016).

The D-Series guidelines are used to identify potential adverse effects by industrial sources on sensitive land uses. The MOECC D-series guidelines provide direction for land use planning to maximize compatibility of industrial uses with adjacent land uses. The D-Series guidelines separate industry into three broad categories, Class I, II, and III, depending on the nature of their operations and the types of potential impacts. These guidelines also outline recommended minimum separation distances and areas of potential influence (i.e., distance within which adverse effects could potentially occur) for each of the three Classes.

The regulation framework for industrial air quality emissions in Ontario is outlined in Ontario Regulation 419/05 (O.Reg. 419/05): Local Air Quality. O. Reg. 419/05 applies to all industries in the province and is the regulation against which contaminant concentrations from air emissions are assessed under Section 9 of the Environmental Protection Act.

Industries in Ontario are required to obtain an Environmental Compliance Approval (ECA) prior to discharging a contaminant into the natural environment, including to the air. For most sources and contaminants, O. Reg. 419/05 requires compliance with provincial standards at and beyond the property line of the industrial facility. The development and implementation of Best Management Practices Plans (BMPPs) are required to manage impacts from fugitive dust and odour.

Guidance from NPC-300 was used to assess environmental noise of industry and rail traffic. The Railway Association of Canada (RAC) guidelines were used for rail vibration and used as a reference tool of best practices for rail-adjacent development. Requirements for dwellings adjacent to CP rail lines are covered under NPC-300 and consistent with the RAC best practices. CP also endorses the RAC guidelines.

The CP and RAC guidelines outline the following minimum requirements for an industrial spur line:

- CP requires building setback of 15 m for residential dwellings. The latest master plan shows building setbacks greater than 15 m which satisfies the CP requirement.
- RAC suggests vibration measurements should be conducted for proposed dwelling units that are within 75 m of the rail ROW. The existing rail corridor is located within 75 m of some proposed structures.

4.2 General AQ Overview of Approach

This feasibility study considered potential air quality impacts on the subject lands from the facilities of interest. This was completed to determine whether any potential incompatibilities may occur between the existing industries and the proposed development. Each facility was assessed individually, using the following methodology:

- The information gathered for each facility was reviewed in order to gain an understanding of their operations and potential emissions to air.
- The classification of the identified industries was reviewed to see if a re-classification might be warranted, and the potential area of influence reduced.
- The remaining facilities were assessed qualitatively to determine if they had the potential to impact the subject lands.
- Where the potential for impact was found to exist, facilities were assessed quantitatively through:
    - The assessment of emissions to air, using published emission factors and RWDI's past experience with similar facilities.
    - The assessment of impacts on the subject lands, using the U.S. EPA's AERMOD dispersion model.

Details of the specific approach are presented in the Findings section of this report.

4.3 General Noise & Vibration Overview of Approach

This feasibility assessment considered both noise and vibration from nearby industrial and rail transportation sources adjacent to the subject lands. This was completed to determine if noise and vibration control measures would be required.

Current road traffic and aircraft flyovers are distant and are not expected to significantly influence sound levels at the site. The development is still in the early stages of design at the time of this assessment. Therefore noise impact potential associated with the proposed road network and mechanical equipment was not considered as data were not available.

The subject lands are influenced by sound from existing industrial sources to the northwest, northeast and east. An existing Canadian Pacific Railway (CP) rail spur line runs through the middle of the site as shown in Figure 3.

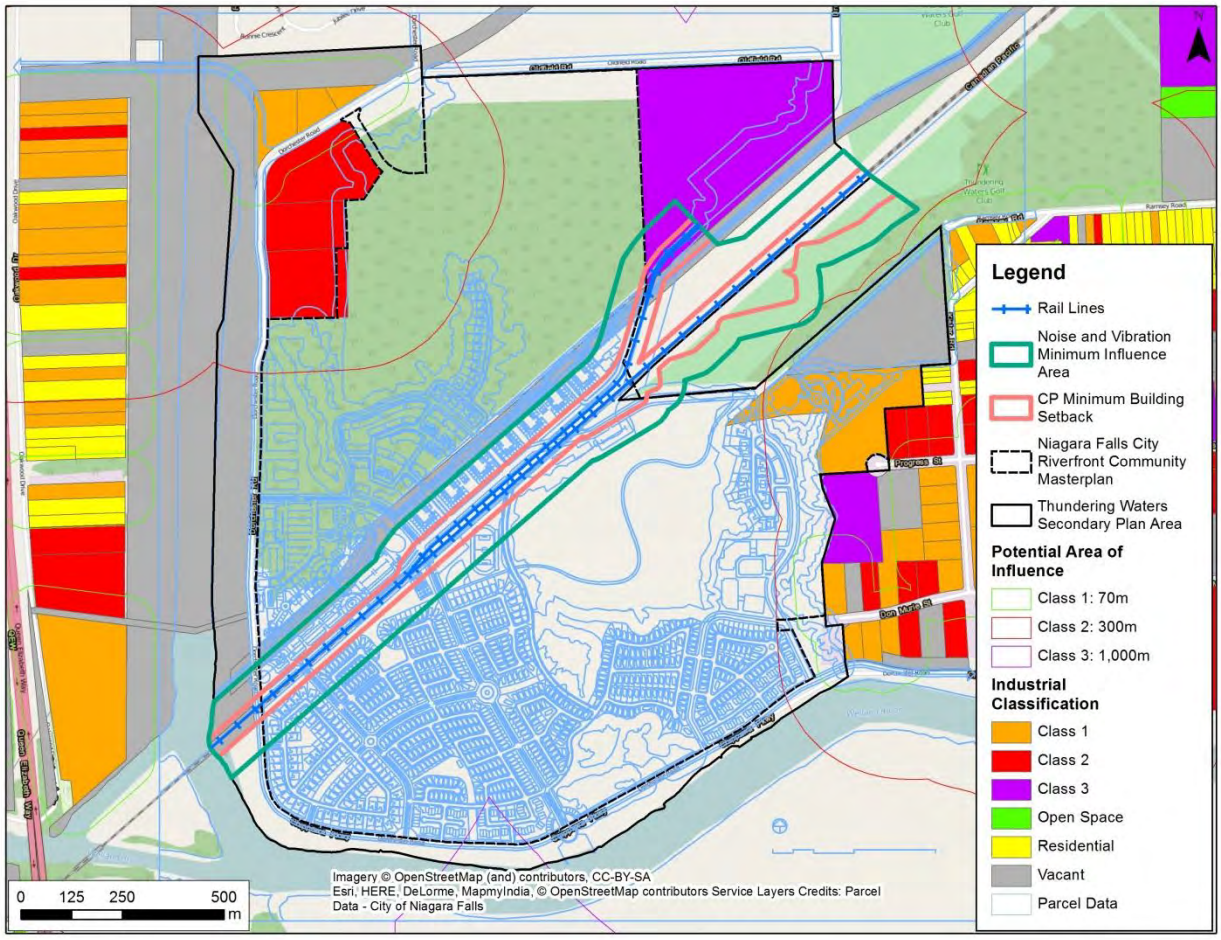

Figure 3: Potential Areas of Influence and Rail Corridor

5. FINDINGS

5.1 Industry

This assessment focuses mainly on Class III industrial facilities and provides a qualitative review of Class II industries at the proposed sensitive areas (e.g., residential homes, apartments, condominiums, school, and student residences). Proposed balconies to apartments and condominiums are assumed to be less than 4 m in depth and therefore not considered noise-sensitive in accordance with NPC-300 guidelines. Offices and sports complexes are not considered noise-sensitive based on the applicable guidelines. Vibration levels from industrial sources, if present, are not anticipated to be an issue given the separation distance to sensitive areas such as residences, apartments and condominiums. The air quality and noise findings for each of the identified facilities of interest are presented below.

5.1.1 Modern Mosaics

Modern Mosaics is a manufacturer of architectural pre-cast concrete slabs and other cladding materials for buildings, located on Oakwood Drive west of the proposed development. Modern Mosaics is located more than 300 m across the Welland River to the west with mostly daytime (7 am to 7 pm) operations. A telephone interview was conducted with Modern Mosaics staff, who indicated that all processing is done within the building. There is some outdoor storage of raw aggregate materials; however, the facility has dust control measures in place to minimize visible dust releases. The main outdoor activity at Modern Mosaics is the storage of finished concrete slabs. Staff were also able to confirm that no public complaints had been received relating to air emissions, odour, dust, or noise from the facility.

Modern Mosaics did not report to NPRI within the previous two years. The facility has two current ECAs, one for air and noise, and the other for industrial sewage works. The ECA for air and noise lists the emission sources at the facility. Since Modern Mosaics has received an ECA for air from the MOECC, air quality contaminants are expected to be in compliance with provincial standards at the facility's property line and beyond.

The review of the facility information and ECA documents indicated that Modern Mosaics would be more appropriately categorized as a Class II facility; rather than the initial Class III categorization assigned in Phase 1. When the potential areas of influence and recommended minimum setback distances were adjusted to Class II levels, Modern Mosaics was no longer predicted to impact the subject lands; therefore, no further assessment was conducted.

5.1.2 Montgomery Brothers Construction and Landscape Materials

Montgomery Brothers Construction and Landscape Materials is an excavation contractor and a landscaping equipment and supply store, open to the public. The facility is located to the west of the proposed development, on Oakwood Drive. The facility is located adjacent to Modern Mosaics across the Welland River with daytime hours of operation. The facility does not have an ECA in place, nor did it report to NPRI for 2013 or 2014. Attempts to contact facility representatives were unsuccessful.

A review of information available online, facility inspection using publically available aerial photography, and RWDI's understanding of operations of this type indicated that Montgomery Brothers Construction would be more appropriately categorized as a Class II facility; rather than the initial Class III categorization assigned in the Land Use Compatibility Assessment. When the potential areas of influence and recommended minimum setback distances were adjusted to Class II levels, Montgomery Brothers Construction and Landscape Materials was no longer predicted to impact the subject lands; therefore, no further assessment was conducted.

5.1.3 Avid Growing Systems

Avid Growing Systems (Avid) is a medical marijuana growing facility located on northwest edge of development on Dorchester Road, north of the proposed school and sports field (see Figures 2 and 3). This facility was classified as a Class II facility, however, a potential for impacts on the proposed development was identified, due to its proximity to the subject lands.

No ECA was found for this facility during the feasibility study; however, Avid is still required to meet MOECC standards at the property line. The facility did not report to NPRI within the previous two years. Fugitive dust and odour impacts are not expected based on current operations. RWDI staff visited the area in January 2016 and did not detect any odours or visible emissions from the Avid property.

The major sources identified at the facility are the large cooling towers on the rooftop. The cooling towers have the potential to cause off-site impacts due to fogging and steady-state noise. No major impulsive noise sources are anticipated at Avid.

Although the MOECC typically requires assessment of fogging impacts on nearby major roadways, not residential locations, Avid's cooling towers were assessed relative to the Master Plan to determine whether potential impacts exist on the proposed development. The Master Plan for the proposed development includes a sports field immediately adjacent to Avid's property, with a school positioned approximately 180 meters from Avid's cooling towers and the nearest planned residence greater than 400 meters away. The visible plume is not likely to extend this far from the cooling tower; therefore, fogging from Avid's cooling towers is not anticipated to be a concern on the proposed development.

Modelled sound levels of the cooling towers at the nearest noise-sensitive area, the proposed school, are less than the applicable criteria using data from similarly sized cooling towers and therefore not anticipated to be of concern.

Avid's operations are not expected to create a significant air quality and noise impact on the proposed development; therefore recommendations have not been included.

5.1.4 Palfinger Inc.

Palfinger is a manufacturer and distributor of cranes, and is located on northwest edge of the development on Dorchester Road, further north than the Avid facility identified above. This facility was also classified as a Class II facility, however, a potential for impacts on the proposed development was identified, due to its proximity to the potentially sensitive receptors within the subject lands.

No ECA or NPRI report was found for this facility. A review of their anticipated operations indicates significant air emissions would not be expected. Existing residences to the north of Dorchester Road are located in closer proximity to Palfinger's facility than are the nearest proposed residences on the subject lands, based on the Master Plan. The facility is also required to meet MOECC standards for air quality at the property line. Palfinger's operations are not expected to create a significant air quality impact on the proposed Thundering Waters development.

The facility is anticipated to have both continuous (e.g., on-site trucks, loading and unloading in the yard, ventilation equipment) and impulsive (e.g., scrap metal bins) noise sources based on aerial photography and street-level views of the facility from Dorchester Road. Major continuous sources at the facility are however not anticipated to be of concern due to large setback distances of greater than 350 m to the nearest noise receptors.

Impulsive noise from the dropping of scrap metal bins (or similar) on hard surfaces in the yard may be of concern. Although the activity may be infrequent, impulsive noise is generally difficult to control and has potential to cause annoyance. There is a potential for noise impacts from this facility and recommendations are provided in Section 6.

5.1.5 Chemtrade Logistics Inc.

Chemtrade Logistics Inc. (Chemtrade) is a distribution facility for sulphur products, and is located to the north of the proposed development, along Oldfield Road. A telephone interview was conducted with Chemtrade staff, who indicated that the facility receives products via train and transport trucks, and ships products out via transport truck. The facility includes storage tanks for various sulphur products. Staff were also able to confirm that no public complaints had been received relating to air emissions, odour, dust, or noise from the facility.

Chemtrade reported to NPRI for the 2014 reporting year. The facility also has two current ECAs, one for air and noise, and the other for industrial sewage works. Chemtrade has an ECA from the MOECC, indicating that air quality contaminants at the facility's property line and noise at closest proposed noise-sensitive area are in compliance with provincial standards.

The review of facility information indicated that issues from fugitive dust and odour are not expected based on Chemtrade's current operations. There is no outdoor handling of aggregate materials at the facility, and on-site truck traffic on unpaved roads is relatively low. RWDI staff visited the area in January 2016 and did not detect any odours or visible emissions at the Chemtrade property.

For noise, the proposed condominiums (Area 8 in Figure 2) are located approximately the same distance to Chemtrade as existing homes on Oldfield Road. Therefore, sound from stead-state (continuous) sources in excess of the guideline limits is not anticipated. Impulsive noise is assessed separately from stead-state noise. Impulsive rail car knuckle thumps (i.e., rail car shunting) that can occur at the southernmost point of Chemtrade are predicted to be below the applicable sound level criteria. This activity is currently only expected to occur twice per week and only during daytime hours (7 am to 7 pm). The southernmost point where knuckle thumps can occur is based on available aerial photography showing parked rail cars.

Chemtrade's operations are not expected to create a significant air quality and steady-state noise impact on the proposed Thundering Waters development and no recommendations are provided. Although not required, a desirable feature is to have masonry construction of the east face of the condominiums (i.e., facing Chemtrade) to reduce potential annoyance due to impulsive noise. The sound characteristic of impulsive noise is such that it can induce annoyance in some people even when it is predicted below the limit.

5.1.6 Quality Ready-Mix

Quality Ready-Mix (QRM) is located on Progress Street, to the east of the proposed development. QRM prepares ready-mix concrete for mixing and delivery by truck mounted in-transit mixers. A telephone interview was conducted with QRM staff, who provided typical production levels and hours of operation. QRM currently operates between 6 am and 5 pm. Staff were also able to confirm that no public complaints had been received relating to air emissions, odour, dust, or noise from the facility. A quantitative analysis was completed for air quality and noise given the type of operations and proximity to sensitive areas. The findings are discussed below.

5.1.6.1 Air Quality

The facility does not appear to have an ECA in place; however, they are still required to comply with MOECC air quality standards at the property line. Ready-Mix plant operations, such as QRM, have a high probability of fugitive dust emissions, originating from sources such as handling and processing of aggregate materials and vehicle traffic over on-site unpaved roads. Many fugitive dust sources are not explicitly covered under the ECA; instead, they are controlled through the use of Best Management Practices Plan (BMPP). A quantitative analysis was conducted to assess the potential impacts of fugitive dust emissions from the QRM Plant on the proposed development.

The quantitative assessment involved calculating the emissions from QRM's various fugitive dust sources. Emissions were calculated based on published emission factors from the U.S. EPA's *Compilation of Air Pollutant Emission Factors* (AP-42), production information provided by QRM staff, and RWDI's knowledge of similar operations. Emissions were calculated based on a typical production rate of 146 tonnes of concrete per hour, and 1,606 tonnes of concrete per day. AP-42 documents were used to calculate emissions, specifically, processing sources (cement unloading, weigh hopper loading, and concrete mix truck loading) used *Chapter 11.12 Concrete Batching*, material handling sources (handling of sand and aggregate material) used *Chapter 13.2.4 Aggregate Handling and Storage Piles*, and vehicle traffic on unpaved roads used *Chapter 13.2.2 Unpaved Roads*.

The U.S. EPA's AERMOD dispersion model was used to predict maximum concentrations resulting from the calculated fugitive dust emissions from the Quality Ready-Mix plant. AERMOD is one of the regulatory models approved by the MOECC for use in Ontario. AERMOD is a steady-state Gaussian model that is capable of handling multiple emission sources. Within the model, receptor grids as well as discrete receptor locations of interest can be considered. The AERMOD model options were selected following MOECC guidance.

Results of the modelling indicate that dust impacts from processing and material handling would be able to meet provincial standards at the property line.

The modelling results indicate dust from vehicles travelling on unpaved internal roads at the Quality Ready-Mix facility have the potential to cause nuisance issues on the Thundering Waters development; however, this is based on the assumption that no dust controls are applied to the on-site roads. The MOECC requires facilities of this type to develop and implement a BMPP to control dust releases from fugitive dust sources, including on-site roads. The modelling results indicate dust from Quality Ready-Mix will need to be managed, through the use of a BMPP, if one is not already in place. The onus will be on QRM to mitigate and maintain acceptable fugitive dust levels at any new development. However, recommendations to limit the potential impacts from QRM on the proposed development are provided in Section 6.

5.1.6.2 Noise

Given that QRM operates between 6 am and 5 pm, both the daytime (7 am to 7 pm) and nighttime (11 pm to 7 am) guideline limits are considered. The nighttime period has the strictest sound level limit (5 dB less) compared to daytime. Since the last iteration of the master plan, only medical offices are located immediately west and north of QRM which is a good design that removes these areas as receptors. The next closest noise-sensitive areas based on the February 2016 master plan, i.e., residential homes, are located to the southwest of QRM. Sound levels from QRM may be in excess of the applicable limits at the residential homes to the southwest of the facility and therefore a quantitative analysis was conducted.

A quantitative analysis was completed using the Cadna/A noise propagation model. Based on information provided by QRM, site sources were modelled using sound levels of similar equipment measured at another site. The current master plan calls for construction of the southwest residential area before the medical offices that is located immediately west of QRM. Therefore shielding of QRM noise sources by the medical buildings will not be present until they are built. As such, recommendations are provided in Section 6.

5.2 Rail

The rail line running through the middle of the subject land is of concern for noise and vibration and is therefore assessed. The noise and vibration findings are provided herein.

The CP and RAC guidelines outline the following minimum requirements for an industrial spur line that runs through the site:

- CP requires building setback of 15 m for residential dwellings. The latest master plan shows building setbacks greater than 15 m which satisfies the CP requirement.
- RAC suggests vibration measurements should be conducted for proposed dwelling units that are within 75 m of the rail right-of-way. The existing rail corridor is located within 75 m of some proposed structures.

Rail traffic data were obtained from correspondence with CP. CP classifies the rail line through the subject lands as an industrial spur line with its main purpose to serve existing industry on an on-demand basis. CP does not expect growth of industry in the area based on a conversation with RWDI personnel. Therefore the current traffic volumes were assumed to be the same for the 10-year time horizon as required under NPC-300. In addition, the maximum volume and speed were used.

There is currently no at-grade crossing in the immediate vicinity of the study area and therefore no whistles and bells are normally expected, as provided by CP. If at-grade crossings are proposed as part of the future development, an assessment of noise from bells and whistles may be necessary. Tracks in the vicinity of the site are assumed predominantly jointed track as a worst-case, and were modelled as such. If actual tracks are continuously welded, noise and vibration levels would be less.

5.2.1 Noise

Sound levels from rail traffic are assessed at both the outdoor living areas (OLAs) and façades, or plane of window. Sound levels were estimated using the Sound from Trains Environmental Analysis Method (STEAM) algorithms (MOECC, 1990). NPC-300 defines outdoor living areas (OLAs) as outdoor amenity areas intended for the quiet enjoyment of the outdoor environment and readily accessible from the building. Balconies and elevated terraces less than 4 m in depth or fully enclosed are not considered. The OLAs are also assessed only during daytime hours from 7 am to 11 pm. This assessment assumes that any balconies or elevated terraces are less than 4 m in depth, and therefore were excluded.

Two main locations have been used to represent sensitive areas: condominiums near Chemtrade, and residential areas across from the Town Centre. Based on STEAM, the OLAs at both representative locations are predicted to be less than 55 dBA. Therefore no noise control measures are required. However, some recommendations have been provided in the event that the current OLA locations change in the future.

The façade locations (as opposed to the OLAs) are predicted to exceed the MOECC limit of 55 dBA but are excesses are less than 5 dB. This result is considered significant, but reasonably controllable. Acoustic measures are required and outlined in Section 6.

5.2.2 Vibration

In the absence of actual measured data, vibration levels from freight trains were estimated using the U.S. Federal Transit Administration (FTA, 2006) algorithms. These algorithms present an analysis method for heavy rail sources.

The CP guidelines provide a vibration limit of 0.14 mm/sec RMS, between 4 and 200 Hz, for railway-induced ground vibration at residential sites within 75 m of their rail corridor. Although action is required for predicted vibration levels above 0.14 mm/s, RAC guidelines further identify levels over 0.2 mm/s to be a significant problem for frequent events.

Vibration levels as a result of freight trains are forecasted to be above 0.2 mm/s RMS calculated on a 1-second rolling window at the closest condominiums and residential areas. The closest condominiums and residential house foundations are located approximately 38 m and 28 m, respectively, to the nearest track. Recommendations are therefore provided in Section 6.

6. RECOMMENDATIONS

The following section outlines the required control measures to achieve a compatible existence between the proposed development and the existing industries and rail activity. A separate section includes additional considerations that are not required, but may be considered to further maintain this balance.

6.1 Required Control Measures

All of the required control measures presented in the following sections pertain to sound and vibration effects.

6.1.1 Quality Ready-Mix

The following control measures are provided as recommendations to reduce QRM sound levels to meet applicable limits at the nearest proposed receptors. Three different options and corresponding requirements are provided. One of the three options should be implemented to ensure QRM operations can remain in compliance at the proposed development points of reception.

6.1.1.1 Option 1: On-Site Barriers at QRM

- Collaborate with QRM to install localized barriers within their property. This option provides the least intrusive and most efficient control of noise from the facility. If QRM agrees to allow construction of mitigation on their site, then two acoustic barriers are required. The barrier designs should be refined based on detailed information from QRM to ensure appropriate reductions, since the current assessment is based on preliminary and assumed inputs.
  - A 5 metre high wall at the west side of cement unloading, and a 7 meter high L-shape wall around the loader area at the base of the conveyor (see Figure 4). No barriers would be required along the residential areas southwest of QRM if on-site barriers can be installed.
  - Barriers must be continuous, without gaps or cracks, and have a minimum face density of 20 kg/m^2. Examples of barriers meeting the required density are provided in Appendix B.

Figure 4: Potential Acoustic Barrier Locations within QRM

6.1.1.2 Option 2: Off-Site Barriers & Revised Start Time for QRM

- Collaborate with QRM to discuss hours of operation and see if facility operations could start at 7 am rather 6 am. This would reduce the need for high barriers (i.e., barriers up to 7 metres high).
    - Assuming that the delay start can be determined with QRM, construct acoustic barriers along the southwest residential areas as shown in Figure 5. Barrier heights will range from 2 to 2.5 meters high and 190 to 315 metres in length (depending if shielding benefits are recognized based on phased construction).
    - Barriers must be continuous, without gaps or cracks, and have a minimum face density of 20 kg/m^2. Examples of barriers meeting the required density are provided in Appendix B.
    - Adjust the phased construction such that the medical office buildings are built before the residential areas to the southwest. This will provide a shielding effect and reduce the length of barriers required to protect the residential area to the southwest of QRM.

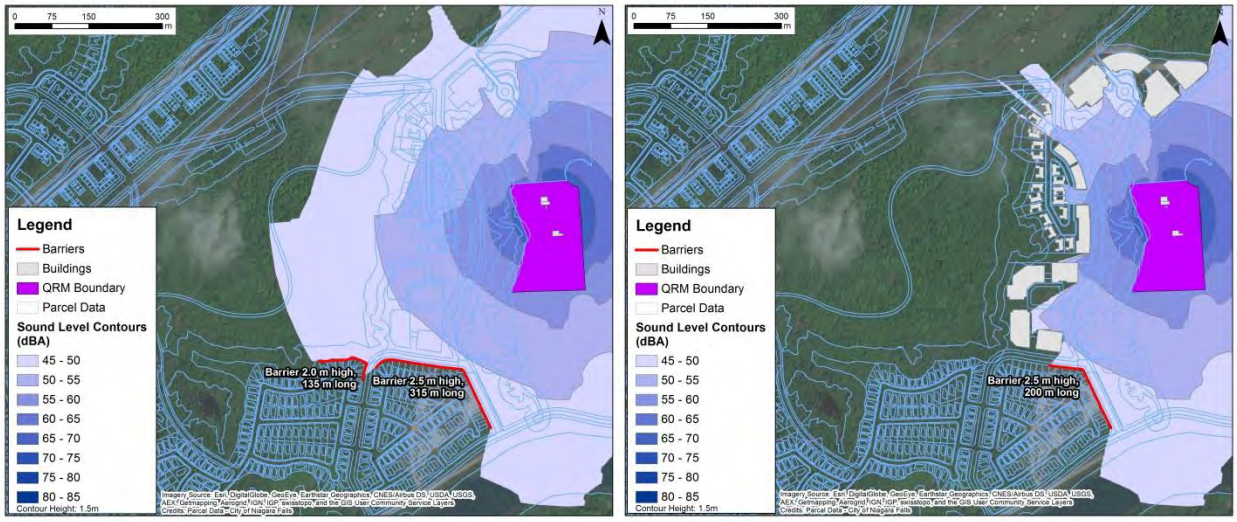

Figure 5: Predicted Sound Level Contours for QRM – before and after Medical Office Buildings

6.1.1.3 Option 3: Off-Site Barriers Only

- If option 1 and option 2 are not feasible, installation of barriers between QRM noise sources and the southwest residential area will be required to break the line of sight. The required height will be dependent on the barrier location.

6.1.2 Rail Noise

Sound levels due to rail activity at façade locations (condominiums near Chemtrade and residential units across from the Town Centre) are predicted to be between 55 dBA and 60 dBA; these levels are considered significant, but reasonably controllable. Acoustic measures are required and are outlined below.

- Provision for the installation of central air conditioning.

- Masonry construction for the façades facing the rail corridor. Use upgraded windows with a thicker pane; minimum window STC of 40. Details to be confirmed at detailed design.
- The above window requirements are required at façades 90º to the façade facing the rail corridor.
- Standard window construction meeting the Ontario Building Code is acceptable for façade opposite the façade facing the rail corridor (i.e., back façade).
- Ensure exterior window frames/doors and insulation are air tight. Use acoustic seals for operable windows/doors for noise insulation.
- Exterior door construction should be of heavy, thick and/or dense materials (i.e., no hollow-core doors).
- Warning clause Type A and Type B are required. Sample wording are provided in Section 6.3.

6.1.3 Rail Vibration

Predicted vibration levels as a result of freight trains are predicted to be above 0.2 mm/s RMS based on modeling which is considered to be significant by CP. The following are required to minimize rail vibrations from entering the dwelling units where people may perceive the vibrations:

- Vibration mitigation for low-rise buildings 3-storeys or less (see Figure 6)[1]:
    - Isolate the upper floors from the foundation wall and internal column supports using rubber pads (5-20 mm deflection under load).
    - use hollow core concrete for 1st floor;
    - seal the seam around the foundation wall (created by the rubber pads) that is insulated and water tight;
    - finishing components must be attached either above or below isolation joint; and
    - line the outside foundation walls facing the rail line and 90º to the rail line with a soft, resilient layer.
- Vibration mitigation for deep foundation buildings for very large design loads (see Figure 6)[1]:
    - The appropriate vibration isolation needs to be designed through collaboration between the structural and vibration engineers as part of the detailed building design; and
    - Where foundation is not deeper than the surface wave, isolation may be required beneath columns and their foundations.
- In addition to the resilient layer, large diameter gravel backfill covered with filter fabric to prevent topsoil infiltration can also be used adjacent to the closest foundations to provide a break in the soil, and further reducing vibration levels.

[1] Guidance taken from the RAC's "Guidelines for New Development in Proximity to Railway Operations".

RAC indicates that minor reductions in vibration levels (approximately 30%) can be achieved through lining of the outside of the foundation walls with a resilient layer, as a minimum. The lining must be quite soft but able to withstand the lateral soil pressures present on the foundation wall. This lining should be installed on the foundation areas facing the rail line and 90º to the rail line.

Low-Rise Buildings *Deep Foundation Buildings*

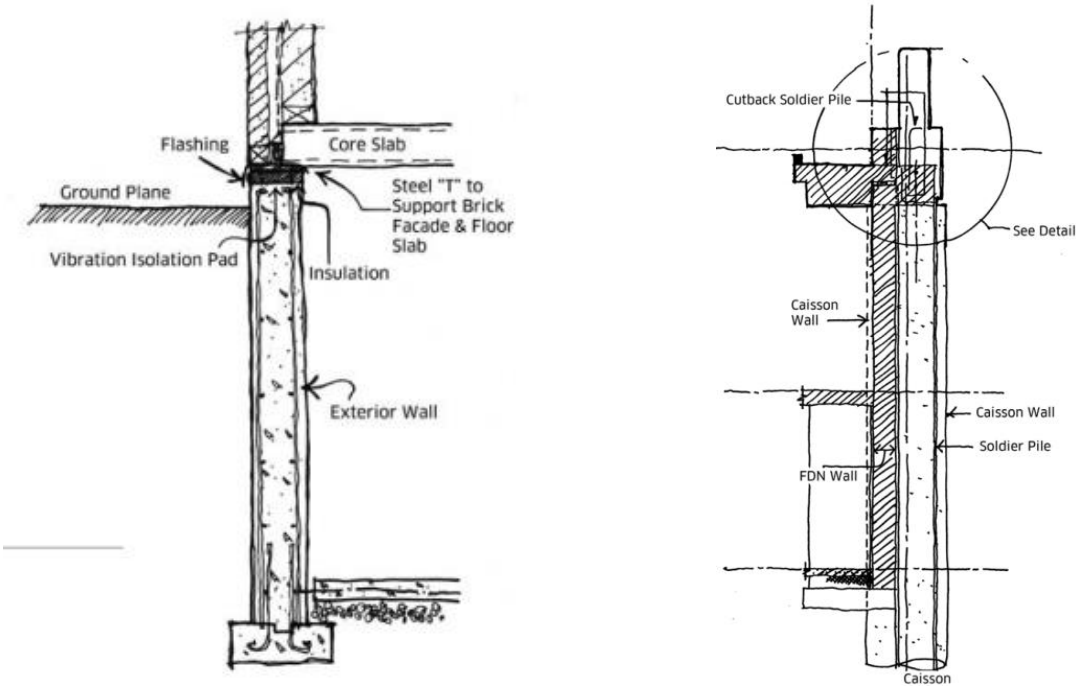

Figure 6: Examples of Vibration Isolation (courtesy of RAC)

6.2 Optional Considerations

Although compliance with the limits is predicted, optional considerations provided herein are best practices to follow to minimize potential for undesirable effects.

6.2.1 Quality Ready-Mix

Quality Ready-Mix shows some potential for nuisance-level fugitive dust impacts on the eastern portion of the proposed Thundering Waters development. The onus will be on Quality Ready-Mix to maintain acceptable levels of fugitive dust beyond their property line; however, the following recommendations may help avoid any future conflicts.

- Avoid placing dust-sensitive land uses on the eastern portion of the Thundering Waters development adjacent to the Quality Ready-Mix property. Dust sensitive land uses include such things as senior's residences, daycares, and residential locations. The medical offices currently located adjacent to the Quality Ready-Mix property, according to the Master Plan, are less sensitive to dust than the land uses listed above;

- Maintain vegetative buffers between the Quality Ready-Mix property and the proposed development, where possible. In order to effectively attenuate potential dust from Quality Ready-Mix operations, the vegetative buffer should consist of a minimum of three rows of coniferous trees (approximately 10 meters), with a minimum initial height of 2 meters;
- Assist Quality Ready-Mix in designing, implementing, and maintaining a fugitive dust best management practices plan to limit the emission of fugitive dust from unpaved roads at the facility; and

In addition to the above dust control measures, the following may be considered to address noise concerns:

- Discuss with the local land-use planning authority whether the proposed residential areas could be defined as Class 4 Areas under NPC-300. The Class 4 Area designation would allow for less stringent noise criteria for stationary sources (i.e., QRM facility). Note that classification of an area to this designation is at the discretion the local land-use authority and would require significant consultation and the negotiation of legally-binding agreements between the source owner, the receptor, and the land-use planning authority. Noise control measures may still be desirable in Class 4 areas to reduce the potential for annoyance (even when criteria are met). Such a designation would not alter noise control requirements associated with transportation.

6.2.2 Palfinger Inc.

Below are desirable features recommended to help reduce the potential for impulsive noise to affect proposed nearby noise-sensitive areas:

- **Residential areas to the southeast:** acoustic barriers and/or detailed assessment.
  - Construct acoustic barriers, approximately 5 m in height at the southeast property line of Palfinger facing southeast residential areas. The potential location of the barriers is shown in Figure 7.
  - Barriers constructed closer to the noise source (i.e., at Palfinger) are more effective than barriers constructed at distances further from the noise sources.
  - Acoustic barriers can be constructed with a wide range of materials. The minimum requirements for acoustic barriers are: must be continuous, without gaps or cracks, and have a minimum face density of 20 kg/m^2. Examples of acoustic barriers meeting these requirements are provided in Appendix B.
  - Palfinger should be contacted and assessed in detail as part of a separate detailed design to confirm if the assessment assumptions still warrant the above recommendations.
- **School to the south:** internal layouts and inoperable windows.
  - Locate classrooms and lecture halls away from the north building façade.
  - Single-loaded corridors facing Palfinger can be incorporated to provide noise buffer for sensitive areas. Standard double-pane inoperable windows can be used.

- Upgraded inoperable windows may be desirable if both of the above cannot be achieved.

- **Student residences to the south:** inoperable windows.
  - Standard double-pane inoperable windows can be used particularly on the façade facing Palfinger.

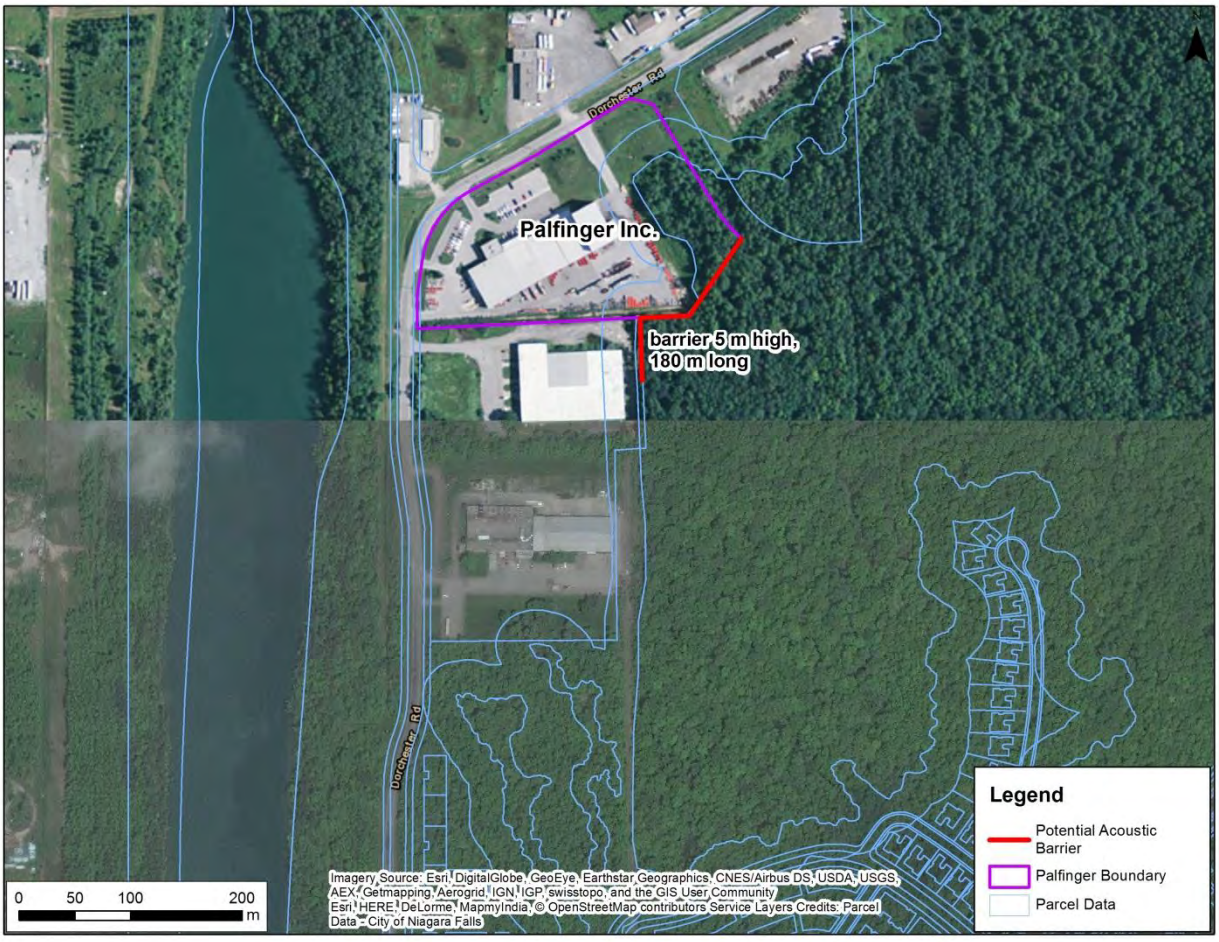

Figure 7: Potential Acoustic Barrier Location near Palfinger

6.2.3 Rail Noise

Although sound levels at the proposed OLAs are less than 55 dBA, the following are recommended for consideration:

- **Condominiums near Chemtrade:**
  - If the Master Plan changes such that OLAs are to be located elsewhere at grade between the condominiums or on top of the condominium, provisions to break line of sight may be required. Further analysis would be necessary to determine the height and extent of appropriate screening.

- Do not locate OLAs to directly face the rail tracks.

In general, CP requires a 1.83 m high chain link security fence be constructed and maintained along the common property line of the railway and the development at the expense of the developer.

6.2.4 Rail Vibration

Given that rail vibration is specific to each site and modelled vibration levels can be conservative in nature, the following are recommended to confirm or modify the above required vibration control measures:

- Vibration measurements are recommended prior to finalizing the design at the proposed dwelling units within 75 m of the rail right-of-way. This is in line with the RAC rail guidelines.
  - These measurements will allow for a better understanding of actual vibration potential at the proposed development with respect to vibration propagation and can enable refinement of the modelling.
  - May reduce the need to overdesigning the buildings from a vibration perspective.

6.3 Warning Clauses

Warning clauses are required to be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit.

CP guidelines indicate that the following warning clause will be included in purchase agreements for developments within 300 metres of the CP right-of-way:

Type A: required by CP

"Canadian Pacific Railway or its assigns or successors in interest has or have a railway right-of-way and yard located within 300 meters from the land subject hereof. There may be alterations to or expansions of the railway facilities and/or operations in the future, which alterations or expansions may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwellings. CPR will not be responsible for complaints or claims arising from the use of its facilities and/or its operations on, over or under the aforesaid right-of-way."

The following warning clause is required by the MOECC if windows are to be present on that façade:

Type B: recommended by MOECC

"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."

APPENDIX A

RWDI
CONSULTING ENGINEERS & SCIENTISTS

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RWDI AIR Inc.
650 Woodlawn Road West
Guelph, Ontario, Canada
N1K 1B8
Email: solutions@rwdi.com

November 6, 2015

Ms. Helen Chang
Chair Woman
GR(CAN) Investment Co., Ltd.
8500 Leslie Street
Suite 502
Markham, ON L3T 7M8

Re: DRAFT Land Use Compatibility Assessment between Industrial and Sensitive Land Uses
Thundering Waters Secondary Plan
RWDI Reference No. 1600158

Email: changzhiying2008@sina.com

Dear Ms. Chang,

RWDI AIR Inc. (RWDI) was retained by GR(CAN) Investment Co., Ltd. to conduct a Land Use Compatibility Assessment for the Thundering Waters Secondary Plan development located in Niagara Falls, Ontario. This letter report outlines the review undertaken and summarizes the findings of the assessment.

INTRODUCTION

The Thundering Waters Secondary Plan was initiated by the City of Niagara Falls, Region of Niagara, and the Niagara Peninsula Conservation Authority to understand the opportunities and constraints for the planning and development of the study area. This study is being undertaken to create a long-term vision for the Thundering Water lands and to provide guidance to manage change in the community that will occur over time.

This letter report has been prepared to provide guidance to the Secondary Plan process and the subsequent development of any policy or zoning by-law amendments. The objective is to ensure compatibility of land uses and flexibility for growth in developing the community.

LOCATION AND EXISTING LAND USES

The Thundering Waters lands are currently undeveloped and are located in a suburban area within the City of Niagara Falls. The lands are bounded by Oldfield Road to the north, the Stanley Park Industrial Park to the east, the Welland River to the south, and the Hydro Canal to the west. The study area is shown in Figure 1. A rail line runs diagonally through the centre of the subject lands with a spur line heading north just past Dorchester Road on the west side of the parcel. The rail line ends in the

northeast as it approaches the downtown area of the City of Niagara Falls. It is expected that the main rail line still sees some limited use given rail cars at some nearby businesses, although details on the volume of traffic is unknown, while the spur line is no longer in use.

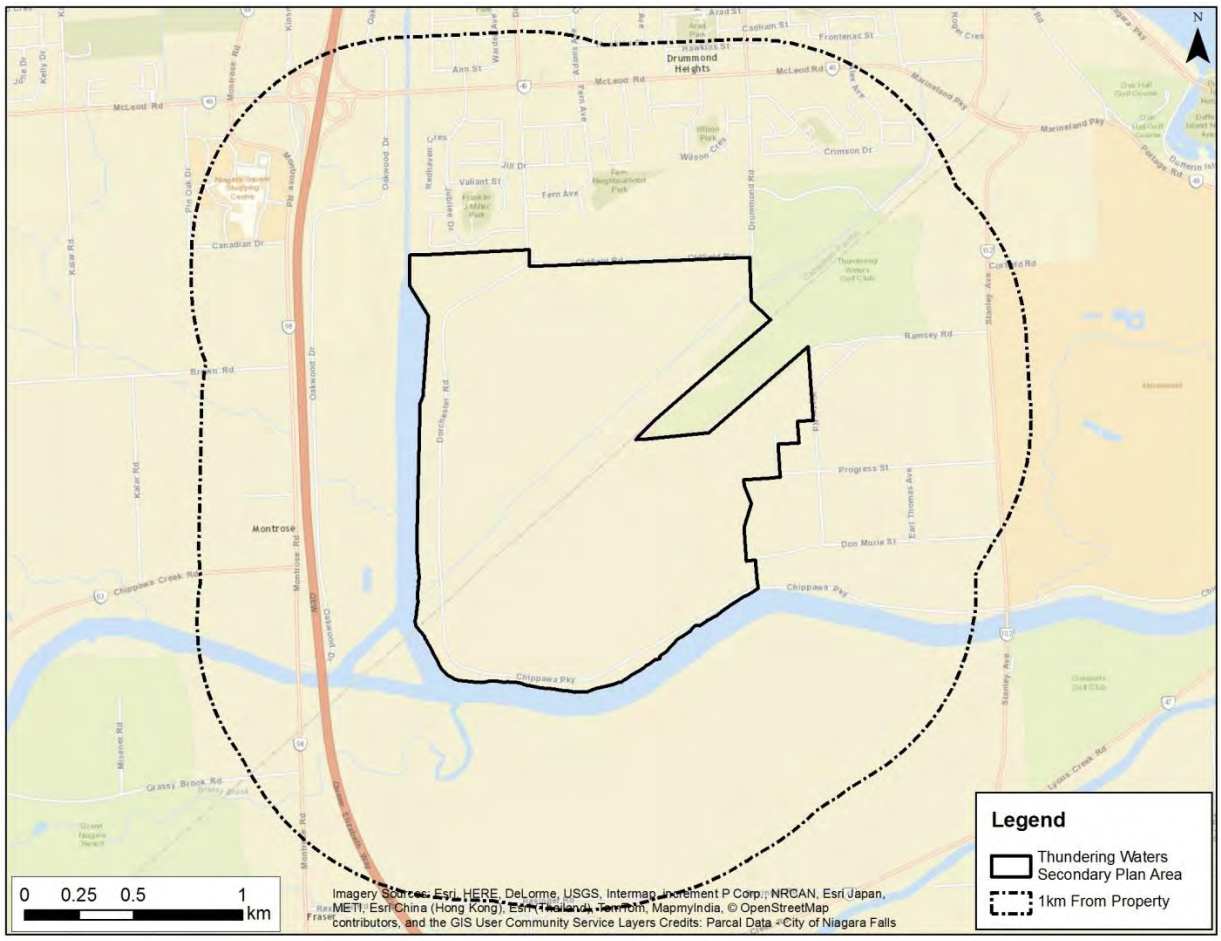

Figure 1: Study Area

The Thundering Waters subject lands are approximately 500 acres in size and are identified as *Residential* and *Environmental Protection Area* in the City of Niagara Falls Official Plan. Industry has been operating nearby in this area for many years and historically in close proximity to residential uses. The subject lands are surrounded primarily by residential, commercial, and industrial land uses. Figure 2 shows the current Official Plan designations in the study area and surrounding areas.

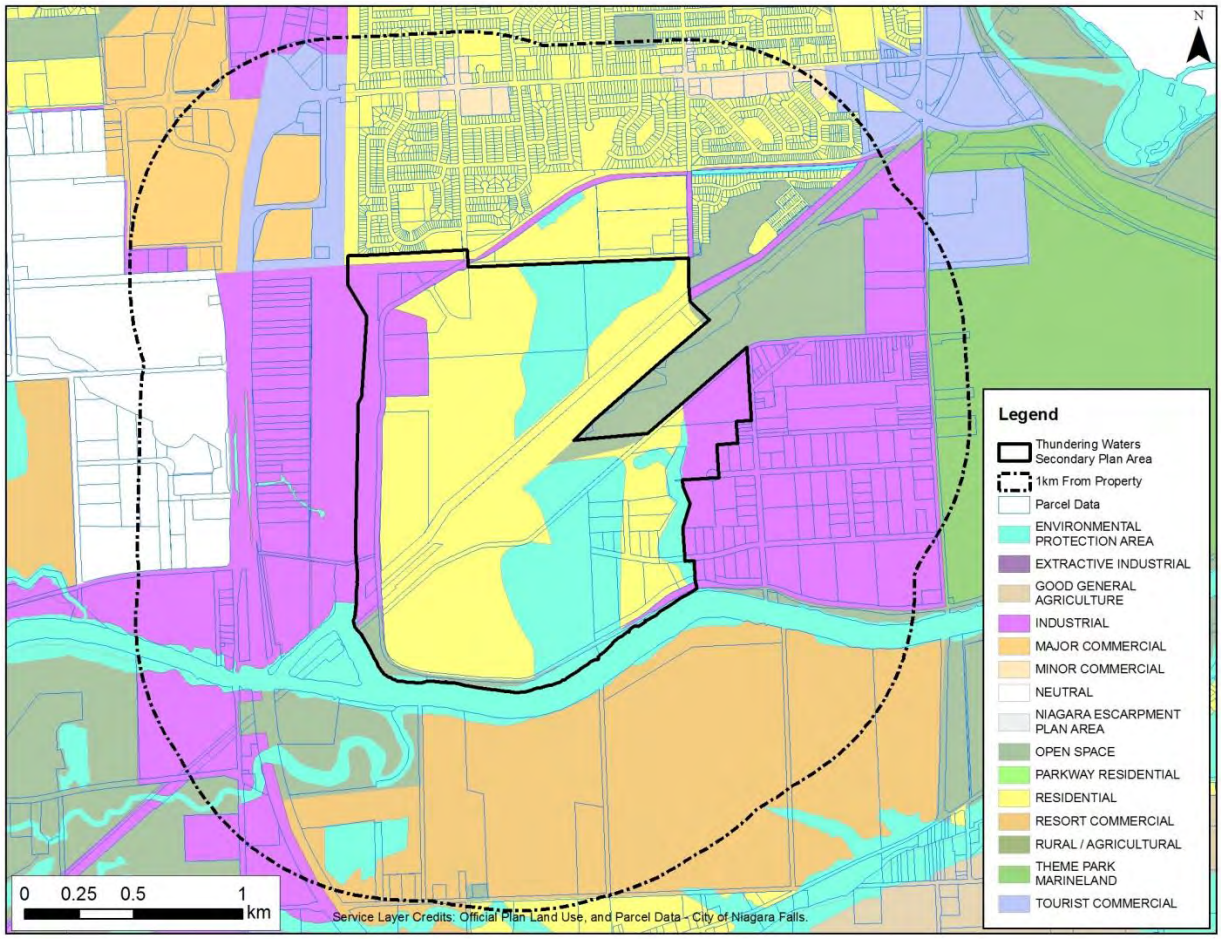

Figure 2: Current Official Plan Designation

APPLICABLE GUIDELINES

A number of guidelines have been reviewed that relate to assessing the potential for adverse impacts from industry on sensitive land uses. Most of the documents reviewed have been produced by the Ontario Ministry of the Environment and Climate Change (MOECC). They are as follows:

- MOECC Guideline D-6: “Compatibility Between Industrial Facilities and Sensitive Land Uses”
- MOECC Environmental Noise Guideline NPC-300 “Stationary and Transportation Sources – Approval and Planning”

- MOECC Regulation 419/05 Air Pollution – Local Air Quality
- MOECC 4871e – Noise Screening Process for s.9 Applications
- Federation of Canadian Municipalities and the Railway Association of Canada – "Guidelines for New Development in Proximity to Railway Operations"
- City of Niagara Falls Noise By-Law 2004-105.

D-Series Guidelines

The MOECC D-series guidelines provide direction for land use planning to maximize compatibility of industrial uses with adjacent land uses. The goal of Guideline D-6 is to minimize encroachment of sensitive land uses on industrial facilities and vice versa, in order to address potential incompatibility due to adverse effects such as noise, odour and dust. Recommended minimum separation distances are provided based on the industry size and operation type.

Guideline D-6 separates industry into three broad categories, depending on the nature of their operations and the types of potential impacts:

- Class I facilities are small scale, self-contained plants or buildings, which produce and/or store products in a package, and have low probability of fugitive emissions. They have daytime operations only, with infrequent movements of products and/or heavy trucks.
- Class II facilities perform medium scale processing, with some outdoor storage of wastes and materials, frequent movement of products and/or heavy trucks, and shift work.
- Class III facilities conduct large scale manufacturing, and are characterized by their large size, large production volumes, continuous operations and movements of products, and a high probability of fugitive emissions.

The recommended minimum separation distances and areas of potential influence (i.e., distance within which adverse effects could potentially occur) are summarized below.

Table 1: Guideline D-6 Recommended Setback Distances and Area of Influence

Industry Classification	Recommended Minimum Separation Distance (m)	Potential Area of Influence (m)
Class I: Light Industry	20	70
Class II: Medium Industry	70	300
Class III: Heavy Industry	300	1000

Guideline D-6 states that the proponent of a development should provide studies for noise, dust and odour, but in the absence of such studies, the influence areas shown in Table 1 shall be used. Under Section 4.6 of Guide D-6, the noise studies must comply with MOECC Publication LU-131 requirements (N.B. LU-131 was replaced by NPC-300 in 2013).

Appendix A of Guideline D-6 provides criteria for classifying industrial land uses, based on their outputs, scale of operations, processes, schedule and intensity of operations. Table 2 provides the classification criteria and a comparison with anticipated operations.

Table 2: Guideline D-6 Industrial Categorization Criteria

Criteria	Class I	Class II	Class III
Outputs	• Sound not audible off property	• Sound occasionally audible off property	• Sound frequently audible off property
Scale	• No outside storage • Small scale plant or scale is irrelevant in relation to all other criteria	• Outside storage permitted • Medium level of production	• Outside storage of raw and finished products • Large production levels
Process	• Self-contained plant or building which produces / stores a packaged product • Low probability of fugitive emissions	• Open process • Periodic outputs of minor annoyance • Low probability of fugitive emissions	• Open process • Frequent outputs of major annoyances • High probability of fugitive emissions
Operation / Intensity	• Daytime operations only • Infrequent movement of products and/or heavy trucks	• Shift operations permitted • Frequent movements of products and/or heavy trucks with the majority of movements during daytime hours	• Continuous movement of products and employees • Daily shift operations permitted

Often an industry will fall between two Classes and judgment is required to apply the most appropriate classification given the balance of the criteria. Guideline D-6 states that no incompatible development should occur within the recommended minimum separation distance as noted in Table 1. Section 4.10 of the Guideline, however, identifies exceptional circumstances with respect to redevelopment, infill and mixed use areas. In these cases, it suggests that separation distances less than the recommended minimum values may be acceptable if a justifying impact assessment is provided.

Environmental Permitting for Industry

Section 9 of the Ontario Environmental Protection Act requires industries in Ontario to obtain an Environmental Compliance Approval (ECA) prior to discharging a contaminant into the natural environment. An ECA covers a range of potential contaminants including air quality, noise, vibration, solid waste, and liquid waste.

Generally a number of technical studies are required as part of an ECA application to demonstrate that an industry will not cause an adverse impact on the natural environment. The MOECC has produced a number of guidelines and regulations to deal with different contaminants and how the technical studies should be completed. Relevant guidelines and regulations are described in the following sections.

NPC-300 Noise Guideline

NPC-300 noise criteria applicable to an industry vary depending on the character of ambient noise in the surrounding area. Class 1 is an urban area with an acoustic environment that is continuously dominated by the sounds of human activity, as would be found in a major urban centre. Class 2 areas are suburban or semi-rural areas where sounds of human activity drop off earlier in the evening. Class 3 areas are rural where the acoustic environment is dominated by natural sounds. The acoustic environment surrounding the study area would be classified as a Class 2 area.

The MOECC sound level criteria for stationary noise in Class 2 areas are shown in Table 3 (i.e., Class 1 and 3 purposely omitted). The sound levels are described in terms of the energy equivalent sound exposure level (L_{EQ}) on a one-hour basis. Where the hourly background sound level is higher than the values in Table 3, the background sound level is used as the applicable limit.

Table 3 provides both outdoor point of reception criteria and plane of the window criteria at the receptor. Outdoor points of reception are assessed when associated with dwellings or noise sensitive zoned lots. For dwellings, the outdoor point of reception is on the land use within 30 m of a façade of the building, at a height of 1.5 m above ground, in backyards, front yards, terraces or patios. Points of reception at the façade of a building include windows or openings in the façade leading to noise-sensitive spaces such as bedrooms, living rooms, eat-in kitchens, classrooms, therapy or treatment rooms, and assembly spaces for worship.

Table 3: One-hour Sound Level Criteria for Stationary Sources in Class 2 Areas ($L_{EQ,1\text{-}hour}$, dBA)

Time Period	Time of Day	Outdoor Points of Reception	Plane of Window
Daytime	0700-1900h	50	50
Evening	1900-2300h	45	50
Night-time	2300-0700h	--	45

The MOE NPC-300 criteria for stationary sources apply to cumulative sound from a site.

NPC-300 also includes criteria for sound from road and rail sources. These are summarized in Table 4.

Table 4: Outdoor and Indoor Sound Level Criteria for Road and Rail (L_{EQ}, dBA)

Type of Space	Time Period (16-hr or 8-hr)	Road	Rail
Outdoor Living Areas	0700-2300h	55*	
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	0700-2300h	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	2300-0700h	45	40
Sleeping quarters	0700-2300h	45	40
	2300-0700h	40	35

* Limit in outdoor living area from both road and rail. All other limits are indoors.

Regulation 419/05 – Local Air Quality

The regulation framework for industrial air quality emissions in Ontario is outlined in Ontario Regulation 419/05 (O.Reg. 419/05): Local Air Quality. O. Reg. 419/05 applies to all industries in the province and is the regulation against which contaminant concentrations from air emissions are assessed under Section 9 of the Environmental Protection Act.

Demonstration of compliance with this regulation is a requirement as part of the ECA process. Air quality standards are evaluated at a Point of Impingement (POI). "POI" is defined in the regulation to exclude points that are on the same property as the emission source (except in certain circumstances), and to include all off-property points that are at ground level. The term POI also includes off-property points that are above ground, on multi-floor structures. In areas where multi-floor structures are permitted but none currently exist and none are currently planned, above ground POI's are typically not considered. Thus, care is sometimes needed when introducing new multi-floor uses into areas near existing industries, as the permitting process for those industries may not have considered the possibility of above-ground POI's.

Odour is regulated on a case-by-case basis in Ontario. Industries of a type known to be of concern for odours are typically subjected to an odour standard as a condition of their ECA. Odours can be quantified and expressed in terms of Odour Units (OU). Under MOECC guidance, the desired odour limit is 1 OU. The MOECC guidance allows an exceedance of the 1 OU provided it occurs less than 0.5% of the time.

Fugitive dust from industrial operations does not need to be assessed quantitatively under O. Reg. 419/05 (except in specific circumstances), but industries with extensive outdoor handling of bulk materials and/or operations of mobile equipment on unpaved areas are typically required to have a dust management plan in place, consistent with industry best practices.. Sources of fugitive dust typically found from industrial sites within an urban area include stock piles of aggregate and truck traffic on unpaved parking areas.

Noise Screening Process for ECA Applications

The MOECC has developed a screening tool for certain types of industries that are in the process of applying for a new ECA. The basis for the tool is that the cumulative noise emissions from a facility will not exceed the MOECC noise guidelines at a point of reception as long as there is sufficient separation distance between the industrial site and the sensitive land use.

The screening process looks at both the type of industry and the type of equipment on the industrial site. A recommended minimum setback distance between the industrial site and the nearest sensitive land use is determined and should the actual separation distance be less than the minimum recommended, the industrial applicant has to prepare a detailed noise impact assessment. The detailed assessment may then lead to requirements for noise mitigation at the industrial site.

Guidelines for New Development in Proximity to Railway Operations

The guideline was developed in part to assist municipalities and developers in establishing a consistent approach in assessing new developments that are in close proximity to railway operations. New developments must be carefully planned to ensure that railway operations do not expose residents to excessive noise and vibration levels from railway operations, and also new developments do not interfere with railway operations.

In the absence of specific zoning by-law requirements, the document provides specific guidelines and setback distances for safety, noise, and vibration. Tables 5 through 7 provide the suggested guidelines.

Table 5: Standard Recommended Building Setbacks from Railway Operations

Type of Operation	Setback Distance (m)
Freight Rail Yard	300
Principal Main Line	30
Secondary Main Line	30
Principal Branch Line	15
Secondary Branch Line	15
Spur Line	15

Table 6: Recommended Minimum Noise Influence Zone from Railway Operations

Type of Operation	Setback Distance (m)
Freight Rail Yard	1,000
Principal Main Line	300
Secondary Main Line	250
Principal Branch Line	150
Secondary Branch Line	75
Spur Line	75

Table 7: Recommended Minimum Vibration Influence Zone from Railway Operations

Type of Operation	Setback Distance (m)
All operations	75

The guide provides a number of examples for noise and vibration mitigation measures including good design practices that can be implemented for new developments. The guide also recommends that detailed noise and vibration studies are undertaken early in the design process to ensure that new developments are designed appropriately to minimize noise and vibration levels for residents and building safety.

City of Niagara Noise By-Law 2004-105

The City of Niagara Noise By-Law does not address sounds from industrial uses or rail.

INDUSTRY MAP INVENTORY

A site visit was completed on September 16, 2015 to review the industrial areas within a 1 km zone around the study area. This distance is consistent with the Guideline D-6 zone of influence of a Class III facility identified in Table 1. Industries identified within this boundary were considered to have the potential for affecting the proposed sensitive land uses on the Thundering Waters subject lands.

Industrial zoned lands identified during the site visit, and from the City of Niagara Official Plan, were categorized according to Guideline D-6 classifications (Class I, II or III) for their potential to influence nearby sensitive land uses. Where the facility's classification was not completely apparent, additional research was conducted to determine the type of operations / products and hours of operation. The resulting classifications are summarized in Appendix A. Figure 3 shows the resulting category for each parcel of land. The land use classifications inherently include some subjectivity. Additional investigation of the critical lands (e.g., Class 3 lands) may indicate a lower classification that produces less restrictions on development.

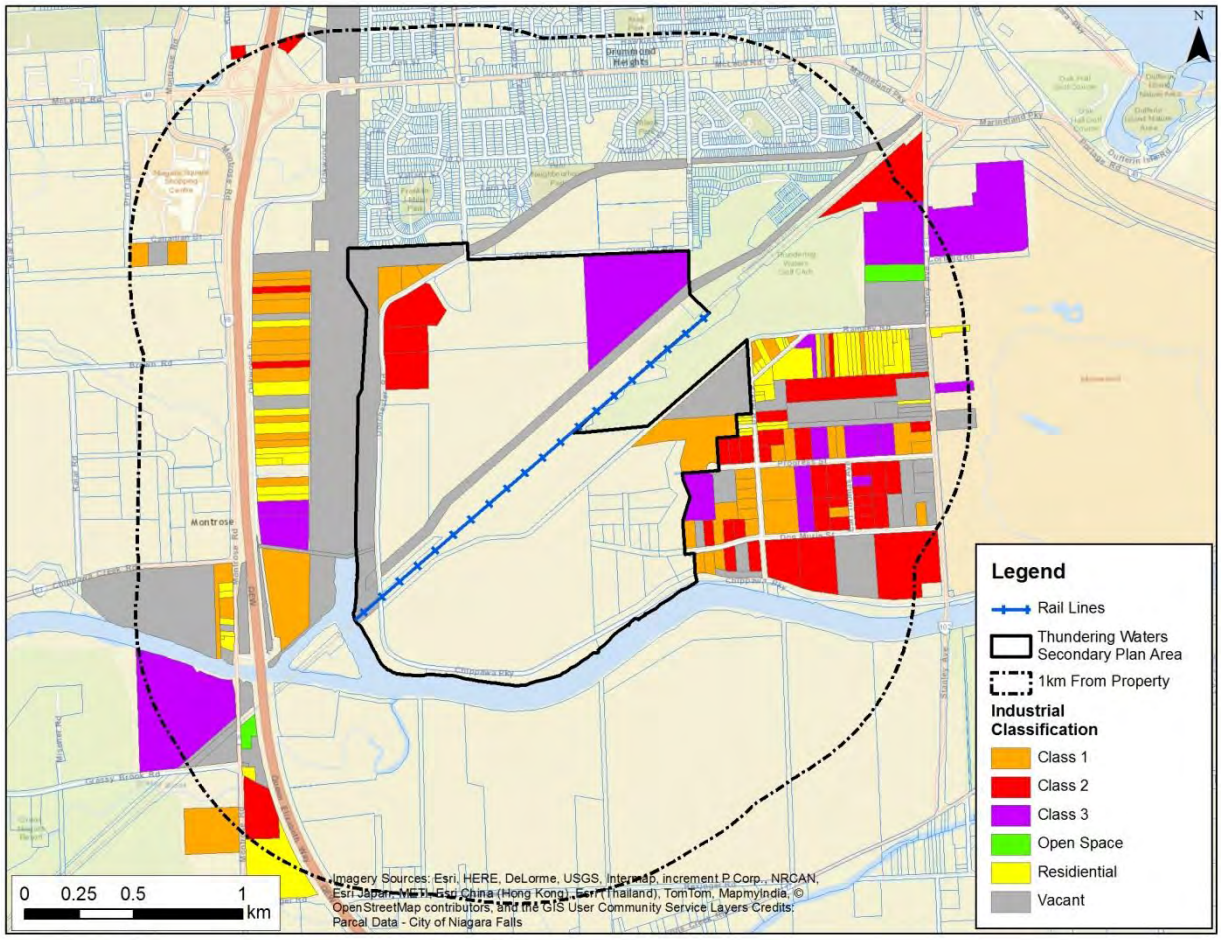

Figure 3: Industrial Land Categorization

A number of properties and buildings were vacant during the study and are indicated as such in Figure 3. Where there are lands that currently do not have an industry identified, they have been classified in Figure 3 as vacant. Some properties are identified as residential in the zoning, but were determined to be industrial based on the site visit and were classified as such for this study.

The potential impacts of the above industries on the proposed development are discussed in the next section.

FINDINGS

The industrial classifications shown in Figure 3 were used to determine the potential areas of influence from each property to sensitive land uses. Where potential areas of influence impose on incoming development, Guideline D-6 states the proponent of a development should provide detailed studies for noise, vibration, dust or odour (as applicable).

Figure 4 presents the area of potential influence (from Table 1) from industrial lands on the subject lands. These regions indicate area of potential effects from the local industries. A significant portion of the subject lands are affected by the influence of the Class 3 industries.

If development of sensitive land uses were to occur in these areas, detailed studies would be required. Such detailed studies typically require a detailed understanding of each industrial process, specific details of the sources operating at each site, and modelling to predict the actual area of potential impact. The results of the detailed studies may result in mitigation requirements for the incoming development.

Table 1 also presents recommended minimum setback distances for the various land use classifications. Guideline D-6 recommends that development of sensitive land uses be avoided within these regions, subject to the results of detailed studies. Further study may confirm if development is feasible within these setbacks, or if mitigation at the source or receiver or both will be sufficient to address any concerns.

The area of influence from a principle rail branch line is also indicated in Figure 4. The rail line noise and vibration areas of influence were taken from Table 6 and 7, respectively. As detailed information on the rail line was not available, it is conceivable that the railway area of influence may decrease if the line is in less use than what was assumed (i.e., principle branch line). Development in these rail setback areas is only recommended with a detailed assessment of the current and future rail use activities for the line. It is anticipated that mitigation measures for development in this area will be necessary. Further discussion is included in the recommendations.

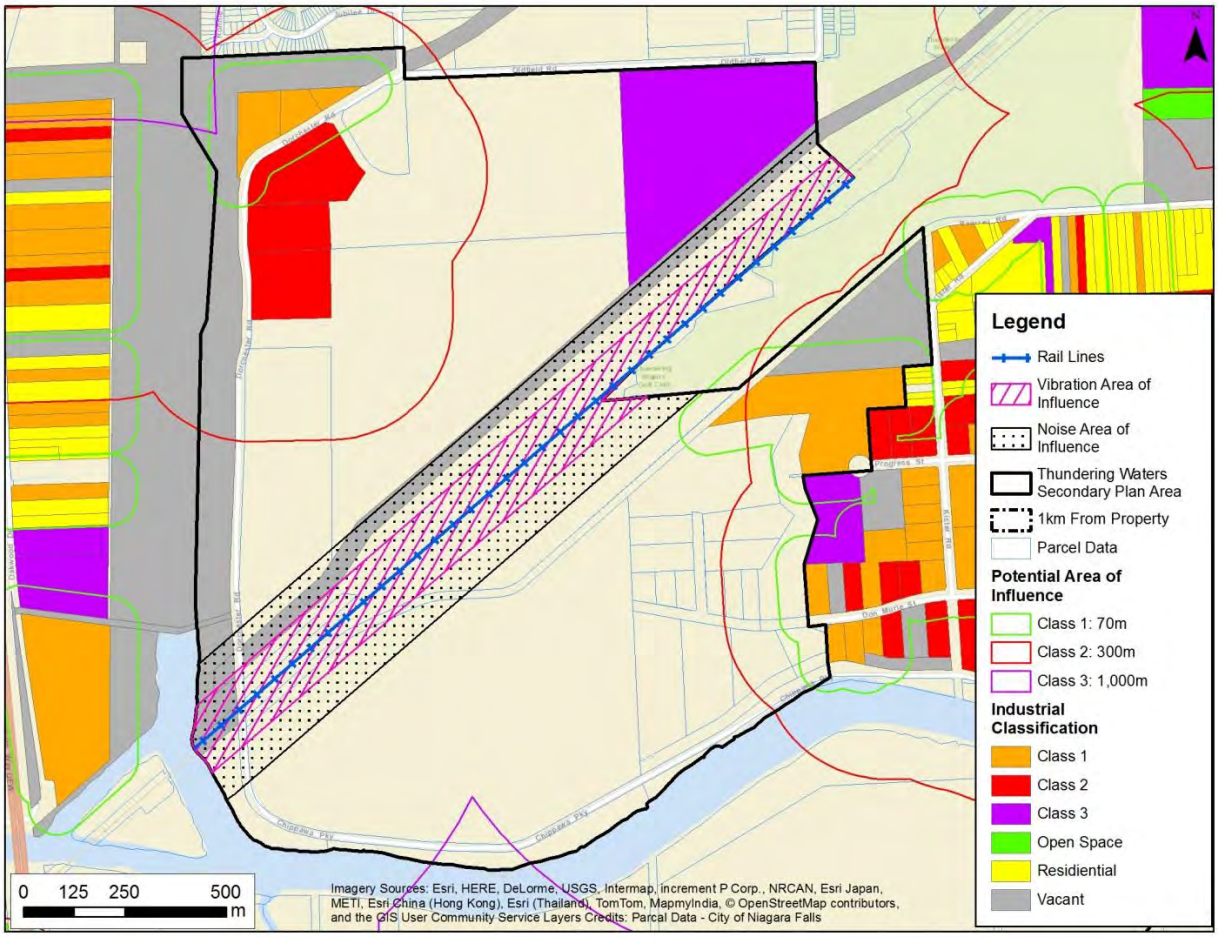

Figure 4: Potential Areas of Influence

RECOMMENDATIONS

The results of our preliminary assessment indicate a significant portion of the proposed development lands are within areas of potential influence from nearby industrial uses, primarily a few Class 3 industries. For the development to proceed in areas where sensitive land uses are proposed, the following recommendations are provided for consideration:

- Development of sensitive land uses (e.g., residential, educational, etc.) within the buffer regions identified in Figure 4 are feasible provided the proponent is willing to conduct detailed assessments of air quality, noise and vibration (as applicable). These studies may identify that mitigation measures are required on the incoming development. Only existing industries that have potential for causing adverse impacts (i.e., noise, vibration, dust or odour) in the study area, or proposed industries for which a site plan approval application has been made, need to be assessed. Potential future industrial uses that have not yet been determined need not be considered in the assessment.

- Prior to undertaking detailed studies, a more detailed review of the identified Class 3 industries could be undertaken and see if a re-classification to Class 2 might be warranted, and the potential area of influence reduced.
- Development of sensitive land use within the minimum recommended separation distances outlined in Table 1 may not be feasible or may be subject to more significant mitigation requirements. This outcome can be confirmed through detailed studies.
- Sensitive land use development in the subject lands that are within the railway influence zones identified in Figure 4 will require a detailed rail and vibration study. This will result in significant mitigation requirement for the incoming development. Classification of the rail line may also be modified based on the use conditions of the line.
- Detailed assessments should follow appropriate MOECC guidelines relevant to the type of study being conducted.

Mitigation Recommendations

There are a number of mitigation measures that could be implemented as part of the planning process. Table 10 provides conceptual mitigation measures for sensitive land uses. GR (CAN) will be required to undertake studies to identify specific mitigation methods required once details of the development are available. Mitigation techniques generally apply to the sensitive land use, however agreements may be struck with adjacent industries to install mitigation at the source, potentially at the expense or partial expense of GR (CAN).

Table 10: Conceptual Mitigation Measures for Proposed Sensitive Land Uses

Mitigation Measure [1]	Limiting Adverse Effect
Barrier	Noise
Enclosed Balconies	Noise
Building Location/Orientation/Room Layout	Noise
Upgraded Façade	Noise
Deep Foundations	Vibration
Vibration Isolation	Vibration
Ventilation (Air Conditioning)	Noise, Odour

Note: All mitigation measures are applicable for railway operations. Only Ventilation (Air Conditioning), Building Location/Orientation/Room Layout, and barriers may be required for other land uses and activities.

CLOSING

We trust the information contained within will warrant a conference call to discuss the results of our findings and the next steps. Once you have had a chance to review our letter, please contact us to set up this call.

Yours very truly,

RWDI AIR Inc.

Melissa Annett, d.E.T.
Senior Project Manager, Associate

MEA/kta

CC: Cynthia Lai – GR (CAN) Investment Co. Ltd.
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jones@mshplan.ca

Stephen Bedford – Stephen Bedford Consulting Inc.
sbc@stephenbedford.ca

Attach.

APPENDIX A

Column1	Address	Longitudel	Latitudel	Company Name	Classification	Notes
1	7888 OAKWOOD DR	-79.120075	43.061343	Ok Tires; Joe's Place; Niagara Auto Auction	Class 1	
2	DON MURIE ST	-79.084288	43.052183	Big lot with small building (looks vacant - no signage)	Class 1	Looks like a large lot with a small vacant building. Nothing on Google and no signage.
3	7818 OAKWOOD DR	-79.12002	43.062623	KIA motors	Class 1	
4	6225 PROGRESS ST	-79.097582	43.055846	Halucha Engineering	Class 1	Previous Washington Mills
5	6050 DON MURIE ST	-79.092216	43.052203	Dynaco Canada Inc.	Class 1	
6	6040 PROGRESS ST	-79.092294	43.053567	Three companies under this address - Spencerarl-Corporate, Niagara Falls Brewing Co., Dorcy Ashflash Canada Ltd.	Class 1	
7	8676 OAKWOOD DR	-79.120527	43.049326	Jellystone Niagara Camp Resort	Class 1	Part of camp on 8676 OAKWOOD DR
8	7838 OAKWOOD DR	-79.120033	43.062323	KIA motors	Class 1	
9	7868 OAKWOOD DR	-79.120056	43.061764	Two Brothers Auto; Revelaton Welding; Parckway Towing & Storage; Niagara Tint; JCW; Papetti Auto Repair; Auto Credit Canada; Maximum Performance Motorsports; Debest Pasta Sauce; Niagara Fun Tours;Wild Bills Auto Repair	Class 1	
10	OAKWOOD DR	-79.120122	43.060218	Mobile Storage Units	Class 1	seems to be part of the residentail house on 8020 OAKWOOD DR
11	8020 OAKWOOD DR	-79.120146	43.059656	Residential; Mobile Storage Units	Class 1	seems that part on the othe lot is Mobile Storage Units
12	8058 OAKWOOD DR	-79.120162	43.059239	Niagra Falls Art Gallery - Niagara Children's Museum	Class 1	
13	8230 OAKWOOD DR	-79.120178	43.056712	St Catharines Truck & Trailer Repair; Volsci Construction Co; Chair Experts Refinishing	Class 1	
14	7825 DORCHESTER RD	-79.111591	43.062939	Niagara Moving & Storage	Class 1	
15	8320 OAKWOOD DR	-79.120184	43.055989	Residential; Anita's Every Woman Esthetics; Oakwood Motors Ltd.	Class 1	
16	8354 OAKWOOD DR	-79.120187	43.055697	Residential; Maid Of The Mist Steamboat Co Ltd	Class 1	
17	8446 OAKWOOD DR	-79.120198	43.054113	Residential; Quantech Electric Contractors	Class 1	
18	7979 DORCHESTER RD	-79.113946	43.06194	A&B Self Storage	Class 1	
19	8108 OAKWOOD DR	-79.120166	43.058532	Niagra Fall Nissan	Class 1	
20	7875 DORCHESTER RD	-79.112862	43.062406	Quantum Niagara Gymnastics & Acro Cats	Class 1	
21	9515 MONTROSE RD	-79.124644	43.039783	Minacs Worldwide Inc ; Cimineili; Warehouse for Lease	Class 1	
22	8675 MONTROSE RD	-79.123658	43.048836	Residential	Class 1	Current Residential unit (rental) but Zoned Industrial
23	8825 MONTROSE RD	-79.1235	43.048944	Vibrations; Sam's Montrose Hotel	Class 1	
24	6100 PROGRESS ST	-79.09417	43.054011	Four companies under this address - Chevy Lane Fabrications, Niagara Woodworking, Milestone Millwork, Niagara Waterproofing	Class 1	
25	6411 KISTER RD	-79.094145	43.0536	Two companies under this address - IRC Mechanical and Hodgson T & Co Ltd.	Class 1	
26	6441 KISTER RD	-79.094121	43.053189	Niagara Bus Wash & RV Cleaning Services	Class 1	
27	6471 KISTER RD	-79.094096	43.052778	Four companies under this address - Niagara RV & Trailer Center, Niagara Vacation Rentals, United Medical Systems Canada, Uni-quatro Industries Canada	Class 1	
28	6501 KISTER RD	-79.09407	43.052353	Micron Installations Ltd. - Prehung Doors	Class 1	
29	6537 KISTER RD	-79.093867	43.051794	Hangups Imprinted Sportswear & Promotional Products	Class 1	
30	6199 DON MURIE ST	-79.09532	43.051985	Niagra River Trading Co.	Class 1	
31	6190 DON MURIE ST	-79.095634	43.050482	International Sew-Right Co.	Class 1	
32	6040 RAMSEY RD	-79.093525	43.059016	Two companies listed under this address - Duguay Haulage Inc. and Hunter Auto Repairs	Class 1	
33	6001 KISTER RD	-79.092669	43.05916	Marc's Marine	Class 1	
34	5917 KISTER RD	-79.091302	43.059556	Two companies under this address - Pineridge Tree Service and Advantage Heating & Air Conditioning	Class 1	
35	5820 RAMSEY RD	-79.089384	43.05882	Residential; Provincial Contractors Inc	Class 1	
36	5722 RAMSEY RD	-79.087388	43.058869	Residential; A B C Fire & Safety	Class 1	

Column1	Address	Longitude	Latitude	Company Name	Classification	Notes
37	6025 PROGRESS ST	-79.091623	43.055177	Three companies under this address - Aztec Frames Ltd., Field of Dreams Gallery, Apple Art & Furniture Company	Class 1	
38	5835 PROGRESS ST	-79.089214	43.055233	Three companies listed under this address - Progressive Mechanical Ltd., Alco Products, Barbisan Allmetal	Class 1	
39	5805 PROGRESS ST	-79.088747	43.055243	Two companies under this address - Niagara Analytical Environmental Laboratories and Niagara Water Conditioning Ltd.	Class 1	
40	8375 STANLEY AV	-79.084856	43.055341	Marineland Marketing	Class 1	Commerical
41	8407 STANLEY AV	-79.084191	43.054939	Three companies under this address - Bateman's Tire, Gilson's Auto Repair, D.I. Roof Seamers	Class 1	DI Roof Seamers 8-5 M-F, No hours listed for Batemans Tire or Gilsons Auto Repair.
42	8621 EARL THOMAS AV	-79.088927	43.052349	Collins Concessions Ltd.	Class 1	
43	6045 PROGRESS ST	-79.092285	43.054828	Garden City Customs Services Inc.	Class 1	
44	7900 CANADIAN DR	-79.128008	43.06361	Family and Children's Services Niagara (FACS); Family Counselling Centre Niagara;	Class 1	
45	7770 CANADIAN DR	-79.125857	43.063653	Roman Cheese Products Ltd	Class 1	
46	6255 DON MURIE ST	-79.097391	43.051562	Gordon Wright Electric Limited	Class 1	
47	6220 DON MURIE ST	-79.096225	43.050351	Marine Clean Ltd.	Class 1	
48	6260 DON MURIE ST	-79.096833	43.050363	Niagara Commercial Coatings & Insulations	Class 1	
49	8100 DORCHESTER RD	-79.113074	43.058594	Avid Growing Systems	Class 2	turn key medicinal marijuana growing operation
50	8040 DORCHESTER RD	-79.113112	43.059867	Warehouse	Class 2	
51	7942 DORCHESTER RD	-79.11262	43.060937	Palfinger Inc; Trans-Quip Inc	Class 2	not sure if Trans-Quip Inc is still in this building
52	5720 DON MURIE ST	-79.086563	43.052336	Brunner Manufacturing & Sales Ltd.	Class 2	
53	5770 DON MURIE ST	-79.08749	43.051902	Tecna Div of Brunner Manufacturing & Sales Ltd.	Class 2	
54	7130 KINSMEN CT	-79.12217	43.071871	Hamblet's Roofing Siding Windows & Doors; Alkaron Metals Inc; Niagra Go-Karts and Mini-Putt	Class 2	not sure about Alkaron Metals Inc, can't see it on Google earth
55	7848 OAKWOOD DR	-79.120044	43.062045	Residential; Leonard Malier; A & M Custom	Class 2	maybe class 1?
56	8066 OAKWOOD DR	-79.120165	43.058958	Residential; Ken Warden Construction Ltd	Class 2	
57	8594 EARL THOMAS AV	-79.087548	43.052793	Stelfab Niagara Ltd.	Class 2	
58	8540 EARL THOMAS AV	-79.087575	43.053204	Two companies under this address - Storage Niagara and Ground Aerial Maintenance Service Ltd.	Class 2	
59	8464 EARL THOMAS AV	-79.087627	43.054088	Food Roll Sales (Niagara) Ltd.	Class 2	
60	5720 PROGRESS ST	-79.086652	43.053706	Hoco Limited (Building for Sale)	Class 2	
61	5676 PROGRESS ST	-79.08583	43.053725	Davert Tools Inc.	Class 2	
62	6025 CHIPPAWA PY	-79.092125	43.050255	Niagara Falls Humane Society	Class 2	Potential noise impact from barking dogs
63	5955 DON MURIE ST	-79.090183	43.050125	H&L Tool and Die Ltd.	Class 2	
64	8699 STANLEY AV	-79.085154	43.050131	Two companies under this address - Defect-O Canada and Oneida Canada Limited	Class 2	Looks vacant and lease signs on lot.
65	6095 PROGRESS ST	-79.094045	43.05502	Niagara Fasteners Inc.	Class 2	
66	6129 PROGRESS ST	-79.094736	43.054998	Two companies under this address - PRW Fabrication and PRW Excavating Contractors	Class 2	
67	6159 PROGRESS ST	-79.095371	43.054977	Two companies under this address - Provincial Design & Fabricating and Supreme Mechanical Contractors	Class 2	
68	6135 DON MURIE ST	-79.094558	43.051736	Niagara Pattern Ltd.	Class 2	
69	6167 DON MURIE ST	-79.095175	43.051671	Building for Sale	Class 2	Building for Sale (currently is Phoenix Wood Products Corp.)
70	DON MURIE ST	-79.096301	43.0516	MCL Waste Management Services?	Class 2	No Buildings, just a couple of storage tanks and some trucks labelled with MCL Waste Management Services. Likely Class 1, possibly Class 2.
71	6090 DON MURIE ST	-79.093685	43.050604	Air Liquide Canada Inc.	Class 2	
72	6150 DON MURIE ST	-79.095033	43.050525	Building for Lease	Class 2	
73	6198 KISTER RD	-79.092582	43.056365	Storage lot of some sort	Class 2	There is a building of some sort and a bunch of vehicles, other items
74	9514 MONTROSE RD	-79.121809	43.040708	Crown Transportation Group Limited	Class 2	
75	5806 RAMSEY RD	-79.089137	43.058826	Freds Concrete	Class 2	in google earth it looks like there is a sign that says Freds Concrete
76	6065 PROGRESS ST	-79.092997	43.054811	Niagara Fence Supply Inc.	Class 2	
77	6272 KISTER RD	-79.092663	43.055478	Fencast Industries	Class 2	
78	6015 PROGRESS ST	-79.09085	43.055196	Louver-Lite Canada Inc.	Class 2	

Column1	Address	Longitude1	Latitude1	Company Name	Classification	Notes
79	8345 STANLEY AV	-79.084242	43.055797	Three companies under this address - Shotz Canada, Peglow Tool & Die Inc., Applied Strobe Technology	Class 2	Likely Class 1 but could be Class 2 (tool & die) due to unknown hours of operation.
80	5952 PROGRESS ST	-79.090003	43.053627	Storage lot of some sort	Class 2	There is a building of some sort and a bunch of vehicles, other items
81	8481 EARL THOMAS AV	-79.089012	43.05365	Factor Forms Niagara Ltd.	Class 2	
82	8591 EARL THOMAS AV	-79.088954	43.05276	LaurCoat Inc.	Class 2	
83	5850 DON MURIE ST	-79.088902	43.051875	Falls Contracting Inc.	Class 2	
84	5920 DON MURIE ST	-79.089913	43.052257	Trimac Transportation System	Class 2	Large outdoor yard, single building, doesnot appear to be much activity in the yard, more for storage
85	8620 EARL THOMAS AV	-79.087521	43.052382	Brunner	Class 2	
86	7071 OAKWOOD DR	-79.119174	43.072346	Niagara Protective Coatings	Class 2	
87	7527 STANLEY AV	-79.086747	43.066242	Walter L & Sons Excavating Ltd	Class 2	Outside storage, 36 employees - anticipate to be sound and dust
88	8203 STANLEY AV	-79.087729	43.05752	AC & First choice vinyl windows LTD.	Class 2	
89	6224 PROGRESS ST	-79.096817	43.053111	Quality Ready Mix Ltd.	Class 3	Outdoor storage, high probability of fugitive emissions
90	9127 MONTROSE RD	-79.126873	43.044835	E S Fox Ltd	Class 3	Fabricated metal product manufacturing, large facility, outdoor storage
91	8220 STANLEY AV	-79.082276	43.057409		Class 3	Unknown - No industry associated with this address, however appears to be outdoor storage areas. Assumed worst case Class 3.
92	8550 OAKWOOD DR	-79.120202	43.053067	Montgomery Bros Construction / Landscape Materials	Class 3	Outdoor storage, high probability of fugitive emissions
93	8620 OAKWOOD DR	-79.120188	43.052031	Modern Mosaic Ltd	Class 3	Outdoor storage, high probability of fugitive emissions
94	8490 EARL THOMAS AV	-79.087601	43.053615	Three companies under this address - Peninsula Architectural Detail, Ontario Electrical Construction, Progressive Mechanicals Limited	Class 3	Outdoor storage, high probability of fugitive emissions
95	5868 RAMSEY RD	-79.090208	43.058804	Tri Cast Bronze	Class 3	Metal Fabricator / Foundry
96	5869 PROGRESS ST	-79.089915	43.055217	Can Mar Manufacturing Inc.	Class 3	Refractory Manufacturing
97	5725 PROGRESS ST	-79.087578	43.05527	Mancuso Chemicals Limited	Class 3	Chemical Manufacturing
98	5635 PROGRESS ST	-79.086176	43.055301	Specialty Cast Metals Ltd.	Class 3	Steel & Cement Industry casting
99	6000 PROGRESS ST	-79.0909	43.053606	Pumpcrete Corp.	Class 3	Outdoor storage, high probability of fugitive emissions
100	5980 DON MURIE ST	-79.090811	43.052236	Dufferin Concrete	Class 3	High probability of fugitive emissions
101	7780 STANLEY AV	-79.080807	43.064741	Washington Mills Electro Minerals Corporation	Class 3	Company makes chemicals - estimated class 3
102	6300 OLDFIELD RD	-79.09996	43.060819	ChemTrade	Class 3	Company makes chemicals - estimated class 3
103	7771 STANLEY AV	-79.085487	43.063806	Salit Steel	Class 3	Large steel facility with a lot of outdoor storage
104	7885 STANLEY AV	-79.085485	43.062161	Marineland	Open Space	
105	9240 MONTROSE RD	-79.122471	43.043849	Baden Powell Park	Open Space	
106	5584 RAMSEY RD	-79.084869	43.059631	Residential	Residiential	
107	OAKWOOD DR	-79.120173	43.058002	Residential	Residiential	
108	MONTROSE RD	-79.1238	43.047736		Residiential	
109	6077 KISTER RD	-79.093584	43.058303	Residential	Residiential	
110	5973 KISTER RD	-79.092126	43.059308	Residential	Residiential	
111	8072 STANLEY AV	-79.082449	43.059758	Residential	Residiential	
112	7960 OAKWOOD DR	-79.120104	43.06064	Residential	Residiential	
113	8252 OAKWOOD DR	-79.120179	43.056355	Residential	Residiential	
114	8356-8358 OAKWOOD DR	-79.120189	43.055423	Residential	Residiential	
115	8378 OAKWOOD DR	-79.12019	43.055096	Residential	Residiential	
116	8392 OAKWOOD DR	-79.120956	43.054955	Residential	Residiential	
117	8468 OAKWOOD DR	-79.120202	43.053782	Residential	Residiential	
118	8488 OAKWOOD DR	-79.120205	43.053491	Residential	Residiential	
119	8212 OAKWOOD DR	-79.120176	43.056991	Residential	Residiential	
120	8731 MONTROSE RD	-79.123536	43.049832	Residential	Residiential	
121	8755 MONTROSE RD	-79.123533	43.04952	Residential	Residiential	
122	8841 MONTROSE RD	-79.123525	43.04839	Residential	Residiential	
123	8891 MONTROSE RD	-79.123474	43.047477	Residential	Residiential	
124	8873 MONTROSE RD	-79.123521	43.047891	Residential	Residiential	
125	8279 STANLEY AV	-79.084563	43.056819	Residential	Residiential	Residential (for sale)
126	6120 KISTER RD	-79.092959	43.05736	Residential	Residiential	
127	6138 KISTER RD	-79.093253	43.05732	Residential	Residiential	
128	6158 KISTER RD	-79.093241	43.05712	Residential	Residiential	

Column1	Address	Longitude	Latitude	Company Name	Classification	Notes
129	6224 KISTER RD	-79.092563	43.056055	Residential	Residiential	
130	6248 KISTER RD	-79.092553	43.055895	Residential	Residiential	
131	6061 KISTER RD	-79.093319	43.058428	Residential	Residiential	
132	6043 KISTER RD	-79.09306	43.058575	Residential	Residiential	
133	5963 KISTER RD	-79.091821	43.05937	Residential	Residiential	
134	5955 KISTER RD	-79.091686	43.059418	Residential	Residiential	
135	9304 MONTROSE RD	-79.122483	43.042066	Residential	Residiential	
136	7473 REIXINGER RD	-79.120748	43.038297	Residential (farm)	Residiential	
137	5794 RAMSEY RD	-79.088876	43.058831	Residential	Residiential	
138	5850 RAMSEY RD	-79.089878	43.05881	Residential	Residiential	
139	KISTER RD	-79.091364	43.058508	Residential	Residiential	
140	6050-6110 KISTER RD	-79.09301	43.058046	Residential	Residiential	
141	5606 RAMSEY RD	-79.085708	43.058907	Residiential	Residiential	Looks like there is a storage area on the back
142	5618 RAMSEY RD	-79.085569	43.059546	Residential	Residiential	
143	5634 RAMSEY RD	-79.085824	43.059082	Residential	Residiential	
144	5650 RAMSEY RD	-79.086134	43.059074	Residential	Residiential	
145	5672 RAMSEY RD	-79.086401	43.058893	Residential	Residiential	
146	5678 RAMSEY RD	-79.086648	43.058887	Residential	Residiential	
147	5698 RAMSEY RD	-79.086894	43.058881	Residential	Residiential	
148	5714 RAMSEY RD	-79.087141	43.058875	Residential	Residiential	
149	5732-5734 RAMSEY RD	-79.087635	43.058862	Residential	Residiential	
150	5746 RAMSEY RD	-79.087882	43.058856	Residential	Residiential	
151	5764 RAMSEY RD	-79.088128	43.05885	Residential	Residiential	
152	5774 RAMSEY RD	-79.088499	43.058841	Residential	Residiential	
153	6259 KISTER RD	-79.094111	43.055663	Residential	Residiential	
154	6251 KISTER RD	-79.09412	43.055815	Residential	Residiential	
155	6227 KISTER RD	-79.09414	43.056134	Residential	Residiential	
156	6199 KISTER RD	-79.094148	43.056271	Residential	Residiential	
157	6189 KISTER RD	-79.094156	43.056408	Residential	Residiential	
158	6025 KISTER RD	-79.0931	43.058998	Residential	Residiential	
159	5594 RAMSEY RD	-79.084943	43.05893	Residential	Residiential	
160	OAKWOOD DR	-79.120092	43.060921	Empty lot	Vacant	Appears to be an empty lot
161	8529-8559 STANLEY AV	-79.084455	43.053073	Vacant Land	Vacant	Lot with small vacant building
162	MONTROSE RD	-79.121845	43.042549		Vacant	
163	7170 OAKWOOD DR	-79.116051	43.07476	Vacant Land	Vacant	
164	8160 OAKWOOD DR	-79.120169	43.057413	Empty lot	Vacant	
165	DORCHESTER RD	-79.118387	43.051388		Vacant	
166	QUEEN ELIZABETH WY	-79.122635	43.048951	Vacant Land	Vacant	
167	QUEEN ELIZABETH WY	-79.121527	43.04952		Vacant	
168	STANLEY AV	-79.082209	43.056053	Vacant Land	Vacant	
169	MONTROSE RD	-79.123523	43.048128	Empty lot	Vacant	
170	STANLEY AV	-79.084092	43.053491	Empty lot	Vacant	Empty lot with small vacant building
171	MCCLIVE ST	-79.094567	43.055961	Empty lot	Vacant	
172	5680 DON MURIE ST	-79.085741	43.052355	Empty lot	Vacant	Large building (looks vacant - no signage)
173	MONTROSE RD	-79.124813	43.043422	Vacant Land	Vacant	
174	DRUMMOND RD	-79.103265	43.065198	Empty lot	Vacant	
175	DORCHESTER RD	-79.119287	43.048713		Vacant	
176	MONTROSE RD	-79.123577	43.046979	Vacant Land	Vacant	
177	MONTROSE RD	-79.12465	43.043343	Vacant Land	Vacant	
178	MONTROSE RD	-79.124327	43.043187	Vacant Land	Vacant	
179	CHIPPAWA CREEK RD	-79.127693	43.048801	Vacant Land	Vacant	<Null>
180	8223 STANLEY AV	-79.087686	43.056943	Vacant Land	Vacant	
181	8297 STANLEY AV	-79.084543	43.056511	Vacant Land	Vacant	
182	8309 STANLEY AV	-79.08453	43.056306	Vacant Land	Vacant	
183	STANLEY AV	-79.085229	43.056552	Vacant Land	Vacant	

Column1	Address	Longitude	Latitude	Company Name	Classification	Notes
184	8323 STANLEY AV	-79.087627	43.056034	Vacant Land	Vacant	
185	8455 STANLEY AV	-79.084137	43.054176	Empty lot	Vacant	Empty lot with small vacant building
186	5795 DON MURIE ST	-79.088024	43.050044	Vacant Land	Vacant	
187	MARINELAND PY	-79.090298	43.067728		Vacant	
188	DON MURIE ST	-79.094388	43.050581	Empty lot	Vacant	Building for Lease (looks like it used to be ES Fox)
189	6178 KISTER RD	-79.092628	43.057215	Vacant Lot	Vacant	
190	MONTROSE RD	-79.122672	43.042462	Empty lot	Vacant	
191	8073 STANLEY AV	-79.084276	43.059491	Vacant Land	Vacant	
192	5836 RAMSEY RD	-79.089631	43.058814	Empty lot with Container	Vacant	
193	5574 RAMSEY RD	-79.084666	43.059637	Vacant Land	Vacant	For Sale
194	CANADIAN DR	-79.126942	43.063631	Empty lot	Vacant	seems like an empty lot
195	OAKWOOD DR	-79.117661	43.072545	Empty lot	Vacant	seems like an empty lot
196	DON MURIE ST	-79.096811	43.051583	Empty lot	Vacant	
197	STANLEY AV	-79.084246	43.058934	Vacant Land	Vacant	
198	8113 STANLEY AV	-79.084255	43.059071	Vacant Land	Vacant	
199	STANLEY AV	-79.084238	43.058797	Vacant Land	Vacant	
200	KISTER RD	-79.096344	43.057823	Vacant Land	Vacant	
201	STANLEY AV	-79.085516	43.060885	Vacant Land	Vacant	
202	MARINELAND PY	-79.100828	43.058621	Vacant Land	Vacant	
203	MONTROSE RD	-79.122893	43.045228	Vacant Land	Vacant	
204	LINCOLN ST	-79.115565	43.048726	Empty lot	Vacant	
205	STANLEY AV	-79.084196	43.058112	Vacant Land	Vacant	
206	STANLEY AV	-79.084204	43.058249	Vacant Land	Vacant	
207	STANLEY AV	-79.084229	43.05866	Vacant Land	Vacant	
208	STANLEY AV	-79.084213	43.058386	Vacant Land	Vacant	
209	STANLEY AV	-79.084221	43.058523	Vacant Land	Vacant	
210	MCLEOD RD	-79.116023	43.060636	Vacant Land	Vacant	
211	DON MURIE ST	-79.097025	43.050728	Empty lot	Vacant	
212	CHIPPAWA PY	-79.094663	43.049923	Vacant Land	Vacant	
213	DORCHESTER RD	-79.115735	43.049829	Empty lot	Vacant	
214	DORCHESTER RD	-79.115375	43.049981	Empty lot	Vacant	
215	PROGRESS ST	-79.095333	43.053514	Vacant Land	Vacant	

APPENDIX B

AIL SOUND WALLS

- PVC Sound Barrier Wall Systems
- Lightweight and easy-to-install
- Lower installed costs
- Sustainable and maintenance-free


Transportation


Industrial


Commercial


Roof Top Mechanical Systems

ENGINEERED SOUND MITIGATION SOLUTIONS

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Build in success with AIL.

Since 1965, Atlantic Industries Limited (AIL) has been adding value to the world's most successful infrastructure projects.

AIL is a world leader in developing innovative engineered solutions in sound barrier wall systems, structural plate, MSE retaining walls, corrugated steel pipe and prefabricated steel bridges.

Choose an AIL infrastructure solution and get the value, experience, innovation, sustainability and support that will ensure your project's success.

AIL SOUND WALLS

An industry leader in sound mitigation.

RECOMMENDED FOR

- Commercial
- Industrial
- Institutional
- Utilities
- Roof Top Mechanical Systems
- Power Generation
- Municipal
- Highways
- Railways
- Bridges
- Oil & Gas

AIL Sound Walls is a division of AIL and the manufacturer of the Silent Protector® and Tuf-Barrier® sound barrier wall systems for absorptive or reflective applications.

Lightweight, easy-to-install, durable and cost-effective.

Lightweight and easy-to-install, AIL Sound Walls are engineered for maximum sound reduction of environmental or ambient noise such as traffic, manufacturing, industrial or commercial noise.

Our turn-key solutions, include: engineering, manufacturing, project management and site assistance.

- Meets accelerated test requirements for durability
- Impervious to rain, snow, ice and sleet
- Will not rust, rot, or stain
- Maintenance-free
- Designed to meet applicable design codes (AASHTO, IBC, CSA)
- Wind load tested for hurricane-force winds

Silent Protector® (Absorptive)

- PVC absorptive sound barrier wall system with acoustical mineral wool
- Noise Reduction Coefficient (NRC) rating of 1.0, the highest achievable rating
- Absorbs unwanted noise
- Silent Protector Plus® offers STC 36 and NRC 0.95, ask for details

AIL Sound Walls are made from long-lasting, UV-resistant PVC, with the highest percentage of recycled content available.

Tuf-Barrier® (Reflective)

- PVC reflective sound barrier wall system
- Blocks and reflects unwanted noise
- Tongue and groove interlocking connection
- Textured finishes available

Industrial, Commercial and Institutional

RECOMMENDED FOR

▸ Commercial Development ▸ Hospitals ▸ Schools and Universities
▸ Loading Docks ▸ Drive-Thru Lanes ▸ Industrial Development

Noise from large commercial or industrial developments and their associated traffic is one of the most contentious environmental problems for surrounding communities.

Residents are demanding better noise abatement solutions from facilities like shopping centers, manufacturing plants, distribution hubs and utility stations.

AIL Sound Walls provide superior performance for all noise sensitive projects.

Lightweight AIL Sound Walls are perfect for roof top applications. Man-doors and gates are easily integrated.

Roof Top, Equipment and Machinery Enclosures

RECOMMENDED FOR

▸ HVAC Units ▸ Generators ▸ Chillers ▸ Cooling Towers ▸ Oil & Gas
▸ Hydro ▸ Compressors ▸ Petro Chemical ▸ Sub Stations

The lighter weight of AIL Sound Walls make them ideal for roof top applications where sound mitigation is needed. The enclosure support system integrates easily with roof structures of both existing and new buildings to deliver effective sound mitigation.

Excessive noise is one of the most common occupational health hazards in today's heavy industrial or manufacturing environments. AIL Sound Walls are often used to mitigate unwanted noise caused by equipment in these types of applications. Transparent panels, utility ports and man-doors can also be integrated to allow access for routine maintenance or emergency repairs with reduced exposure to noise.

Transportation

RECOMMENDED FOR

▶ Highways ▶ Bridges ▶ Railways ▶ LRT
▶ Airports ▶ Bus Terminals

With their lighter weight, lower installed costs and long-term durability, AIL Sound Walls are a perfect choice to keep the peace in neighbourhoods along busy transportation corridors.

In addition to their excellent sound mitigation properties, AIL Sound Walls can be installed easily on narrow road or rail jobsites and are an efficient land use solution in urban areas. They are also available in a variety of attractive colours and configurations to satisfy important aesthetic considerations. Plus, our custom graphic capabilities can personalize any project (see back cover).

Maintenance-free AIL Sound Walls are impervious to rain, snow and ice. Plus, they will not rust, rot or stain.

Structure-Mounted Solutions

AIL Sound Walls are most often ground-mounted on concrete piers, but their light weight makes them ideal to mount to various types of structures such as concrete traffic barriers, bridge rail systems or MSE wall systems, including AIL Vist-A-Walls.™ Our in-house engineering capability with multiple systems ensures project success.

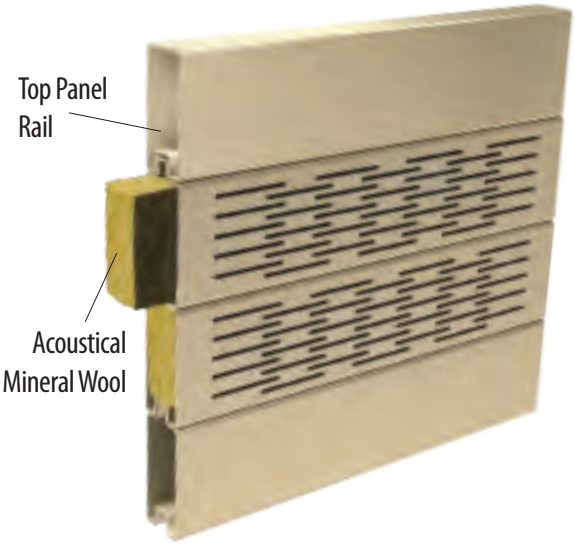
Transparent Walls: Full and Partial Panels Available

Reduce the tunnel effect and allow more natural light onto roadways or properties by incorporating ACRYLITE® Soundstop clear reflective panels into your design.

Easy to install with local crews and reduced need for lifting equipment.

AIL Sound Walls are constructed with tongue and groove PVC panels. Panels are stacked and placed within standard steel posts to the required height and capped with a top panel. A standard panel is 10 ft. (3.0 m) in length and weighs only 21 lbs. (9.5 kg).

Typical Installation



Flange Mounted Footing

Direct Bury Footing

AIL SOUND WALLS

Product Specifications	Silent Protector® (Absorptive)	Tuf Barrier® (Reflective)
Span[1]	8 ft - 12 ft (2.44 m - 3.66 m)	8 ft - 14 ft (2.44 m - 4.27 m)
Panel Width	2.70 in (68.58 mm)	2.70 in (68.58 mm)
Panel Height	5.96 in ± .10 in (151.38 mm ± 0.25 mm)	5.96 in ± .10 in (151.38 mm ± 0.25 mm)
Weight	4.30 lbs/ft² (21 kg/m²)	Min. 4.10 lbs/ft² (20 kg/m²)
Wall Height	Greater than 30' / 9 m	Greater than 30' / 9 m
STC Rating	up to 36[2]	up to 32
NRC Rating	1.0[3]	n/a

For product technical specifications visit ailsoundwalls.com

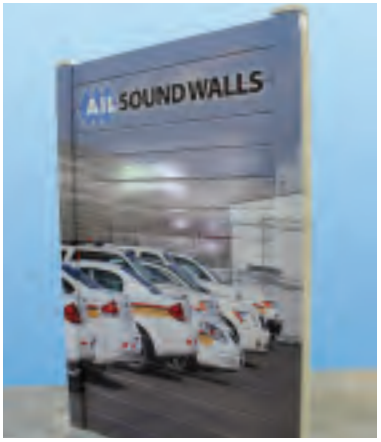
1. Span is governed by wind loads and varies on code requirements. Contact AIL Sound Walls for recommended panel spans for your project.
2. Standard Silent Protector has an STC rating of 31. Silent Protector Plus can achieve STC of 36.
3. Standard Silent Protector NRC 1.0. Silent Protector Plus NRC is 0.95.

Customize your AIL Sound Wall project with one of our specialized graphic treatments.

AIL Sound Walls are available in a variety of attractive colours and textured finishes. Custom colours are also available.

Gray | Adobe | Tan | Beige | White

Color reproduction in this brochure is subject to limitations of the printing process. Please ask for actual PVC color samples.



Sound Transmission Loss ASTM E90 / E413

Octave Band Number	2	3	4	5	6	7	STC
Center Frequency (Hz)	125	250	500	1000	2000	4000	–
Silent Protector®	20	21	26	40	40	44	
Tuf-Barrier®	16	22	31	39	41	49	

RATINGS UP TO STC 36 ASK FOR DETAILS

Sound Absorption Coefficients ASTM C423/E795

Octave Band Number	2	3	4	5	6	7	NRC
Center Frequency (Hz)	125	250	500	1000	2000	4000	–
Silent Protector®	0.41	0.84	1.19	1.06	1	0.81	1.0

STC – Sound Transmission Class

STC is an integer rating used to measure the decibel reduction through a partition. It states the number of decibels lost through that partition in a laboratory environment.

NRC – Noise Reduction Coefficient

NRC is a rating between 0 and 1 to index how absorptive a material is. An NRC of 0 means no sound waves are absorbed whereas a rating of 1 means all of the sound waves are absorbed.

NRC	Qualitative
0.4 or less	Poor
0.5 to 0.6	Mediocre
0.6 to 0.7	Good
0.7 to 0.85	Very Good
> 0.85	Excellent
1.0	AIL Silent Protector®

ailsoundwalls.com

For project planning and assistance call toll-free 1-866-231-7867, or email: info@ailsoundwalls.com

Save time. Save money. Choose efficient sound mitigation solutions from AIL Sound Walls.

We support you.

- Be confident with an AIL Sound Walls solution
- Designs based on wind loading and soil conditions
- Detailed proposals complete with installation budget estimates
- Engineer-stamped project drawings for approvals and construction
- Professional support in engineering, project management and site assistance

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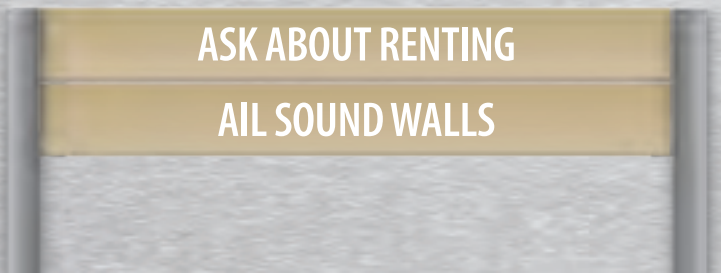
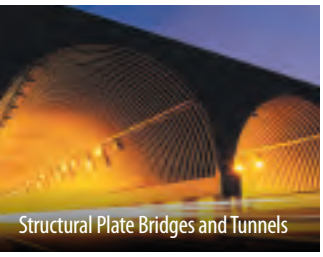


The information and suggested applications in this brochure are accurate and correct to the best of our knowledge and are intended for general information purposes only. These general guidelines are not intended to be relied upon as final specifications and we do not guarantee specific results for any particular purpose. We strongly recommend consultation with an AIL Sound Walls Technical Sales Representative before making any design and purchasing decisions.

AIL products contain recycled content and are 100% recyclable.

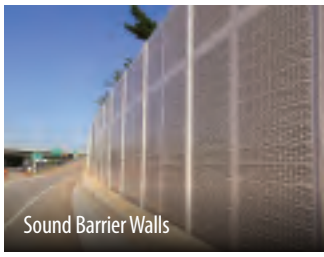
MIX Paper from responsible sources FSC® C101994


Structural Plate Bridges and Tunnels


Prefabricated Bridges


Culvert Bridges


Retaining Walls and Abutments


Sound Barrier Walls

Get AIL's innovative engineered solutions working for your better bottom line.

AIL SOUND WALLS

AIL Sound Walls is a Division of Atlantic Industries Limited and is a member of The AIL Group of Companies. The AIL Group is made up of a network of companies with technical sales teams, engineering departments, manufacturing plants and distribution centers across Canada and in the United States. AIL International and the operations of the AIL Group's licensees in Australia, Europe and Asia help extend our global reach.

A member of
THE AIL GROUP OF COMPANIES

AIL Atlantic Industries Limited

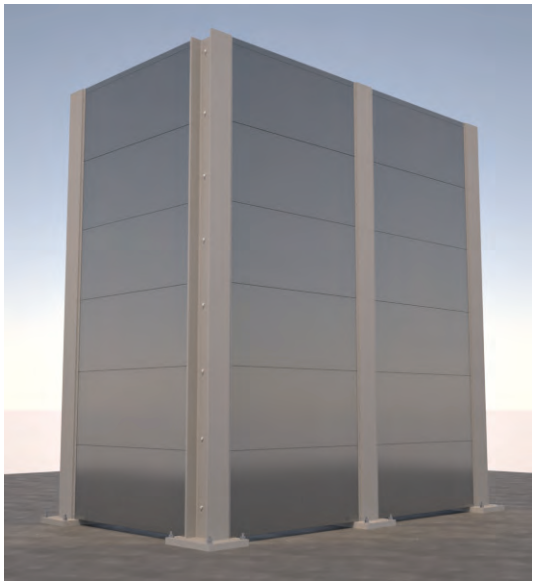
BIG R BRIDGE

VISTAWALL SYSTEMS

AIL INTERNATIONAL

NOISEBLOCK™

Barrier Wall Systems



KINETICS
Noise Control

www.kineticsnoise.com

NOISEBLOCK™ Barrier Wall Systems

Industrial, commercial, and environmental noise control is an important and often overlooked part of the design process. Whether it is to comply with municipal ordinances, conform to OSHA standards or to achieve occupant comfort, it takes knowledge and experience to design an acoustical system that achieves the required sound levels. NOISEBLOCK™ Barrier Wall Systems are modular, cost effective, custom engineered solutions for rooftop equipment, electrical sub-stations, oil and gas compressor stations, residential compliance, loading docks, railways, and airport noise.

NOISEBLOCK™ double-walled acoustic panels are quickly and easily assembled, deliver high levels of sound absorption (noise reduction) and transmission loss (noise blocking). Project management assistance, design, engineering, and manufacturing are included with purchase. Established in 1958, Kinetics Noise Control has the experience and manufacturing capabilities to deliver a noise control solution for your indoor or outdoor application.

Advantages of NOISEBLOCK™ Barrier Wall Systems

- Particularly suitable for outdoor mechanical equipment barriers allowing easy field cutting and sealing for electrical, piping, duct penetrations, etc.
- Panels are shipped knock-down in modular form for inherent freight cost savings.
- Self-draining, “wicking” moisture, durable, easy to install, remove and reuse.
- Acoustic performance is backed by independent tests conducted in a NVLAP accredited laboratory per ASTM E90 (transmission loss) and ASTM C423 (sound absorption). Panel performance is STC 40-43 and NRC 1.0.
- Each system includes AutoCAD submittals and piece-marked installation drawings.
- System structural steel is designed from baseplate upward. The column and base plates are supplied as factory-welded assemblies. The column and angle attachments are factory-punched and supplied with required bolts, washers and nuts. No field welding is required.
- Panels are available in galvanized G90, aluminum and stainless types 304 and 316. Structural steel components are available in various finishes from prime painted, hot dipped galvanized or painted.
- Detailed structural engineering calculations including column baseplate reaction forces.
- Maintenance free

Barrier Wall Comparison

The following tables compare the acoustic performance, physical properties, and application of NOISEBLOCK™ Barrier Wall System to standard concrete, wood, PVC, and metal vision screen barrier walls.

Acoustic Performance

Material	NOISEBLOCK™	Concrete	Wood	PVC	Metal Vision Screen
Type of System	Absorptive/Blocking	Reflective	Reflective	Reflective/Absorptive	Reflective
STC Rating[1]	43	28	26	36	21
NRC Rating[2]	1.0	0.0	0.85	1.0	0.0

Physical Properties

Material	NOISEBLOCK™	Concrete	Wood	PVC	Metal Vision Screen
Type of System	Post/Panel	Post/Panel	Post/Panel	Post/Panel	Post/Panel
Moisture Resistance	Excellent	Good	Poor	Good	Good
Freeze/Thaw Resistance	Excellent	Fair	Poor	Fair	Good
Fire Resistance	Excellent	Excellent	Poor	Unknown	Excellent
Weight (lbs./sf)	6-8	100-125	4-5	3-4	1-2

Application

Material	NOISEBLOCK™	Concrete	Wood	PVC	Metal Vision Screen
Heavy Equipment Needed	Some	Yes	Some	Some	Some
Works on Rooftops	Yes	No	Yes	Yes	Yes
Works on Bridges	Yes	No	Yes	Yes	Yes
Works in Challenging Terrain	Yes	No	Yes	Yes	Yes
Ease of Onsite Changes	Yes	No	Yes	No	Yes

NOISEBLOCK™ rooftop barrier wall surface mounted to structural support steel

NOISEBLOCK™ wall system, Hospital Rooftop Equipment Yard

Rooftop Equipment

Chillers, Condensers and Cooling Towers and other mechanical equipment generate unwanted noise negatively affecting surrounding residential and business communities. NOISEBLOCK™ barrier wall systems reduce the noise to acceptable levels.

Air-cooled chiller attenuation systems

Residential Noise Compliance

Many neighborhoods have strict noise ordinances for hearing protection and comfort levels. NOISEBLOCK™ barrier panels are used to control noise at shopping malls, schools, recreational facilities, parks and other outdoor applications.

Power plant process NOISEBLOCK™ wall system

Utilities

Electrical sub-stations, transformers and generators cause unwanted noise and can be unpleasant to view. NOISEBLOCK™ barrier wall systems reduce the unwanted noise to acceptable levels and block the view for increased security.

Midstream compressor NOISEBLOCK™ walls

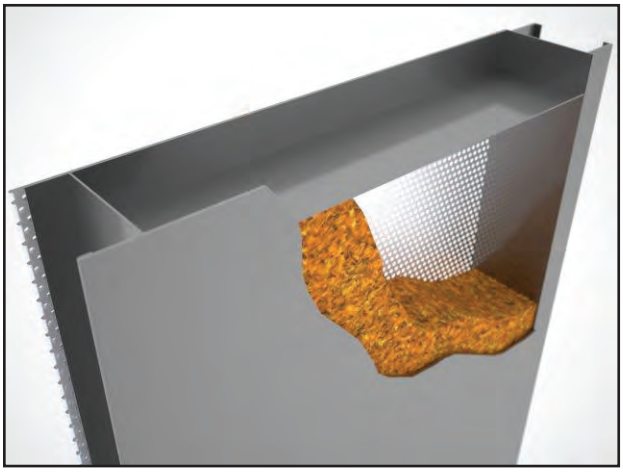
Oil and Gas Compressors Stations

NOISEBLOCK™ barrier wall systems are a cost effective solution to limit oil and gas midstream compressor noise.

Transportation / Drive-Thru Lanes / Loading Docks

Noise from loading docks, traveling motorists on major highways/interstates, airport areas, and railways are effectively reduced using Kinetics reflective or absorptive barrier wall systems.

NOISEBLOCK™ Wall Panel Construction



Panel Cutaway

KINETICS™ STL panels are fabricated with outer solid shell of 16/18 gage and inner perforated shell of 22 gage. Panels are stiffened with 18 gage internal channels and edge rails. The acoustic grade fill is 2.5 to 6 pcf long strand fiberglass or mineral wool depending on the application and are inert, mildew resistant, vermin proof and incombustible and is suitable for wet/dry and freeze/thaw cycling. Mating panels are attached by inherent tongue and groove panel joints. Typical panel joints are horizontal however vertical panel joints are used depending on the project requirements and aesthetics desired by the architect/owner.

Sound Absorption Coefficients

NOISEBLOCK™ panel acoustic performance is backed by independent testing in a NVLAP accredited laboratory. When tested in accordance with *ASTM C423, Standard Method of Test for Sound Absorption of Acoustic Materials in Reverberant Rooms*, the panel assembly shall have the following minimum airborne sound absorption:

		Sound Absorption						
Model	**Construction[2]**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**NRC[3]**
STL-4[1]	16 ga. solid / 22 ga. perforated	0.60	1.13	1.12	1.09	1.03	0.91	1.00
STL-4[1]	18 ga. solid / 22 ga. perforated	0.60	1.13	1.12	1.09	1.03	0.91	1.00

[1] (4) = 4-inch thickness

[2] solid inner skin available

[3] Noise Reduction Coefficient (NRC) is the average of coefficients at 250, 500, 1K and 2K Hz, expressed in the nearest integral multiple of 0.05.

Sound Transmission Loss

When tested in accordance with *ASTM E90, Standard Recommended Practice for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions*, the panel assembly shall have the following minimum airborne sound transmission loss:

		Transmission Loss, dB						
Model	**Construction[2]**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**STC[3]**
STL-4[1]	16 ga. solid / 22 ga. perforated	24	32	41	51	60	66	43
STL-4[1]	18 ga. solid / 22 ga. perforated	21	28	39	48	56	58	40

[1] (4) = 4-inch thickness

[2] solid inner skin available

[3] Sound Transmission Class (STC) is determined by comparing test data with a set of standard STC contours as described in *ASTM E413, Standard Classification for Determination of Sound Transmission Class*.

The acoustic performance of NOISEBLOCK™ panel systems is not degraded through prolonged exposure to noise, vibration, pressure differential, rain, wind or snow.

Engineering Performance and Design

NOISEBLOCK™ wall systems are placed between a noise source and a receiver. The barrier creates a “sound shadow” zone of attenuation that can be designed to effectively attenuation an area either indoors or outdoors and at varied distances from the noise source.

Standard Panel Dimensions

NOISEBLOCK™ panels are available in standard designated widths of 21.625” and 45.625” and lengths up to 144”. Other widths and lengths are available by special order. NOISEBLOCK™ wall systems incorporate as many standard panels as possible and then finish with nonstandard panels for cost effectiveness.

Structural Performance

NOISEBLOCK™ wall systems are designed per industry standards following the applicable IBC building codes, referenced standards and guidelines. These referenced codes, standards, and guidelines include wind, snow, and seismic loading conditions. Deliverables include copies of the certified structural steel calculations and P.E. stamp. Kinetics engineering group uses the latest AutoCAD software and can incorporate your equipment or system layout into our submittals to assure proper clearances and access locations.

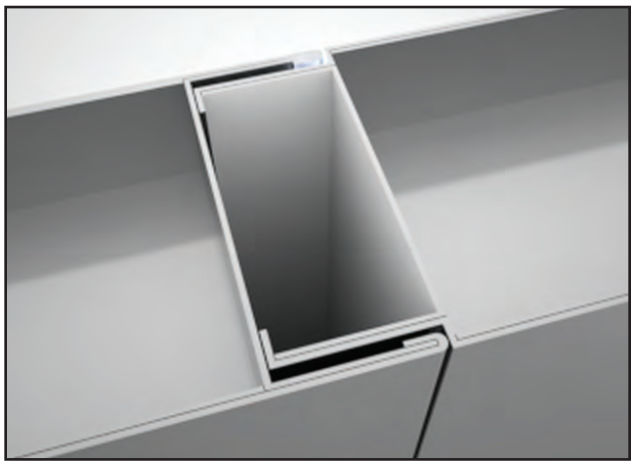
Structural Steel Components

Structural steel components and welded assemblies are designed for either bolt together (standard) or field welding assembly. Standard structural items are shipped with one factory coat of primer for protection during shipping. Kinetics can supply structural items with hot-dip galvanized coated finish or factory painted with either a wet paint or powder-coat finish depending on size and specification.

Finish

NOISEBLOCK™ wall systems are available in mill or factory powder-coat finish per selection of Kinetics standard colors; color matching is available.

NOISEBLOCK™ Panel Joint

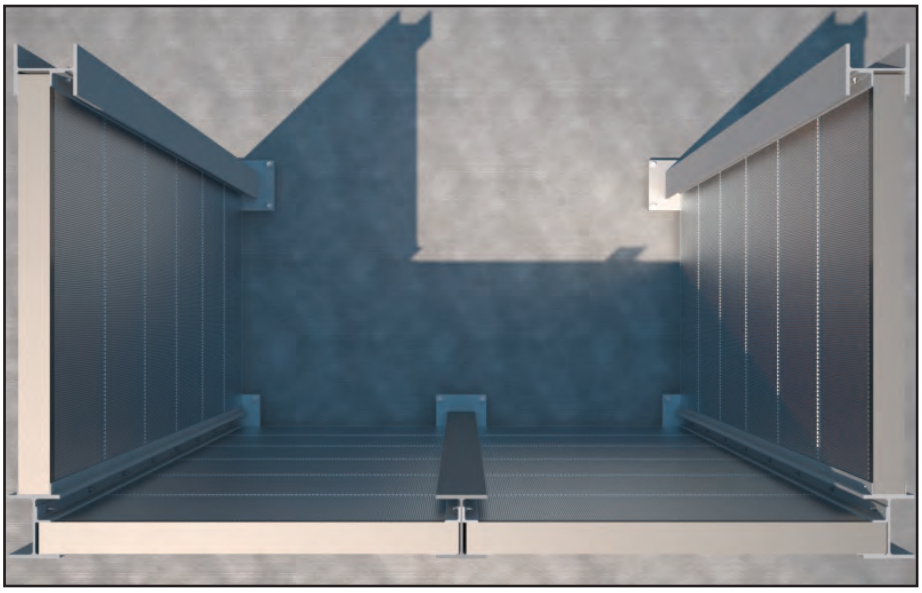


Typical groove and tongue (GT) panel joint

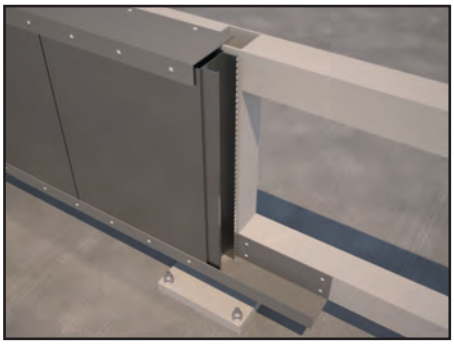
Standard Colors

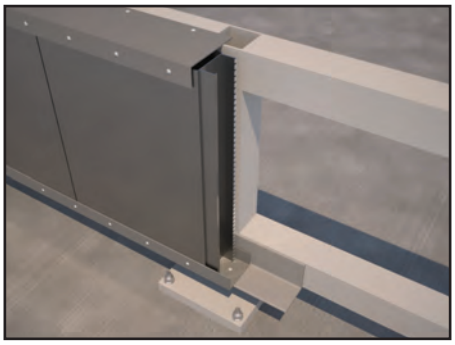
Typical Panel to Structural Connections

Other connection methods available

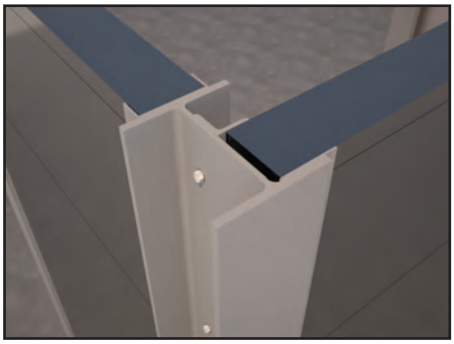


Surface connection to HSS steel framing





Standard W-Column to Panel Connection Detail



KINETICS Noise Control

kineticsnoise.com/industrial/barrier_walls.html
sales@kineticsnoise.com
1-800-959-1229

Manufacturing facilities in Ohio, USA; California, USA; and Ontario, Canada. Sales offices worldwide.