

August 24, 2023

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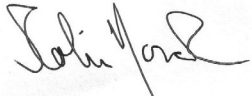
Re: Environmental Noise Assessment Report for the Proposed Residential Development – Caboto Club Apartments, City of Windsor, Ontario

Dear Mr. Bortolotti:

Please find attached a noise assessment report for the proposed residential development located on Tecumseh Road East in the City of Windsor, Ontario. This assessment considers the potential impacts from transportation noise, including road and rail.

I trust that the enclosed information meets your requirements. Please do not hesitate to contact me if you have any questions.

Sincerely,



Colin Novak PhD, PEng.

Environmental Noise Assessment Report for the Proposed Caboto Club Apartment Residential Development, City of Windsor



akoustik
engineering limited

August 24, 2023

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Statement of Liability

Akoustik Engineering Limited prepared this acoustical assessment report for Sfera Architectural Associates Inc. The material in it reflects Dr. Helen Ule's and Dr. Colin Novak's judgement in light of the information available to them and Akoustik Engineering Limited at the time of the study, including all acoustical measurements, under the stated test conditions. Any use that a Third Party makes of this report (other than Sfera Architectural Associates Inc.), or any reliance on decisions made based on it, is the responsibility of such Third Parties. Akoustik Engineering Limited accepts no responsibility for damages, if any, suffered by any Third Party resulting from decisions made or actions based on this report.

Introduction

This report is a noise assessment prepared for Sfera Architectural Associates Inc. in accordance with the procedures for noise assessment outlined by the applicable Ministry of the Environment, Conservation and Parks (MECP) Noise Pollution Control Guidelines (NPC). This assessment is in support of an application for a proposed six storey residential apartment development to be located on Tecumseh Road East, Windsor, Ontario, which is adjacent to the existing Caboto Club facility. The assessment pertains to the environmental noise impacts on the development from nearby sources of transportation noise. An illustration of the geographical area showing the proposed development areas used for this assessment is given in Appendix A: Site Location.

The expected transportation noise impacts have been predicted using the MECP prediction software STAMSON and are based on available road and rail traffic volumes, which have been projected 10 years forward. Given that the road traffic occurs during all periods of a 24-hour day, as defined by the applicable MECP's Noise Pollution Control documents (NPC-300), the assessment has been carried out for the entire 24-hour period. A description for any recommended abatement (if required) to control the noise is included in this report.

Identification of Noise Sources

A zoning map for the area is provided in Appendix B: Land-use Zoning Map of Area. The proposed development is surrounded by commercial land in all directions. It should be noted that immediately outside of the surrounding band of commercial land are residential lands. The Ministry of the Environment, Conservation and Parks specifications for the identification of existing or future major sources of noise impact on a development is whether they are within 500 metres of the site. The noise sources which have been identified to possibly produce an impact on the proposed development are Tecumseh Road East (eastbound and westbound) immediately north of the development, Parent Avenue to the east and Howard Avenue which is west of the development. The posted speeds for all the identified roadways is 50 km/h.

The identification of rail noise impacts on a development is whether the nearest track of railway line is within 300 metres of the site. Given that this proposed development is located within 300 metres of the nearby Essex Terminal Railway (ETR) rail line, the impacts from rail noise are included in this assessment report. Given that the rail is more than 75 meters from the proposed building, the measurement and assessment of ground vibrations is not required.

There are no other significant sources (transportation or stationary) of noise which are expected to have an impact on the proposed development.

Ministry of the Environment, Conservation and Parks Noise Criteria

In accordance with the MECP Noise Pollution Control (NPC) Guideline, NPC-300, the following sound level limits from transportation noise for Class 1 residential development have been set and are shown in

Table 1 below. The NPC-300 reference pages are given in Appendix C: NPC-300 Reference Pages. The proposed development is classified as a Class 2 area, given that the region has an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as “urban hum”. It is worth noting that where the sound level limits presented in Table 1 are exceeded, noise control abatement is required.

Table 1: Ministry of the Environment and Climate Change Noise Criteria for a Class 1 Area – Transportation Noise

| Point of Reception Location | Daytime LA_{eq} [dBA] | Nighttime LA_{eq} [dBA] |
|------------------------------------|--------------------------------------|--|
| Outdoor Living Area (OLA) | 55 | -- |
| Plane of Window (Indoor) | 55 (45) | 50 (40) |

From Table 1, daytime refers to the period from 07:00 to 23:00 and nighttime refers to the period from 23:00 to 07:00 hours. An outdoor living area (OLA) generally refers to a location such as a patio, yard, or barbecue area. There are no designated outdoor amenity areas for this development.

The limits presented in Table 1 are the limits before noise control measures are required. The noise level limit in an OLA may be exceeded by up to 5 dBA if proper warning clauses are inserted in the titles, deeds, and any tenancy agreements relating to the property and only after barriers or other noise control measures have been found to be impractical or unfeasible. A noise attenuation barrier is required to protect and bring the sound level down to 55 dBA in the OLA if the noise level exceeds 60 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with the appropriate warning clause; in this situation, any excess above the noise limit will not be deemed acceptable if it exceeds 5 dB.

The guideline also recommends the provision for the installation of central air conditioning when the noise level outside the plane of a window exceeds 55 dBA for the daytime or 50 dBA for the nighttime. If the noise level exceeds 65 dBA for the daytime or 60 dBA for the nighttime, the installation of central air conditioning should be implemented. Further, building components including exterior walls, windows and doors should be designed to have sufficient Sound Transmission Class (STC) ratings to meet the indoor noise guidelines given in Table 1.

Identification of the Representative Receptor Locations

The proposed six storey apartment building is to consist of 54 apartments. There are no designated outdoor amenity areas as defined by the MECP within the development area. Figure 1 below identifies the development area within the red region. It should be noted that while the surrounding property is also owned by the developer of the proposed development, only the region within the red outline and identified as the development area is considered and evaluated in this report.

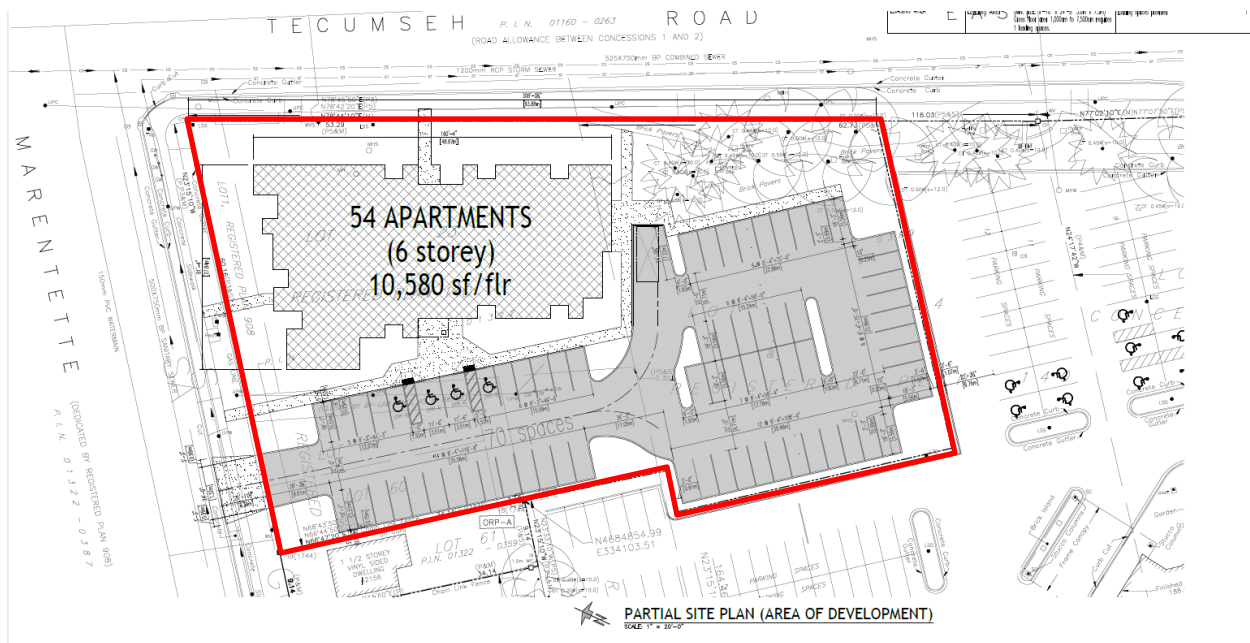


Figure 1: Partial Site Plan Illustrating the Area of Development

The MECP defines a sensitive point of reception (POR) as an existing, or zoned for future use, residence, hotel, nursing or retirement home, hospital, campground or other sensitive building/area within 500 metres of the facility. An aerial view of the facility and surrounding location is included in Appendix A: Facility Location and Noise Sources, which illustrates the land surrounding the property and the identified PORs. For this study, seven representative sensitive receptors are identified for evaluation of potential noise impact from the nearby sources of transportation noise.

POR1 is taken to be at the northwest corner of the building, POR2 is located at the northeast corner of the building, POR3 is at the southwest corner of the building and POR4 is taken to be at the southeast corner of the building. For these PORs, the units on the first (L) and sixth storeys (U) are considered (i.e. POR1L, POR1U, POR2L, POR2U etc.).

Assessment Approach for Transportation Noise

The predicted sound levels from the nearby road traffic were determined using the MECP prediction noise modelling software STAMSON 5.0. All input data pertaining to the development was based on the site plan provided at the time of the study and as shown in Appendix A: Site Location. The input data used to calculate the predicted sound level exposures for the selected receptors impacted by the road traffic noise, and the resulting outputs, are given in Appendix D: Noise Model Printout. The model for the predicted noise levels at the representative units was developed to determine compliance to the MECP limits and extent of the noise control measures required (if any). The MECP requires the calculation of the noise impacts to be determined at the plane of window for the dwelling(s) and OLA locations.

Transportation Noise Source Data

Road traffic volume data was obtained from the City of Windsor Average Daily Traffic Volume document dated January 2020. It is assumed in this case that the annual average daily traffic (AADT) is equivalent to the average daily traffic (ADT). The projected road traffic volumes, along with the breakdown of vehicle types are given in Appendix E: Road Traffic Volume Data. Also, given in Appendix E are the distances between the representative receptor locations and the roadway that were used in the prediction model.

Given that the traffic report document gives only one year of traffic volume data for roadways considered in this assessment, a conservative 2% growth rate is assumed for the roadways. Day and night traffic volumes were calculated having an assumed 90%-day and 10%-night split as per the MECP STAMSON protocol. The percentage of commercial truck traffic on Tecumseh Road East was taken as 5% with 20% of that being heavy trucks and 80% being medium trucks. The percent of commercial truck traffic on Parent Avenue was taken as 2% with 0% of the commercial traffic as heavy trucks and 100% medium trucks. The percentage of commercial truck traffic on Howard Avenue was taken as 5% with 20% of this being heavy trucks and the remaining 80% being medium trucks.

The ETR train volume data, along with other pertinent information was provided by the local ETR office. The rail traffic data was projected 10 years into the future using a 2.5% increase per annum. As such, the predicted noise levels given in this report are for future traffic volumes. The ETR traffic information is given in Appendix F: Rail Traffic Volume Data.

Transportation Noise Source Summary

The predicted noise level impacts for the daytime and nighttime periods at the plane of window for the representative receptors with no control measures are given in Table 2. From this table, it is seen that the MECP noise limits for transportation noise identified in Table 1 are exceeded at all the units during the daytime and most during the nighttime periods. As such, noise abatement controls are required.

Table 2: Predicted Road and Rail Noise Levels – Plane of Window – with No Abatement

| POR ID | Daytime Period LAeq (dBA) | Nighttime Period LAeq (dBA) |
|-----------------------|---------------------------|-----------------------------|
| POR1L (1.5 m height) | 66 | 59 |
| POR1U (16.5 m height) | 67 | 61 |
| POR2L (1.5 m height) | 66 | 59 |
| POR2U (16.5 m height) | 67 | 61 |
| POR3L (1.5 m height) | 57 | 50 |

| | | |
|-----------------------|----|----|
| POR3U (16.5 m height) | 60 | 53 |
| POR4L (1.5 m height) | 58 | 52 |
| POR4U (16.5 m height) | 61 | 54 |

*red text denotes exceedance

Given that the receptor sound levels exceed the MECP noise limits at most representative residential units, warning clauses are required to meet the noise guideline limits given in Table 1. Also required is the specification of building component design for noise control for the exterior walls, doors and windows. These must be designed to have sufficient Sound Transmission Class (STC) ratings to meet the indoor noise guidelines given in Table 1.

Results and Noise Control Requirements

The following section is a summary and assessment of the modeled results for the representative units with respect to transportation sources of noise.

Rail and Road Noise

As specified by the MECP Environmental Noise Guideline NPC-300, the outdoor and indoor sound level limits (based on one-hour LA_{eq} values) at a residence for road traffic noise are categorized into three (3) limits, based on the type of space assessed. The document also specifies the recommended noise control measures, if required, that should be followed for the plane of a window (ventilation requirements) and the indoor living area (building components) noise assessments. The select pages from the NPC-300 guideline given in Appendix C includes the stated warning clauses and other requirements based on the predicted noise levels.

The predicted noise level impacts for the daytime and nighttime periods at the plane of window for the representative receptors with no control measures are given in Table 2. From this table, it was shown that the MECP noise limits for transportation noise identified in Table 1 are exceeded. Given this, warning clauses are required.

Notes taken from NPC-300 (where applicable):

Note A: Noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.

Note B: Noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B.

Note C: The dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

Note D: Installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2.

Note E: Building components including windows, walls and doors, where applicable, need to be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) needs to be specified. In addition, the exterior walls of the first row of dwellings next to railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic Leq (24-hour), estimated at a location of a nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks.

If required, the following warning clauses are to be implemented in all development agreements, offers to Purchase, and agreements of Purchase or Sale or Lease of each dwelling unit:

Warning Clause(s) (where applicable):

Type A: "Purchasers/tenants are advised that sound levels due to increasing road traffic and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."

Type B: "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic and rail traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."

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

Type D: "This dwelling unit has been equipped with central air conditioning in order to 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, Conservation and Parks. Air conditioning units are to be installed in a noise insensitive area."

Type E: "Purchasers/tenants are advised that due to the proximity of the adjacent facility, noise from the facility may at times be audible."

Given the proximity of the proposed lots, it is required that the following warning clause be implemented in all development agreements, offers to Purchase, and agreements of Purchase or Sale or Lease of each

affected dwelling unit (all units). Further information can be found in Appendix H: CN Rail Land Use Guidelines.

Warning Clause:

Essex Terminal Railway, or its assigns or successors in interest has or have a right-of-way within 300 meters from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion 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 dwelling(s). ETR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way.

STC Requirements

Given the predicted excessive noise levels, the calculation for the minimum sound transmission class (STC) for the window, door and building wall components is required. The STC building requirements were determined for an assumed living room. The sound level at the plane of the window was taken to be 67 dBA (worst case) during the daytime. Given there is railway activity during the daytime period only, both the noise impacts from roadway and rail noise is considered to determine the STC requirements to achieve a 40 dBA daytime indoor sound level limit for the living room area. The window requirements were calculated for both an operable thick double/triple paned window and a sealed thick double-glazed window. The typical living room was assumed to have a floor area of 11 m² with a window area of 3.75 m², an exterior door area of 1.86 m² and a wall area of 8.5 m². Given that the representative space is a living room, it was also assumed that the room is intermediately absorptive as a typical living room is furnished by both soft and hard surfaces (e.g., couch, non-carpeted floors, window treatments etc.). The program inputs and results for the STC calculations are given in Appendix G: STC Output Results. The building component STC requirements are provided in Table 3.

Table 3: Building Components STC Requirements.

| Location Evaluated | Required STC for Building Exterior Walls | Required STC for Double Exterior (Balcony) Door | Required STC for Building Windows |
|---------------------------|---|--|---|
| Living Room | 39 | 27 | 32 for operable thick double/triple paned |
| | | | 35 for sealed thick double glazed |

Combined Results Summary



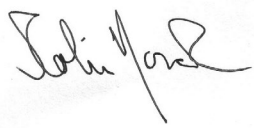
Table 4 summarizes the required warning clauses and building requirements for all residential units within the proposed development. It is required that any necessary warning clauses be implemented in all development agreements, offers to Purchase, and agreements of Purchase or Sale or Lease as identified in Table 4.

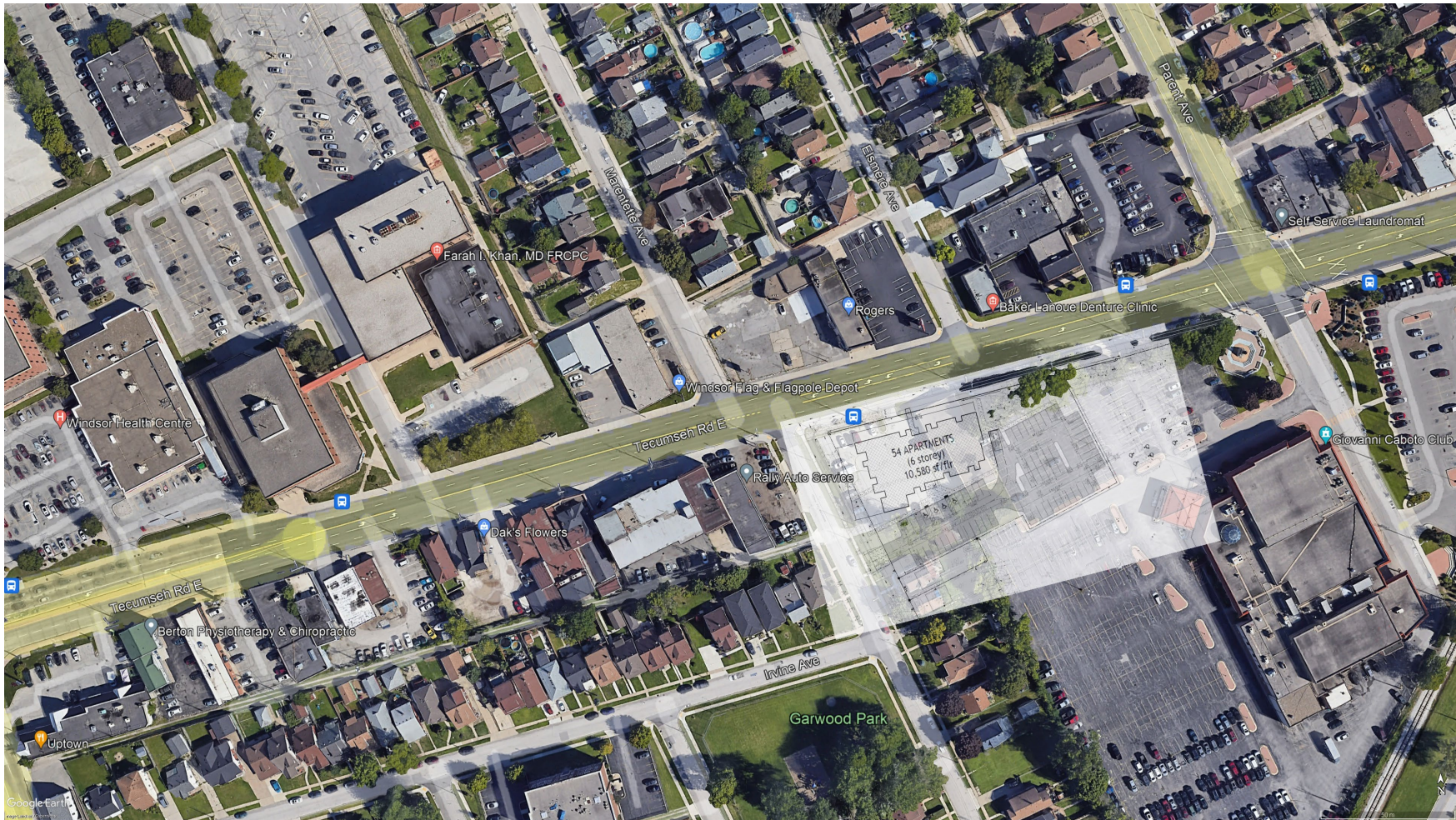
Table 4: Summary of Warning Clauses and Building Component Requirements

| POR | Noise Barrier Requirement (Y/N) | Warning Clause(s) | Building Component Requirement(s) | Ventilation Requirement(s) |
|---|--|--------------------------|--|---|
| Units with facades facing Tecumseh Road East | N/A | Type D, Rail | Minimum STC Rating for the following Building Components: Exterior Wall – 39 Window – 32 (operable thick double paned) Window – 35 (sealed thick double paned) Double exterior (balcony) door - 27 | Installation of Central Air Conditioning |
| Units with no facades facing Tecumseh Road East | N/A | Type C, Rail | Minimum Ontario building code | Provision for adding Central Air Conditioning |

Conclusion

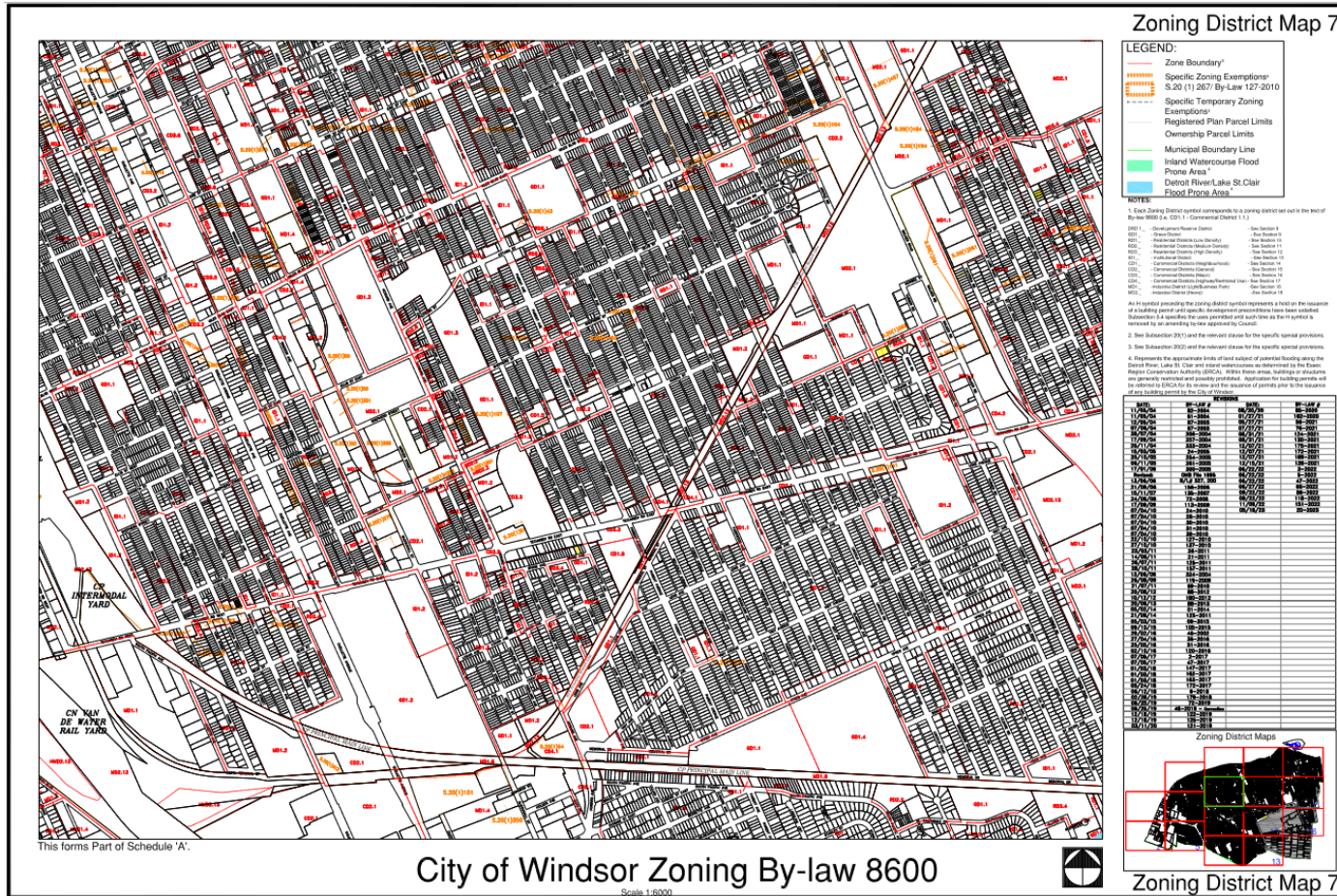
The noise impacts on the proposed development are found to exceed the limits set by the Ontario Ministry of the Environment, Conservation and Parks. However, given that the noise impacts can be mitigated through the installation or provision for the future installation of central air conditioning, warning clauses and appropriate building material design (STC), it is recommended that the development be given approval with the understanding that the stated noise control measures are implemented. It should also be noted that there shall be no designated outdoor living area within the defined development area.

| | | |
|--|---|---|
| <p>For</p>  <p>akoustik engineering limited</p> |  |  |
| | <p>Prepared by: Helen Ule, Ph.D., PEng</p> | <p>Reviewed by: Colin Novak, Ph.D., PEng</p> |

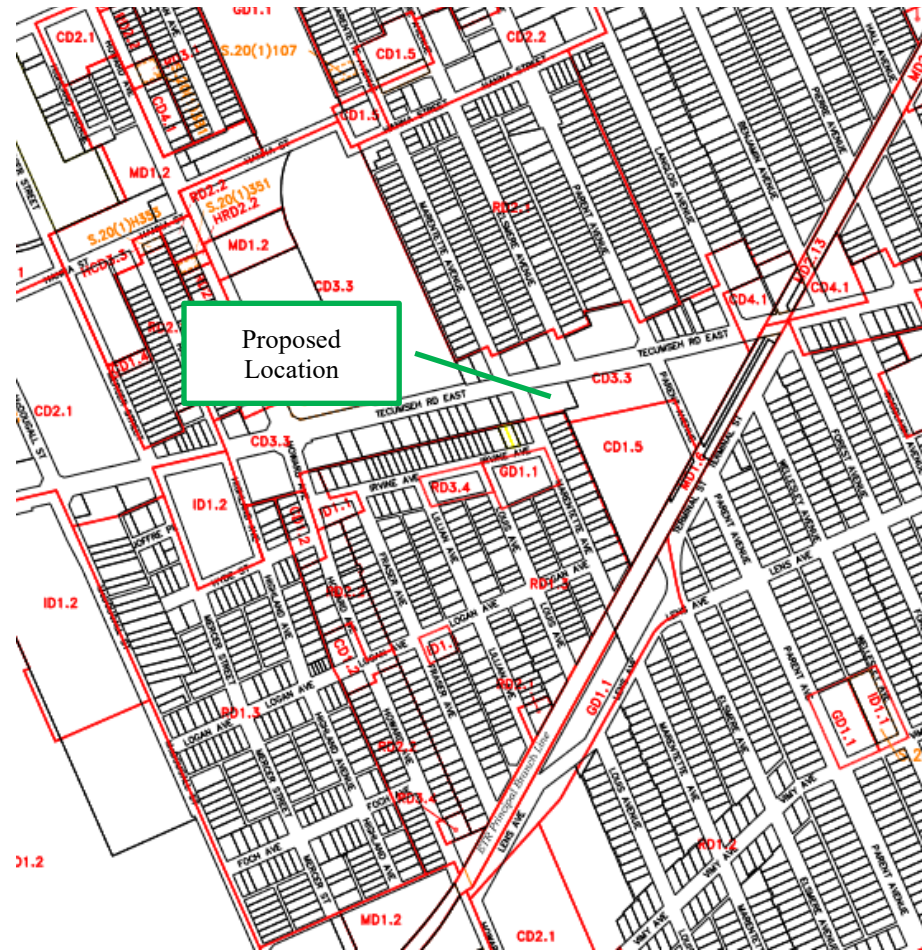



A2: Aerial View of Proposed Development Location

Appendix B: Zoning By-law Map



B1: Zoning District Map – City of Windsor; Zoning Map 7



Scale 1:6000 

B2: Zoning District Map – City of Windsor; Map No. 7, Site Location

Appendix C: NPC-300 Reference Pages

for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours). Sound level limits apply during the nighttime period (23:00 – 07:00) for the plane of the window of a noise sensitive space. In general, the outdoor points of reception will be protected during the nighttime as a consequence of meeting the sound level limits at the adjacent plane of window of noise sensitive spaces.

Note that for Class 1, 2 and 3 areas, the plane of window limits apply to a window that is assumed to be open. For Class 4 areas, the plane of window limits apply to a window which is assumed to be closed. This distinction does not affect the prediction of plane of window sound levels.

Table B-1
Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA)
Outdoor Points of Reception

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

Table B-2
Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq} , dBA)
Plane of Window of Noise Sensitive Spaces

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

B7.2 Impulsive Sound – Outdoors and Plane of Window

For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source, the sound level limit at a point of reception expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) is the higher of the applicable exclusion limit value given in Table B-3 or Table B-4, or the background sound level for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours). Sound level limits apply during the nighttime period (23:00 – 07:00) for the plane of the window of a noise sensitive space. In general, the outdoor points of reception will be protected during the nighttime as a consequence of meeting the sound level limits at the adjacent plane of window of noise sensitive spaces.

Notwithstanding Publication NPC-103, Reference [29], the following sound level limits in Table B-3 and Table B-4 below apply to impulsive sound:

C 1: Exclusion Limit Values for Stationary Sources

In addition, sound level limits do not apply to emergency equipment operating in emergency situations.

B7.4 Sound Level Limits for Layover Sites

The sound level limit for noise from a layover site in any hour, expressed in terms of the One-Hour Equivalent Sound Level (L_{eq}) is the higher of either 55 dBA or the background sound level.

B8 Noise Impact Assessment – Multiple Sources

Impulse sources, non-impulse sources and emergency equipment are to be analyzed separately. Where there are multiple, non-impulse sources at a stationary source, the noise assessment needs to be based on the combined effect of all sources comprising the stationary source, added together on an energy basis.

B9 Determination of Area Class

Area classification refers to the receptor location.

B9.1 Class 1, 2 and 3 Areas

Determination of whether an area is Class 1, 2 or 3 can usually be done by determining the proximity of the point of reception to roads, the volumes of road traffic (and associated sound levels), and the nature of land uses and activities (or lack thereof) in the area, as a function of time.

B9.2 Class 4 Area

Class 4 area classification is based on the principle of formal confirmation of the classification by the land use planning authority. Such confirmation would be issued at the discretion of the land use planning authority and under the procedures developed by the land use planning authority, in the exercise of its responsibility and authority under the Planning Act.

The following considerations apply to new noise sensitive land uses proposed in a Class 4 area:

- an appropriate noise impact assessment should be conducted for the land use planning authority as early as possible in the land use planning process that verifies that the applicable sound level limits will be met;
- noise control measures may be required to ensure the stationary source complies with the applicable sound level limits at the new noise sensitive land use;

L_{eq} (8). For complete description on assessing road traffic impacts, refer to ORNAMENT. Other traffic noise prediction models have been and are being developed by various authorities and may be adopted from time to time for use in Ontario by the MOE.

In order to be consistent with MOE guidelines, the sound level should be assessed in an OLA, such as a rear yard or a patio, and in indoor living areas, such as bedrooms and living rooms. Where the noise impact exceeds the applicable sound level limits, mitigation measures such as site planning, architectural design, noise barriers, building envelope elements (windows, exterior walls, doors) with upgraded sound isolation performance and/or central air conditioning may be required. Noise control measures are not required if the sound level estimated in the OLA is 55 dBA or less during the daytime and 50 dBA or less in the plane of bedroom windows during either daytime or nighttime.

C3.2.2 Daytime Outdoor Sound Level Limit

Table C-1 gives the equivalent sound level (L_{eq}) limit for designated OLAs. The limit applies to the entire daytime period from 07:00 to 23:00.

Table C-1
Sound Level Limit for Outdoor Living Areas
Road and Rail

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

C3.2.3 Indoor Sound Level Limits

Table C-2 gives the equivalent sound level (L_{eq}) limits and the applicable time periods for the indicated types of indoor spaces. The specified indoor sound level limits are maxima and apply to the indicated indoor spaces with windows and doors closed.

Table C-2
Indoor Sound Level Limits
Road and Rail

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

C 3: Daytime Outdoor and Daytime/Nighttime Indoor Sound Level Limits

**Table C-10
Supplementary Indoor Aircraft Noise Limits
(Applicable over 24-hour period)**

| Type of Space | Indoor NEF/NEP* |
|---|-----------------|
| General offices, reception areas, retail stores, etc. | 15 |
| Individual or semi-private offices, conference rooms, etc. | 10 |
| Living/dining areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, daycare centres, places of worship, etc. | 5 |
| Sleeping quarters of residences, hospitals, nursing/retirement homes, etc. | 0 |

* The indoor NEF/NEP values listed in Table C-10 are not obtained from NEF/NEP contour maps. The values are representative of the indoor sound levels and are used as assessment criteria for the evaluation of acoustical insulation requirements.

C7 Noise Control Measures

The following sections provide MOE guidance for appropriate noise control measures. These sections constitute requirements that are applied to MOE approvals for stationary sources. This information is also provided as guidance which land use planning authorities may consider adopting.

The definition in Part A describes the various types and application of noise control measures. All the noise control measures described in the definition are appropriate to address the impact of noise of transportation sources (road, rail and aircraft) on planned sensitive land uses. Only some of the noise control measures described in the definition are appropriate to address the noise impact of stationary sources on planned sensitive land uses.

C7.1 Road Noise Control Measures

C7.1.1 Outdoor Living Areas

If the 16-Hour Equivalent Sound Level, $L_{eq}(16)$ in the OLA is greater than 55 dBA and less than or equal to 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.

If the 16-Hour Equivalent Sound Level, $L_{eq}(16)$ in the OLA is greater than 60 dBA, noise control measures should be implemented to reduce the level to 55 dBA. Only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons would an excess above the limit (55 dBA) be acceptable with a warning clause Type B. In the above situations, any excess above the limit will not be acceptable if it exceeds 5 dBA.

C7.1.2 Plane of a Window – Ventilation Requirements

C7.1.2.1 Daytime Period, 07:00 – 23:00 Hours

Noise control measures may not be required if the $L_{eq}(16)$ daytime sound level in the plane of a bedroom or living/dining room window is less than or equal to 55 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 55 dBA and less than or equal to 65 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the daytime sound level in the plane of a bedroom or living/dining room window is greater than 65 dBA, installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.2.2 Nighttime Period, 23:00 – 07:00 Hours

Noise control measures may not be required if the $L_{eq}(8)$ nighttime sound level in the plane of a bedroom or living/dining room window is less than or equal to 50 dBA. If the sound level in the plane of a bedroom or living/dining room window is greater than 50 dBA and less than or equal to 60 dBA, the dwelling should be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.

If the nighttime sound level in the plane of a bedroom or living/dining room window is greater than 60 dBA, installation of central air conditioning should be implemented, with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The location and installation of the outdoor air conditioning device should comply with sound level limits of Publication NPC-216, Reference [32], and guidelines contained in Environmental Noise Guidelines for Installation of Residential Air Conditioning Devices, Reference [6], or should comply with other criteria specified by the municipality.

C7.1.3 Indoor Living Areas – Building Components

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 60 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 65 dBA, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the

sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) should be specified.

C7.2 Rail Noise Control Measures

C7.2.1 Outdoor Living Areas

Whistle noise is not included in the determination of the outdoor daytime sound level due to railway trains. All the provisions of Section C7.1.1 apply also to noise control requirements for rail noise.

C7.2.2 Plane of a Window – Ventilation Requirements

Whistle noise is not included in the determination of the sound level in the plane of a window. All the provisions of Section C7.1.2 apply also to noise control requirements for rail noise.

C7.2.3 Indoor Living Areas – Building Components

The sound level, L_{eq} , during the daytime (16-hour) and nighttime (8-hour) periods is determined using the prediction method STEAM, Reference [34], immediately outside the dwelling envelope. Whistle noise is included in the determination of the sound level.

If the nighttime sound level outside the bedroom or living/dining room windows exceeds 55 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 60 dBA, building components including windows, walls and doors, where applicable, need to be designed so that the indoor sound levels comply with the sound level limits in Table C-2. The acoustical performance of the building components (windows, doors and walls) needs to be specified.

In addition, the exterior walls of the first row of dwellings next to railway tracks are to be built to a minimum of brick veneer or masonry equivalent construction, from the foundation to the rafters when the rail traffic L_{eq} (24-hour), estimated at a location of a nighttime receptor, is greater than 60 dBA, and when the first row of dwellings is within 100 metres of the tracks.

C7.3 Combination of Road and Rail Noise

The noise impact in the OLA and in the plane of a window, and the requirements for outdoor measures, ventilation measures and warning clauses, should be determined by combining road and rail traffic sound levels.

The assessment of the indoor sound levels and the resultant requirement for the acoustical descriptors of the building components should be done separately for road

In Class 4 areas, where windows for noise sensitive spaces are assumed to be closed, the use of central air conditioning may be acceptable if it forms an essential part of the overall building designs.

C7.9 Verification of Noise Control Measures

It is recommended that the implementation of noise control measures be verified by qualified individuals with experience in environmental acoustics.

C8 Warning Clauses

The use of warning clauses or easements in respect of noise are recommended when circumstances warrant. Noise warning clauses may be used to warn of potential annoyance due to an existing source of noise and/or to warn of excesses above the sound level limits. Direction on the use of warning clauses should be included in agreements that are registered on title to the lands in question. The warning clauses would be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations. Alternatively, the use of easements in respect of noise may be appropriate in some circumstances. Additional guidance on the use of noise warning clauses is provided in Section C7.1.1, Section C7.1.2.1, Section C7.1.2.2, Section C7.3 and Section C7.4.

C8.1 Transportation Sources

The following warning clauses may be used individually or in combination:

TYPE A: (see Section C7.1.1)

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

TYPE B: (see Section C7.1.1 and Section C7.4)

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

TYPE C: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

“This dwelling unit has been designed with the provision for adding central air conditioning at the occupant’s discretion. Installation of

central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment.”

TYPE D: (see Section C7.1.2.1, Section C7.1.2.2 and Section C7.4)

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

C8.2 Stationary Sources

It is not acceptable to use warning clauses in place of physical noise control measures to identify an excess over the MOE sound level limits. Warning clause (Type E) for stationary sources may identify a potential concern due to the proximity of the facility but it is not acceptable to justify exceeding the sound level limits.

TYPE E: (see Section C7.6)

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

C8.3 Class 4 Area Notification

TYPE F: (see Section B9.2 and Section C4.4.2)

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

Appendix D: Noise Model Printout

POR 2U: Sixth Storey at 16.5 m (Including road and rail noise)

STAMSON 5.0 NORMAL REPORT Date: 15-08-2023 14:59:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: POR2U.te Time Period: Day/Night 16/8 hours
Description: POR 2 Sixth Storey

Rail data, segment # 1: ETR (day/night)

```
-----  
Train                    ! Trains                    ! Speed !# loc !# Cars! Eng !Cont  
Type                    !                    ! (km/h) !/Train!/Train! type !weld  
-----+-----+-----+-----+-----+-----  
  1.                    ! 12.8/0.0                    ! 16.0 ! 2.0 ! 20.0 !Diesel! Yes
```

Data for Segment # 1: ETR (day/night)

```
-----  
Angle1    Angle2                    : -90.00 deg    90.00 deg  
Wood depth                    :                    0                    (No woods.)  
No of house rows                :                    0 / 0  
Surface                    :                    1                    (Absorptive ground surface)  
Receiver source distance        : 198.00 / 198.00 m  
Receiver height                : 16.50 / 16.50 m  
Topography                    :                    1                    (Flat/gentle slope; no barrier)  
No Whistle  
Reference angle                :                    0.00
```

Results segment # 1: ETR (day)

```
-----  
LOCOMOTIVE (0.00 + 51.11 + 0.00) = 51.11 dBA  
Angle1 Angle2    Alpha RefLeq    D.Adj    F.Adj    W.Adj    H.Adj    B.Adj    SubLeq  
-----+-----+-----+-----+-----+-----+-----+-----  
  -90    90    0.14    64.20    -12.72    -0.37    0.00    0.00    0.00    51.11  
-----+-----+-----+-----+-----+-----+-----
```

```
-----  
WHEEL (0.00 + 33.73 + 0.00) = 33.73 dBA  
Angle1 Angle2    Alpha RefLeq    D.Adj    F.Adj    W.Adj    H.Adj    B.Adj    SubLeq  
-----+-----+-----+-----+-----+-----+-----+-----  
  -90    90    0.24    48.26    -13.90    -0.63    0.00    0.00    0.00    33.73  
-----+-----+-----+-----+-----+-----+-----
```

Segment Leq : 51.19 dBA

Total Leq All Segments: 51.19 dBA

Results segment # 1: ETR (night)

LOCOMOTIVE (0.00 + -13.09 + 0.00) = 0.00 dBA

| Angle1 | Angle2 | Alpha | RefLeq | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.14 | 0.00 | -12.72 | -0.37 | 0.00 | 0.00 | 0.00 | -13.09 |

WHEEL (0.00 + -14.53 + 0.00) = 0.00 dBA

| Angle1 | Angle2 | Alpha | RefLeq | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj | SubLeq |
|--------|--------|-------|--------|--------|-------|-------|-------|-------|--------|
| -90 | 90 | 0.24 | 0.00 | -13.90 | -0.63 | 0.00 | 0.00 | 0.00 | -14.53 |

Segment Leq : 0.00 dBA

Total Leq All Segments: 0.00 dBA

Road data, segment # 1: Tec Rd E EB (day/night)

Car traffic volume : 16324/1814 veh/TimePeriod
 Medium truck volume : 688/76 veh/TimePeriod
 Heavy truck volume : 172/19 veh/TimePeriod
 Posted speed limit : 50 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Tec Rd E EB (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 15.00 / 15.00 m
 Receiver height : 16.50 / 16.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: Tec Rd E WB (day/night)

```
-----
Car traffic volume : 16324/1814 veh/TimePeriod
Medium truck volume : 688/76 veh/TimePeriod
Heavy truck volume : 172/19 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 2: Tec Rd E WB (day/night)

```
-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.00 / 24.00 m
Receiver height : 16.50 / 16.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 3: Parent (day/night)

```
-----
Car traffic volume : 8689/965 veh/TimePeriod
Medium truck volume : 177/20 veh/TimePeriod
Heavy truck volume : 0/0 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 3: Parent (day/night)

```
-----
Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 122.00 / 122.00 m
Receiver height : 16.50 / 16.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 4: Howard (day/night)

```

-----
Car traffic volume : 28713/3190 veh/TimePeriod
Medium truck volume : 1209/135 veh/TimePeriod
Heavy truck volume : 302/33 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
  
```

Data for Segment # 4: Howard (day/night)

```

-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 380.00 / 380.00 m
Receiver height : 16.50 / 16.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
  
```

Results segment # 1: Tec Rd E EB (day)

Source height = 1.00 m

ROAD (0.00 + 65.17 + 0.00) = 65.17 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|
| -90 | 90 | 0.22 | 65.76 | 0.00 | 0.00 | -0.60 | 0.00 | 0.00 | 0.00 |

```

-----
--
65.17
-----
--
  
```

Segment Leq : 65.17 dBA

Results segment # 2: Tec Rd E WB (day)

Source height = 1.00 m

ROAD (0.00 + 62.67 + 0.00) = 62.67 dBA

| Angle1 | Angle2 | Alpha | RefLeq | P.Adj | D.Adj | F.Adj | W.Adj | H.Adj | B.Adj |
|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|
| -90 | 90 | 0.22 | 65.76 | 0.00 | -2.50 | -0.60 | 0.00 | 0.00 | 0.00 |

```

-----
--
62.67
-----
--
  
```

Segment Leq : 62.67 dBA

Results segment # 3: Parent (day)

Source height = 0.50 m

ROAD (0.00 + 45.65 + 0.00) = 45.65 dBA

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

SubLeq

| | | | | | | | | | |
|-------|---|------|-------|------|--------|-------|------|------|------|
| -- | | | | | | | | | |
| -90 | 0 | 0.24 | 60.59 | 0.00 | -11.29 | -3.64 | 0.00 | 0.00 | 0.00 |
| 45.65 | | | | | | | | | |

Segment Leq : 45.65 dBA

Results segment # 4: Howard (day)

Source height = 1.00 m

ROAD (0.00 + 50.42 + 0.00) = 50.42 dBA

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

SubLeq

| | | | | | | | | | |
|-------|----|------|-------|------|--------|-------|------|------|------|
| -- | | | | | | | | | |
| -90 | 90 | 0.23 | 68.21 | 0.00 | -17.20 | -0.60 | 0.00 | 0.00 | 0.00 |
| 50.42 | | | | | | | | | |

Segment Leq : 50.42 dBA

Total Leq All Segments: 67.23 dBA

Results segment # 1: Tec Rd E EB (night)

Source height = 1.00 m

ROAD (0.00 + 58.62 + 0.00) = 58.62 dBA

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

SubLeq

| | | | | | | | | | |
|-------|----|------|-------|------|------|-------|------|------|------|
| -- | | | | | | | | | |
| -90 | 90 | 0.23 | 59.22 | 0.00 | 0.00 | -0.60 | 0.00 | 0.00 | 0.00 |
| 58.62 | | | | | | | | | |

Segment Leq : 58.62 dBA

Results segment # 2: Tec Rd E WB (night)

Source height = 1.00 m

ROAD (0.00 + 56.12 + 0.00) = 56.12 dBA

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

--
-90 90 0.23 59.22 0.00 -2.50 -0.60 0.00 0.00 0.00
56.12

--

Segment Leq : 56.12 dBA

Results segment # 3: Parent (night)

Source height = 0.50 m

ROAD (0.00 + 39.14 + 0.00) = 39.14 dBA

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

SubLeq

| | | | | | | | | | |
|-------|---|------|-------|------|--------|-------|------|------|------|
| -- | | | | | | | | | |
| -90 | 0 | 0.24 | 54.07 | 0.00 | -11.29 | -3.64 | 0.00 | 0.00 | 0.00 |
| 39.14 | | | | | | | | | |

--

Segment Leq : 39.14 dBA

Results segment # 4: Howard (night)

Source height = 1.00 m

ROAD (0.00 + 43.87 + 0.00) = 43.87 dBA

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

SubLeq

| | | | | | | | | | |
|-------|----|------|-------|------|--------|-------|------|------|------|
| -- | | | | | | | | | |
| -90 | 90 | 0.23 | 61.67 | 0.00 | -17.20 | -0.60 | 0.00 | 0.00 | 0.00 |
| 43.87 | | | | | | | | | |

--

Segment Leq : 43.87 dBA

Total Leq All Segments: 60.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.34

(NIGHT): 60.68

Appendix E: Road Traffic Volume Data

E 1: Predicted Tecumseh Road East Traffic Volumes (2% growth rate per annum) [Eastbound and Westbound total]

| Year | Road | Location | ADT |
|------|------------------|-------------------|-------|
| 2011 | Tecumseh Rd East | East of McDougall | 24700 |
| 2033 | Tecumseh Rd East | East of McDougall | 38186 |

E 2: Predicted Parent Ave. Traffic Volumes (2% growth rate per annum)

| Year | Road | Location | ADT |
|------|-------------|-------------------|------|
| 2012 | Parent Ave. | North of Tecumseh | 6500 |
| 2033 | Parent Ave. | North of Tecumseh | 9852 |

E 3: Predicted Howard Avenue Traffic Volumes (2% growth rate per annum)

| Year | Road | Location | ADT |
|------|-------------|-------------------|-------|
| 2011 | Howard Ave. | South of Tecumseh | 22600 |
| 2033 | Howard Ave. | South of Tecumseh | 33582 |

E 4: Predicted Traffic Volumes (Tecumseh Rd East) per Period and Breakdown of Cars, Medium Trucks and Heavy Trucks – each direction of travel

| Period | Auto Traffic Volume (Vehicles/hr) | Medium Truck Traffic Volume (Vehicles/hr) | Heavy Truck Traffic Volume (Vehicles/hr) |
|-----------------|-----------------------------------|---|--|
| Day (16 hours) | 1020 | 43 | 11 |
| Night (8 hours) | 227 | 10 | 2 |

E 5: Predicted Traffic Volumes (Parent Ave.) per Period and Breakdown of Cars, Medium Trucks and Heavy Trucks

| Period | Auto Traffic Volume (Vehicles/hr) | Medium Truck Traffic Volume (Vehicles/hr) | Heavy Truck Traffic Volume (Vehicles/hr) |
|-----------------|-----------------------------------|---|--|
| Day (16 hours) | 543 | 11 | 0 |
| Night (8 hours) | 121 | 3 | 0 |

E 6: Predicted Traffic Volumes (Howard Ave.) per Period and Breakdown of Cars, Medium Trucks and Heavy Trucks

| Period | Auto Traffic Volume (Vehicles/hr) | Medium Truck Traffic Volume (Vehicles/hr) | Heavy Truck Traffic Volume (Vehicles/hr) |
|-----------------|-----------------------------------|---|--|
| Day (16 hours) | 1795 | 76 | 19 |
| Night (8 hours) | 399 | 17 | 4 |

E 7: Distance from Roadway to Selected Representative PORs

| POR | Distance to Tecumseh Rd. East EB (m) | Distance to Tecumseh Rd. East WB (m) | Distance to Parent Ave (m) | Distance to Howard Ave (m) |
|-----------------|--------------------------------------|--------------------------------------|----------------------------|----------------------------|
| POR1L/ POR1U | 15 | 24 | 170 | 337 |
| POR2L/ POR2U | 15 | 24 | 122 | 380 |
| POR3L/ POR3U | 40 | 49 | N/A | N/A |
| POR4L/ POR4U | 32 | 41 | 127 | N/A |

Appendix F: Rail Traffic Volume Data

F 1: ETR Rail Train Volume Data Modelled for 2033

| | Number of Trains | Max Speed (km/h) | Number of Locomotive per Train | Number of Cars per Train | Engine Type |
|-------|------------------|------------------|--------------------------------|--------------------------|-------------|
| Day | 12.8 | 16 | 2 | 20 | Diesel |
| Night | 0 | N/A | - | - | - |

F 2: Distance from ETR Rail Line to Selected Representative PORs

| POR | Distance to ETR Line (m) |
|----------|--------------------------|
| POR1U/1L | N/A |
| POR2U/2L | 198 |
| POR3U/3L | 213 |
| POR4U/4L | 188 |

Appendix G: STC Output Results

```

Indoor sound level in dB(A) is 40
Room absorption category is: intermediate
Outdoor sound level is 67 dB(A) (plus 0 dB from Table 2)

```

| Components: | After Step 2 | From Table 3 (% energy) | From Table 4 (% floor area) | From Table 5 (spectrum) | STC |
|-----------------------------|-----------------|----------------------------|--------------------------------|----------------------------|-----|
| 1. Exterior wall | 27 | +5 dB (33 %) | -0 dB (77 %) | +7 dB | 39 |
| 2. Window, openable thick d | 27 | +5 dB (33 %) | -4 dB (34 %) | +4 dB | 32 |
| 3. Double exterior door | 27 | +5 dB (33 %) | -7 dB (17 %) | +2 dB | 27 |

Calculation is for: POR2U Living Room

G 1: STC Results for Nighttime Bedroom (Openable window)

```

Indoor sound level in dB(A) is 40
Room absorption category is: intermediate
Outdoor sound level is 67 dB(A) (plus 0 dB from Table 2)

```

| Components: | After Step 2 | From Table 3 (% energy) | From Table 4 (% floor area) | From Table 5 (spectrum) | STC |
|-----------------------------|-----------------|----------------------------|--------------------------------|----------------------------|-----|
| 1. Exterior wall | 27 | +5 dB (33 %) | -0 dB (77 %) | +7 dB | 39 |
| 2. Window, sealed thick dou | 27 | +5 dB (33 %) | -4 dB (34 %) | +7 dB | 35 |
| 3. Double exterior door | 27 | +5 dB (33 %) | -7 dB (17 %) | +2 dB | 27 |

Calculation is for: POR2U Sealed Living Room

G 2: STC Results for Nighttime Bedroom (Non-openable window)

Appendix H: CN Rail Land Use Guidelines



Railway Properties

1 Administration Rd
Concord, ON L4K 1B9
Telephone: 514-399-7627
Fax: 514-399-4296

PRINCIPAL MAIN LINE REQUIREMENTS

- A. Safety setback of habitable buildings from the railway rights-of-way to be a minimum of 30 metres in conjunction with a safety berm. The safety berm shall be adjoining and parallel to the railway rights-of-way with returns at the ends, 2.5 metres above grade at the property line, with side slopes not steeper than 2.5 to 1.
- B. The Owner shall engage a consultant to undertake an analysis of noise. At a minimum, a noise attenuation barrier shall be adjoining and parallel to the railway rights-of-way, having returns at the ends, and a minimum total height of 5.5 metres above top-of-rail. Acoustic fence to be constructed without openings and of a durable material weighing not less than 20 kg. per square metre of surface area. Subject to the review of the noise report, the Railway may consider other measures recommended by an approved Noise Consultant.
- C. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, ± 3 dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.
- D. The Owner shall install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line.
- E. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way: "Warning: Canadian National Railway Company or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion 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 dwelling(s). CNR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way."
- F. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.
- G. The Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the safety berm, fencing and vibration isolation measures implemented are not to be tampered with or altered and further that the Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of CN.
- H. The Owner shall enter into an Agreement with CN stipulating how CN's concerns will be resolved and will pay CN's reasonable costs in preparing and negotiating the agreement.
- I. The Owner shall be required to grant CN an environmental easement for operational noise and vibration emissions, registered against the subject property in favour of CN.

K 1: CN Rail Canada – Principal Main Line Requirements (note item E)