FINAL REPORT

THE OLD LIVERPOOL HOUSE

PICKERING, ON

NOISE FEASIBILITY STUDY

RWDI # 1902099

May 22, 2019

SUBMITTED TO

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EXECUTIVE SUMMARY

RWDI was retained to prepare a Noise Impact Feasibility Study for a proposed development located at 1294 Kingston Road and 1848-1852 Liverpool Road in Pickering, Ontario. The location of the proposed development is at the northwest corner of Liverpool and Kingston Road. The development will include a 25-storey building, a 12-storey building, and a row of 7 townhouses.

The site is exposed to noise from road traffic on Liverpool Road to the east and Kingston Road to the south. Rail lines in the area are located further than 670m from the proposed development, and are therefore not considered to be significant noise or vibration sources on the proposed development.

Predicted levels of road traffic noise lead to the requirement that air-condition should be a mandatory feature of the development, which is assumed to be the case. Compliance with indoor sound level limits for road traffic noise was found to be achievable using reasonable means. The requirements include minimum STC 30 windows, STC 19 doors, and STC 45 exterior walls.

For Outdoor Living Areas (OLAs), if technically and economically feasible, noise barriers ranging from 0.5m to 1.3m should be installed to shield the applicable OLA.

Warning clauses related to transportation noise sources are required to be be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. The required warning clauses are included with Section 2.5.4 of this report.

Based on the results of this assessment, the development is feasible with respect to meeting the environmental noise criteria.

The feasibility study was based on assumptions regarding building configuration and construction and therefore the resulting recommendations are broad. As such, a detailed acoustical design review is recommended at the detailed design stage to ensure that appropriate noise control measures to meet the NPC-300 limits have been incorporated into the final design.

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1 INTRODUCTION

RWDI was retained to prepare a Noise Impact Feasibility Study for a proposed development located at 1294 Kingston Road and 1848-1852 Liverpool Road in Pickering, Ontario. Altona Group, owner of the site known municipally as 1294 Kingston Road, 1848 Liverpool Road, and 1852 Liverpool Road ("subject site"), is proposing the redevelopment and intensification of the subject site with a mixed use development that incorporates a 25-storey tower, a 12-storey midrise building, and a row of 3-storey townhouses. The proposal also commits to the restoration and adaptive reuse of the Old Liverpool House as well as new publicly accessible open space and improvements to the public realm.

The proposed development adds 391 units to the 0.91hectare site with a total residential gross floor area of 32,350 square metres. Active at grade retail and commercial uses make up 850 square metres along the Liverpool and Kingston Road frontages of the new buildings and the retained Old Liverpool House. A total gross floor area of 33,200 square metres is proposed at a density of 3.61 FSI over the subject site. A total of 512 parking spaces will be provided, mostly within 3 levels of underground parking with 10 spaces provided at-grade to support the retail.

This assessment was based on (updated) conceptual design drawings dated May 16, 2019, received by RWDI on May 16, 2019. The proposed development includes a 25-storey and 12-storey tower as well as a row of Townhouses located to the north of the site (see **Image 1** below).

Image 1: Proposed Site Plan – Courtesy: MBTW Group

The site is exposed to noise from road traffic on Liverpool Road to the east and Kingston Road to the south. Rail lines in the area are located 670 km from the proposed development, and are therefore not considered to be significant noise or vibration sources on the proposed development. This assessment considered the impact from

nearby transportation sources on the proposed development, and determines the appropriate noise control measures.

While there are several other retail and commercial office facilities in the area, due to the masking sound generated by surrounding roads, noise from these commercial facilities is expected to comply with applicable noise guidelines. Therefore, noise from these stationary sources was not assessed in detail as part of this study.

This assessment was completed in support the Zoning By-Law Amendment (ZBA) application as required by the City of Pickering, ON. The objective of this assessment was to determine the feasibility of the proposed mixed-use development considering the noise impact of the environment on the proposed development, the noise impact of the proposed development on the environment, and the noise impact of the proposed development on itself.

2 IMPACT OF THE ENVIRONMENT ON THE PROPOSED DEVELOPMENT

RWDI assessed the impact of the future noise environment surrounding the development based on predicted levels of road traffic noise. This section describes the applicable criteria used for the assessment, the details of the traffic volume data, the points of noise reception considered within the development, the prediction results, and recommendations.

2.1 Applicable Criteria

Applicable criteria for transportation noise sources (road) are described in this section.

2.1.1 Transportation Noise Sources

Guidance from the Ministry of the Environment, Conservation and Pa rks (MECP) publication NPC-300 Environmental Noise Guideline was used to assess environmental noise generated by transportation-related sources. There are three aspects to consider, which include the following:

1. Transportation source noise in indoor living areas, which determines façade sound isolation requirements.
2. Transportation source noise in Outdoor Living Areas (OLAs), which determines OLA noise barrier requirements.
3. Transportation source noise at the plane of window, which determines HVAC system requirements.

For assessing sound originating from transportation sources, NPC-300 defines sound level criteria as summarized in **Table 1** for two types of locations: outdoor living areas (OLAs), and indoor areas of sensitive uses. Outdoor sound

level limits are specified for OLAs, which include terraces and balconies with a minimum depth of 4 m and common amenity areas of a multi-unit dwelling. Indoor living areas include living rooms and sleeping quarters.

Table 1: NPC-300 Sound Level Limits for Transportation Sources

Assessment Location	Time Period	NPC-300 Limit L_{EQ} (averaged over time period)	Requirement
		Road	
Indoor Living Quarters	16 hr Daytime 0700-2300h	45 dBA	Façade components should be specified to achieve the indicated indoor sound levels based on the assumption of a closed window.
	8 hr Nighttime 2300-0700h		
Indoor Sleeping Quarters	16 hr Daytime 0700-2300h	45 dBA	
	8 hr Nighttime 2300-0700h	40 dBA	
Outdoor Living Areas	16 hr Daytime 0700-2300h	55 – 60 dBA	If technically and economically feasible, noise barriers should be used to achieve 55 dBA sound levels in OLAs. The 60 dBA limit is also acceptable, however a warning clause "Type A" or "Type B" must be included in this case.
Commercial / Retail	16 hr Daytime 0700-2300h	50 dBA	Not normally considered a noise sensitive receptor, limits are provided for information and as a good design practice objective.

Noise control measures for residential buildings, including building component selection, ventilation requirements, noise barrier fences, and warning clauses, are determined based on predicted levels of transportation noise at the exterior Plane of Window (POW) or centre of an OLA as summarized in **Table 2** below.

Table 2: NPC-300 Noise Control Requirements – Transportation Sources

Assessment Location	Transportation Noise Level		NPC-300 Requirements
	Daytime Leq,16-hr	Nighttime Leq,8-hr	
Plane of Window	Equal or greater than 65 dBA	Equal or greater than 60 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 • Central air conditioning required to allow windows to remained closed • Warning clause "Type D" required
	Between 55 dBA and 65 dBA	Between 50 dBA and 60 dBA	• Provision for the installation of central air-conditioning • Warning clause "Type C" is required
	Less than 55 dBA	Less than 50 dBA	• Noise control measures may not be required
Outdoor Living Areas	Greater than 60 dBA	Not Applicable	• Noise controls (barriers) should be implemented to meet the 55-60 dBA limit. • Warning Clause "Type A" or "Type B" required
	Between 55 dBA and 60 dBA	Not Applicable	• Noise controls (barriers) should be considered, if feasible • Warning Clause "Type A" or "Type B" required
	Less than 55 dBA	Not Applicable	• Noise control measures may not be required

The wording for any required warning clauses are included with Section 2.5.4. Any required warning clauses must be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations.

2.2 Road Traffic Data

The main roadways that have the potential to influence the proposed mixed-use development are Kingston Road and Liverpool Road. Other roads in the area are not considered significant sources of noise and have not been included in the model.

Road traffic data was obtained from the Regional Municipality of Durham. For Kingston and Liverpool Road, the Ultimate Average Annual Daily Traffic (AADT) was utilized as required by the City of Pickering. A summary of the traffic data used is included in **Table 3** below with the data source included in **Appendix A**.

Table 3: Road Traffic Data Summary

Roadway	Ultimate AADT	% Day	% Night	Post Speed Limit (km/hr)	% Trucks	Medium : Heavy Ratio
Kingston Road	35,000	85%	15%	60	8%	70:30
Liverpool Road	20,000	85%	15%	50	7%	70:30

2.3 Representative Receptors for Transportation Sources

The selection of a worst-case receptor, "R1" (exposure to Liverpool and Kingston Road, refer to **Figure 1**) affected by transportation noise sources was based on provided drawings, which show the massing of the proposed development. By demonstrating a means of compliance with the applicable sound level limits at the selected receptor location, the entire development would be considered feasible from the noise aspect.

Daytime sound levels were assessed in qualifying OLAs, which include common outdoor amenity areas. For this project, OLAs were assumed to include the most exposed portion of the rooftop outdoor amenity area. The location is indicated on below.

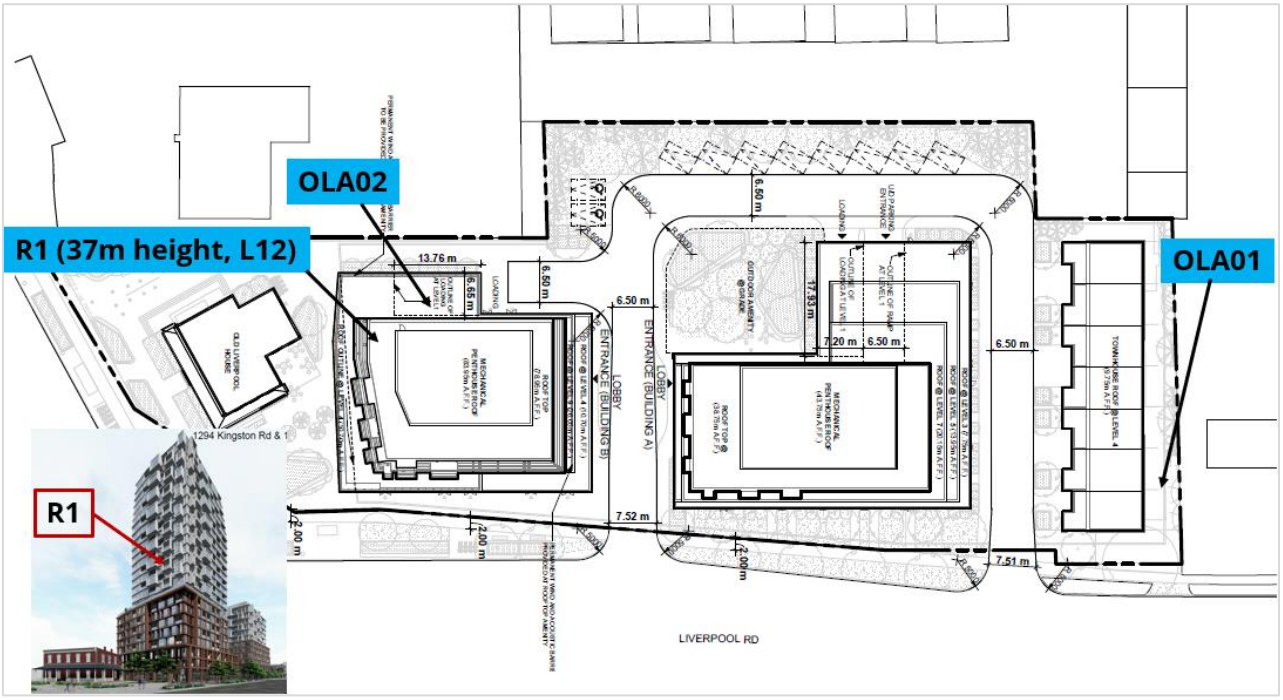

Figure 1: Representative Receptor and OLAs

2.4 Methods & Results

Methods and results for the assessment of potential noise impacts are discussed in the following.

2.4.1 Transportation Noise

Predictions of road traffic noise were carried out using the ORNAMENT road traffic noise prediction method as condoned by the Ministry of the Environment, Conservation and Parks (MECP).

2.4.1.1 Predicted Sound Levels

To assess the impact of transportation noise on the development, road traffic sound levels at locations R1 and OLA1 were predicted. These are summarized in **Table 4** below. Sample calculations are included with **Appendix B**.

Table 4: Predicted Levels of Transportation Noise - Façade and Indoors

Assessment Location	Road Traffic Facade Sound Levels (dBA)		NPC-300 Requirements
	Daytime L_{EQ}, 16hr	Nighttime L_{EQ}, 8hr	
R1	66	62	• Building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits • Central air conditioning required to allow windows to remained closed • Warning clause "Type D" required
OLA01	59	n/a	• Noise controls (barriers) recommended to meet 55 dBA • Warning Clause "Type A" or "Type B" may be required
OLA02	61	n/a	• Noise controls (barriers) recommended to meet 55 dBA • Warning Clause "Type A" or "Type B" may be required

2.4.2 Stationary Sources

Based on an aerial photography review of the rooftops of the existing commercial facilities surrounding the development, no significant impact from existing stationary noise sources is expected at the development. While

there are other stationary noise sources in the area (e.g., small rooftop units on retail stores), they are far enough away and/or surrounded by existing residential receptors. It is therefore expected that their noise impact will remain in compliance at the new development since they are required to comply at existing residential receptors.

It is recommended to warn potential residents of the nearby commercial land-uses with a warning clause Type E.

2.5 Recommendations

Based on an analysis of the predicted noise levels, the following recommendations and requirements were determined for the project.

2.5.1 Building Façade Components

As the daytime and/or nighttime façade sound levels are above 65 dBA and 60 dBA respectively, it is required to specify the sound isolation performance of exterior walls, windows, and doors.

Based on estimations from the building plans, the following assumptions where adopted to calculate the glazing and exterior door minimum Sound Transmission Class rating requirements:

Living rooms:

- 70% window-to-wall area ratio
- 12% exterior door to wall area ratio
- 55% façade to floor area ratio
- "hard" acoustical absorption (e.g. hard flooring, drywall ceilings)

Bedrooms:

- 80% window-to-wall area ratio (no exterior doors assumed)
- 70% façade to floor area ratio
- "intermediate" acoustical absorption (e.g. bed)

Based on the indicated assumptions, the sound isolation requirements for building components of the project have been determined using the BPN-56 method as indicated in **Table 5**.

Table 5 - Building Components – Minimum Sound Insulation Requirements

Building Component	Sound Isolation Requirement
Exterior Walls	STC 45
Windows	STC 30
Doors	STC 19

These requirements should not be considered onerous as they can be achieved by readily available building components; however, we recommend that the window/door suppliers confirm that the proposed components meet the minimum sound insulation requirements.

2.5.2 Outdoor Living Areas

As the predicted daytime level of noise in the OLA is above 55 dBA, noise controls should be considered and implemented if technically and economically feasible.

To reduce the noise levels to 55 dBA, a 1.3m tall noise barrier would be required for OLA01, and a 0.5m tall noise barrier would be required for OLA02. Refer to **Figure 2** below.

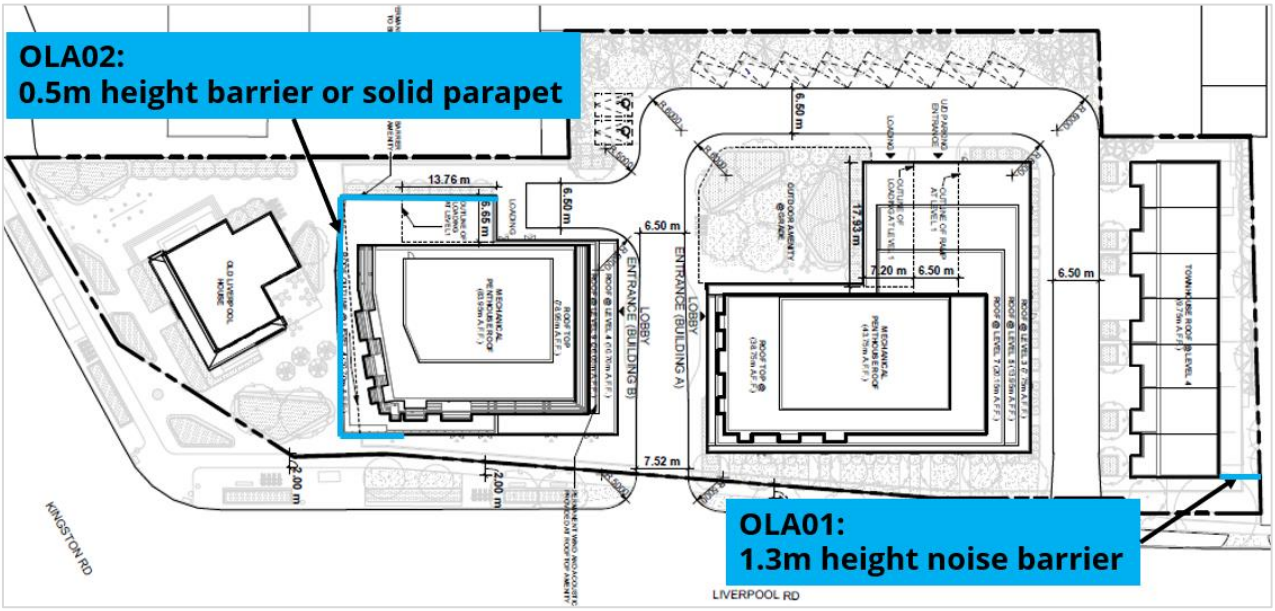

Figure 2: OLA Barrier Requirements

The standard NPC-300 requirements for an acoustical barrier are a minimum surface weight of 20 kg/m^2 and a construction without any gaps or openings. Such a barrier could be built from glazed panels allowing unobstructed views through the barrier. If the noise barrier is installed, warning clauses with respect to the OLA would not be required since the NPC-300 limit would be achieved.

If a noise barrier will not be installed for OLA01 because it is not technically or economically feasible, a warning clause Type A would be required.

If the recommended 1.3m noise barrier for OLA01 cannot be installed because it is not technically or economically feasible, a warning clause Type B would be required.

2.5.3 Ventilation Requirements

Ventilation and warning clause requirements apply to all suites of the proposed development. Assuming air-conditioning would be a standard feature of this development; this requirement is considered feasible and will be achieved.

2.5.4 Warning Clauses

Warning clauses must be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. Warning clauses may be used individually or in combination.

The following warning clauses are recommended by the MECP:

Type A: recommended to address transportation noise in OLAs if noise controls are not applied (barrier), and the sound level is greater than 55 dBA, but less than or equal to 60 dBA

"Purchasers/tenants are advised that sound levels due to increasing road 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: recommended to address transportation noise in OLAs if noise controls are applied (barrier), however the sound level is greater than 55 dBA, but less than or equal to 60 dBA

"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 D: recommended to address transportation noise in indoor spaces

"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."

Type E: recommended to address stationary noise sources

"*Purchasers/tenants are advised that due to the proximity of the adjacent commercial/Industrial facilities, noise from the commercial facilities may at times be audible."*

3 IMPACT OF PROPOSED DEVELOPMENT ON ITS SURROUNDINGS

3.1 Applicable Criteria

Guidance from the MOECC NPC-300 Environmental Noise Guideline was used to evaluate noise from stationary noise sources with this development. Sound level limits for stationary noise sources are based on one-hour equivalent sound levels (Leq,1hr) at the Plane of Windows (POW) of residential building. For urban environments, sound level limits for stationary noise sources are typically determined relative to predicted hourly equivalent (Leq,1h) levels of road traffic noise; however, NPC-300 also includes the minimum exclusion limits of 50 dBA during the daytime or 45 dBA during the nighttime. Another consideration is the impact of changes in traffic noise due to the proposed development.

3.2 Recommendations

On-site stationary sources for the development are expected to consist of HVAC related equipment in the roof-top mechanical penthouse, various exhaust fans, as well as possible deliveries/trucks related to the on-site commercial component of the mixed-use development.

As the design is currently in progress, a detailed assessment of the noise impact by the development on the surrounding environment is not possible. Provided that best practices for the acoustical design of the building are followed, noise associated with the proposed development is expected to meet the NPC-300 limits due to the nature of the proposed development.

The potential impact of noise due to increased transportation source noise from the development on its surroundings is expected to be low. Traffic noise related to the proposed development will be insignificant in relation to the traffic noise on the major roads immediately adjacent to the development. Traffic noise because of the development is therefore not of concern.

4 IMPACT OF THE PROPOSED DEVELOPMENT ON ITSELF

4.1 Applicable Criteria

The noise produced by stationary noise sources associated with the development itself would be evaluated based on the MOECC NPC-300 Environmental Noise Guideline. The requirements were described in Section 3.1.

4.2 Recommendations

Consideration should be given to control air-borne and structure-borne noise generated within the proposed development. Within the development itself, the main sources of noise that are likely to affect the uses of the building are the mechanical systems and sources related to the commercial uses of the proposed buildings. Provided that best practices for the acoustical design of the building are followed, noise from the development itself is expected to meet the requirements of NPC-300 due to the nature of the proposed development.

5 CONCLUSIONS

RWDI has completed a noise feasibility study to assess the compatibility of the proposed development at 1294 Kingston Road and 1848-1852 Liverpool Road in in Pickering, Ontario, with existing sources of noise as well as with surrounding noise sensitive receptors.

Predicted levels of road traffic noise lead to the requirement that air-condition should be a mandatory feature of the development, which his assumed to be the case. Compliance with indoor sound level limits for road traffic noise was found to be achievable using reasonable means. The requirements include upgraded STC 30 windows, STC 19 doors, and STC 45 exterior walls.

For OLAs, if technically and economically feasible, noise barriers ranging from 0.5m to 1.3m should be installed around to shield the applicable OLA.

The inclusion of warning clauses related to transportation noise sources are required to be be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. The required warning clauses are included with Section 2.5.4 of this report.

Based on the results of this assessment, the development is feasible with respect to meeting the environmental noise criteria.

The feasibility study was based on assumptions regarding building configuration and construction and therefore the resulting recommendations are broad. As such, a detailed acoustical design review is recommended at the detailed design stage to ensure that appropriate noise control measures to meet the NPC-300 limits have been incorporated into the final design.

6 REFERENCES

1. Ontario Ministry of the Environment and Climate Change (MOECC), August 2013, Publication NPC-300, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning
2. Ontario Ministry of the Environment and Climate Change (MOECC), 1989, ORNAMENT Ontario Road Noise Analysis Method for Environment and Transportation, Technical Publication
3. Controlling Sound Transmission into Buildings (BPN-56), National Research Council Canada (NRCC), 1985.

APPENDIX A

Planning and Economic
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Planning Division

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Brian Bridgeman, MCIP, RPP
Commissioner of Planning and
Economic Development

The Regional Municipality of Durham

ROAD SEGMENT TRAFFIC FORECASTS FOR NOISE ANALYSES

This information is to be used as the basis for assessing the potential impacts of noise, generated by traffic on Provincial Highways and arterial roads, on proposed land uses that are sensitive (e.g., residential subdivisions). Arterial roads include existing and future Type A, B and C, as designated in the Durham Regional Official Plan.

Noise assessment reports recommend specific measures to be integrated into the design of sensitive developments to reduce road noise impacts to acceptable levels.

Provided For:

Name / Name of Firm: Kelly Baah, RWDI

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Telephone: (519) 823-1311 Fax: (519) 823-1316

Location of Proposal:

1294 Kingston Rd., Pickering (north side, west of Liverpool Rd.)

Municipality: Pickering Lot(s): Concession:

Durham Region File No. (if available):

Name of Property Owner (if available):

Date Request Received: February-22-19 Received By: Chris Leitch

Date Forecast Sent: February-26-19

Name of Road Segment	Forecasted AADT*	No. of Lanes	% of Trucks	Heavy : Medium Truck Ratio		Speed (km/h)
Kingston Rd., west of Liverpool Rd.	35,000	6	8	30	70	60
Liverpool Rd., north of Kingston Rd.	20,000	4	7	30	70	50
	0	0	0	0	0	0
	0	0	0	0	0	0

* Average Annual Daily Traffic. Forecast based on ultimate development according to the Durham Regional Official Plan.

APPENDIX B

ORNAMENT

Ontario Road Noise Analysis Method for ENvironment and Transportation

version 2.09

Job No. 1902099
Job Name The Old Liverpool House

Scenario Road Traffic Noise Impact

ROAD CHARACTERISTICS | **SOURCE-RECEIVER-BARRIER-TOPOGRAPHY CHARACTERISTICS**

ID	Description	Time Period	Number of Vehicles			Speed (km/h)	Road Gradient (%)	Two Way? (y/n)	Pavement Type	Road Viewable Angle		Source-Receiver Distance (m)	Ground Type (Hard/Soft)	Topo-graphy Type	Source Height (m)	Road Elevation (m asl)	Receptor Height (m)	Receptor Elevation (m asl)	Ground Elevation Change (m)			Barrier Height (m)	Barrier Elevation (m asl)	Barrier-Reciever Distance (m)	Barrier Viewable Angle		No. of Rows of Houses	Density of Houses (% Houses)	Depth of Woods	Adjustment (dB)	Reason For Adjustment	Total Segment L_{eq} (dBA)
			Autos	Medium	Heavy					Θ_1	Θ_2								Elevation Change e (m)	Hor. Dist a (m)	Hor. Dist b (m)				Θ_1	Θ_2						
R1 Day	Liverpool Rd, North of Kingston	16	15810	833	357	50	0	y	1	0	90	**35.0**	Hard	A	1.2	0.0	**1.5**	**37.0**	0.0													60.51
	Kingston Rd, West of Liverpool	16	27370	1666	714	60	0	y	1	-90	90	**73.0**	Hard	A	1.2	0.0	**1.5**	**37.0**	0.0													64.76
																															Total (Day):	**66**
R1_Night	Liverpool Rd, North of Kingston	8	2790	147	63	50	0	y	1	0	90	**35.0**	Hard	A	1.2	0.0	**1.5**	**37.0**	0.0													55.99
	Kingston Rd, West of Liverpool	8	4830	294	126	60	0	y	1	-90	90	**73.0**	Hard	A	1.2	0.0	**1.5**	**37.0**	0.0													60.24
																															Total (Night):	**62**
OLAs Without Barrier																																
OLA01	Liverpool Rd, North of Kingston	16	15810	833	357	50	0	y	1	-90	0	25.0	Soft	A	1.2	0.0	1.5															59.01
																															Total (Day):	**59**
OLA02	Kingston Rd, West of Liverpool	16	27370	1666	714	60	0	y	1	0	90	90.0	Hard	B	1.2	0.0	1.5		24.0	10.0	80.0											60.90
																															Total (Day):	**61**
OLAs With Barrier																																
OLA01b	Liverpool Rd, North of Kingston	16	15810	833	357	50	0	y	1	-90	0	25.0	Soft	A	1.2	0.0	1.5					1.3		3.0	-70	0						55.06
																															Total (Day):	**55**
OLA02b	Kingston Rd, West of Liverpool	16	27370	1666	714	60	0	y	1	0	90	90.0	Hard	B	1.2	0.0	1.5		24.0	10.0	80.0	0.5	24.0	10.0	0	90						43.72
																															Total (Day):	**44**