aercoustics

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 0G1

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

ENVIRONMENTAL NOISE IMPACT STUDY
Project: 13156.01

Proposed Residential Development
Jack Kenny Court

Town of Caledon, Ontario

Prepared for:

1361605 Ontario Limited
448 Highcliff Drive
Thornhill ON L4S 7M7

Prepared by:

Iwona Stasiewicz, Sr.Eng./Arch.Tech.

Bob Rimrott, P.Eng.

July 11, 2013
Revised: March 03, 2016
Revised: April 13, 2017
Revised: January 24, 2018

Table of Contents

1 Introduction

1361605 Ontario Limited has retained the services of Aercoustics Engineering Limited to prepare an Environmental Noise and Vibration Impact Study for a proposed residential development to be located at the north side of Jack Kenny Court in the Town of Caledon, Ontario. The proposed development comprising seven single family dwellings. Figure 1 provides a key plan showing the proposed development location.

The purpose of this study is to examine the existing and future noise and vibration environment in the development area, and evaluate its impact potential on the future receptors. This report also investigates the noise control features that are required for the development in order to meet the noise guidelines of the Ontario Ministry of the Environment and Climate Change (MOECC) and to satisfy the requirements of the Town of Caledon as well as Region of Peel.

It is understood that this study is required for Proposed Draft Plan of Subdivision, Zoning By-Law Amendment and Official Plan Amendment application.

The noise environment in the subject study area is dominated by road traffic on Coleraine Drive and rail traffic on the CP Rail line located about 100m to the south of the proposed buildings. At present, there exist two rows of houses between the rail line and the proposed houses as well as a safety/noise barrier abutting the north right-of-way of the rail line. To the east direction, existing residential lots/dwellings separating the proposed development from Coleraine Drive.

With respect to the vibration impact potential of the nearby rail line, the proposed residences will be located over 100m from the CN Rail's right-of-way. The Principal Main Line Requirements as defined by CP Rail states that 'ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75m from the railway right-of-way will be impacted by vibration conditions. Based on this statement, the subject development will not require vibration assessment as the separation distance is greater than the 75m right-of-way buffer defined by CP Rail. Consequently, rail vibration is not further investigated in this study.

Also, the potential impact of the surrounding land uses on the proposed project has been examined. The adjacent properties typically comprise residential land uses. There are existing industrial facilities located on the south side of CP Rail, while there are two rows of existing residential dwellings located on the north side of the rail tracks. These existing dwellings represent the nearest noise sensitive receptors potentially impacted by these existing industrial land uses. Site observations indicate that the adjacent industry is an insignificant contributor to the noise environment in the proposed development area. Therefore, sound levels due the operation of these facilities are expected to be within acceptable limits as defined by MOECC.

March 2016 update of this document addresses recent changes in the proposed topography of the site, and a newly introduced pathway between lots 2 and 3. The updated noise level predictions and the noise control recommendations are based on Grading Plan dated 2016, and provided by Calder Engineering.

The noise limits reference the new MOECC noise guidelines (NPC-300). Note that this did not introduce any changes.

February 2017 update of this document addresses Town of Caledon review comments dated November 2, 2016 as well as the review comments provided by Region of Peel dated October 31, 2016. It should be noted that the road authority of Coleraine Drive has changed from the Town to the Region and as such is being addressed in this study. Traffic volumes on this transportation corridor have been updated.

January 2018 update of this document addresses Town of Caledon/peer review comments provided by Valcoustics Canada Ltd dated October 30, 2017 as well as the review comments provided by Region of Peel dated August 11, 2017.

In addition, the updated grading/site plan provided by Calder Engineering in January 2018 has been considered in this revision of the report.

2 Guidelines and Criteria

The major transportation noise sources in the area comprise road traffic on Coleraine Drive and rail traffic on the nearby CP Rail principal main line. The impact of other transportation corridors located in the vicinity does not have significant on the overall acoustic environment of the site under review. This is due to the significant distance setbacks from major traffic corridors and/or the local nature of the roads (i.e. low traffic volumes).

2.1 Road and Rail Traffic Noise - Outdoor Living Area (OLA)

MOECC Guidelines (Reference 1) recommend that equivalent noise levels (Leq) in outdoor living areas should not exceed 55dBA. Predicted noise levels between 55dBA and 60dBA may be acceptable, provided that the future occupants of the dwelling(s) are made aware of the potential noise problems which are be addressed accordingly through appropriate warning clauses. Noise levels above 60dBA are generally not acceptable. The Town of Caledon does not accept sound levels in excess of the 55dB, unless design features exceed standard detail.

The report shall demonstrate that the noise level at the outdoor living areas, after applying noise control measures, is the lowest viable noise level based on technical, aesthetic, administrative and economic constraints.

2.2 Road and Rail Traffic Noise - Indoor Living Spaces

Indoor noise levels are also examined with respect to the MOECC Guidelines. According to Reference 1, bedrooms are normally required to meet an indoor Leq of 40dBA, and the recommended indoor sound limit for living or dining rooms is an Leq of 45dBA. In order to ensure a quiet indoor environment and to address the low frequency locomotive noise as result of proximity to the CP Rail principal main line, a 5dB(A) more restrictive indoor noise criteria has been applied for this project. The Town of Caledon Policies and Guidelines as well as Region of Peel Guidelines also recommend the same limits.

To achieve these levels, the MOECC Guidelines provide a basis for the type of windows and exterior walls/doors that will be required as a function of the projected outdoor noise levels.

It is also an MOECC/Town of Caledon/Region of Peel requirement that a central air conditioning system be installed for the dwelling(s) when the nighttime or daytime outdoor noise levels at the façade of the dwelling are above 60dBA and 65dBA respectively.

The required limits as per NPC-300 are summarized in Table 2.1 below.

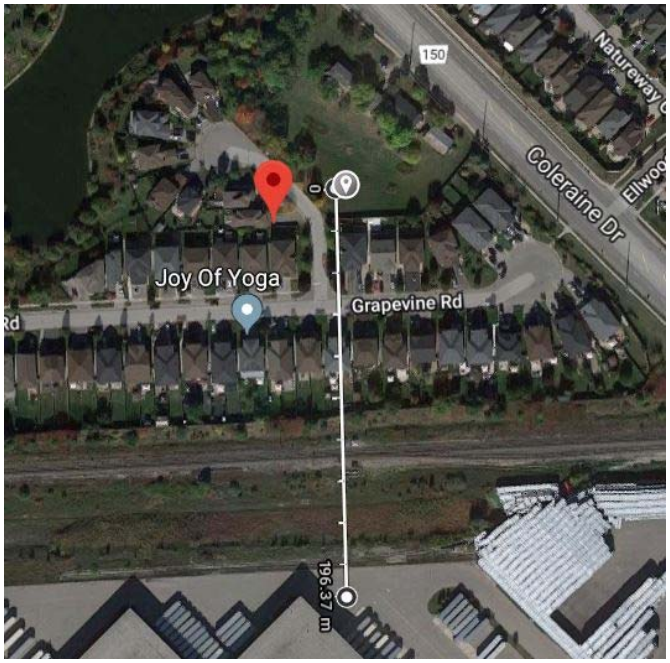
Table 2.1: Noise Criteria – Road and Rail Traffic

Type of Space	Time Period	Road Minimum LEQ (dBA)	Rail Minimum LEQ (dBA)
Living/dining, den areas of residences, hospitals, nursing homes, schools, day-care centres (Indoor)	07:00 – 23:00	45 dBA	40 dBA
Living/dining, den areas of residences, hospitals, nursing homes (Indoor)	23:00 – 07:00	45 dBA	40 dBA
Sleeping quarters (Indoor)	07:00 – 23:00	45 dBA	40 dBA
	23:00 – 07:00	40 dBA	35 dBA
Outdoor Living Areas (OLA)	07:00 – 23:00	55 dBA	55 dBA

2.3 Stationary Noise sources

The potential impact of the surrounding land uses on the proposed project has been reviewed, and it has been noted that there are existing facilities located on the south side of CP Rail that might potentially impact the acoustic environment of the surrounding land uses. These facilities are located about 200m to the south of the subject property and includes Exel Canada Distribution Centre and Aluma Systems concrete contractor. Both facilities were observed to be warehouse type operations, with no major equipment

on their rooftops, which store and distribute goods/materials. Aercoustics conducted search for MOECC registration (ECA or EASR) of the two facilities, none were found.



There currently exist two rows of two storey residential dwellings located on the north side of the rail tracks and are positioned between the existing warehouse facilities and the proposed development. Based on our research, the existing houses have been there prior to 2004 and predate at least one of the warehouse operations described in the last paragraph. The latest google earth imagery, dated Oct 27, 2016, is consistent with the site observations conducted in 2013.

These existing dwellings represent the nearest noise sensitive receptors potentially impacted by these existing land uses/stationary noise sources as defined in the applicable MOECC guidelines.

In order to comply with the MOECC guidelines the stationary noise sources/existing facilities would be required to meet the applicable noise level limits at the existing dwellings. With this, and the fact that the proposed development will be comprised of two storey dwellings, the noise impact of the facilities would also satisfy the MOECC sound limits at the subject development.

Furthermore, the noise from the facilities was not audible on our site visit conducted on June 27th, 2013. The visit was conducted on a week day (Thursday) afternoon/ under calm (no wind was observed) conditions with no precipitation day.

Site observations indicate that facility is a negligible sound source at the proposed development. With this, and the additional research conducted in 2017 described above, the sound levels due to the operation of these facilities at the subject site are expected to be within acceptable limits as defined by MOECC.

3 Noise Level Predictions

3.1 Road and Rail Noise Calculations Procedure

Noise level calculations were performed in accordance with the Ministry of the Environment Guidelines and Climate Change outlined in Reference 1, and by the Guidelines of the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT). Sample hard copies of the traffic noise predictions from MOE's Road and Rail Traffic Noise Prediction Model STAMSON (Version 5.04) are included in Appendix A.

The equivalent sound levels (Leqs) due to road traffic on the neighbouring road and rail traffic on CP Rail line were calculated at receptors 1 through 3 as shown in Figure 2 of this report. The calculations were performed for both daytime and nighttime conditions at receiver heights representing ground floor level as well as the 2nd level residential storey. Noise levels were also predicted at the critical/most sensitive outdoor living areas throughout the proposed development; namely at 3m from the rear facede of the proposed buildings at 1.5m height measured from the proposed grading at these designated OLA receptors.

3.2 Road and Traffic Data

Predictions of road and rail traffic noise were based on the traffic data outlined in Tables 3.1 and 3.2 below. The planned road traffic volume counts were provided by the Region of Peel/Transportation Division, Public Works. A 2.5% annual growth factor has been applied to the rail traffic to account for future growth over the next 10 years. Copies of the correspondence/data received from the Region and CP Rail are attached in Appendix A.

Table 3.1: Road Traffic Volumes update based on letter from region

	Coleraine Drive
24hr Volume	32,400
Day/Night Split (%)	75/25
Percentage of Trucks (%)	10
Heavy/Medium Ratio (%)	45/55
Posted Speed (km/hr)	70*

* as per the Town's guidelines Traffic Speed used in assessment of road traffic noise impact should be 10kph over the posted speed

Table 3.2: Rail Traffic Volumes (2013 counts)

	CP Rail
Number of Freight Trains Day (07:00-23:00)	11
Number of Freight Trains Night (23:00-07:00)	6
Number of Locomotives per Train	5 (max)
Number of Cars per Train	81 (average) 165 (max)
Maximum Speed (km/hr)	88

Note that whistle signals are not routinely sounded through the study area; whistle noise is not included in the analysis.

4 Results of Road and Rail Noise Predictions

Table 4.1 below lists the daytime and night time Leq's due to road and rail traffic as predicted at critical locations within the development, as shown on the site plan in Figure 2.

Table 4.1: Calculated Noise Levels Due to Road and Rail Traffic

Calculation Location	Leq (dBA) OLA(*)(**)	Leq (dBA) Day			Leq (dBA) Night(***)		
		Rail	Road	Total	Rail	Road	Total
1 Lot 1-Rear	61. dBA unmitigated 55dBA with 2.4m acoustic barrier	48	60	60.5	49	59	59.6
2 Lot 5-Rear	58dBA unmitigated 55dBA with 2.4m acoustic barrier	50	58	58	51	57	58
3 Lot 7-Rear	57dBA unmitigated 55dBA with 2.4m acoustic barrier	52	56	57	53	55	57

OLA – indicates Outdoor Living Areas; the outdoor receptor is located 3m from the rear wall of the proposed dwelling and its height is 1.5m above ground
(*) bottom elevation of the barrier is the elevation at the property shown in Site Grading provided by the client;

(**) a 2.4m acoustic barrier/fence at this location as shown in the updated Grading Plan is required to reduce levels to 55 dBA.

(***) nighttime noise levels at Lots4-7 have been confirmed to be below 60dBA.

The unmitigated noise levels predicted at the critical/most sensitive receptors throughout the development indicate that the noise controls are required for the outdoor living areas associated with the proposed development in order to satisfy the applicable guidelines defined by MOECC and the Town.

Similarly, all of the dwellings will require provisions for central A/C as the nighttime noise levels are predicted to be between 50 and 60dBA

The recommended controls are discussed in Section 5 below.

5 Noise Control Recommendations

5.1 Outdoor Living Areas

The road and rail noise level predictions, as listed in Table 4.1 above, indicate that the future noise levels at the outdoor points of reception will be between 58 and 61.5dBA. Therefore, noise controls in the form of acoustic barriers must be considered for these locations.

In order to achieve the 55 dBA sound level limit (defined by MOECC, and required by the Town) **at these locations a 2.4m acoustic barrier shall be installed along the east boundary of the lots wrapping around rear yards of Lots 2 and 3, as well as north property line of Lot 1 as shown in Figure 2 of the report**. It should be noted that the topography of the side has also been altered by introducing an earth berm at the east boundary of the site and lowering the rear yard elevations in order to reduce the height of the acoustic fence to 2.4m, the maximum height of an acoustic fence allowed by the Region.

It should be noted that the Region of Peel in their guidelines[1] state that barrier walls be located on the private homeowner's side of the lot line and generally be positioned no further than 0.3m from the rear lot line or as specified by the Area Municipality.

The proposed topography and the sample noise calculation locations is shown in the attached cross sections/ Figure 3 of this report.

5.2 Indoor Living Spaces

Indoor sound levels have been examined with respect to MOECC Guidelines as summarized in Section 2.2 of this report. In order to determine the building envelope construction of the future dwelling, it has been estimated (that the maximum window-to-floor ratio is about 32% for the daytime and 25% for the nighttime indoor living spaces. The recommendations discussed below are based on this ratio and shall be verified upon the review of the final architectural design of the proposed development.

The worst case impact of the daytime road and rail traffic predicts a level of 60.5dBA at the north façade of the proposed building(s). It should be noted that the road traffic is the major component of the noise environment at this location. At this road noise level a window glazing performance specification satisfying the requirements of the Ontario

[1] Region of Peel document entitled "General Guidelines for the preparation of Acoustical reports in the Region of Peel", dated November 2012.

Building Code (OBC) is expected to provide adequate acoustical protection for the living rooms located on the south side of the building.

The nighttime noise levels have been calculated at 59.6dBA at the north façade; this represents the 'worst' case scenario. Bedroom windows with the eastern exposure should receive, as a minimum, window glazing of satisfying the OBC requirements. The nighttime window glazing satisfying the OBC will also suffice for the noise control reasons.

Provisions for central air conditioning systems are reqired for all of the residential units located within the proposed develpment as the nighttime noise levels at these locations are expected to between 50 and 60dBA. Warning clause, Clause 2 is required for these units.

Table 5.1: Recommended Window and or Sliding Door Glazing/Central AC Requirements

Lot Number	Daytime Window STC	Nighttime Window STC	Central AC requirements	Warning
Lots 1, 2, 3, 4, 5, 6 and 7	OBC	OBC	provisions	1, 2 3 and 4

OBC – window glazing meeting the requirement of the Ontario Building Code (OBC) will also suffice for the noise control reasons
Note: The above listed STC rating should be reviewed/confirmed once the final design drawings are available.

6 Summary of Noise Control Recommendations

Section 5, Table 5.1 as well as Figure 2 provide the summary of the noise control recommendations discussed in the report. Section 7 of the report provides notes and sample wording of the warning clauses.

7 Notes and Warning Clauses

1. A condition be included in the Subdivision Agreement stating that the owner shall include the following warning clauses in all agreements of purchase and sale, or lease for all lots in the Plan:

   Warning Clause 1:
   " *Purchasers are advised that despite the inclusion of noise control features in this development area and within the dwelling units, noise due to increasing road and/or rail traffic will be of concern, occasionally interfering with the activities of the occupants as the noise levels will exceed the noise criteria of the Municipality and the MOECC.'*

Warning Clause 2:
"This dwelling unit was fitted with a forced air heating system and the ducting, etc sized to accommodate a central air conditioning unit. Air conditioning may be installed at the owner's option and cost"

The CP Rail line located about 100m to the south of the property is classified as a principal main line, therefore the safety barrier, namely a 2.5m earth berm/crash wall located between the rail line and a residential development is required – note that this requirement has been satisfied by the erection of the already existing structure abutting the north CP Rail right-of-way. However, a warning clause, Clause 3, is required for all the dwelling units located within 300m of the railway right-of-way; in this particular case this clause applies to the entire proposed development.

Warning Clause 3 (CP Rail)*:*
" Warning: Canadian Pacific 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 expansions may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuation measures in the design of the development and individual dwelling(s). CPR 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.."

Warning Clause 4:
"The acoustical berm and/or barriers are being installed, and shall be maintained or repaired by the owner. Any maintenance, repair or replacement shall be with the same material, or to the same standards and having the same colour and appearance of the original."

2. The general configuration and grading of the site is an integral part of the noise control system, and any major deviations will require further analysis for verification purposes.

3. Acoustic barriers, as required, shall be erected where shown on Aercoustics Figure 2. Barriers can be a combination of berm and acoustic fence/wall. The fence shall be continuous with no openings through or beneath it, and it shall be of durable material, with a mass of 20 kg. per sq. meter or more. Note that the use of wood in noise control barriers and walls is prohibited in the Town of Caledon. Any gaps under the noise barrier that are necessary for drainage purposes must be minimized and localized and must not deteriorate the acoustical performance.

8 References

1. "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning", Ontario Ministry of the Environment and Climate Change, Publication NPC-300, August 2013 (updated final version #22).

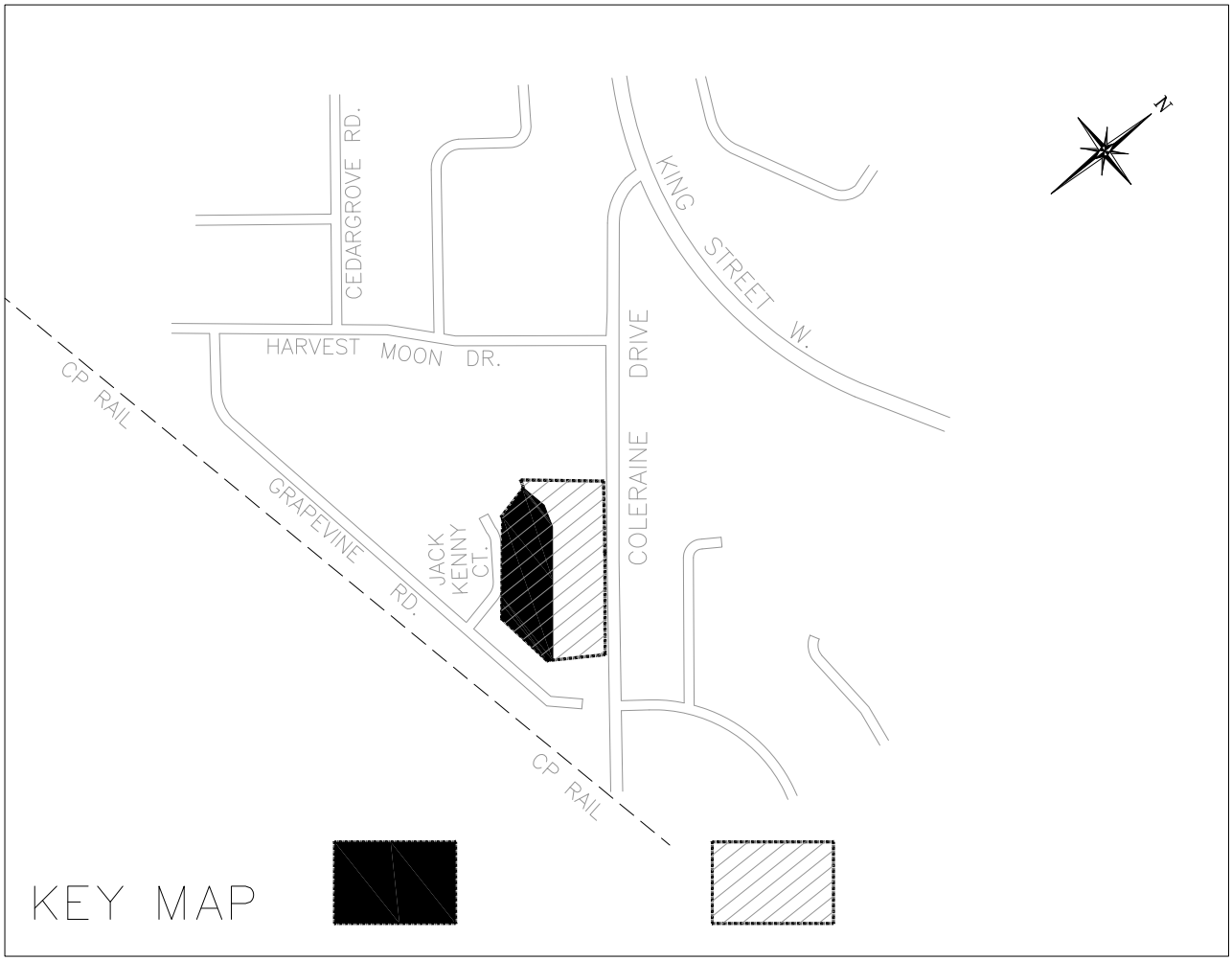
2. ORNAMENT – "Ontario Road Noise Analysis Method for Environmental and Transportation", Ontario Ministry of the Environment, October, 1989

3. Policies and Guidelines Prepared by the Town of Caledon, Public Works and Engineering Department, Version 4, January 2009

4. "General Guidelines for the Preparation of Acoustical Reports in the Region of Peel", Region of Peel, November 2012.

Revisions:

No.	Description	Date



NOT FOR CONSTRUCTION

aercoustics
1004 Middlegate Rd., Suite 1100, Mississauga ON L4Y 0G1

Scale: nts
Drawn: is
Eng: BR
Date: 2018.01.22

Project Name:
Jack Kenny Court Proposed Residential Develpment

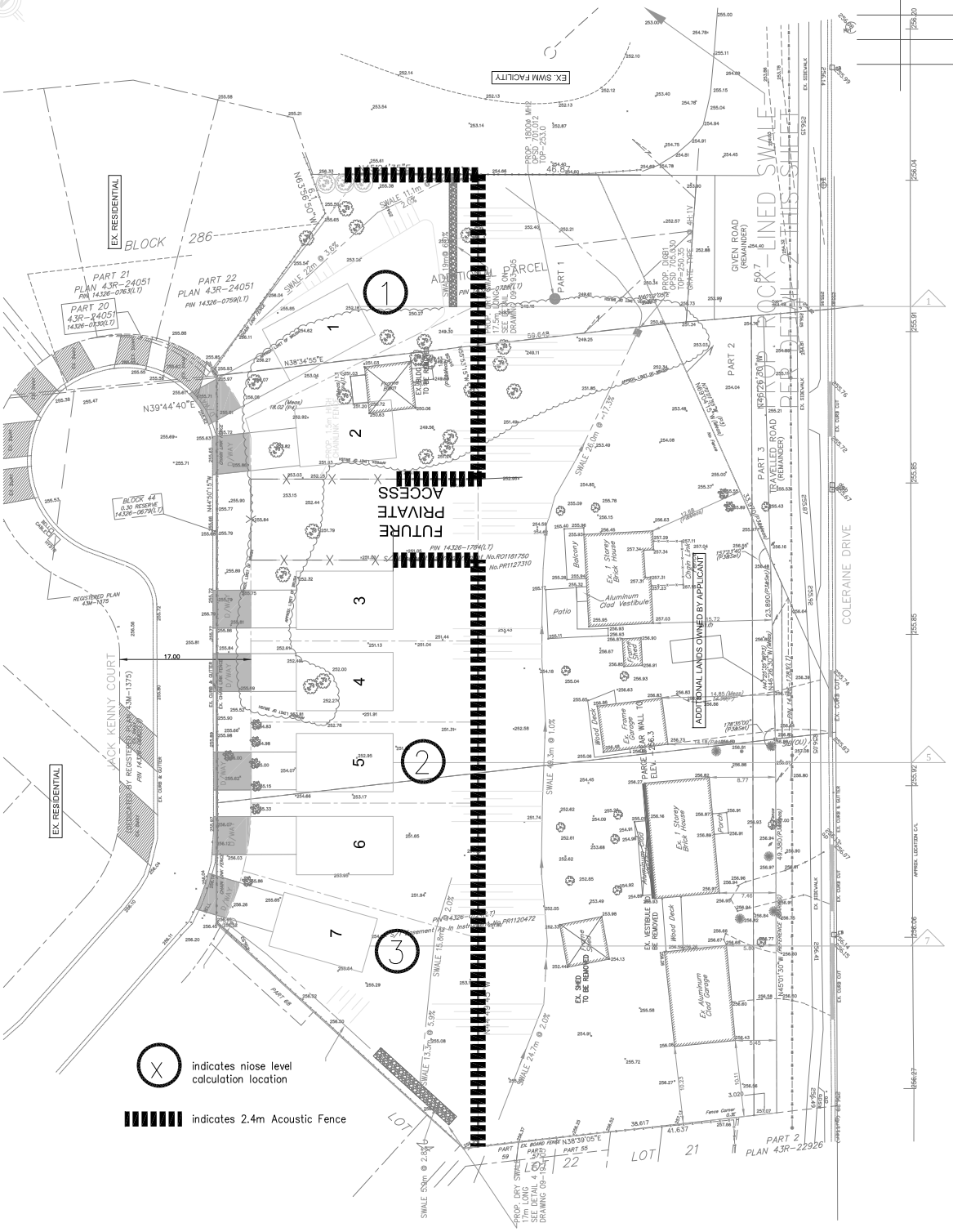
AEL No: 1315

Drawing Tile:
Key Plan Showing Site Location

Figure: 1

Revisions:

No.	Description	Date



NOT FOR CONSTRUCTION

aercoustics

1004 Middlegate Rd., Suite 1100, Mississauga ON L4Y 0G1

The scope of the work outlined in this document is limited to the acoustic, noise and/or vibration control aspects of the design. Contractor to verify all dimensions.

Scale: nts
Drawn: IS
Eng: BR
Date: 2018.01.22

Project Name:

Jack Kenny Court Proposed Residential Development

AEL No:13156

Drawing Tile:

Site Plan Showing Calculation Locations

Figure: 2

Revisions:

No.	Description	Date

LOT 5 SECTION

REFER TO CIVIL ENGINEERING DRAWINGS
PREPARED BY CALDER ENGINEERING FOR
DETAILED CONFIGURATION OF ACOUSTIC BARRIER

PROPOSED GRADE

OLA Receptor
3m from House

PROP. SWALE

PROPOSED GRADE
4H:1V (TYP)

REAR LOT LINE

ADDITIONAL LANDS OWNED BY APPLICANT

PROPOSED GRADE
3H:1V (TYP)

PROPOSED 2.4m HIGH NOISE BARRIER
REFER TO TOWN OF CALEDON STANDARD 601 AND 609
NOISE BARRIER TO BE MIN 0.3m OFF REAR LOT LINE

BERM SLOPES TO BE SODDED OVER 300mm TOPSOIL

PROP. SWALE

MATCH TO EXISTING

LOT 7 SECTION

EXISTING GRADE

PROPOSED GRADE

OLA Receptor
3m from House

PROP. SWALE

PROPOSED GRADE
4H:1V (TYP)

REAR LOT LINE

ADDITIONAL LANDS OWNED BY APPLICANT

PROPOSED GRADE
3H:1V (TYP)

PROPOSED 2.4m HIGH NOISE BARRIER
REFER TO TOWN OF CALEDON STANDARD 601 AND 609
NOISE BARRIER TO BE MIN 0.3m OFF REAR LOT LINE

BERM SLOPES TO BE SODDED OVER 300mm TOPSOIL

PROP. SWALE

See Figure 3b

NOT FOR CONSTRUCTION

aercoustics
1004 Middlegate Rd., Suite 1100, Mississauga ON L4Y 0G1

The scope of the work outlined in this document is limited to the acoustic, noise and/or vibration control aspects of the design. Contractor to verify all dimensions.

Scale: 1:100
Drawn: is
Eng: BR
Date: 2018.01.23

Project Name:
Jack Kenny Court Proposed Residential Development
AEL No:13156

Drawing Tile:
Cross Sections
Figure: 3a

Revisions:

No.	Description	Date
	MATCH TO EXISTING	

See Figure 3a

Line of Sight

Line of Sight

EX. CURB

EX. CURB

LOT 5 SECTION

LOT 7 SECTION

Coleraine Drive

Coleraine Drive

c/l

c/l

250 251 252 253 254 255 256 257 258 259 260 261

NOT FOR CONSTRUCTION

aercoustics

1004 Middlegate Rd., Suite 1100, Mississauga ON L4Y 0G1

The scope of the work outlined in this document is limited to the acoustic, noise and/or vibration control aspects of the design. Contractor to verify all dimensions.

Scale: 1:100
Drawn: is
Eng: BR
Date: 2018.01.23

Project Name:
Jack Kenny Court Proposed Residential Development

AEL No:13156

Drawing Tile:
Cross Sections

Figure: 3b

Appendix A

Correspondence/Relevant Information

February 1, 2017

Iwona Stasiewicz
Aercoustics
Re: Traffic Data Request – Noise Study
Coleraine Drive south of King St W/Harvest Moon Drive
Town of Caledon

Iwona:

Per your request, we are providing the following traffic data.

Coleraine Drive, south of King St W

	Planned
24 Hour Traffic Volume	32,400
# of Lanes	4
Day/Night Split	75/25
% Med + Heavy Trucks	10%
Ratio of Medium to Heavy Trucks	45/55
Right-of-Way Width	36 metres
Posted Speed Limit	60 km/h

If you require further assistance, please contact me at (905) 791-7800 ext. 4549.

Regards,

Gordon Hui, EIT
Planner, Transportation Planning Engineering
Transportation Division, Public Works, Region of Peel

10 Peel Centre Drive, Suite B, 4th Floor, Brampton, ON, L6T 4B9
E: Gordon.hui@peelregion.ca • W: 905-791-7800 x4549 • C: 416-845-5172

Iwona Stasiewicz

From: Orest Rojik <Orest_Rojik@cpr.ca>
Sent: Friday, June 21, 2013 10:21 AM
To: Iwona Stasiewicz
Subject: RE: Train Traffic Data for CPR Line West of Coleraine Drive in Bolton ON

Follow Up Flag: Follow up
Flag Status: Flagged

CPR Rail Traffic Volumes – Bolton

Typically, we would provide the appended data for noise evaluation carried out for residential development:

1. Number of freight trains (0700 to 2300): 11
   Number of freight trains (2300 to 0700): 6
2. Number of locomotives per train: 2 average, 5 maximum
3. Number of cars per train: 81 average, 165 maximum
4. Maximum permissible speed: 55 miles per hour
5. Whistle signals are not routinely sounded for the crossing at Coleraine Drive but are for King Street and Humber Station Road.
6. The single track is comprised of continuously welded rail.

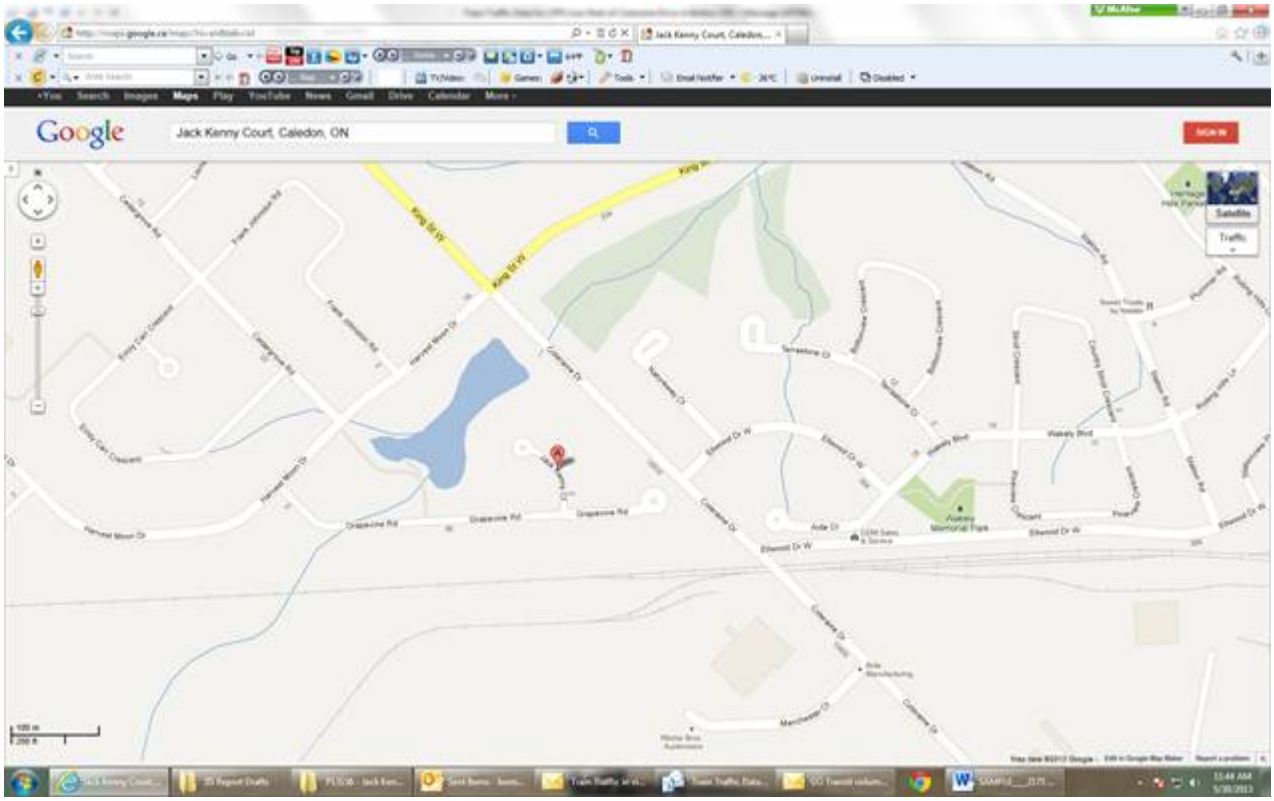
The information provided is based on average rail traffic and variations of the above exist on a day-to-day basis. Specific measurements may also vary significantly depending on customer demands.

Orest Rojik SR/WA | Right-of-Way Representative Ontario | 800-1290 Central Parkway West, Mississauga, ON L5C 4R3 | **905-803-3425 Canadian Pacific**

From: Iwona Stasiewicz [mailto:IwonaS@aercoustics.com]
Sent: Thursday, May 30, 2013 11:49 AM
To: Orest Rojik
Subject: Train Traffic Data for CPR Line West of Coleraine Drive in Bolton ON

Orest,

We have been asked to complete a noise study for a site located in Bolton ON.
The site is located on the east side of Jack Kenny Court about 120m north of CP Rail line, and West of Coleraine Drive.



Could you please provide a 10 year train volume forecast for all trains on this line.
The required information includes the following:

1. Your classification for this line (i.e. main line, secondary line, etc)
2. The type of train that travels this line (i.e. Freight, Switcher, Passenger)
3. The range and average number of trains per day for the daytime period 07:00-23:00 for each type of train
4. The range and average number of trains per day for the nighttime period 23:00-07:00 for each type of train
5. The average speed of each type of train
6. The average number of locomotives per train for each type of train
7. The average number of cars per train for each type of train
8. Please let us know if this forecast includes CNR traffic as well (if applicable)
9. Are there any whistle signals (public crossings) in the area?
10. Are there any rail junctions in the area?

If a forecast is not available we generally use existing traffic escalated by 2.5% per annum to get a 10 year forecast.

Please provide the data at your earliest convenience.

Thank you,
Iwona

Iwona Stasiewicz, Eng. Tech.
Aercoustics Engineering Ltd.
50 Ronson Dr., Suite 165,
Toronto, ON M9W 1B3

Appendix B

Sample Printouts of

Noise Level Calculations

STAMSON 5.0 NORMAL REPORT Date: 23-01-2018 13:15:32
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 13156d1r.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: cpr-freight (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
* 1. freight	15.2/8.3	88.0	5.0	165.0	Diesel	Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

Train type: No	Name	Unadj. Trains	Annual % Increase	Years of Growth
1.	freight	11.0/6.0	2.50	13.00

Data for Segment # 1: cpr-freight (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 2 / 2	
House density	: 95 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 215.00 / 215.00 m	
Receiver height	: 1.50 / 4.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	: 0.00	

Results segment # 1: cpr-freight (day)

LOCOMOTIVE (0.00 + 46.85 + 0.00) = 46.85 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	75.97	-18.33	-1.33	0.00	-9.47	0.00	46.85

WHEEL (0.00 + 39.39 + 0.00) = 39.39 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.51	-19.20	-1.46	0.00	-9.47	0.00	39.39

Segment Leq : 47.57 dBA

Total Leq All Segments: 47.57 dBA

Results segment # 1: cpr-freight (night)

LOCOMOTIVE (0.00 + 48.43 + 0.00) = 48.43 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	76.35	-17.29	-1.17	0.00	-9.47	0.00	48.43

WHEEL (0.00 + 40.57 + 0.00) = 40.57 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	69.89	-18.50	-1.35	0.00	-9.47	0.00	40.57

Segment Leq : 49.09 dBA

Total Leq All Segments: 49.09 dBA

Road data, segment # 1: cleraine opn (day/night)

Car traffic volume : 21870/7290 veh/TimePeriod *
Medium truck volume : 1094/365 veh/TimePeriod *
Heavy truck volume : 1337/446 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 32400
Percentage of Annual Growth : 0.00
Number of Years of Growth : 24.00
Medium Truck % of Total Volume : 4.50
Heavy Truck % of Total Volume : 5.50
Day (16 hrs) % of Total Volume : 75.00

Data for Segment # 1: cleraine opn (day/night)

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.30 / 70.30 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 45.00 deg
Barrier height : 2.40 m
Barrier receiver distance : 12.00 / 12.00 m
Source elevation : 255.90 m

```
Receiver elevation        : 256.30 m
Barrier elevation         : 256.90 m
Reference angle           :   0.00


Road data, segment # 2: clr_rows (day/night)
-------------------------------------------
Car traffic volume  : 21870/7290  veh/TimePeriod  *
Medium truck volume :  1094/365   veh/TimePeriod  *
Heavy truck volume  :  1337/446   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  32400
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  24.00
    Medium Truck % of Total Volume     :   4.50
    Heavy Truck  % of Total Volume     :   5.50
    Day (16 hrs) % of Total Volume     :  75.00

Data for Segment # 2: clr_rows (day/night)
------------------------------------------
Angle1   Angle2           :  45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     75 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  70.30 / 70.30  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            :  45.00 deg   Angle2 : 90.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :  12.00 / 12.00  m
Source elevation          : 255.90 m
Receiver elevation        : 256.30 m
Barrier elevation         : 256.90 m
Reference angle           :   0.00


Results segment # 1: cleraine opn (day)
---------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        1.50 !        0.84 !       257.74
```

```
ROAD (0.00 + 53.20 + 0.00) = 53.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     45   0.52  73.66   0.00 -10.16  -2.11   0.00   0.00  -8.18
53.20
-------------------------------------------------------------------------
---

Segment Leq : 53.20 dBA


Results segment # 2: clr_rows (day)
-----------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        1.50 !        0.84 !       257.74

ROAD (0.00 + 48.19 + 0.00) = 48.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
    45     90   0.66  73.66   0.00 -11.13  -9.04   0.00  -5.17   0.00
48.32
    45     90   0.52  73.66   0.00 -10.16  -8.46   0.00   0.00  -6.84
48.19
-------------------------------------------------------------------------
---

Segment Leq : 48.19 dBA

Total Leq All Segments: 54.39 dBA


Results segment # 1: cleraine opn (night)
-----------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        4.50 !        3.33 !       260.23
```

ROAD (0.00 + 59.20 + 0.00) = 59.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.43	71.90	0.00	-9.56	-1.99	0.00	0.00	-2.98	57.38*
-90	45	0.57	71.90	0.00	-10.53	-2.18	0.00	0.00	0.00	59.20

* Bright Zone !

Segment Leq : 59.20 dBA

Results segment # 2: clr_rows (night)

Source height = 1.53 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.53	4.50	3.33	260.23

ROAD (0.00 + 47.52 + 0.00) = 47.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
45	90	0.57	71.90	0.00	-10.53	-8.69	0.00	-5.17	0.00	47.52
45	90	0.43	71.90	0.00	-9.56	-8.08	0.00	0.00	-4.04	50.22*
45	90	0.57	71.90	0.00	-10.53	-8.69	0.00	0.00	0.00	52.69

* Bright Zone !

Segment Leq : 47.52 dBA

Total Leq All Segments: 59.49 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.21
(NIGHT): 59.86

STAMSON 5.0 NORMAL REPORT Date: 23-01-2018 13:55:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 13156d4.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: cpr-freight (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
* 1. freight	15.2/8.3	88.0	5.0	165.0	Diesel	Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

Train type: No	Name	Unadj. Trains	Annual % Increase	Years of Growth
1.	freight	11.0/6.0	2.50	13.00

Data for Segment # 1: cpr-freight (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 2 / 2	
House density	: 95 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 150.00 / 150.00 m	
Receiver height	: 1.50 / 4.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	: 0.00	

Results segment # 1: cpr-freight (day)

LOCOMOTIVE (0.00 + 48.89 + 0.00) = 48.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	75.97	-15.85	-1.33	0.00	-9.90	0.00	48.89

WHEEL (0.00 + 41.56 + 0.00) = 41.56 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.51	-16.60	-1.46	0.00	-9.90	0.00	41.56

Segment Leq : 49.63 dBA

Total Leq All Segments: 49.63 dBA

Results segment # 1: cpr-freight (night)

LOCOMOTIVE (0.00 + 50.34 + 0.00) = 50.34 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	76.35	-14.95	-1.17	0.00	-9.90	0.00	50.34

WHEEL (0.00 + 42.64 + 0.00) = 42.64 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	69.89	-16.00	-1.35	0.00	-9.90	0.00	42.64

Segment Leq : 51.02 dBA

Total Leq All Segments: 51.02 dBA

Road data, segment # 1: cleraine opn (day/night)

Car traffic volume : 21870/7290 veh/TimePeriod *
Medium truck volume : 1094/365 veh/TimePeriod *
Heavy truck volume : 1337/446 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 32400
Percentage of Annual Growth : 0.00
Number of Years of Growth : 24.00
Medium Truck % of Total Volume : 4.50
Heavy Truck % of Total Volume : 5.50
Day (16 hrs) % of Total Volume : 75.00

Data for Segment # 1: cleraine opn (day/night)

Angle1 Angle2 : -90.00 deg -45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 68.50 / 68.50 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -45.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 8.00 / 8.00 m
Source elevation : 255.87 m

```
Receiver elevation        : 257.30 m
Barrier elevation         : 257.85 m
Reference angle           :   0.00


Road data, segment # 2: clr_rows (day/night)
-------------------------------------------
Car traffic volume  : 21870/7290  veh/TimePeriod  *
Medium truck volume :  1094/365   veh/TimePeriod  *
Heavy truck volume  :  1337/446   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  32400
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  24.00
    Medium Truck % of Total Volume     :   4.50
    Heavy Truck  % of Total Volume     :   5.50
    Day (16 hrs) % of Total Volume     :  75.00

Data for Segment # 2: clr_rows (day/night)
------------------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     75 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  68.50 / 68.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -45.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   8.00 / 8.00   m
Source elevation          : 255.87 m
Receiver elevation        : 257.30 m
Barrier elevation         : 257.85 m
Reference angle           :   0.00


Results segment # 1: cleraine opn (day)
---------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        1.50 !        0.79 !       258.64
```

ROAD (0.00 + 53.67 + 0.00) = 53.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-45	0.66	73.66	0.00	-10.94	-9.04	0.00	0.00	-4.01	49.66*
-90	-45	0.66	73.66	0.00	-10.94	-9.04	0.00	0.00	0.00	53.67

* Bright Zone !

Segment Leq : 53.67 dBA

Results segment # 2: clr_rows (day)

Source height = 1.53 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.53	1.50	0.79	258.64

ROAD (0.00 + 55.26 + 0.00) = 55.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	90	0.66	73.66	0.00	-10.94	-2.29	0.00	-5.17	0.00	55.26
-45	90	0.66	73.66	0.00	-10.94	-2.29	0.00	0.00	-2.92	57.51*
-45	90	0.66	73.66	0.00	-10.94	-2.29	0.00	0.00	0.00	60.43

* Bright Zone !

Segment Leq : 55.26 dBA

Total Leq All Segments: 57.55 dBA

Results segment # 1: cleraine opn (night)

Source height = 1.53 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.53	4.50	3.44	261.29

ROAD (0.00 + 52.86 + 0.00) = 52.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-45	0.57	71.90	0.00	-10.35	-8.69	0.00	0.00	-0.21	52.65*
-90	-45	0.57	71.90	0.00	-10.35	-8.69	0.00	0.00	0.00	52.86

* Bright Zone !

Segment Leq : 52.86 dBA

Results segment # 2: clr_rows (night)

Source height = 1.53 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.53	4.50	3.44	261.29

ROAD (0.00 + 54.20 + 0.00) = 54.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	90	0.57	71.90	0.00	-10.35	-2.18	0.00	-5.17	0.00	54.20
-45	90	0.57	71.90	0.00	-10.35	-2.18	0.00	0.00	-0.07	59.30*
-45	90	0.57	71.90	0.00	-10.35	-2.18	0.00	0.00	0.00	59.37

* Bright Zone !

Segment Leq : 54.20 dBA

Total Leq All Segments: 56.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.20
(NIGHT): 57.65

STAMSON 5.0 NORMAL REPORT Date: 23-01-2018 13:29:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 13156d5r.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: cpr-freight (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
* 1. freight	15.2/8.3	88.0	5.0	165.0	Diesel	Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

Train type: No	Name	Unadj. Trains	Annual % Increase	Years of Growth
1.	freight	11.0/6.0	2.50	13.00

Data for Segment # 1: cpr-freight (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	2 / 2	
House density	95 %	
Surface	1	(Absorptive ground surface)
Receiver source distance	150.00 / 150.00 m	
Receiver height	1.50 / 4.50 m	
Topography	1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	0.00	

Results segment # 1: cpr-freight (day)

LOCOMOTIVE (0.00 + 48.89 + 0.00) = 48.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	75.97	-15.85	-1.33	0.00	-9.90	0.00	48.89

WHEEL (0.00 + 41.56 + 0.00) = 41.56 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.51	-16.60	-1.46	0.00	-9.90	0.00	41.56

Segment Leq : 49.63 dBA

Total Leq All Segments: 49.63 dBA

Results segment # 1: cpr-freight (night)

LOCOMOTIVE (0.00 + 50.34 + 0.00) = 50.34 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	76.35	-14.95	-1.17	0.00	-9.90	0.00	50.34

WHEEL (0.00 + 42.64 + 0.00) = 42.64 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	69.89	-16.00	-1.35	0.00	-9.90	0.00	42.64

Segment Leq : 51.02 dBA

Total Leq All Segments: 51.02 dBA

Road data, segment # 1: cleraine opn (day/night)

Car traffic volume : 21870/7290 veh/TimePeriod *
Medium truck volume : 1094/365 veh/TimePeriod *
Heavy truck volume : 1337/446 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 32400
Percentage of Annual Growth : 0.00
Number of Years of Growth : 24.00
Medium Truck % of Total Volume : 4.50
Heavy Truck % of Total Volume : 5.50
Day (16 hrs) % of Total Volume : 75.00

Data for Segment # 1: cleraine opn (day/night)

Angle1 Angle2 : -90.00 deg -45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.50 / 65.50 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -45.00 deg
Barrier height : 2.40 m
Barrier receiver distance : 8.00 / 8.00 m

```
Source elevation          : 256.00 m
Receiver elevation        : 257.35 m
Barrier elevation         : 258.00 m
Reference angle           :   0.00


Road data, segment # 2: clr_rows (day/night)
-------------------------------------------
Car traffic volume  : 21870/7290  veh/TimePeriod  *
Medium truck volume :  1094/365   veh/TimePeriod  *
Heavy truck volume  :  1337/446   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  32400
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  24.00
    Medium Truck % of Total Volume     :   4.50
    Heavy Truck  % of Total Volume     :   5.50
    Day (16 hrs) % of Total Volume     :  75.00

Data for Segment # 2: clr_rows (day/night)
------------------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     75 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  65.50 / 65.50  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -45.00 deg   Angle2 : 90.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :   8.00 / 8.00   m
Source elevation          : 256.00 m
Receiver elevation        : 257.35 m
Barrier elevation         : 258.00 m
Reference angle           :   0.00


Results segment # 1: cleraine opn (day)
---------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
```

```
       1.53 !        1.50 !        0.69 !       258.69

ROAD (0.00 + 47.78 + 0.00) = 47.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90    -45   0.52  73.66   0.00  -9.70  -8.46   0.00   0.00  -7.72
47.78
-------------------------------------------------------------------------
---

Segment Leq : 47.78 dBA


Results segment # 2: clr_rows (day)
-----------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        1.50 !        0.69 !       258.69

ROAD (0.00 + 52.37 + 0.00) = 52.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -45     90   0.66  73.66   0.00 -10.62  -2.29   0.00  -5.18   0.00
55.57
   -45     90   0.52  73.66   0.00  -9.70  -2.11   0.00   0.00  -9.48
52.37
-------------------------------------------------------------------------
---

Segment Leq : 52.37 dBA

Total Leq All Segments: 53.67 dBA


Results segment # 1: cleraine opn (night)
-----------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
```

```
       1.53 !        4.50 !        3.32 !       261.32

ROAD (0.00 + 53.17 + 0.00) = 53.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90    -45   0.43  71.90   0.00  -9.12  -8.08   0.00   0.00  -3.57
51.12*
   -90    -45   0.57  71.90   0.00 -10.04  -8.69   0.00   0.00   0.00
53.17
-------------------------------------------------------------------------
---

 * Bright Zone !

Segment Leq : 53.17 dBA


Results segment # 2: clr_rows (night)
-------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        4.50 !        3.32 !       261.32

ROAD (0.00 + 54.50 + 0.00) = 54.50 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -45     90   0.57  71.90   0.00 -10.04  -2.18   0.00  -5.18   0.00
54.50
   -45     90   0.43  71.90   0.00  -9.12  -1.99   0.00   0.00  -1.85
58.94*
   -45     90   0.57  71.90   0.00 -10.04  -2.18   0.00   0.00   0.00
59.68
-------------------------------------------------------------------------
---

 * Bright Zone !

Segment Leq : 54.50 dBA

Total Leq All Segments: 56.90 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.11
                           (NIGHT): 57.89
```

STAMSON 5.0 NORMAL REPORT Date: 23-01-2018 13:50:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 13156d6.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: cpr-freight (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
* 1. freight	15.2/8.3	88.0	5.0	165.0	Diesel	Yes

* The identified number of trains have been adjusted for future growth using the following parameters:

No	Train type: Name	Unadj. Trains	Annual % Increase	Years of Growth
1.	freight	11.0/6.0	2.50	13.00

Data for Segment # 1: cpr-freight (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 2 / 2	
House density	: 95 %	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 150.00 / 150.00 m	
Receiver height	: 1.50 / 4.50 m	
Topography	: 1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	: 0.00	

Results segment # 1: cpr-freight (day)

LOCOMOTIVE (0.00 + 48.89 + 0.00) = 48.89 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	75.97	-15.85	-1.33	0.00	-9.90	0.00	48.89

WHEEL (0.00 + 41.56 + 0.00) = 41.56 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.51	-16.60	-1.46	0.00	-9.90	0.00	41.56

Segment Leq : 49.63 dBA

Total Leq All Segments: 49.63 dBA

Results segment # 1: cpr-freight (night)

LOCOMOTIVE (0.00 + 50.34 + 0.00) = 50.34 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.50	76.35	-14.95	-1.17	0.00	-9.90	0.00	50.34

WHEEL (0.00 + 42.64 + 0.00) = 42.64 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.60	69.89	-16.00	-1.35	0.00	-9.90	0.00	42.64

Segment Leq : 51.02 dBA

Total Leq All Segments: 51.02 dBA

Road data, segment # 1: cleraine opn (day/night)

Car traffic volume : 21870/7290 veh/TimePeriod *
Medium truck volume : 1094/365 veh/TimePeriod *
Heavy truck volume : 1337/446 veh/TimePeriod *
Posted speed limit : 70 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 32400
Percentage of Annual Growth : 0.00
Number of Years of Growth : 24.00
Medium Truck % of Total Volume : 4.50
Heavy Truck % of Total Volume : 5.50
Day (16 hrs) % of Total Volume : 75.00

Data for Segment # 1: cleraine opn (day/night)

Angle1 Angle2 : -90.00 deg -45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 68.60 / 68.60 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -45.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 8.00 / 8.00 m

```
Source elevation          : 256.00 m
Receiver elevation        : 257.40 m
Barrier elevation         : 258.00 m
Reference angle           :   0.00


Road data, segment # 2: clr_rows (day/night)
-------------------------------------------
Car traffic volume  : 21870/7290  veh/TimePeriod  *
Medium truck volume :  1094/365   veh/TimePeriod  *
Heavy truck volume  :  1337/446   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  32400
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :  24.00
    Medium Truck % of Total Volume     :   4.50
    Heavy Truck  % of Total Volume     :   5.50
    Day (16 hrs) % of Total Volume     :  75.00

Data for Segment # 2: clr_rows (day/night)
------------------------------------------
Angle1   Angle2           : -45.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     75 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  68.60 / 68.60  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -45.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   8.00 / 8.00   m
Source elevation          : 256.00 m
Receiver elevation        : 257.40 m
Barrier elevation         : 258.00 m
Reference angle           :   0.00


Results segment # 1: cleraine opn (day)
---------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
```

```
       1.53 !        1.50 !        0.74 !       258.74

ROAD (0.00 + 53.66 + 0.00) = 53.66 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90    -45   0.66  73.66   0.00 -10.95  -9.04   0.00   0.00  -4.14
49.52*
   -90    -45   0.66  73.66   0.00 -10.95  -9.04   0.00   0.00   0.00
53.66
-------------------------------------------------------------------------
---

 * Bright Zone !

Segment Leq : 53.66 dBA


Results segment # 2: clr_rows (day)
-----------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        1.50 !        0.74 !       258.74

ROAD (0.00 + 55.25 + 0.00) = 55.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -45     90   0.66  73.66   0.00 -10.95  -2.29   0.00  -5.17   0.00
55.25
   -45     90   0.66  73.66   0.00 -10.95  -2.29   0.00   0.00  -3.21
57.21*
   -45     90   0.66  73.66   0.00 -10.95  -2.29   0.00   0.00   0.00
60.42
-------------------------------------------------------------------------
---

 * Bright Zone !

Segment Leq : 55.25 dBA

Total Leq All Segments: 57.54 dBA


Results segment # 1: cleraine opn (night)
-----------------------------------------
```

Source height = 1.53 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.53	4.50	3.39	261.39

ROAD (0.00 + 52.85 + 0.00) = 52.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-45	0.57	71.90	0.00	-10.36	-8.69	0.00	0.00	-0.22	52.63*
-90	-45	0.57	71.90	0.00	-10.36	-8.69	0.00	0.00	0.00	52.85

* Bright Zone !

Segment Leq : 52.85 dBA

Results segment # 2: clr_rows (night)

Source height = 1.53 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.53	4.50	3.39	261.39

ROAD (0.00 + 54.19 + 0.00) = 54.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	90	0.57	71.90	0.00	-10.36	-2.18	0.00	-5.17	0.00	54.19
-45	90	0.57	71.90	0.00	-10.36	-2.18	0.00	0.00	-0.07	59.29*
-45	90	0.57	71.90	0.00	-10.36	-2.18	0.00	0.00	0.00	59.36

* Bright Zone !

Segment Leq : 54.19 dBA

Total Leq All Segments: 56.58 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.19
(NIGHT): 57.65

STAMSON 5.0 NORMAL REPORT Date: 23-01-2018 13:40:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 13156d7r.te Time Period: Day/Night 16/8 hours
Description:

Rail data, segment # 1: cpr-freight (day/night)

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. freight	14.1/7.7	88.0	5.0	165.0	Diesel	Yes

Data for Segment # 1: cpr-freight (day/night)

Angle1 Angle2	-90.00 deg	90.00 deg
Wood depth	0	(No woods.)
No of house rows	2 / 2	
House density	95 %	
Surface	1	(Absorptive ground surface)
Receiver source distance	110.00 / 110.00 m	
Receiver height	1.50 / 4.50 m	
Topography	1	(Flat/gentle slope; no barrier)
No Whistle		
Reference angle	0.00	

Results segment # 1: cpr-freight (day)

LOCOMOTIVE (0.00 + 50.37 + 0.00) = 50.37 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	75.64	-13.72	-1.33	0.00	-10.23	0.00	50.37

WHEEL (0.00 + 43.13 + 0.00) = 43.13 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	69.19	-14.36	-1.46	0.00	-10.23	0.00	43.13

Segment Leq : 51.12 dBA

Total Leq All Segments: 51.12 dBA

Results segment # 1: cpr-freight (night)

LOCOMOTIVE (0.00 + 51.69 + 0.00) = 51.69 dBA

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

```
-------------------------------------------------------------------------
   -90     90   0.50  76.03 -12.94  -1.17   0.00 -10.23   0.00  51.69
-------------------------------------------------------------------------

WHEEL (0.00 + 44.14 + 0.00) = 44.14 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.60  69.57 -13.84  -1.35   0.00 -10.23   0.00  44.14
-------------------------------------------------------------------------

Segment Leq : 52.39 dBA

Total Leq All Segments: 52.39 dBA


Road data, segment # 1: cleraine opn (day/night)
-----------------------------------------------
Car traffic volume  : 21870/7290  veh/TimePeriod  *
Medium truck volume :  1094/365   veh/TimePeriod  *
Heavy truck volume  :  1337/446   veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  32400
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   4.50
    Heavy Truck  % of Total Volume     :   5.50
    Day (16 hrs) % of Total Volume     :  75.00

Data for Segment # 1: cleraine opn (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      1 / 1
House density             :     75 %
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  68.70 / 71.70  m
Receiver height           :   1.50 / 4.50   m
Topography                :      2       (Flat/gentle slope; with
barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :  11.00 / 11.00  m
Source elevation          : 256.20 m
Receiver elevation        : 257.00 m
Barrier elevation         : 258.40 m
Reference angle           :   0.00


Results segment # 1: cleraine opn (day)
```

```
---------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        1.50 !       -0.02 !       258.38

ROAD (0.00 + 52.38 + 0.00) = 52.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.66  73.66   0.00 -10.96  -1.45   0.00  -5.17   0.00
56.07
   -90     90   0.52  73.66   0.00 -10.01  -1.20   0.00   0.00 -10.06
52.38
-------------------------------------------------------------------------
---

Segment Leq : 52.38 dBA

Total Leq All Segments: 52.38 dBA


Results segment # 1: cleraine opn (night)
-----------------------------------------

Source height = 1.53 m

Barrier height for grazing incidence
-----------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.53 !        4.50 !        2.52 !       260.92

ROAD (0.00 + 54.78 + 0.00) = 54.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.57  71.90   0.00 -10.66  -1.30   0.00  -5.16   0.00
54.78
   -90     90   0.43  71.90   0.00  -9.68  -1.03   0.00   0.00  -4.97
56.21*
   -90     90   0.57  71.90   0.00 -10.66  -1.30   0.00   0.00   0.00
59.94
-------------------------------------------------------------------------
---
```

* Bright Zone !

Segment Leq : 54.78 dBA

Total Leq All Segments: 54.78 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.81
(NIGHT): 56.76