Appendix M NOISE IMPACT ASSESSMENT

BASS PRO MILLS DRIVE EXTENSION MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT – NOISE IMPACT ASSESSMENT

FINAL REPORT

August 3, 2022

Prepared for:
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Project Number:
160540006

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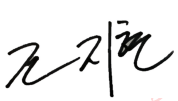

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Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by the City of Vaughan (the City) to conduct a noise impact assessment in support of a Schedule "C" Class Environmental Assessment for the Bass Pro Mills Drive Extension (the Project) located in the City of Vaughan, Ontario. The Project involves extending the existing Bass Pro Mills Drive from Highway 400 to Weston Road support future development in the study area, including the employment and intensification plans developed as part of the Vaughan Mills Centre Secondary Plan (VMCSP).

The existing Bass Pro Mills Drive ends at the west of Highway 400, in the City of Vaughan. The VMCSP (The City of Vaughan, 2014) recommends the extension of Bass Pro Mills Drive westerly to Weston Road. The purpose of this noise impact assessment is to evaluate the Project's noise impact on surrounding noise sensitive areas in accordance with applicable regional and provincial noise guidance documents for road projects. The following guidance documents are considered for this assessment:

- Standard Operating Procedures for Traffic Noise Mitigation on Regional Roads (York Region, 2019)
- York Region Traffic Noise Mitigation Policy for Regional Roads (York Region, 2006)
- Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning NPC-300 (Ontario Ministry of the Environment, Conservation and Parks, 2013)
- Ontario Ministry of Transportation Environmental Guide for Noise (Ontario Ministry of Transportation, 2008)
- Ontario Ministry of Transportation Environmental Reference for Highway Design (Ontario Ministry of Transportation, 2009)

Vehicle traffic on the Bass Pro Mills Extension is not expected to generate vibration levels high enough to adversely impact human comfort or building conditions (i.e., cosmetic building damage or structural building damage). Therefore, a vibration impact assessment for the operation of the Bass Pro Mills Extension is not included in this report.

This assessment considers two representative points of reception in the vicinity of the Project that were identified from site visit observations, and a review of aerial imagery and City of Vaughan's PLANit viewer–an online tool with information about the proposed developments within the City limits. The current Zoning By-law number 1-88 (The Corporation of the City of Vaughan, 2018) zones the land surrounding the Project site as a mixture of Agricultural (A), Employment (EM1, EM2), and Commercial (C1). Although noise-sensitive developments have not been approved yet at the planned VMCSP, it is anticipated that any approved development will undertake noise assessment as part of the approval process and any required noise mitigation will be implemented as part of the development. Therefore, only existing noise sensitive land uses in the vicinity of the Project were evaluated.

The Project noise impact was assessed by predicting road traffic noise levels from Bass Pro Mills Extension and Weston Road at representative outdoor living areas (OLAs), and then comparing those noise levels against applicable criteria. Road traffic noise levels were predicted using STAMSON (version 5.03) noise modelling software, a computerized implementation of the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT). Road traffic data for Bass Pro Mills Extension was provided by the Stantec traffic team and is based on the Bass Pro Mills Extension Traffic Impact Analysis (Stantec Consulting Ltd., 2021). The road traffic data for Weston Road was provided by York Region.

The noise assessment considers the Project construction to start and end in 2027. As per provincial guidelines, noise impacts were assessed by predicting road traffic noise levels from the Project at the representative POR for “No-build” (without Project) and “Build” (with Project) with data for the horizon year of 2037. Noise impacts per regional guideline were assessed by predicting road traffic noise levels for the start of construction year 2027 and mature state of development year 2041.

The noise assessment, under provincial guidelines, predicts that 2037 “Build” road traffic noise levels would increase by up to 1 dB over 2037 “No-build” road traffic noise levels. The 2037 “Build” road traffic noise levels do not warrant a noise mitigation investigation under provincial guidelines.

The noise assessment, under regional guidelines, predicts that 2041 road traffic noise levels would increase by 2 dB over 2027 road traffic noise levels. The 2041 road traffic noise levels warrant a noise mitigation investigation under regional guidelines.

Noise mitigation measures for the Bass Pro Mills Extension were investigated and were ruled out since they are not feasible under regional guidelines. Therefore, noise mitigation for the Bass Pro Mills Extension is not recommended.

The typical sounds levels from most of the construction equipment shows that they can be operated in compliance with the MECP NPC-115 and NPC-118 limits. However, there is potential for higher sound levels for some equipment (e.g., dump trucks and paving machines). Once equipment and construction schedules are finalized, construction equipment sound levels should be reviewed during detailed design to confirm that nose emissions are within the permissible limits. If they are higher than the limits, noise control options shall be explored for the construction equipment. Methods to minimize construction noise impacts are included in the Construction Code of Practice, as outlined in Section 7.4.

Acronyms / Abbreviations

AADT	Annual Average Daily Traffic
dB	Decibel
dBA	Decibel, A-weighted
Leq-16	16-hr Energy Equivalent Sound Level
m	Metre(s)
MECP	Ontario Ministry of the Environment, Conservation and Parks (formerly MOECC)
MTO	Ontario Ministry of Transportation
NPC-300	Noise Pollution Control Guideline - Ontario
OLA	Outdoor Living Area
ORNAMENT	Ontario Road Noise Analysis Method for Environment and Transportation
OS	Open Space
POR	Point of Reception
VMSCP	Vaughan Mills Center Secondary Plan
YRT	York Region Transit

1 Introduction

Stantec Consulting Ltd. (Stantec) was retained by the City of Vaughan (the City) to conduct a noise impact assessment in support of a Schedule "C" Class Environmental Assessment for the Bass Pro Mills Drive Extension (the Project) located in the City of Vaughan, Ontario. The Project involves extending the existing Bass Pro Mills Drive from Highway 400 to Weston Road, to support future development in the study area, including the employment and intensification plans developed as part of the Vaughan Mills Centre Secondary Plan (VMCSP).

The VMCSP (The City of Vaughan, 2014) recommends the extension of Bass Pro Mills Drive westerly to Weston Road. The new extension will help to distribute east-west traffic, alleviating Rutherford Road to the north, and providing another route connection for York Region Transit (YRT). According to the VMCSP, the extension is a major collector roadway that includes active transportation facilities that will connect into the rest of the pedestrian/cycling network in the area.

The purpose of this noise impact assessment is to evaluate the Project's noise impact on surrounding noise sensitive areas in accordance with applicable regional and provincial noise guidance documents for road projects. The following guidance documents are considered for this assessment:

- Standard Operating Procedures for Traffic Noise Mitigation on Regional Roads (York Region, 2019)
- York Region Traffic Noise Mitigation Policy for Regional Roads (York Region, 2006)
- Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning (NPC-300) (Ontario Ministry of the Environment, Conservation and Parks, 2013)
- Ontario Ministry of Transportation Environmental Guide for Noise (Ontario Ministry of Transportation, 2008)
- Ontario Ministry of Transportation Environmental Reference for Highway Design (Ontario Ministry of Transportation, 2009)

Drawings showing the Project Site, and Bass Pro Mills Extension plan and alignment profiles are provided in Appendix A – Figure 1 and Appendix B, respectively.

Vehicle traffic on the Bass Pro Mills Extension is not expected to generate vibration levels high enough to adversely impact human comfort or building conditions (i.e., cosmetic building damage or structural building damage). Therefore, vibration impacts for the operation of the Bass Pro Mills Extension are not considered further.

2 Project Description

The existing Bass Pro Mills Drive terminates on west side of Highway 400, and the proposed extension will connect to Weston Road in the City of Vaughan. The planned VMCSP will add significant development north of Bass Pro Mills Drive Extension. According to the VMCSP, planned land uses north of the Bass Pro Mills Extension include primarily employment uses (Prestige Office Employment and Prestige Employment), the Black Creek and associated Greenway Public Open Space (OS). Although noise-sensitive developments have not been approved yet at the planned VMCSP, it is anticipated that any approved development will undertake noise assessment as part of the approval process and any required noise mitigation will be implemented as part of the development. This assessment considers the Project construction to start and be completed in 2027.

The current Zoning By-law number 1-88 (The Corporation of the City of Vaughan , 2018) zones the land surrounding the Project site as a mixture of Agricultural (A), Employment (EM1, EM2), and Commercial (C1). Agricultural zones permit noise sensitive land uses such as residential developments. A map of the current land zoning in the vicinity of the Project is provide in Figure 2.

3 Assessment Criteria

Both provincial and regional transportation noise guidelines are applicable to this project. Ontario Provincial policies established by the Ministry of the Environment, Conservation and Parks (MECP) and the Ministry of Transportation (MTO), and York Region's transportation noise guidelines are considered for this assessment. These guidelines are discussed in the following subsections.

3.1 Ontario Provincial Guidelines and Policies

The MECP Publication NPC-300 Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning provides guidance for road traffic noise in the context of land use planning. Based on MECP requirements, the developers are responsible for ensuring that noise levels in the outdoor living area are consistent with the provincial objective of 55 dBA ten (10) years after construction. The MECP guideline should be considered for the noise study for any noise-sensitive land uses proposed adjacent to Bass Pro Mills Drive Extension in the future.

Other provincial applicable guidelines for assessing road traffic noise impacts of Bass Pro Mills Drive extension include:

- MTO Environmental Guide for Noise (MTO Guide)
- MTO Environmental Reference for Highway Design (MTO Highway Design)

These guidelines apply to major roadway construction and reconstruction of municipal roads, provincial highways, and freeways. The MTO Guide supersedes both the MOE/MTO "Joint Protocol" (MTO & MOE, 1986) and the MTO Quality and Standards Directive QST-A1 (MTO 1992a).

Under the MTO Guide the importance of changes from a noise impact perspective is based on the objective level and change from existing conditions. The MTO Guide requires that the assessments be completed based on a 10-year future horizon year (i.e., on traffic volumes 10 years after the completion of the project).

Noise mitigation is warranted when sound levels are increased to 65 dBA or 5 dB over the "no-build" ambient, as per the MTO Guide. Mitigation measures can include noise barriers, noise reducing asphalts, and changes in vertical profiles and horizontal alignments. Noise mitigation where applied must be administratively, economically and technically feasible, and must provide at least 5 dB of reduction averaged over the first row of noise-sensitive receivers. Mitigation measures are restricted to within the roadway right-of-way. Off right-of-way noise mitigation, such as window upgrades and air conditioning, is not considered.

Under the provincial policies, Leq-24 sound levels are used to assess impacts from freeways (400-series major highways), and daytime Leq-16 sound levels are used to assess impacts from all other roadways, including arterial roads. As this project is a municipal arterial road, Leq-16 values have been used in the assessment.

3.2 York Region Traffic Noise Mitigation Policies

The proposed Bass Pro Mills Drive extension is within York Region; therefore, regional transportation noise guidelines are considered. The assessment considers York Region noise criteria for capital road projects, as provided in the following technical guidelines for the assessment and mitigation of noise:

- Standard Operating Procedures for Traffic Noise Mitigation on Regional Roads (York Region SOPs)
- York Region Traffic Noise Mitigation Policy for Regional Roads (York Region Noise Policy)

Noise criteria for Capital Road Projects as given in the York Region Noise Policy is based on the A-weighted 16-hr equivalent sound level between 07:00 and 23:00 (Leq-16) and was used for this Project. York Region Noise Policy states that mitigation is not considered unless projected noise levels are greater than 60 dBA either at the start of construction or mature state of development. The Policy also requires that for projected noise levels at the start of construction greater than 55 dBA, and projected future noise level increases greater than 5 dB, the feasibility of noise mitigation measures shall be investigated where a minimum attenuation of 6 dB can be achieved. Further, any mitigation deemed necessary shall achieve a minimum reduction of 6 dB against the greater of either the objective level (55 dBA) or the established ambient noise level at the start of construction. When noise mitigation is not warranted on the basis of projected noise levels not exceeding 60 dBA, the mitigation may be deferred until noise levels exceed 60 dBA.

4 Points of Reception

In accordance with the applicable guidelines, the Points of Reception (PORs) represent the outdoor living areas (OLAs) of noise sensitive land uses expected to experience the greatest noise impact due to their exposure to the Project. Noise sensitive land uses as per the applicable guidelines include the following:

- Residential developments
- Seasonal residential developments
- Hospitals and nursing/retirement homes
- Schools and daycare centres

The existing subdivision located on the west side of Weston Road, west of the proposed extension/ intersection with Weston Road is identified as the noise sensitive land uses for this assessment. They are reverse frontage lot OLAs directly exposed to traffic noise from Weston Road and the proposed Project. The OLAs of the existing dwellings are considered as the PORs for this traffic noise impact assessment. The physical POR location is 3 m from the façade of the dwelling, and 1.5 m (approximate head-height) above the ground surface. No noise sensitive land uses were identified along Bass Pro Mills Drive.

Two representative PORs are identified in the vicinity of the Project site, as shown in Figure 1. Table 4.1 provides a description of the POR with approximate UTM coordinates.

Table 4.1 Points of Reception

POR ID	Description	Approximate UTM Coordinates (Zone 17)	
		Easting (m)	Northing (m)
POR1	Residential Dwelling - 122 Flushing Avenue	616218	4852769
POR2	Residential Dwelling -160 Flushing Avenue	616191	4852872

The representative PORs were identified from a review of aerial imagery along with the City of Vaughan's PLANit viewer–an online tool with information about the proposed developments within the City limits. The representative PORs were confirmed through site observations made by Stantec on October 8, 2021.

The representative PORs are expected to sustain the highest road traffic noise levels from Bass Pro Mills Drive Extension, as compared to other existing OLAs/PORs along Weston Road. Other existing OLAs/PORs are further setback from the Bass Pro Mills Drive Extension; therefore, they are expected to be impacted less by the Bass Pro Mills Drive Extension as compared to the representative PORs.

No pending or approved future noise sensitive developments are identified in the vacant lots adjacent to the Project.

5 Impact Assessment

Noise impacts from the Project are assessed using provincial guidelines (MECP NPC-300, MTO Guide) and regional guidelines (York Region Noise Policy and SOP's). The following subsections discuss the methods and results of the assessment.

5.1 Methods

Noise modelling was completed with STAMSON (v5.03) noise modelling software, a computerized implementation of the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT), which is an acceptable road traffic noise prediction method by MECP, MTO and York Region. The following modelling inputs are considered for the assessment:

- Annual Average Daily Traffic (AADT)
- Road traffic speeds and composition
- Setback distance between the roadway and the POR
- Local topography based on available elevation data from Google Earth and Project design data
- Acoustically reflective and absorptive surfaces between the roadways and the POR
- Existing noise walls

The Stantec traffic team provided the Bass Pro Mills Extension AADT and commercial vehicles % for 2031 based on peak hourly vehicle volumes from the Bass Pro Mills Extension Traffic Impact Analysis (Stantec Consulting Ltd., 2021). The 2031 AADT was adjusted to the applicable horizon years for provincial and regional guidelines using a 2% annual growth rate. In the absence of day/night traffic split and medium/heavy truck data for the Bass Pro Mills Drive Extension, corresponding percentages for Weston Road are used in the assessment.

The noise assessment included Weston Road due its proximity to the PORs and its higher Annual AADT as compared to the Bass Pro Mills Drive Extension. It is expected that Weston Road, based on AADT, will contribute most to the overall noise levels at the PORs. Road traffic data for Weston Road was provided by York Region and it includes AADT along with road traffic composition for 2019 and 2041. Weston Road traffic data is attached as Appendix C.

There are existing noise barriers (walls) for the residential subdivisions along Weston Road between Valeria Boulevard and Rutherford Road. Based on site observations, the noise walls along this segment are continuous, with heights ranging between 2 m and 2.3 m above ground. At POR1, the existing noise wall height is approximately 2.2 m above ground. And at POR2, the existing noise wall height is approximately 2.0 m above ground.

5.1.1 Provincial Guidelines

As per MTO Guide, noise impacts are assessed by predicting road traffic noise levels from the Project at the representative POR for "No-build" (without Project) and "Build" (with Project) with the traffic data for the horizon year of 2037. Table 5.1 lists the road traffic data used for the noise assessment completed under provincial guidelines.

Table 5.1 Road Traffic Data – Provincial Noise Assessment

Year	Traffic Data	Bass Pro Mills Drive Extension	Weston Road
2037 (No-build)	AADT	N/A	47818[a]
	Modelled Speed (km/h)	N/A	60[b]
	Day / Night Split (%)	N/A	92/8[c]
	Overall Commercial Vehicles (%)	N/A	5[c]
	Medium Truck / Heavy Truck (%)	N/A	2/3[c]
2037 (Build)	AADT	21960[d]	Assumed same as 2037 No-build
	Modelled Speed (km/h)	50[e]	Assumed same as 2037 No-build
	Day / Night Split (%)	Assumed same as Weston Road	Assumed same as 2037 No-build
	Overall Commercial Vehicles (%)	11[f]	Assumed same as 2037 No-build
	Medium Truck / Heavy Truck (%)	Assumed same as Weston Road	Assumed same as 2037 No-build

NOTES:

[a] Weston Road 2037 AADT was calculated using a linear interpolation between 2019 AADT (38000) and 2041 AADT (50000). The 2019 AADT and 2041 AADT were provided by York Region.

[b] The modelled speed is the posted speed limit in accordance with the MTO Guide.

[c] Refers to road traffic data provided by York Region.

[d] Future Bass Pro Mills Drive Extension 2037 AADT was calculated using a 2% annual growth rate applied to the Future Bass Pro Mills Drive Extension 2031 AADT (19500). The 2031 AADT was provided by the Stantec traffic team and is based on peak hourly vehicle volumes from the Bass Pro Mills Extension Traffic Impact Analysis (Stantec 2021).

[e] Future Bass Pro Mills Drive Extension modelled speed is the posted speed limit for the existing Bass Pro Mills Drive.

[f] Future Bass Pro Mills Drive Extension overall commercial vehicles was provided by the Stantec traffic team and is based on the peak hourly vehicle volumes from the Bass Pro Mills Extension Traffic Impact Analysis (Stantec 2021).

5.1.2 Regional Guidelines

The York Region noise policy requires that the assessment be completed by comparing the sound level at the start of construction to the mature state of development. Therefore, this assessment considers the start of construction year to be 2027 and the mature state of development year to be 2041. Table 5.2 lists the road traffic data used for the noise assessment under regional guidelines.

Table 5.2 Road Traffic Data Summary – Regional Noise Assessment

Year	Traffic Data	Bass Pro Mills Drive Extension	Weston Road
2027 Start of Construction	AADT	N/A	42364[a]
	Modelled Speed (km/h)	N/A	78[b,c]
	Day / Night Split (%)	N/A	92/8[b]
	Overall Commercial Vehicles (%)	N/A	5[b]
	Medium Truck / Heavy Truck (%)	N/A	2/3[b]
2041 Mature state of development year	AADT	23770[d]	50000[b]
	Modelled Speed (km/h)	65[e]	Assumed same as 2027
	Day / Night Split (%)	Assumed same as Weston Road	Assumed same as 2027
	Overall Commercial Vehicles (%)	11[f]	Assumed same as 2027
	Medium Truck / Heavy Truck (%)	4/7[g]	Assumed same as 2027

NOTES:

[a] Weston Road 2027 AADT was calculated using a linear interpolation between 2019 AADT (38000) and 2041 AADT (50000). The 2019 AADT and 2041 AADT were provided by York Region.

[b] Refers to road traffic data provided by York Region.

[c] The modelled speed if the 85th percentile speed in accordance with Regional guidelines.

[d] Future Bass Pro Mills Drive Extension 2041 AADT was calculated using a 2% annual growth rate applied to the Future Bass Pro Mills Drive Extension 2031 AADT (19500). The 2031 AADT was provided by the Stantec traffic team and is based on peak hourly vehicle volumes from the Bass Pro Mills Extension Traffic Impact Analysis (Stantec 2021).

[e] Future Bass Pro Mills Drive Extension modelled traffic speed of 65 km/h represents an estimate of the 85th percentile speed. The 85th percentile speed (65 km/h) for the future Bass Pro Mills Extension was estimated using an adjustment factor on the posted speed limit (50 km/h). This adjustment factor was calculated as the ratio of the 85th percentile speed (78 km/h) and the posted speed limit for Weston Road (60 km/h).

[f] Future Bass Pro Mills Drive Extension overall commercial vehicles was provided by the Stantec traffic team and is based on the peak hourly vehicle volumes from the Bass Pro Mills Extension Traffic Impact Analysis (Stantec 2021).

[g] Medium Truck and Heavy Truck are assumed to be 40% and 60% of overall commercial vehicles, respectively, to match Weston Road.

5.2 Results

5.2.1 Provincial Guidelines

Road traffic noise level at the OLA for the modelled PORs were predicted for “No-build” and “Build” scenarios for the horizon year of 2037 traffic per provincial guidelines. The predicted noise levels and requirements for noise mitigation investigation are listed in Table 5.3.

Table 5.3 Noise Assessment Results – Provincial Guidelines

POR ID	Predicted Road Traffic Noise Level, Leq-16 (dBA)		Predicted Noise Impact			
	2037 "No-build"	2037 "Build"	Change in Noise Level (2037 "Build" – 2037 "No-Build") (dB)	Change in Noise Level greater than +5 dB? (Y/N)	2037 "Build" Noise Level greater than 65 dBA? (Y/N)	Mitigation Investigation Required? (Y/N)
POR1	63	64	+1	N	N	N
POR2	63	63	0	N	N	N

The noise assessment results under provincial guidelines predict a 1 dB increase at POR1 from "No-build" (i.e., without the Project) to "Build" (i.e., with the Project) in 2037. In other words, the assessment predicts that road traffic noise levels in 2037 would increase marginally with the operation of the Bass Pro Mills Drive Extension, as compared to 2037 road traffic noise levels without the Bass Pro Mills Drive Extension. At POR2, the 2037 road traffic noise levels are the same with and without the operation of the Bass Pro Mills Drive Extension.

As per the MTO Guide, no mitigation investigation is warranted since the 2037 "Build" road traffic noise levels at the modelled PORs are below 65 dBA and are less than 5 dB over 2037 "No-build" levels.

5.2.2 Regional Guidelines

Road traffic noise levels at the OLA for the modelled PORs were predicted for the construction year of 2027 and for the mature state of development year 2041, per the regional guidelines. The predicted noise levels and requirements for noise mitigation investigation are listed in Table 5.4. STAMSON calculations are provided in Appendix D.

Table 5.4 Noise Assessment Results – Regional Guidelines

POR ID	Predicted Road Traffic Noise Level, Leq-16 (dBA)		Predicted Noise Impact			
	2027 Start of Construction	2041 Mature State of Development	Change in Noise Level (2041 – 2027) (dB)	Change in Noise Level greater than +5 dB? (Y/N)	2027 or 2041 Noise Level greater than 60 dBA? (Y/N)	Mitigation Investigation Required? (Y/N)
POR1	65	67	+2	N	Y	Y
POR2	64	66	+2	N	Y	Y

Under regional guidelines, the assessment predicts a 2 dB increase in road traffic noise levels at POR1 and POR2 from 2027 to 2041. The assessment demonstrates that road traffic noise levels at these PORs in 2041 may increase from 2027 as a result of the operation of Bass Pro Mills Drive Extension and increasing traffic volumes on the existing Weston Road.

As per the regional guidelines, mitigation investigation is warranted at the modelled PORs since the 2041 road traffic noise levels are greater than 60 dBA. The noise mitigation investigation is discussed in the following section.

6 Noise Mitigation Investigation

Based on the assessment results in Table 5.4, a noise mitigation investigation at the modelled PORs is required under regional guidelines. For the mitigation to be warranted, the regional guidelines require a 6 dB noise level reduction against the greater of either the objective level (55 dBA) or the established ambient noise level at the start of construction. Table 5.2 lists the ambient noise level at the start of construction 2027 at the modelled PORs and they are greater than 55 dBA; therefore the 2027 road traffic noise levels are used to evaluate the feasibility of the investigated noise mitigation.

6.1 Right-of-Way Noise Mitigation

Noise mitigation measures that can be implemented within the right-of-way of the Bass Pro Mills Extension include:

- Changes to road alignments (both vertical and horizontal)
- Changes to pavement surface types
- Acoustical barriers (noise walls/barriers and berms)

At best, these right-of-way noise mitigation measures would be expected to reduce road traffic noise levels in the vicinity of the Bass Pro Mills Extension to road traffic noise levels without the Bass Pro Mills Extension.

The noise mitigation investigation compares the 2041 road traffic noise levels with right-of-way mitigation measures (i.e., road traffic noise levels without the Bass Pro Mills Extension) against the road traffic levels at the start of construction 2027. Table 6.1 lists the noise mitigation investigation results for mitigation measures implemented within the right-of-way of Bass Pro Mills Extension.

Table 6.1 Noise Mitigation Investigation Results – Bass Pro Mills Extension Right-of-Way

POR ID	Predicted Road Traffic Noise Level, Leq-16 (dBA)		Noise Level Reduction (dB)[b]	Meets Minimum 6 dB Noise Level Reduction? (Y/N)
	2027 Start of Construction	2041 Mature State of Development with right-of-way mitigation[a]		
POR1	65	66	-1	N
POR2	64	65	-1	N

NOTES:

[a] Refers to mitigated road traffic noise levels where right-of-way mitigation measures have reduced levels at the PORs to road traffic noise levels without the Bass Pro Mills Extension.

[b] Noise Level Reduction is calculated as the difference between overall road traffic noise levels at 2027 Start of Construction and 2041 Mature State of Development with right-of-way mitigation. Negative values indicate a noise level increase from the 2027 Start of Construction.

The noise mitigation results show that 2041 road traffic noise levels, with right-of-way noise mitigation, would not meet the minimum 6 dB noise level reduction to be warranted under regional guidelines.

On this basis, noise mitigation measures within the right-of-way of Bass Pro Mills Extension are not feasible and are not considered further in this assessment.

Off right-of-way noise barriers are considered in the following sub-section as part of the noise mitigation investigation.

6.2 Noise Walls

Noise walls reduce noise levels at protected receptors through blocking the path of sound waves emanating from the source towards the receiver. Noise walls must at least break the line-of-sight between the source (the roadway) and the receptor (OLA under investigation) to be effective.

Where noise walls are to be used, they should be free of gaps and cracks, and have a minimum surface density (mass per unit of face area) of 20 kg/m^2 (4 lb/ft^2).

Noise walls conforming to York Region's maximum noise wall height of 3 m are considered for the noise mitigation investigation. The 3 m noise walls are located along the Weston Road right-of-way in place of the existing noise walls discussed in Section 5.1.

The mitigated road traffic noise levels at the PORs with 3 m noise walls are compared against the road traffic noise level at the start of construction with the existing noise walls. Table 6.2 lists the noise mitigation investigation results.

Table 6.2 Noise Mitigation Investigation Results – Noise Walls

POR ID	Predicted Road Traffic Noise Level, Leq-16 (dBA)				Noise Level Reduction with 3 m Noise Walls[a] (dB)	Meets Minimum 6 dB Noise Level Reduction? (Y/N)
	2027 Start of Construction	Noise Wall Height (m)	2041 Mature State of Development	Noise Wall Height (m)		
POR1	65	2.2	64	3	1	N
POR2	64	2	63	3	1	N

NOTE:

[a] Noise Level Reduction is calculated as the difference between overall road traffic noise levels at 2027 Start of Construction with existing noise walls and 2041 Mature State of Development with 3 m noise walls.

The noise mitigation results show that 3 m noise walls can reduce overall road traffic noise levels by 1 dB at the modelled PORs which is less than the minimum 6 dB noise reduction required by the regional guidelines. Based on exposure to the Bass Pro Mills Extension, the 1 dB noise level reduction at the modelled PORs is expected to be representative of the expected noise reduction for other PORs within the existing subdivision along Weston Road.

Based on the results of the noise mitigation investigation, 3 m noise walls for the existing subdivision along Weston Road are not technically feasible, and therefore, not recommended.

7 Construction Noise Impacts

Construction noise impacts are temporary in nature, and largely unavoidable. With adequate controls, impacts can be minimized. However, for some periods of time and types of work, construction noise will be noticeable at some receptor locations. This section of the report provides an evaluation of construction equipment noise and discusses guideline and Code of Practice to minimize construction impacts.

7.1 Construction Noise Guidelines

7.1.1 Local Noise Control By-law

The proposed Project is subject to City of Vaughan Noise By-law 121-2021. The City's noise by-law does not provide noise limits for construction; it only limits construction period within the City. The By-law permits noise from construction activities from Monday through Saturday, 07:00 to 19:00 and not permitted at all on Sunday or statutory holidays. However, the City can permit construction outside these periods through exemption.

7.1.2 MECP Model Municipal Noise Control By-law

The MECP stipulates limits on noise emissions from each equipment, rather than for overall construction noise. In the presence of persistent noise complaints, sound emission standards for the various types of construction equipment used on the project should be verified to ensure that they meet the specified limits contained in MECP Publication NPC-115 (MECP 1978) and NPC-118 (MECP 1982), as summarized in Table 7.1.

Table 7.1 Construction Noise Emission Limits (NPC-115 and NPC-118)

Type of Unit	Maximum Allowed Sound Pressure Level [a] (dBA)	Distance at Which Sound Levels are Measured (m)	Power Rating (kW)
Excavation Equipment [b]	83	15	Less than 75 kW
	85	15	75 kW or Greater
Pneumatic Equipment [c]	85	7	-
Portable Compressors	76	7	-
Track Drills	100	15	-
Heavy Vehicles with Governed Diesel Engines	95	15	-

NOTES:

[a] Maximum permissible sound levels presented here are for equipment manufactured after Jan 1, 1981

[b] Excavation equipment includes bulldozers, backhoes, front end loaders, graders, excavators, steam rollers and other equipment capable of being used for similar applications

[c] Pneumatic equipment includes pavement breakers

7.2 Expected Construction Activities

The following construction activities are expected as part of this project:

- Construction and rehabilitation of the base course
- Addition of new lane(s), active transportation facilities and stormwater management features
- Paving (and repaving) of the roadway surface

7.3 Expected Construction Noise Levels

Construction activities will vary temporally and spatially as the project progresses. Noise levels from construction at a given receptor location will also vary over time as different activities take place, and as those activities change location within the right-of-way.

Currently, a detailed construction plan is not available. A list of typical construction equipment for this type of construction is summarized in Table 7.2.

Table 7.2 Construction Equipment Sound Level Assessment

Type of Equipment	Typical Range of Maximum Sound Levels at 15 m (dBA)	NPC-115 Sound Level at 15 m (dBA)	Meets NPC-115 Sound Level? (Y/N)
Front-End Loaders	77 – 85	85	Y
Backhoe	66 – 80	85	Y
Auger	76 – 84	85	Y
Dump Trucks	76 – 88	95[b]	Y
Concrete Trucks	77 – 85	85	Y
Concrete Pump and Boom	77 – 82	85	Y
Vibratory Compactors	79 – 83	85	Y
Paving Machines	77 – 89	85	N[a]
Cranes	73 – 83	85	Y
Grader	79 – 85	85	Y

NOTES:

[a] These equipment units have potential to exceed the applicable MECP limits and precautions/noise control feasibility should be investigated if they are used near sensitive receptors

[b] Refers to the NPC-118 Sound Level at 15 m

The typical sound levels presented in Table 7.2 shows that most equipment can be operated in compliance with the MECP NPC-115 limits. The list also shows that there is the potential for higher sound levels than the permissible limits for paving machines. Once equipment and construction schedules are finalized, the equipment noise data should be reviewed during detailed design to confirm that noise emissions are within the permissible limits. If the sound levels are higher than the limits, noise control options shall be explored.

7.4 Construction Code of Practice

To minimize the potential for construction noise impacts, it is recommended that provisions be written into the contract documentation for the contractor, as outlined below.

- All construction equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order.
- There should be explicit indication that Contractors are expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work done by Contractors.
- The Contract documents should contain a provision that any initial noise complaint will trigger verification of construction noise and typical noise control measures.
- In the presence of persistent noise complaints, all construction equipment should be verified to comply with MECP NPC-115 and NPC-118 guidelines.
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative, and economic feasibility of the various alternatives.

8 Conclusion and Closure

A noise impact assessment was conducted in accordance with MTO (provincial guidelines) and York Region technical guidelines (regional guidelines) for the Bass Pro Mills Drive Extension Project.

The noise assessment, under provincial guidelines, predicts that 2037 road traffic noise levels with the Bass Pro Mills Extension would increase by up to 1 dB over 2037 road traffic noise levels without the Bass Pro Mills Extension. The 2037 road traffic noise levels with the Bass Pro Mills Extension do not warrant a noise mitigation investigation under provincial guidelines.

The noise assessment, under regional guidelines, predicts that 2041 road traffic noise levels (mature state of development) would increase by 2 dB as compared to 2027 road traffic noise levels (start of construction). The 2041 road traffic noise levels warrant a noise mitigation investigation under regional guidelines.

Noise mitigation measures for the Bass Pro Mills Extension were investigated and were ruled out since they are not feasible under regional guidelines. Therefore, noise mitigation for the Bass Pro Mills Extension is not recommended.

The typical sounds levels from most of the construction equipment shows that they can be operated in compliance with the MECP NPC-115 and NPC-118 sound levels. However, there is potential for higher sound levels for some equipment (e.g., dump trucks and paving machines). Once equipment and construction schedules are finalized, construction equipment sound levels should be reviewed during detailed design to confirm that nose emissions are within the permissible limits. If they are higher than the limits, noise control options shall be explored. Methods to minimize construction noise impacts are included in the Construction Code of Practice (Section 7.4).

9 References

Ontario Ministry of the Environment, Conservation and Parks. (1982). *Publication NPC-118 for Motorized Conveyances.*

Ontario Ministry of the Environment, Conservation and Parks. (2013). *Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300).*

Ontario Ministry of Transportation. (2008). *Environmental Guide for Noise, Version 1.1.*

Ontario Ministry of Transportation. (2009). *Environmental Reference for Highway Design. Version 3.*

Stantec Consulting Ltd. (2021). *Bass Pro Mills Drive Extension.*

The City of Vaughan. (2014). *Vaughn Mills Secondary Plan.*

The Corporation of the City of Vaughan . (2018). *The Comprehensive Zoning By-Law.*

The Ontario Ministry of the Environment, Conservation and Parks. (1978). *Publication NPC-115, Model Municipal Control By-law.*

York Region. (2006). *York Region Traffic Noise Mitigation Policy for Regional Roads.*

York Region. (2019). *Standard Operating Procedures (SOP's) for Traffic Noise Mitigation.*

APPENDICES

Appendix A Figures

Stantec

Legend

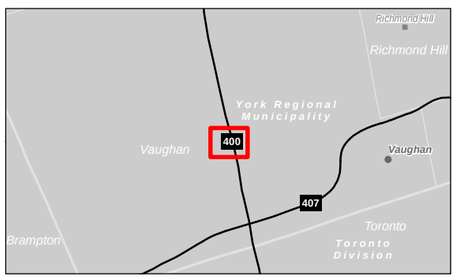
- Study Area
- Watercourse (Permanent)
- Point of Reception (POR)

0 150 300 m

1:6,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
3. Orthoimagery © First Base Solutions, 2021, imagery date 2020.



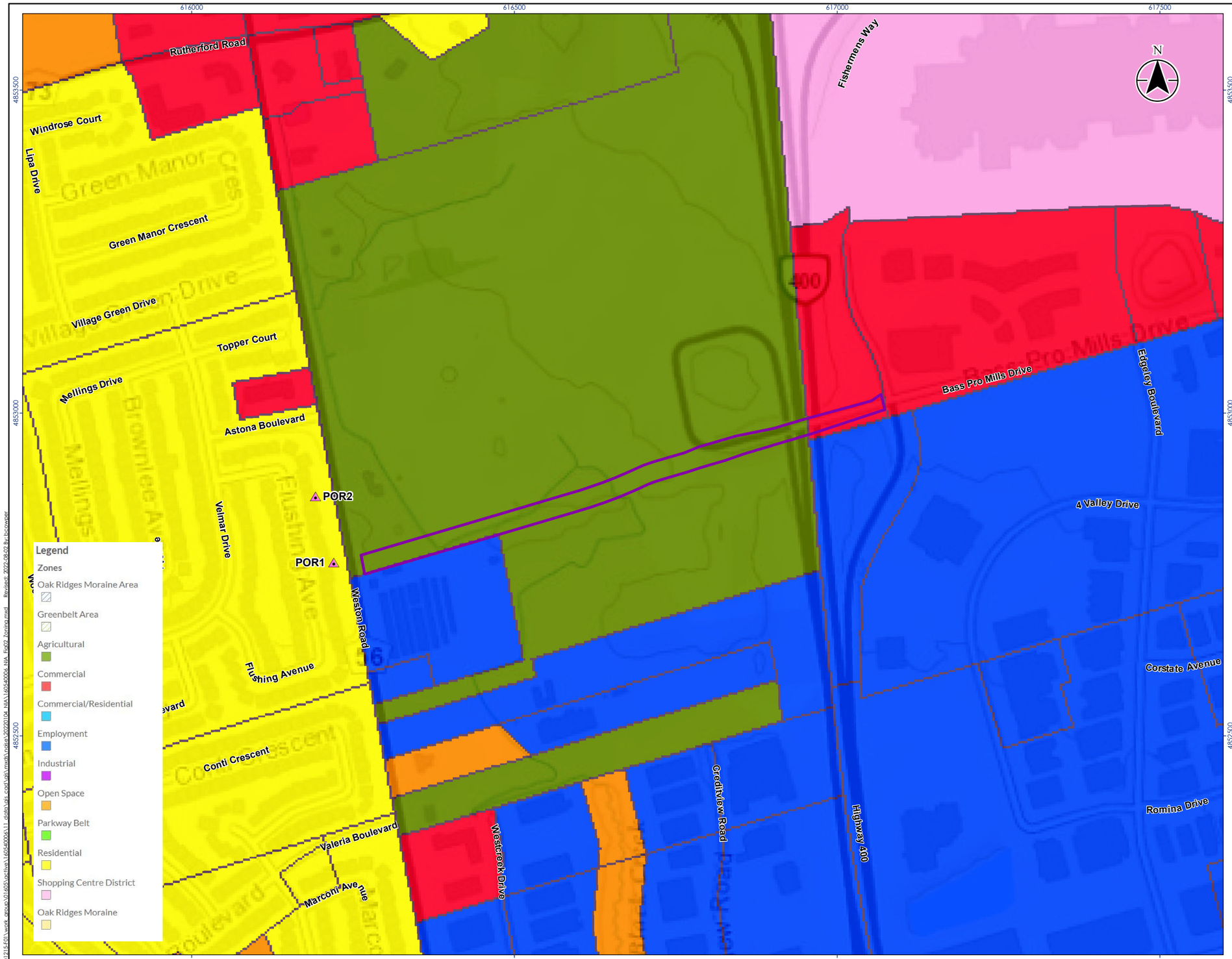
Project Location
City of Vaughan

160540006 REV4
Prepared by BCC on 2022-07-27
Technical Review by TD on 2021-06-23

Client/Project
CITY OF VAUGHAN
BASS PRO MILLS DRIVE EXTENSION

Figure No.
1

Title
Project Location



Stantec

Legend

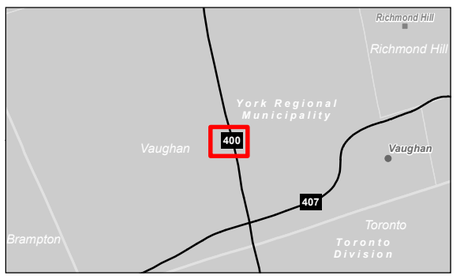
- Study Area
- Point of Reception (POR)

0 150 300 m

1:6,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 17N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2021.
3. Zoning data source - City of Vaughan 2022.



Project Location
City of Vaughan

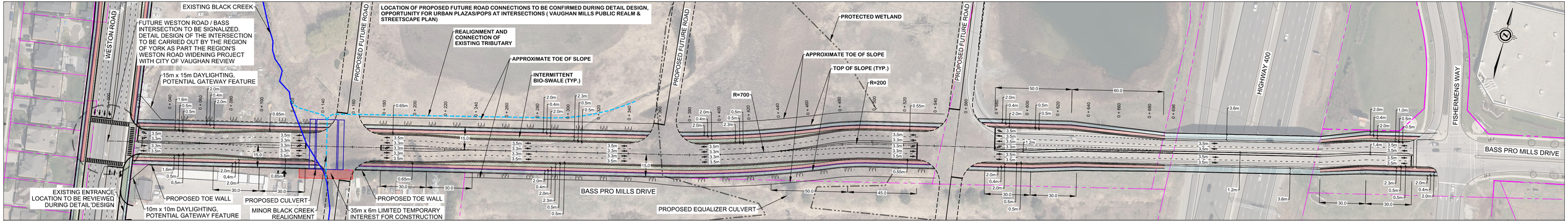
160540006 REV4
Prepared by BCC on 2022-08-02
Technical Review by TD on 2021-06-23

Client/Project
CITY OF VAUGHAN
BASS PRO MILLS DRIVE EXTENSION

Figure No.
2

Title
Land Use Zoning

Appendix B Bass Pro Mills Extension Plan and Profile



LEGEND:
- CONCRETE SIDEWALK
- STAMPED CONCRETE BUFFER
- BIKE PATH
- BOULEVARD
- CONCRETE STRIP
- CONCRETE BARRIER

Appendix C Road Traffic Data

Alvarado, Fabian

From: Cimpan, Cristina <Cristina.Cimpan@york.ca>
Sent: Friday, June 11, 2021 1:52 PM
To: Chan, Peter
Cc: Brown, Travis; So, Richard
Subject: #88196 Weston Rd Detailed Design - Traffic Counts

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Peter,

Please find below the existing and future AADT traffic volumes for Weston Rd project.

Regards,
Cristina

From: Gao, Wenli <Wenli.Gao@york.ca>
Sent: Friday, March 5, 2021 12:32 PM
To: Cimpan, Cristina <Cristina.Cimpan@york.ca>
Cc: Subhani, Ahmad <Ahmad.Subhani@york.ca>
Subject: RE: Information Gathering for Weston Rd Detailed Design (Project # 88196) - Traffic Counts

Hi Cristina,

Sorry for the late reply.

The AADTs for your study are estimated in the table below.

Road Segment	Existing			2041	
	Year	No. of lanes	AADT	No. of lanes	AADT
Weston Rd btwn Rutherford Rd and Comdel Blvd	2019	4 GPLs	36,000	4 GPLs + 2 HOVs	50,000
Weston Rd btwn Rutherford Rd and Langstaff Rd	2019	4 GPLs	38,000	4 GPLs + 2 HOVs	50,000
Weston Rd btwn Hwy 7 and Langstaff Rd	2018	4 GPLs	33,000	4 GPLs + 2 HOVs	50,000
Weston Rd btwn Hwy 7 and Hwy 407	2019	5 GPLs	38,000	4 GPLs + 2 HOVs	56,000

Please note the following assumptions.

- The existing AADTs for Weston Rd north and south of Rutherford Rd are based on the Turning Movement Counts for the intersection of Weston Rd and Rutherford Rd due the data availability in the Region's traffic database.
- The 2041 road network is based on the Region's 2016 TMP recommendations – Map 19, Transportation Master Plan | York Region.

Let me know if you have further questions.

Regards,

Wenli Gao | Transportation Technologist - Forecasting, Transportation and Infrastructure Planning, Transporation Services Department
---
1-877-464-9675 ext. 75197

Our Mission: **Working together to serve our thriving communities – today and tomorrow**

Alvarado, Fabian

From: Cimpan, Cristina <Cristina.Cimpan@york.ca>
Sent: Tuesday, November 30, 2021 8:17 AM
To: Alvarado, Fabian
Cc: So, Richard; Cholewa, Peter; Salim, Mohammed
Subject: Weston Rd Detailed Design _ Traffic Data_ additional information

Good morning Fabian,

Please find below the additional traffic data, as requested. Bass Pro Mills is under the jurisdiction of the City of Vaughan and there is no traffic data available at the Region.

Regards,

Cristina Cimpan, P. Eng. | Planning and Design Coordinator | Capital Planning and Delivery Branch, Transportation Services Department
---
The Regional Municipality of York | Courier Address: 90 Bales Dr. E., East Gwillimbury, ON L0G 1V0 | Mailing Address: 17250 Yonge Street | Newmarket, ON L3Y 6Z1
O: 1-877-464-9675 ext. 75390 | cristina.cimpan@york.ca | www.york.ca

Our Mission: **Working together to serve our thriving communities – today and tomorrow**

From: Gao, Wenli <Wenli.Gao@york.ca>
Sent: Monday, November 29, 2021 4:51 PM
To: Cimpan, Cristina <Cristina.Cimpan@york.ca>
Cc: So, Richard <Richard.So@york.ca>; Subhani, Ahmad <Ahmad.Subhani@york.ca>; Traffic data <Traffic.data@york.ca>
Subject: RE: Weston Rd Detailed Design between Hwy 407 to Fieldstone Dr/ Chrislea Rd and future Bass Pro Mills Extension to Hawkview Blvd _ additional information

Hi Cristina,

Please see the table below for the required information. The information is based on the available traffic data and should be applicable for the future.

Roadway	Road Segment	Speed (km/h)		Day/Night Traffic Split (%)	Truck Percentage (%)	
		Posted Limit	85th Percentile		Medium/Heavy	
Weston Rd	Hwy 407 - Hwy 7	60	74	91/9	2/3	
Weston Rd	Hwy 7 - Fieldstone Dr/Chrislea Rd	60	65	93/7	3/3	
Weston Rd	Langstaff Rd - Greenpark Blvd/Crestmount Blvd	60	78	92/8	2/3	*
Weston Rd	Maria Antonia Rd/Hawstone Rd - Major Mackenzie Dr West	60	70	93/7	2/3	
Rutherford Rd	Fossil Hill Rd - Weston Rd	60	74	91/9	2/3	
Rutherford Rd	Weston Rd - Vellore Woods Blvd	60	74	89/11	3/3	

Note:
* The data could be applied to Weston Rd both north and south of Rutherford Rd for the detailed design due to the similar conditions along Weston Rd and conservative estimation.

Let me know if you need further assistance.

Thanks,

Wenli Gao | Transportation Technologist - Forecasting, Transportation and Infrastructure Planning, Transporation Services Department
---

Appendix D STAMSON Calculations

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 10:42:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1b37.te Time Period: Day/Night 16/8 hours
Description: POR1 Build 2037

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

Car traffic volume : 20896/1817 veh/TimePeriod *
Medium truck volume : 440/38 veh/TimePeriod *
Heavy truck volume : 660/57 veh/TimePeriod *
Posted speed limit : 60 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): 23909
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 20.00 / 15.00 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 : 2.20 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 20896/1817 veh/TimePeriod *
Medium truck volume : 440/38 veh/TimePeriod *
Heavy truck volume : 660/57 veh/TimePeriod *
Posted speed limit : 60 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): 23909
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 32.00 / 15.00 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 : 2.20 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

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

Car traffic volume : 17981/1564 veh/TimePeriod *
Medium truck volume : 889/77 veh/TimePeriod *
Heavy truck volume : 1333/116 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 19500
Percentage of Annual Growth : 2.00
Number of Years of Growth : 6.00
Medium Truck % of Total Volume : 4.40
Heavy Truck % of Total Volume : 6.60
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -60.00 deg

Barrier height : 2.20 m
Barrier receiver distance : 9.00 / 9.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.43 ! 212.43

ROAD (0.00 + 60.17 + 0.00) = 60.17 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.53 70.01 0.00 -1.92 -1.24 0.00 0.00 -6.68 60.17

Segment Leq : 60.17 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.45 ! 212.45

ROAD (0.00 + 60.40 + 0.00) = 60.40 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 70.01 0.00 -3.29 0.00 0.00 0.00 -6.31 60.40

Segment Leq : 60.40 dBA

Results segment # 3: BP (day)

Source height = 1.60 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.60 ! 1.50 ! 1.56 ! 212.56

ROAD (0.00 + 57.17 + 0.00) = 57.17 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -60 0.00 70.65 0.00 0.00 -7.78 0.00 0.00 -5.69 57.17

Segment Leq : 57.17 dBA

Total Leq All Segments: 64.24 dBA

Results segment # 1: WS (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.31 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 61.08 + 0.00) = 61.08 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.44 62.39 0.00 0.00 -1.07 0.00 0.00 -4.85 56.47*
-90 90 0.58 62.39 0.00 0.00 -1.31 0.00 0.00 0.00 61.08
---

* Bright Zone !

Segment Leq : 61.08 dBA

Results segment # 2: WN (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.31 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 62.39 + 0.00) = 62.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	62.39	0.00	0.00	0.00	0.00	0.00	-4.85	57.54*
-90	90	0.00	62.39	0.00	0.00	0.00	0.00	0.00	0.00	62.39

* Bright Zone !

Segment Leq : 62.39 dBA

Results segment # 3: BP (night)

Source height = 1.60 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.60	4.50	2.76	213.76

ROAD (0.00 + 55.27 + 0.00) = 55.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-60	0.00	63.05	0.00	0.00	-7.78	0.00	0.00	-4.38	50.89*
-90	-60	0.00	63.05	0.00	0.00	-7.78	0.00	0.00	0.00	55.27

* Bright Zone !

Segment Leq : 55.27 dBA

Total Leq All Segments: 65.25 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.24
(NIGHT): 65.25

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 10:40:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1_nb.te Time Period: Day/Night 16/8 hours
Description: POR1 No Build 2037

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

Car traffic volume : 20896/1817 veh/TimePeriod *
Medium truck volume : 440/38 veh/TimePeriod *
Heavy truck volume : 660/57 veh/TimePeriod *
Posted speed limit : 60 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): 23909
Percentage of Annual Growth : 2.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 20.00 / 15.00 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 : 2.20 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 20896/1817 veh/TimePeriod *
Medium truck volume : 440/38 veh/TimePeriod *
Heavy truck volume : 660/57 veh/TimePeriod *
Posted speed limit : 60 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): 23909
Percentage of Annual Growth : 2.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 32.00 / 15.00 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 : 2.20 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.43 ! 212.43

ROAD (0.00 + 60.17 + 0.00) = 60.17 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.53 70.01 0.00 -1.92 -1.24 0.00 0.00 -6.68 60.17

Segment Leq : 60.17 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.32 ! 1.50 ! 1.45 ! 212.45

ROAD (0.00 + 60.40 + 0.00) = 60.40 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 70.01 0.00 -3.29 0.00 0.00 0.00 -6.31 60.40

Segment Leq : 60.40 dBA

Total Leq All Segments: 63.30 dBA

Results segment # 1: WS (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.31 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 61.08 + 0.00) = 61.08 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.44 62.39 0.00 0.00 -1.07 0.00 0.00 -4.85 56.47*
-90 90 0.58 62.39 0.00 0.00 -1.31 0.00 0.00 0.00 61.08
---

* Bright Zone !

Segment Leq : 61.08 dBA

Results segment # 2: WN (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.31 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 62.39 + 0.00) = 62.39 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90	90	0.00	62.39	0.00	0.00	0.00	0.00	0.00	-4.85	57.54*
-90	90	0.00	62.39	0.00	0.00	0.00	0.00	0.00	0.00	62.39

* Bright Zone !

Segment Leq : 62.39 dBA

Total Leq All Segments: 64.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.30
(NIGHT): 64.79

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 16:16:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2b37.te Time Period: Day/Night 16/8 hours
Description: POR2 2037 Build

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

Car traffic volume : 20896/1817 veh/TimePeriod *
Medium truck volume : 440/38 veh/TimePeriod *
Heavy truck volume : 660/57 veh/TimePeriod *
Posted speed limit : 60 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): 23909
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 28.00 / 15.00 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 : 2.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 20896/1817 veh/TimePeriod *
Medium truck volume : 440/38 veh/TimePeriod *
Heavy truck volume : 660/57 veh/TimePeriod *
Posted speed limit : 60 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): 23909
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 40.00 / 15.00 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 : 2.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

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

Car traffic volume : 17981/1564 veh/TimePeriod *
Medium truck volume : 889/77 veh/TimePeriod *
Heavy truck volume : 1333/116 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 19500
Percentage of Annual Growth : 2.00
Number of Years of Growth : 6.00
Medium Truck % of Total Volume : 4.40
Heavy Truck % of Total Volume : 6.60
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -15.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 122.00 / 122.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -15.00 deg

Barrier height : 2.00 m
Barrier receiver distance : 8.00 / 8.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.41 ! 212.41

ROAD (0.00 + 58.79 + 0.00) = 58.79 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.55 70.01 0.00 -4.19 -1.26 0.00 0.00 -5.76 58.79

Segment Leq : 58.79 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.44 ! 212.44

ROAD (0.00 + 60.20 + 0.00) = 60.20 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 70.01 0.00 -4.26 0.00 0.00 0.00 -5.55 60.20

Segment Leq : 60.20 dBA

Results segment # 3: BP (day)

Source height = 1.60 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.60 ! 1.50 ! 1.51 ! 212.51

ROAD (0.00 + 52.28 + 0.00) = 52.28 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -15 0.00 70.65 0.00 -9.10 -3.80 0.00 0.00 -5.46 52.28

Segment Leq : 52.28 dBA

Total Leq All Segments: 62.95 dBA

Results segment # 1: WS (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.31 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 61.08 + 0.00) = 61.08 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.46 62.39 0.00 0.00 -1.09 0.00 0.00 -4.26 57.04*
-90 90 0.58 62.39 0.00 0.00 -1.31 0.00 0.00 0.00 61.08
---

* Bright Zone !

Segment Leq : 61.08 dBA

Results segment # 2: WN (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.31 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 62.39 + 0.00) = 62.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	62.39	0.00	0.00	0.00	0.00	0.00	-4.26	58.13*
-90	90	0.00	62.39	0.00	0.00	0.00	0.00	0.00	0.00	62.39

* Bright Zone !

Segment Leq : 62.39 dBA

Results segment # 3: BP (night)

Source height = 1.60 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.60	4.50	4.31	215.31

ROAD (0.00 + 50.15 + 0.00) = 50.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-15	0.00	63.05	0.00	-9.10	-3.80	0.00	0.00	-0.29	49.85*
-90	-15	0.00	63.05	0.00	-9.10	-3.80	0.00	0.00	0.00	50.15

* Bright Zone !

Segment Leq : 50.15 dBA

Total Leq All Segments: 64.94 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.95
(NIGHT): 64.94

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 15:53:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por2nb37.te Time Period: Day/Night 16/8 hours
Description: POR2 No Build 2037

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

Car traffic volume : 20896/1817 veh/TimePeriod *
Medium truck volume : 440/38 veh/TimePeriod *
Heavy truck volume : 660/57 veh/TimePeriod *
Posted speed limit : 60 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): 23909
Percentage of Annual Growth : 2.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 28.00 / 15.00 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 : 2.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 20896/1817 veh/TimePeriod *
Medium truck volume : 440/38 veh/TimePeriod *
Heavy truck volume : 660/57 veh/TimePeriod *
Posted speed limit : 60 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): 23909
Percentage of Annual Growth : 2.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 40.00 / 15.00 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 : 2.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.41 ! 212.41

ROAD (0.00 + 58.79 + 0.00) = 58.79 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.55 70.01 0.00 -4.19 -1.26 0.00 0.00 -5.76 58.79

Segment Leq : 58.79 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.32 ! 1.50 ! 1.44 ! 212.44

ROAD (0.00 + 60.20 + 0.00) = 60.20 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 70.01 0.00 -4.26 0.00 0.00 0.00 -5.55 60.20

Segment Leq : 60.20 dBA

Total Leq All Segments: 62.56 dBA

Results segment # 1: WS (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.31 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 61.08 + 0.00) = 61.08 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.46 62.39 0.00 0.00 -1.09 0.00 0.00 -4.26 57.04*
-90 90 0.58 62.39 0.00 0.00 -1.31 0.00 0.00 0.00 61.08
---

* Bright Zone !

Segment Leq : 61.08 dBA

Results segment # 2: WN (night)

Source height = 1.31 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.31 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 62.39 + 0.00) = 62.39 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90	90	0.00	62.39	0.00	0.00	0.00	0.00	0.00	-4.26	58.13*
-90	90	0.00	62.39	0.00	0.00	0.00	0.00	0.00	0.00	62.39

* Bright Zone !

Segment Leq : 62.39 dBA

Total Leq All Segments: 64.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.56
(NIGHT): 64.79

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 10:56:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por127.te Time Period: Day/Night 16/8 hours
Description: POR1 Start of Construction 2027

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

Car traffic volume : 18513/1610 veh/TimePeriod *
Medium truck volume : 390/34 veh/TimePeriod *
Heavy truck volume : 585/51 veh/TimePeriod *
Posted speed limit : 78 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): 21182
Percentage of Annual Growth : 0.00
Number of Years of Growth : 8.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 20.00 / 15.00 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 : 2.20 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 18513/1610 veh/TimePeriod *
Medium truck volume : 390/34 veh/TimePeriod *
Heavy truck volume : 585/51 veh/TimePeriod *
Posted speed limit : 78 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): 21182
Percentage of Annual Growth : 2.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 32.00 / 15.00 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 : 2.20 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.43 ! 212.43

ROAD (0.00 + 62.02 + 0.00) = 62.02 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.53 71.86 0.00 -1.92 -1.24 0.00 0.00 -6.68 62.02

Segment Leq : 62.02 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.32 ! 1.50 ! 1.45 ! 212.45

ROAD (0.00 + 62.25 + 0.00) = 62.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	71.86	0.00	-3.29	0.00	0.00	0.00	-6.31	62.25

Segment Leq : 62.25 dBA

Total Leq All Segments: 65.15 dBA

Results segment # 1: WS (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 62.95 + 0.00) = 62.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.44	64.27	0.00	0.00	-1.07	0.00	0.00	-4.85	58.35*
-90	90	0.58	64.27	0.00	0.00	-1.31	0.00	0.00	0.00	62.95

* Bright Zone !

Segment Leq : 62.95 dBA

Results segment # 2: WN (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 64.27 + 0.00) = 64.27 dBA

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

-90	90	0.00	64.27	0.00	0.00	0.00	0.00	0.00	-4.85	59.42*
-90	90	0.00	64.27	0.00	0.00	0.00	0.00	0.00	0.00	64.27

* Bright Zone !

Segment Leq : 64.27 dBA

Total Leq All Segments: 66.67 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.15
(NIGHT): 66.67

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 11:05:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1.te Time Period: Day/Night 16/8 hours
Description: POR1 2041 Mature State of Development

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

Car traffic volume : 21850/1900 veh/TimePeriod *
Medium truck volume : 460/40 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 78 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 20.00 / 15.00 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 : 2.20 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 21850/1900 veh/TimePeriod *
Medium truck volume : 460/40 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 78 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 32.00 / 15.00 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 : 2.20 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

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

Car traffic volume : 19463/1692 veh/TimePeriod *
Medium truck volume : 962/84 veh/TimePeriod *
Heavy truck volume : 1443/126 veh/TimePeriod *
Posted speed limit : 65 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): 19500
Percentage of Annual Growth : 2.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 4.40
Heavy Truck % of Total Volume : 6.60
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -60.00 deg

Barrier height : 2.20 m
Barrier receiver distance : 9.00 / 9.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.43 ! 212.43

ROAD (0.00 + 62.74 + 0.00) = 62.74 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.53 72.57 0.00 -1.92 -1.24 0.00 0.00 -6.68 62.74

Segment Leq : 62.74 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.45 ! 212.45

ROAD (0.00 + 62.97 + 0.00) = 62.97 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 72.57 0.00 -3.29 0.00 0.00 0.00 -6.31 62.97

Segment Leq : 62.97 dBA

Results segment # 3: BP (day)

Source height = 1.60 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.60 ! 1.50 ! 1.56 ! 212.56

ROAD (0.00 + 59.59 + 0.00) = 59.59 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -60 0.00 73.06 0.00 0.00 -7.78 0.00 0.00 -5.69 59.59

Segment Leq : 59.59 dBA

Total Leq All Segments: 66.79 dBA

Results segment # 1: WS (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 63.67 + 0.00) = 63.67 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.44 64.98 0.00 0.00 -1.07 0.00 0.00 -4.85 59.06*
-90 90 0.58 64.98 0.00 0.00 -1.31 0.00 0.00 0.00 63.67
---

* Bright Zone !

Segment Leq : 63.67 dBA

Results segment # 2: WN (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 64.98 + 0.00) = 64.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	64.98	0.00	0.00	0.00	0.00	0.00	-4.85	60.13*
-90	90	0.00	64.98	0.00	0.00	0.00	0.00	0.00	0.00	64.98

* Bright Zone !

Segment Leq : 64.98 dBA

Results segment # 3: BP (night)

Source height = 1.60 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.60	4.50	2.76	213.76

ROAD (0.00 + 57.70 + 0.00) = 57.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-60	0.00	65.48	0.00	0.00	-7.78	0.00	0.00	-4.38	53.32*
-90	-60	0.00	65.48	0.00	0.00	-7.78	0.00	0.00	0.00	57.70

* Bright Zone !

Segment Leq : 57.70 dBA

Total Leq All Segments: 67.83 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.79
(NIGHT): 67.83

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 15:56:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por227.te Time Period: Day/Night 16/8 hours
Description: POR2 2027 Start of Construction

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

Car traffic volume : 18513/1610 veh/TimePeriod *
Medium truck volume : 390/34 veh/TimePeriod *
Heavy truck volume : 585/51 veh/TimePeriod *
Posted speed limit : 78 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): 21182
Percentage of Annual Growth : 0.00
Number of Years of Growth : 8.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 28.00 / 15.00 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 : 2.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 18513/1610 veh/TimePeriod *
Medium truck volume : 390/34 veh/TimePeriod *
Heavy truck volume : 585/51 veh/TimePeriod *
Posted speed limit : 78 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): 21182
Percentage of Annual Growth : 2.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 40.00 / 15.00 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 : 2.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.41 ! 212.41

ROAD (0.00 + 60.64 + 0.00) = 60.64 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.55 71.86 0.00 -4.19 -1.26 0.00 0.00 -5.76 60.64

Segment Leq : 60.64 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.44 ! 212.44

ROAD (0.00 + 62.05 + 0.00) = 62.05 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 71.86 0.00 -4.26 0.00 0.00 0.00 -5.55 62.05

Segment Leq : 62.05 dBA

Total Leq All Segments: 64.41 dBA

Results segment # 1: WS (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 62.95 + 0.00) = 62.95 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.46 64.27 0.00 0.00 -1.09 0.00 0.00 -4.25 58.92*
-90 90 0.58 64.27 0.00 0.00 -1.31 0.00 0.00 0.00 62.95
---

* Bright Zone !

Segment Leq : 62.95 dBA

Results segment # 2: WN (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 64.27 + 0.00) = 64.27 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90	90	0.00	64.27	0.00	0.00	0.00	0.00	0.00	-4.25	60.01*
-90	90	0.00	64.27	0.00	0.00	0.00	0.00	0.00	0.00	64.27

* Bright Zone !

Segment Leq : 64.27 dBA

Total Leq All Segments: 66.67 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.41
(NIGHT): 66.67

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 16:15:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por241.te Time Period: Day/Night 16/8 hours
Description: POR2 2041 Mature State of Development

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

Car traffic volume : 21850/1900 veh/TimePeriod *
Medium truck volume : 460/40 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 78 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 28.00 / 15.00 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 : 2.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 21850/1900 veh/TimePeriod *
Medium truck volume : 460/40 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 78 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 40.00 / 15.00 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 : 2.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

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

Car traffic volume : 19463/1692 veh/TimePeriod *
Medium truck volume : 962/84 veh/TimePeriod *
Heavy truck volume : 1443/126 veh/TimePeriod *
Posted speed limit : 65 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): 19500
Percentage of Annual Growth : 2.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 4.40
Heavy Truck % of Total Volume : 6.60
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -15.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 122.00 / 122.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -15.00 deg

Barrier height : 2.00 m
Barrier receiver distance : 8.00 / 8.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.41 ! 212.41

ROAD (0.00 + 61.36 + 0.00) = 61.36 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.55 72.57 0.00 -4.19 -1.26 0.00 0.00 -5.76 61.36

Segment Leq : 61.36 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.44 ! 212.44

ROAD (0.00 + 62.76 + 0.00) = 62.76 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 72.57 0.00 -4.26 0.00 0.00 0.00 -5.55 62.76

Segment Leq : 62.76 dBA

Results segment # 3: BP (day)

Source height = 1.60 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.60 ! 1.50 ! 1.51 ! 212.51

ROAD (0.00 + 54.70 + 0.00) = 54.70 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -15 0.00 73.06 0.00 -9.10 -3.80 0.00 0.00 -5.46 54.70

Segment Leq : 54.70 dBA

Total Leq All Segments: 65.50 dBA

Results segment # 1: WS (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 63.67 + 0.00) = 63.67 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.46 64.98 0.00 0.00 -1.09 0.00 0.00 -4.25 59.63*
-90 90 0.58 64.98 0.00 0.00 -1.31 0.00 0.00 0.00 63.67
---

* Bright Zone !

Segment Leq : 63.67 dBA

Results segment # 2: WN (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 64.98 + 0.00) = 64.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	64.98	0.00	0.00	0.00	0.00	0.00	-4.25	60.72*
-90	90	0.00	64.98	0.00	0.00	0.00	0.00	0.00	0.00	64.98

* Bright Zone !

Segment Leq : 64.98 dBA

Results segment # 3: BP (night)

Source height = 1.60 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.60	4.50	4.31	215.31

ROAD (0.00 + 52.57 + 0.00) = 52.57 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-15	0.00	65.48	0.00	-9.10	-3.80	0.00	0.00	-0.29	52.28*
-90	-15	0.00	65.48	0.00	-9.10	-3.80	0.00	0.00	0.00	52.57

* Bright Zone !

Segment Leq : 52.57 dBA

Total Leq All Segments: 67.53 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.50
(NIGHT): 67.53

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 18:14:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por141.te Time Period: Day/Night 16/8 hours
Description: POR1 2041 Mitigated

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

Car traffic volume : 21850/1900 veh/TimePeriod *
Medium truck volume : 460/40 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 78 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 20.00 / 15.00 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 : 3.00 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 21850/1900 veh/TimePeriod *
Medium truck volume : 460/40 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 78 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 32.00 / 15.00 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 : 3.00 m
Barrier receiver distance : 8.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

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

Car traffic volume : 19463/1692 veh/TimePeriod *
Medium truck volume : 962/84 veh/TimePeriod *
Heavy truck volume : 1443/126 veh/TimePeriod *
Posted speed limit : 65 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): 19500
Percentage of Annual Growth : 2.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 4.40
Heavy Truck % of Total Volume : 6.60
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -60.00 deg

Barrier height : 3.00 m
Barrier receiver distance : 3.00 / 3.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.43 ! 212.43

ROAD (0.00 + 60.07 + 0.00) = 60.07 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.49 72.57 0.00 -1.86 -1.15 0.00 0.00 -9.50 60.07

Segment Leq : 60.07 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.45 ! 212.45

ROAD (0.00 + 60.42 + 0.00) = 60.42 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 72.57 0.00 -3.29 0.00 0.00 0.00 -8.86 60.42

Segment Leq : 60.42 dBA

Results segment # 3: BP (day)

Source height = 1.60 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.60 ! 1.50 ! 1.52 ! 212.52

ROAD (0.00 + 56.84 + 0.00) = 56.84 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -60 0.00 73.06 0.00 0.00 -7.78 0.00 0.00 -8.44 56.84

Segment Leq : 56.84 dBA

Total Leq All Segments: 64.15 dBA

Results segment # 1: WS (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 57.52 + 0.00) = 57.52 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.40 64.98 0.00 0.00 -0.97 0.00 0.00 -6.49 57.52

Segment Leq : 57.52 dBA

Results segment # 2: WN (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 58.49 + 0.00) = 58.49 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

```
-------------------------------------------------------------------------------
  -90    90   0.00  64.98   0.00   0.00   0.00   0.00   0.00  -6.49  58.49
-------------------------------------------------------------------------------

Segment Leq : 58.49 dBA


Results segment # 3: BP (night)
-------------------------------

Source height = 1.60 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
      1.60 !        4.50 !        3.92 !       214.92

ROAD (0.00 + 57.70 + 0.00) = 57.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
  -90   -60   0.00  65.48   0.00   0.00  -7.78   0.00   0.00  -1.95  55.75*
  -90   -60   0.00  65.48   0.00   0.00  -7.78   0.00   0.00   0.00  57.70
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 57.70 dBA

Total Leq All Segments: 62.70 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 64.15
                           (NIGHT): 62.70
```

STAMSON 5.0 NORMAL REPORT Date: 26-07-2022 18:16:42
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por241.te Time Period: Day/Night 16/8 hours
Description: POR2 2041 Mitigated

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

Car traffic volume : 21850/1900 veh/TimePeriod *
Medium truck volume : 460/40 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 78 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: WS (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 : 28.00 / 15.00 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 : 3.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Road data, segment # 2: WN (day/night)

Car traffic volume : 21850/1900 veh/TimePeriod *
Medium truck volume : 460/40 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 78 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): 25000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.00
Heavy Truck % of Total Volume : 3.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 2: WN (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 40.00 / 15.00 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 : 3.00 m
Barrier receiver distance : 14.00 / 10.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

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

Car traffic volume : 19463/1692 veh/TimePeriod *
Medium truck volume : 962/84 veh/TimePeriod *
Heavy truck volume : 1443/126 veh/TimePeriod *
Posted speed limit : 65 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): 19500
Percentage of Annual Growth : 2.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 4.40
Heavy Truck % of Total Volume : 6.60
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg -15.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 122.00 / 122.00 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -15.00 deg

Barrier height : 3.00 m
Barrier receiver distance : 8.00 / 8.00 m
Source elevation : 211.00 m
Receiver elevation : 211.00 m
Barrier elevation : 211.00 m
Reference angle : 0.00

Results segment # 1: WS (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.41 ! 212.41

ROAD (0.00 + 58.76 + 0.00) = 58.76 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.49 72.57 0.00 -4.03 -1.15 0.00 0.00 -8.64 58.76

Segment Leq : 58.76 dBA

Results segment # 2: WN (day)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 1.50 ! 1.44 ! 212.44

ROAD (0.00 + 60.32 + 0.00) = 60.32 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 72.57 0.00 -4.26 0.00 0.00 0.00 -7.99 60.32

Segment Leq : 60.32 dBA

Results segment # 3: BP (day)

Source height = 1.60 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.60 ! 1.50 ! 1.51 ! 212.51

ROAD (0.00 + 52.24 + 0.00) = 52.24 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -15 0.00 73.06 0.00 -9.10 -3.80 0.00 0.00 -7.92 52.24

Segment Leq : 52.24 dBA

Total Leq All Segments: 63.00 dBA

Results segment # 1: WS (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 57.52 + 0.00) = 57.52 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.40 64.98 0.00 0.00 -0.97 0.00 0.00 -6.49 57.52

Segment Leq : 57.52 dBA

Results segment # 2: WN (night)

Source height = 1.32 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
---+---+---+---
1.32 ! 4.50 ! 2.38 ! 213.38

ROAD (0.00 + 58.49 + 0.00) = 58.49 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

```
-------------------------------------------------------------------------------
  -90    90   0.00  64.98   0.00   0.00   0.00   0.00   0.00  -6.49  58.49
-------------------------------------------------------------------------------

Segment Leq : 58.49 dBA


Results segment # 3: BP (night)
-------------------------------

Source height = 1.60 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
      1.60 !        4.50 !        4.31 !       215.31

ROAD (0.00 + 52.57 + 0.00) = 52.57 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
  -90    -15   0.00  65.48   0.00  -9.10  -3.80   0.00   0.00  -1.00  51.58*
  -90    -15   0.00  65.48   0.00  -9.10  -3.80   0.00   0.00   0.00  52.57
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 52.57 dBA

Total Leq All Segments: 61.62 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 63.00
                           (NIGHT): 61.62
```