SWALL Thornton Tomasetti

OFESSION

MAHFUMUFN 100189783

POVINCE OF ON

Marenger St. Development

1258 Marenger Street SW20034

Prepared For Rocco Giamberardino

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NOISE IMPACT STUDY

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1.0 Introduction

At the request of Revelstoke Custom Homes & Renovations, Swallow Acoustic Consultants Ltd. (SACL) presents this Noise Impact Study (NIS) for the proposed 3-storey staked townhouses (Project) to be located at 1258 Marenger Street, Ottawa, Ontario. The Project will make up twelve residential units. The objective of this study is to determine if the proposed Project can meet the noise guidelines of the City of Ottawa and the Ontario Ministry of the Environment, Conservation and Parks (MECP).

2.0 Site

A site plan for the Project and an aerial photo of the Project area are provided in Appendix A, Figure 1 and Figure 2. A zoning map of the project area is provided in Appendix A, Figure 3. The Project is located in a residential area (zone R4Z, shown in Figure 3). Surrounding the Project to the north and east are residential areas, whereas to the south and west is an "arterial mainstreet zone" (zone AM3), currently occupied by residential buildings and small business to the south, and a medical centre to the west. There is an existing 1-storey single-family house located on the Project site, which is to be demolished.

3.0 Noise Sources

This NIS assesses noise impacts from nearby surface transportation sources on the Project. The surface transportation sources impacting the Project are road traffic on the following road:

- St. Joseph Boulevard;
- Queensway 174 on/off ramps at Jeanne D'Arc Boulevard.

These roads are respectfully designated as an Urban Arterial road and a City Freeway by Schedule E of the City of Ottawa Official Plan^[1]. Of note, the Queensway 174 itself is located over 600m from the Project, which is beyond the 500m distance cited by the City of Ottawa's *Environmental Noise Control Guidelines*^[2] (ENCG); it is therefore not required to be included in the Project's noise impact study. However, the 174's on/off ramps at Jeanne D'Arc Boulevard are within 500m of the Project, and were included to result in a more conservative analysis. Furthermore, Jeanne D'Arc Boulevard (Urban Arterial road) is located over 200m from the Project, which is beyond the 100m distance cited by the City of Ottawa's ENCG; it is therefore not required to be included in the Project's noise impact study.

Based on a site visit conducted by SACL on April 17, 2020, and a review of satellite photos of the area, there are no significant stationary noise sources nearby that may impact the Project.

4.0 Noise Assessment Criteria

The City of Ottawa requirements for environmental noise impact studies are outlined in the City's ENCG and are based on the Ontario Ministry of the Environment, Conservation, and Parks (MECP) document *Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning*^[3] (NPC-300).

4.1 Surface Transportation Noise Assessment Criteria

Sound level limits outlined in ENCG for road traffic noise impacting on noise-sensitive areas applicable to the Project are summarized in Table 1. Sound level limits are given in A-weighted, equivalent sound levels (L_{eq} , dBA), defined in both ENCG and NPC-300.

Additionally, ENCG and NPC-300 provide requirements for building components, ventilation, and warning clauses to be used in sale and lease agreements. These requirements are based on calculated sound levels at OLAs and the plane-of-window of bedrooms and living/dining rooms. Sound level limits and associated requirements applicable to the Project are summarized in Table 2 and Table 3. Warning clause types are defined in NPC-300.

Table 1: Sound Level Limits for Noise-Sensitive Areas – Road Noise

Type of Space	Time Period	Maximum L _{eq} (dBA)
Outdoor Living Area	Daytime (07:00 to 23:00)	55
Living/dining, den areas of residences, hospitals, schools,	Daytime (07:00 to 23:00)	45
etc. (indoor)	Nighttime (23:00 to 07:00)	45
Slooping guarters of residences (indeer)	Daytime (07:00 to 23:00)	45
Sleeping quarters of residences (indoor)	Nighttime (23:00 to 07:00)	40
General offices, reception areas, retail stores, etc. (indoor)	Daytime (07:00 to 23:00)	50

Table 2: Building Component and Ventilation Requirements – Road Noise

Time Period	Sound Level, L _{eq} (dBA), at Bedroom or Living/Dining Room Plane-of-Window	Building Component Requirement	Ventilation Requirement
Daytime	$55 < L_{eq} \le 65$	Building components must be compliant with the Ontario Building Code (OBC)	Forced air heating with provision for central air conditioning
(07:00 – 23:00)	$L_{eq} > 65$	Building components (walls, windows, etc.) should be designed to achieve indoor sound level criteria in Table 1	Central air conditioning
Nighttime (23:00 – 07:00)	$50 < L_{eq} \le 60$	Building components must be compliant with the Ontario Building Code (OBC)	Forced air heating with provision for central air conditioning
	L _{eq} > 60	Building components (walls, windows, etc.) should be designed to achieve indoor sound level criteria in Table 1	Central air conditioning

Table 3: Warning Clause Requirements

Assessment Location	Time Period	Sound Level, L _{eq} (dBA)	Warning Clause Requirement			
Bedroom or	Daytime	$55 < L_{eq} \le 65$	Type C Required			
Living/Dining Room Plane-	(07:00 – 23:00)	$L_{eq} > 65$	Type D Required			
	Nighttime	$50 < L_{eq} \le 60$	Type C Required			
of-Window	(23:00 – 07:00)	$L_{eq} > 60$	Type D Required			
Outdoor	Doutimo	$55 < L_{eq} \le 60$	If noise control measures are not provided, Type A is required			
Outdoor Living Areas	(07:00 – 23:00)	$L_{eq} > 60$	Noise control measures must be provided to reduce levels to 60 dBA or lower; if resultant level is above 55 dBA. Type B is required			

5.0 Sound Level Calculations

5.1 Points of Reception

Four points of reception (PORs) were chosen at the points on the top floor building façade of Buildings A & B that are most exposed to the transportation noise sources identified in Section 3.0. Two Outdoor Living Area (OLA) reception points were also included to evaluate the noise impact on the ground level backyards associated with the Project, subject to the requirements of Table 1 and Table 3. There is no amenity rooftop terrace planned for the development. Site plans showing the locations of the PORs and the OLAs are provided in Appendix A, Figure 4 and Figure 5. The locations of the PORs are summarized in Table 4.

Point of Reception (POR)	Level	POR Height (m)	Location	Notes/Comments
POR 1	3	8.5	SW corner of Building A	Representative of sound levels on the top floor plane-of- window areas of the southwest corner of Building A.
POR 2	3	8.5	NW corner of Building A	Representative of sound levels on the top floor plane-of- window areas of the northwest corner of Building A.
POR 3	3	8.5	NE corner of Building B	Representative of sound levels on the top floor plane-of- window areas of the northeast corner of Building B.
POR 4	3	8.5	SE corner of Building B	Representative of sound levels on the top floor plane-of- window areas of the southeast corner of Building B.
OLA 1	Grade	1.5	Westernmost backyard of Building A	Outdoor Living Area in backyard.
OLA 2	Grade	1.5	Easternmost backyard of Building B	Outdoor Living Area in backyard.

Table 4: Points of Reception and Outdoor Living Areas

5.2 Road Traffic Noise Parameters

The "ultimate" road traffic data for the road traffic noise sources identified in Section 3.0, including the Annual Average Daily Traffic (AADT), were obtained from the ENCG, based on the road classifications provided in the City of Ottawa Official Plan, and are summarized in Table 5. Of note, the Queensway 174 on/off ramp speed was modelled as 100 km/h, despite the lower actual vehicle speed of vehicles leaving or entering the highway. This results in a conservative assessment. The on/off ramps were modelled as a continuous 2-lane road segment, with an AADT of 18,333 per lane, consistent with ENCG Table B1.

Table 5: Traffic Parameters

Road Name	Implied Roadway Class	Speed Limit (km/h)	AADT (Vehicles/day)	Day/ Night Split (%)	Medium Trucks %	Heavy Trucks %
St. Joseph Blvd.	4-Lane Urban Arterial – Undivided (2-UAU)	60	30,000	92/8	7	5
Queensway 174 On/Off Ramps at Jeanne D'Arc Blvd.	Freeway	100 ¹	36,666 ²	92/8	7	5

¹ Actual recommended ramp speed is lower; 100 km/h was used in this study, resulting in a conservative assessment.

² Per ENCG Table B1, AADT is 18,333 vehicles/day per lane. The on/off ramps were modelled as a continuous 2-lane road segment.

5.3 Calculated Sound Levels

Sound levels were calculated at each POR using software developed by the MECP for the assessment of road and rail noise, STAMSON 5.04. Scaled site plans showing distances and angles used in STAMSON are provided in Appendix B, and Details of these calculations are provided in Appendix C. The calculated daytime and nighttime levels are presented in Table 6, along with the building component, ventilation, and warning clause requirements, as applicable.

Of note, the existing 4-storey residential building at 1921/1931 St. Joseph Boulevard was modelled as a 12m tall barrier. St. Joseph Boulevard was modelled as two road segments (eastbound and westbound), consistent with ENCG recommendations for improved accuracy. The ground for the St. Joseph Boulevard segments was modelled as absorptive towards the east (including 1931 St. Joseph Boulevard and residential lawns to the east) and reflective towards the west (including 1921 St. Joseph Boulevard and parking lots to the west).

The Queesway 174 on/off ramps were modelled as a road segment parallel to the Queensway itself, having a source-receiver distance equivalent to the shortest distance between the Project and the ramps, since the latter are significantly curved. The modelling approach for the on/off ramps is conservative, and the contribution of this road segment to the overall noise levels are low. For the Queensway 174 on/off ramps, the ground was modelled as absorptive.

POR	Daytime L _{eq} (dBA)	Nighttime L _{eq} (dBA)	Building Component Requirement	Ventilation Requirement	Warning Clause Requirement
POR 1	63	55	Building components must be compliant with the OBC.	Forced air heating with provision for central A/C.	Туре С
POR 2	62	54	Building components must be compliant with the OBC.	Forced air heating with provision for central A/C.	Туре С
POR 3	59	52	Building components must be compliant with the OBC.	Forced air heating with provision for central A/C.	Туре С
POR 4	62	55	Building components must be compliant with the OBC.	Forced air heating with provision for central A/C.	Туре С
OLA 1	62	N/A	Mitigation required to reduce noise levels at OLA1.	N/A	Type A or B ¹
OLA 2	61	N/A	Mitigation required to reduce noise levels at OLA1.	N/A	Type A or B ¹

Table 6: Calculated Sound Levels at PORs

¹ Type A or B warning clause may be required if no mitigation is provided or if mitigation does not reduce noise levels to 55 dBA or lower (see Table 3).

6.0 Noise Control Requirements

6.1 Building Component Requirements

Building components for all residential units will achieve the interior sound requirements for the building by meeting the requirements of the OBC.

6.2 Ventilation Requirements

All residential units require a minimum of forced-air heating with the provision for central air conditioning. It is expected that central air conditioning will be available for all units.



6.3 Outdoor Living Area Mitigation

The calculated outdoor noise level at the worst-case backyard outdoor living area is 62 dBA, which exceeds the City of Ottawa daytime limit of 55 dBA.

Due to the location of the OLAs behind the proposed buildings, many of the City of Ottawa preferred mitigation strategies are not available or practical, including:

- distance setback;
- insertion of noise insensitive land use between the source and receptor;
- orientation of Project to provide sheltered zones;
- earth berms.

A suitable noise control measure is to implement a noise barrier along the south lot line, which would ideally be constructed on top of the existing interlocking block retaining wall (alternatively, the block retaining wall can also simply be made taller using the same block material). SACL calculations show that in order to meet 55 dBA at the worst-case OLA, the total barrier height from the final grade level of the finished Project, including the block retaining wall, must be at least 2.3 metres (7.5 feet). This minimum barrier height is also required for the proposed privacy screen between individual backyards within the Project itself. A sketch showing the location of the barriers is included as Figure 6.

In the event that increasing the total barrier height, including propose privacy screens, to 2.3 metres (7.5 feet) is not feasible, SACL recommends that the 5 dB conditional tolerance be considered for this Project for the backyard OLAs. In this case, a noise barrier is still required along the south lot line, ideally on top of the existing interlocking block retaining wall as described above, with a total barrier height of at least 1.5 metres (5 feet). This lower barrier height results in a calculated outdoor noise level of 58 dBA at both OLA 1 and OLA 2. In this scenario, the privacy screens are not affected or included in the barrier mitigation recommendations. A sketch showing the location of the barriers is included as Figure 7.

Per the ENCG, noise barriers must be designed and constructed such that there are no cracks or gaps in the selected material, and must have a minimum surface density of 20 kg/m². The barrier documents as required by the ENCG Section 3.1 of Part 5 of the ENCG must be submitted to the City for approval following completion of the design drawings for the noise barrier.

6.4 Warning Clause Requirements

Since a minimum of forced-air heating with the provision for central air conditioning is required for all residential units, the following Type C warning clause is required:

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

Additionally, if the second OLA mitigation option (1.5m barrier along the south lot line) is implemented, the following Type B warning clause is required:



"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment and Climate Change.

To help address the need for sound attenuation this development includes an acoustic barrier.

To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features."

7.0 Impact of the Project on Surrounding Area

Mechanical equipment within the Project may be considered as a stationary noise source which may impact nearby noise-sensitive areas. Mechanical equipment selections have not yet been made, precluding a detailed analysis at this time. The final mechanical design will be required to comply with ENCG sound level limits from a stationary source at all nearby noise-sensitive areas.

8.0 Concluding Comments

The noise impact of the nearby transportation noise sources on the Project is expected to meet the requirements of the City of Ottawa and the MECP, provided the recommended noise mitigation as described in Section 0 is implemented. The proposed Project should therefore be approved from a noise perspective.

----- End ------



9.0 References

1. City of Ottawa. Official Plan, Schedule F – Central Area / Inner City Road Network, 2013.

2. City of Ottawa. Environmental Noise Control Guidelines, January 2016.

3. Ontario Ministry of the Environment and Climate Change. Environmental Noise Guideline, Stationary and Transportation Sources - Approval and Planning, Publication NPC-300, August 2013

4. City of Ottawa. geoOttawa, 2019. [Online]. Available: http://maps.ottawa.ca/geoottawa/. [Accessed: 28- May- 2019].



Appendix A - Site Plans



Figure 1: Site Plan of the project





Figure 2: Aerial view of the site and surroundings





Figure 3: Zoning map of the project area^[4]





Figure 4: Points of Reception at the 3rd level



Figure 5: Worst-case Outdoor Living Areas at grade



Figure 6: Proposed noise barriers for compliance at OLA 1 and 2 – Option 1.



Figure 7: Proposed noise barriers for compliance (with Warning Clause) at OLA 1 and 2 – Option 2.





Appendix B - Distances and Angles Used in STAMSON 5.04

Figure 8: POR 1 distances and exposure angles to Queensway 174 on/off ramps (A) and St. Joseph Boulevard (B).





Figure 9: POR 2 distances and exposure angles to Queensway 174 on/off ramps (A) and St. Joseph Boulevard (B).





Figure 10: POR 3 distances and exposure angles to Queensway 174 on/off ramps (A) and St. Joseph Boulevard (B).





Figure 11: POR 4 distances and exposure angles to Queensway 174 on/off ramps (A) and St. Joseph Boulevard (B).





Figure 12: OLA 1 distances and exposure angles to St. Joseph Boulevard.



Figure 13: OLA 2 distances and exposure angles to St. Joseph Boulevard.

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SWALL SW



Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h 0 % Road gradient : Road pavement : 1 (Typical asphalt or concrete) * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth:0.00Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00 Day (16 hrs) % of Total Volume : 92.00 Data for Segment # 4: StJoseph EB2 (day/night) _____ Angle1Angle2: -13.00 deg90.00 degWood depth: 0(No woods : 0 (No woods.) Receiver source distance : 80.00 / 80.00 m Receiver height::: Barrier receiver distance : 33.00 / 33.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 5: StJoseph WB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h 0 % Road gradient : Road pavement : 1 (Typical asphalt or concrete) * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 5: StJoseph WB2 (day/night) _____ Angle1Angle2: -13.00 deg90.00 degWood depth: 0(No woods.) No of house rows : 0 / 0 Surface : 2 (Reflective ground surface)

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Receiver source distance : 70.00 / 70.00 m Receiver height : 8.50 / 8.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -13.00 deg Angle2 : 25.00 deg Barrier height : 12.00 m Barrier receiver distance : 33.00 / 33.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 : 0.00 Reference angle Result summary (day) _____ ! source ! Road ! Total ! height ! Leq ! Leq ! (m) ! (dBA) ! (dBA)

 1.StJoseph_EB1
 !
 1.50 !
 52.05 !
 52.05

 2.StJoseph_WB1
 !
 1.50 !
 52.86 !
 52.86

 3.HWY174_Ramps
 !
 1.50 !
 47.88 !
 47.88

 4.StJoseph_EB2
 !
 1.50 !
 58.35 !
 58.35

 5.StJoseph_WB2
 !
 1.50 !
 58.92 !
 58.92

 _____ Total 62.74 dBA Result summary (night) _____ ! source ! Road ! Total ! height ! Leq ! Leq ! (m) ! (dBA) ! (dBA) _____+ 1.StJoseph_EB1!1.50 !44.45 !44.452.StJoseph_WB1!1.50 !45.26 !45.263.HWY174_Ramps!1.50 !40.28 !40.284.StJoseph_EB2!1.50 !50.75 !50.755.StJoseph_WB2!1.50 !51.32 !51.32

Total

55.14 dBA

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TOTAL Leg FROM ALL SOURCES (DAY): 62.74 (NIGHT): 55.14



STAMSON 5.0 SUMMARY REPORT Date: 10-06-2020 15:06:17 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258m_p2.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at POR2. Road data, segment # 1: StJoseph EB (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) 0 % * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB (day/night) _____ Angle1Angle2:0.00 deg90.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface)Receiver source distance:90.00 / 90.00 m Receiver height : 8.50 / 8.50 m Topography:2(Flat/gentle slope; with barrier)Barrier angle1:0.00 degAngle2 : 20.00 degBarrier height:12.00 m Barrier receiver distance : 43.00 / 43.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 2: StJoseph WB (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00

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Road data, segment # 3: HWY174_Ramps (day/night)
-----Car traffic volume : 29685/2581 veh/TimePeriod *
Medium truck volume : 2361/205 veh/TimePeriod *
Heavy truck volume : 1687/147 veh/TimePeriod *
Posted speed limit : 100 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):36666Percentage of Annual Growth0.00Number of Years of Growth0.00Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00

Data for Segment # 3: HWY174_Ramps (day/night)

Angle1 Angle2	:	-30.00	de	eg	42.00 deg
Wood depth	:	0			(No woods.)
No of house rows	:	0	/	0	
Surface	:	1			(Absorptive ground surface)
Receiver source distance	:	470.00	/	470.	00 m
Receiver height	:	8.50	/	8.50) m
Topography	:	1			(Flat/gentle slope; no barrier)
Reference angle	:	0.00			

Result summary (day)

! source ! Road ! Total ! height ! Leq ! Leq

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	!	(m)	!	(dBA)	!	(dBA)
1.StJoseph_EB 2.StJoseph_WB 3.HWY174_Ramps	! ! !	1.50 1.50 1.50	! ! !	58.13 58.64 52.57	! ! !	58.13 58.64 52.57
	+- I	'otal				61.94 dBA

Result summary (night)

	!	source	!	Road	!	Total
	!	height	!	Leq	!	Leq
	!	(m)	!	(dBA)	!	(dBA)
1.StJoseph_EB	!	1.50	!	50.54	!	50.54
2.StJoseph_WB		1.50	!	51.04	!	51.04
3.HWY174_Ramps		1.50	!	44.97	!	44.97
	-+-	Total	- + -		- + -	54.34 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.94 (NIGHT): 54.34



STAMSON 5.0 SUMMARY REPORT Date: 11-06-2020 14:03:03 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258m_p3.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at POR 3. Road data, segment # 1: StJoseph EB (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB (day/night) _____ Angle1Angle2: -90.00 deg0.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface)Receiver source distance:90.00 / 90.00 m Receiver height : 8.50 / 8.50 m Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00 Road data, segment # 2: StJoseph WB (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h Road gradient : 0 % : 0 % : 1 (Typical asphalt or concrete) Road pavement * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:0.00Heavy Truck % of Total Volume:7.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 2: StJoseph WB (day/night) _____

Angle1Angle2: -90.00 deg0.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface) Receiver source distance : 80.00 / 80.00 m Receiver height:8.50 / 8.50 mTopography:1Reference angle:0.00 Road data, segment # 3: HWY174 Ramps (day/night) _____ Car traffic volume : 29685/2581 veh/TimePeriod * Medium truck volume : 2361/205 veh/TimePeriod * Heavy truck volume : 1687/147 veh/TimePeriod * Posted speed limit : 100 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): 36666 Percentage of Annual Growth0.00Number of Years of Growth0.00Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 3: HWY174 Ramps (day/night) _____ Angle1 Angle2 : -31.00 deg 41.00 deg Wood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface) Receiver source distance : 470.00 / 470.00 m Receiver height:8.50 / 8.50 mTopography:1Reference angle:0.00 Result summary (day) _____ ! source ! Road ! Total ! height ! Leq ! Leq ! (m) ! (dBA) ! (dBA)

 1.StJoseph_EB
 !
 1.50 !
 54.62 !
 54.62

 2.StJoseph_WB
 !
 1.50 !
 55.36 !
 55.36

 3.HWY174_Ramps
 !
 1.50 !
 52.57 !
 52.57

 Total 59.11 dBA

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Result summary (night)

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	! ! !	source height (m)	! ! !	Road Leq (dBA)	! ! !	Total Leq (dBA)
	+		-+-		• •+-	
1.StJoseph_EB	!	1.50	!	47.02	!	47.02
2.StJoseph WB	!	1.50	!	47.77	!	47.77
3.HWY174_Ramps	!	1.50	!	44.98	!	44.98
	T	otal	- 1 -		- 1 -	51.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.11 (NIGHT): 51.51



STAMSON 5.0 SUMMARY REPORT Date: 12-06-2020 11:49:10 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258m_p4.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at POR 4. Road data, segment # 1: StJoseph EB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB1 (day/night) _____ Angle1Angle2: -90.00 deg40.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface) Receiver source distance : 80.00 / 80.00 m Receiver height : 8.50 / 8.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 10.00 deg Angle2 : 40.00 deg Barrier height : 12.00 m Barrier receiver distance : 33.00 / 33.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 2: StJoseph WB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00

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Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 2: StJoseph WB1 (day/night) -----Angle1Angle2: -90.00 deg40.00 degWood depth:0(No woodsNo of house rows:0 / 0Surface:1(Absorptive) (No woods.) Surface : 1 (Abso Receiver source distance : 70.00 / 70.00 m (Absorptive ground surface) Receiver height : 8.50 / 8.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 10.00 deg Angle2 : 40.00 deg Barrier height : 12.00 m Barrier receiver distance : 33.00 / 33.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 3: HWY174 Ramps (day/night) _____ Car traffic volume : 29685/2581 veh/TimePeriod Medium truck volume : 2361/205 veh/TimePeriod * Heavy truck volume : 1687/147 veh/TimePeriod * Posted speed limit : 100 km/h Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) Road pavement * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 36666 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 3: HWY174 Ramps (day/night) _____ Angle1 Angle2 : -5.00 deg 41.00 deg Wood depth : 0 (No woods.) No of house rows : 0 / 0 Surface : 1 (Absorptive ground surface) Receiver source distance : 480.00 / 480.00 m Receiver height : 8.50 / 8.50 m Topography : 1 (Flat/gentle slope; no barrier) Reference angle : 0.00 Road data, segment # 4: StJoseph EB2 (day/night) -----Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Number of Years of Growth: 0.00Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 Data for Segment # 4: StJoseph EB2 (day/night) _____ Angle1Angle2: 40.00 deg90.00 degWood depth: 0(No woods : 0 (No woods.) No of house rows : 0 / 0 Surface : 2 (Reflective ground surface) Receiver source distance : 80.00 / 80.00 m Receiver height : 8.50 / 8.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 40.00 deg Angle2 : 60.00 deg Barrier height : 12.00 m Barrier receiver distance : 33.00 / 33.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 5: StJoseph WB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 5: StJoseph WB2 (day/night) _____ Angle1Angle2: 40.00 deg90.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 70.00 / 70.00 m Receiver height : 8.50 / 8.50 m

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Topography Barrier anglel Barrier height Barrier receiver dist Source elevation Receiver elevation Barrier elevation Reference angle	: 40 12 tance:33 :0 :0 :0 :0 :0	2 (0.00 deg 7 0.00 m 0.00 / 33.00 0.00 m 0.00 m 0.00 m	Flat/gentlongle2 : 60	e slope; .00 deg	with	barrier)
Result summary (day)						
	! source ! height ! (m)	! Road ! Leq ! (dBA)	! Total ! Leq ! (dBA)			
1.StJoseph_EB1 2.StJoseph_WB1 3.HWY174_Ramps 4.StJoseph_EB2 5.StJoseph_WB2	! 1.50 ! 1.50 ! 1.50 ! 1.50 ! 1.50 ! 1.50	! 56.00 ! 56.83 ! 50.48 ! 55.02 ! 55.59	! 56.00 ! 56.83 ! 50.48 ! 55.02 ! 55.59	_		
	Total	I	62.23	dBA		
Result summary (nigh	t) 					
	! source ! height ! (m)	! Road ! Leq ! (dBA)	! Total ! Leq ! (dBA)			
1.StJoseph_EB1 2.StJoseph_WB1 3.HWY174_Ramps 4.StJoseph_EB2 5.StJoseph_WB2	+ ! 1.50 ! 1.50 ! 1.50 ! 1.50 ! 1.50	! 48.41 ! 49.23 ! 42.89 ! 47.42 ! 47.99	! 48.41 ! 49.23 ! 42.89 ! 47.42 ! 47.99	_		
	Total		54.63	dBA		
TOTAL Leq FROM ALL SO						



STAMSON 5.0 SUMMARY REPORT Date: 11-06-2020 13:31:17 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258m_o1.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at OLA 1 (no mitigation). Road data, segment # 1: StJoseph EB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) 0 % * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB1 (day/night) _____ Angle1Angle2: -90.00 deg-8.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface)Receiver source distance:77.00 m Receiver height: 1.50 / 1.50 mTopography: 2 (Flat/gentle slope; with barrier)Barrier angle1: -40.00 deg Angle2 : -8.00 degBarrier height: 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 2: StJoseph WB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00

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Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 2: StJoseph WB1 (day/night) -----Angle1Angle2: -90.00 deg-8.00 degWood depth:0(No woodsNo of house rows:0 / 0Surface:1(Absorptive) (No woods.) (Absorptive ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height:1.50 / 1.50 mTopography:2 (Flat/gentle slope; with barrier)Barrier angle1:-40.00 deg Angle2 : -8.00 degBarrier height:12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 3: StJoseph EB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 3: StJoseph EB2 (day/night) _____ Angle1Angle2: -8.00 deg90.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Receiver norgan:2(Flat/gentle slope;Topography:-8.00 degAngle2 : 32.00 degBarrier height:12.00 mConstruction-0.00 / 20.00 m 2 (Flat/gentle slope; with barrier) Barrier receiver distance : 30.00 / 30.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00



Road data, segment # 4: StJoseph WB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 4: StJoseph WB2 (day/night) -----Angle1Angle2: -8.00 deg90.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -8.00 deg Angle2 : 32.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Result summary (day) _____ ! source ! Road ! Total ! height ! Leq ! Leq ! (m) ! (dBA) ! (dBA)

 1.StJoseph_EB1
 !
 1.50 !
 50.03 !
 50.03

 2.StJoseph_WB1
 !
 1.50 !
 51.02 !
 51.02

 3.StJoseph_EB2
 !
 1.50 !
 58.00 !
 58.00

 4.StJoseph_WB2
 !
 1.50 !
 58.61 !
 58.61

 _____ Total 62.00 dBA Result summary (night) _____ ! source ! Road ! Total ! height ! Leq ! Leq



	!	(m)	!	(dBA)	!	(dBA)
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2	-+ ! ! !	1.50 1.50 1.50 1.50	!	42.44 43.43 50.41 51.01	! ! !	42.44 43.43 50.41 51.01
	+- T	otal	-+-		+-	54.40 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.00 (NIGHT): 54.40



STAMSON 5.0 SUMMARY REPORT Date: 11-06-2020 11:56:18 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258m_o2.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at OLA 2 (no mitigation). Road data, segment # 1: StJoseph EB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) 0 % * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB1 (day/night) _____ Angle1Angle2: -90.00 deg43.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1Receiver source distance:77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 10.00 deg Angle2 : 43.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 2: StJoseph WB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00

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Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 2: StJoseph WB1 (day/night) -----Angle1Angle2: -90.00 deg43.00 degWood depth:0(No woodsNo of house rows:0 / 0Surface:1(Absorptive) (No woods.) Surface : 1 (Abso Receiver source distance : 67.00 / 67.00 m (Absorptive ground surface) Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 10.00 deg Angle2 : 43.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 3: StJoseph EB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 3: StJoseph EB2 (day/night) _____ Angle1Angle2: 43.00 deg90.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; Barrier angle1 : 43.00 deg Angle2 : 62.00 deg Barrier height : 12.00 m 2 (Flat/gentle slope; with barrier) Barrier receiver distance : 30.00 / 30.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00



Road data, segment # 4: StJoseph WB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 4: StJoseph WB2 (day/night) -----Angle1Angle2:43.00 deg90.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 43.00 deg Angle2 : 62.00 deg Barrier receiver distance : 30.00 / 30.00 m Source elevation : 0.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Result summary (day) _____ ! source ! Road ! Total ! height ! Leq ! Leq ! (m) ! (dBA) ! (dBA)

 1.StJoseph_EB1
 !
 1.50 !
 54.42 !
 54.42

 2.StJoseph_WB1
 !
 1.50 !
 55.42 !
 55.42

 3.StJoseph_EB2
 !
 1.50 !
 54.84 !
 54.84

 4.StJoseph_WB2
 !
 1.50 !
 55.44 !
 55.44

 _____ Total 61.07 dBA Result summary (night) _____ ! source ! Road ! Total ! height ! Leq ! Leq



	!	(m)	!	(dBA)	!	(dBA)
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2	-+ ! ! !	1.50 1.50 1.50 1.50 1.50	! ! !	46.82 47.82 47.25 47.85	! ! !	46.82 47.82 47.25 47.85
	-+- -	Total	-+-		•+-	53.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.07 (NIGHT): 53.48



STAMSON 5.0 SUMMARY REPORT Date: 11-06-2020 13:35:53 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258_o1m.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at OLA 1 (7.5ft barrier). Road data, segment # 1: StJoseph EB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB1 (day/night) _____ Angle1Angle2: -40.00 deg-8.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface)Receiver source distance:77.00 / 77.00 m Receiver height: 1.50 / 1.50 mTopography: 2 (Flat/gentle slope; with barrier)Barrier angle1: -40.00 deg Angle2 : -8.00 degBarrier height: 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 2: StJoseph WB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00

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Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 2: StJoseph WB1 (day/night) -----Angle1Angle2: -40.00 deg-8.00 degWood depth:0(No woodsNo of house rows:0 / 0Surface:1(Absorptive) (No woods.) (Absorptive ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height:1.50 / 1.50 mTopography:2 (Flat/gentle slope; with barrier)Barrier angle1:-40.00 deg Angle2 : -8.00 degBarrier height:12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 3: StJoseph EB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 3: StJoseph EB2 (day/night) _____ Angle1Angle2: -8.00 deg32.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Receiver norgan:2(Flat/gentle slope;Topography:-8.00 degAngle2 : 32.00 degBarrier height:12.00 mConstruction-0.00 / 20.00 m 2 (Flat/gentle slope; with barrier) Barrier receiver distance : 30.00 / 30.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00



Road data, segment # 4: StJoseph WB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 4: StJoseph WB2 (day/night) -----Angle1Angle2: -8.00 deg32.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m : 2 (Flat/gentle slope; with barrier) Topography Topography:2(1100, genere elegen)Barrier angle1:-8.00 degAngle2 : 32.00 degBarrier height:12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation Receiver elevation : 0.00 Barrier elevation : 0.00 : 0.00 Source elevation : 0.00 m : 0.00 m : 0.00 m Road data, segment # 5: StJoseph EB3 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h : 0 % : 1 (Typical asphalt or concrete) Road gradient : Road pavement * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:0.00Heavy Truck % of Total Volume:7.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 5: StJoseph EB3 (day/night) _____

Angle1Angle2: -90.00 deg-40.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface) Receiver source distance : 77.00 / 77.00 m Receiver source distance : 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -90.00 deg Angle2 : -40.00 deg Barrier height : 2.29 m Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 6: StJoseph WB3 (day/night) -----Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 7.00 Data for Segment # 6: StJoseph WB3 (day/night) _____ Angle1Angle2: -90.00 deg-40.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 1(Absorptive ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -90.00 deg Angle2 : -40.00 deg Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 7: StJoseph EB4 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod *

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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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Number of Years of Growth: 0.00Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 Data for Segment # 7: StJoseph EB4 (day/night) _____ Angle1Angle2: 32.00 deg90.00 degWood depth: 0(No woods : 0 (No woods.) No of house rows : 0 / 0 Surface : 2 (Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 32.00 deg Angle2 : 90.00 deg Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 8: StJoseph WB4 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 8: StJoseph WB4 (day/night) _____ Angle1Angle2: 32.00 deg90.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m

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Topography	:	2		(Flat/g	gen	tle slope;	with	barrier)
Barrier angle1	:	32.00	deg	Angle2	:	90.00 deg		
Barrier height	:	2.29	m					
Barrier receiver distance	:	3.00	/ 3.00	m				
Source elevation	:	0.00	m					
Receiver elevation	:	0.00	m					
Barrier elevation	:	0.00	m					
Reference angle	:	0.00						

Result summary (day)

	! ! !	source height (m)	! ! !	Road Leq (dBA)	! ! !	Total Leq (dBA)	
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2 5.StJoseph_EB3 6.StJoseph_WB3 7.StJoseph_EB4 8.StJoseph_WB4	! ! ! ! ! !	1.50 1.50 1.50 1.50 1.50 1.50 1.50 1.50	! ! ! ! !	35.39 36.00 36.36 36.96 44.57 45.48 51.00 51.60	! ! ! ! !	35.39 36.00 36.36 36.96 44.57 45.48 51.00 51.60	
	+	 Iotal	-+-		•+-	 55.45 dB	A

10

Result summary (night)

	! ! !	source height (m)	! ! !	Road Leq (dBA)	! ! !	Total Leq (dBA)
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2 5.StJoseph_EB3 6.StJoseph_WB3 7.StJoseph_EB4 8.StJoseph_WB4	+- ! ! ! ! !	1.50 1.50 1.50 1.50 1.50 1.50 1.50 1.50	-+- ! ! ! !	27.79 28.40 28.76 29.37 36.98 37.89 43.41 44.00	+= ! ! ! !	27.79 28.40 28.76 29.37 36.98 37.89 43.41 44.00
	+-	Total	-+-		+-	47.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.45 (NIGHT): 47.86



STAMSON 5.0 SUMMARY REPORT Date: 11-06-2020 13:39:01 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258_o2m.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at OLA 2 (7.5ft barrier). Road data, segment # 1: StJoseph EB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB1 (day/night) _____ Angle1Angle2: 10.00 deg43.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1Receiver source distance:77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 10.00 deg Angle2 : 43.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 2: StJoseph WB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00

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Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 2: StJoseph WB1 (day/night) -----Angle1Angle2: 10.00 deg43.00 degWood depth: 0(No woodsNo of house rows: 0 / 0Surface: 1(Absorptive) (No woods.) Surface : 1 (Abso Receiver source distance : 67.00 / 67.00 m (Absorptive ground surface) Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 10.00 deg Angle2 : 43.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 3: StJoseph EB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 3: StJoseph EB2 (day/night) _____ Angle1Angle2: 43.00 deg62.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 43.00 deg Angle2 : 62.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00



Road data, segment # 4: StJoseph WB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 4: StJoseph WB2 (day/night) -----Angle1Angle2: 43.00 deg62.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Topography:2(flat/genetic blops)Barrier angle1:43.00 degAngle2 : 62.00 degBarrier height:12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation Receiver elevation : 0.00 Barrier elevation : 0.00 : 0.00 Source elevation : 0.00 m : 0.00 m : 0.00 m Road data, segment # 5: StJoseph EB3 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h : 0 % : 1 (Typical asphalt or concrete) Road gradient : Road pavement * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:0.00Heavy Truck % of Total Volume:7.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 5: StJoseph EB3 (day/night) _____

Angle1Angle2: -90.00 deg10.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface) Receiver source distance : 77.00 / 77.00 m Receiver source distance : 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -90.00 deg Angle2 : 10.00 deg Barrier height : 2.29 m Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 6: StJoseph WB3 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 7.00 Data for Segment # 6: StJoseph WB3 (day/night) _____ Angle1Angle2: -90.00 deg10.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 1(Absorptive ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -90.00 deg Angle2 : 10.00 deg Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 7: StJoseph EB4 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod *

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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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Number of Years of Growth: 0.00Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 Data for Segment # 7: StJoseph EB4 (day/night) _____ Angle1Angle2: 62.00 deg90.00 degWood depth: 0(No woods Wood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 62.00 deg Angle2 : 90.00 deg Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 8: StJoseph WB4 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 8: StJoseph WB4 (day/night) _____ Angle1Angle2: 62.00 deg90.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m

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Topography	:	2		(Flat/g	gentle	<pre>slope;</pre>	with	barrier)
Barrier angle1	:	62.00	deg	Angle2	: 90.0	0 deg		
Barrier height	:	2.29	m					
Barrier receiver distance	:	3.00	/ 3.00) m				
Source elevation	:	0.00	m					
Receiver elevation	:	0.00	m					
Barrier elevation	:	0.00	m					
Reference angle	:	0.00						

Result summary (day)

	! ! !	source height (m)	! ! !	Road Leq (dBA)	! ! !	Total Leq (dBA)
1.StJoseph_EB1 2 StJoseph_WB1	!	1.50	!	35.52	!	35.52
3.StJoseph_EB2	!	1.50	!	33.33	!	33.33
4.StJoseph_WB2 5.StJoseph_EB3	! !	1.50	! !	33.79 47.88	! !	33.79 47.88
6.StJoseph_WB3 7.StJoseph EB4	! !	1.50 1.50	! !	48.79 48.67	! !	48.79 48.67
8.StJoseph_WB4	! _+-	1.50	!	49.27	!	49.27
	1	Total				54.88 dBA

Result summary (night)

	! ! !	source height (m)	! ! !	Road Leq (dBA)	! ! !	Total Leq (dBA)	
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2 5.StJoseph_EB3 6.StJoseph_WB3 7.StJoseph_EB4 8.StJoseph_WB4	+- ! ! ! ! !	1.50 1.50 1.50 1.50 1.50 1.50 1.50 1.50	! ! ! ! !	27.93 28.53 25.73 26.19 40.28 41.19 41.07 41.67	! ! ! ! !	27.93 28.53 25.73 26.19 40.28 41.19 41.07 41.67	
	+-	 Total	-+-		-+-	47.28 d	BA

TOTAL Leq FROM ALL SOURCES (DAY): 54.88 (NIGHT): 47.28



STAMSON 5.0 SUMMARY REPORT Date: 23-06-2020 14:59:52 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258_olt.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at OLA 1 (5ft barrier). Road data, segment # 1: StJoseph EB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB1 (day/night) _____ Angle1Angle2: -40.00 deg-8.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface)Receiver source distance:77.00 / 77.00 m Receiver height: 1.50 / 1.50 mTopography: 2 (Flat/gentle slope; with barrier)Barrier angle1: -40.00 deg Angle2 : -8.00 degBarrier height: 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 2: StJoseph WB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00

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Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 2: StJoseph WB1 (day/night) -----Angle1Angle2: -40.00 deg-8.00 degWood depth:0(No woodsNo of house rows:0 / 0Surface:1(Absorptive) (No woods.) (Absorptive ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height:1.50 / 1.50 mTopography:2 (Flat/gentle slope; with barrier)Barrier angle1:-40.00 deg Angle2 : -8.00 degBarrier height:12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 3: StJoseph EB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 3: StJoseph EB2 (day/night) _____ Angle1Angle2: -8.00 deg32.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Receiver norgan:2(Flat/gentle slope;Topography:-8.00 degAngle2 : 32.00 degBarrier height:12.00 mConstruction-0.00 / 20.00 m 2 (Flat/gentle slope; with barrier) Barrier receiver distance : 30.00 / 30.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00



Road data, segment # 4: StJoseph WB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 4: StJoseph WB2 (day/night) -----Angle1Angle2: -8.00 deg32.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m : 2 (Flat/gentle slope; with barrier) Topography Topography:2(1100, genere elegen)Barrier angle1:-8.00 degAngle2 : 32.00 degBarrier height:12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation Receiver elevation : 0.00 Barrier elevation : 0.00 : 0.00 Source elevation : 0.00 m : 0.00 m : 0.00 m Road data, segment # 5: StJoseph EB3 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h : 0 % : 1 (Typical asphalt or concrete) Road gradient : Road pavement * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:0.00Heavy Truck % of Total Volume:7.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 5: StJoseph EB3 (day/night) _____

Angle1Angle2: -90.00 deg-40.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface) Receiver source distance : 77.00 / 77.00 m Receiver source distance : 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -90.00 deg Angle2 : -40.00 deg Barrier height : 1.50 m Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 6: StJoseph WB3 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 7.00 Data for Segment # 6: StJoseph WB3 (day/night) _____ Angle1Angle2: -90.00 deg-40.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 1(Absorptive ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -90.00 deg Angle2 : -40.00 deg Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 7: StJoseph EB4 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod *

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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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Number of Years of Growth: 0.00Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 Data for Segment # 7: StJoseph EB4 (day/night) _____ Angle1Angle2: 32.00 deg90.00 degWood depth: 0(No woods : 0 (No woods.) No of house rows : 0 / 0 Surface : 2 (Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 32.00 deg Angle2 : 80.00 deg Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 8: StJoseph WB4 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 8: StJoseph WB4 (day/night) _____ Angle1Angle2: 32.00 deg90.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective) 0 / 0 2 (Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m

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Topography	:	2		(Flat/c	gen	tle slope;	with	barrier)
Barrier angle1	:	32.00	deg	Angle2	:	80.00 deg		
Barrier height	:	1.50	m					
Barrier receiver distance	:	3.00	/ 3.00) m				
Source elevation	:	0.00	m					
Receiver elevation	:	0.00	m					
Barrier elevation	:	0.00	m					
Reference angle	:	0.00						

Result summary (day)

	! ! !	source height (m)	! ! !	Road Leq (dBA)	! ! !	Total Leq (dBA)
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2 5.StJoseph_EB3 6.StJoseph_WB3 7.StJoseph_EB4 8.StJoseph_WB4	+- ! ! ! ! !	1.50 1.50 1.50 1.50 1.50 1.50 1.50 1.50	-+- ! ! ! !	35.39 36.00 36.36 45.84 46.79 54.35 54.95	-+ ! ! ! !	35.39 36.00 36.36 36.96 45.84 46.79 54.35 54.95
	+-	 Total	-+-		•+-	 58.37 dBA

- -

Result summary (night)

	! source ! height ! (m)	! Road ! Leq ! (dBA)	! Total ! Leq ! (dBA)	
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2 5.StJoseph_EB3 6.StJoseph_WB3 7.StJoseph_EB4 8.StJoseph_WB4	! 1.50 ! 1.50 ! 1.50 ! 1.50 ! 1.50 ! 1.50 ! 1.50 ! 1.50 ! 1.50	! 27.79 ! 28.40 ! 28.76 ! 29.37 ! 38.25 ! 39.20 ! 46.75 ! 47.36	! 27.79 ! 28.40 ! 28.76 ! 29.37 ! 38.25 ! 39.20 ! 46.75 ! 47.36	
	Total	-+	-+ 50.78 dB	A

TOTAL Leq FROM ALL SOURCES (DAY): 58.37 (NIGHT): 50.78



STAMSON 5.0 SUMMARY REPORT Date: 23-06-2020 15:01:00 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: 1258_o2t.te Time Period: Day/Night 16/8 hours Description: Sound level prediction at OLA 2 (5ft barrier). Road data, segment # 1: StJoseph EB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 1: StJoseph EB1 (day/night) _____ Angle1Angle2: 10.00 deg43.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1Receiver source distance:77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 10.00 deg Angle2 : 43.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 2: StJoseph WB1 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00

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Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 2: StJoseph WB1 (day/night) -----Angle1Angle2: 10.00 deg43.00 degWood depth: 0(No woodsNo of house rows: 0 / 0Surface: 1(Absorptive) (No woods.) Surface : 1 (Abso Receiver source distance : 67.00 / 67.00 m (Absorptive ground surface) Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 10.00 deg Angle2 : 43.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation:0.00 mReceiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 3: StJoseph EB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 3: StJoseph EB2 (day/night) _____ Angle1Angle2: 43.00 deg62.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 43.00 deg Angle2 : 62.00 deg Barrier height : 12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00



Road data, segment # 4: StJoseph WB2 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume:7.00Heavy Truck % of Total Volume:5.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 4: StJoseph WB2 (day/night) -----Angle1Angle2: 43.00 deg62.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Topography:2(flat/genetic blops)Barrier angle1:43.00 degAngle2 : 62.00 degBarrier height:12.00 m Barrier receiver distance : 30.00 / 30.00 m Source elevation Receiver elevation : 0.00 Barrier elevation : 0.00 : 0.00 Source elevation : 0.00 m : 0.00 m : 0.00 m Road data, segment # 5: StJoseph EB3 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod * Posted speed limit : 60 km/h : 0 % : 1 (Typical asphalt or concrete) Road gradient : Road pavement * Refers to calculated road volumes based on the following input: 24 hr Traffic Volume (AADT or SADT): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume:0.00Heavy Truck % of Total Volume:7.00Day (16 hrs) % of Total Volume:92.00 Data for Segment # 5: StJoseph EB3 (day/night) _____

Angle1Angle2: -90.00 deg10.00 degWood depth:0(No woods.)No of house rows:0 / 0Surface:1(Absorptive ground surface) Receiver source distance : 77.00 / 77.00 m Receiver source distance : 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -60.00 deg Angle2 : 10.00 deg Barrier height : 1.50 m Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 6: StJoseph WB3 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth:0.00Number of Years of Growth:0.00 Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 7.00 Data for Segment # 6: StJoseph WB3 (day/night) _____ Angle1Angle2: -90.00 deg10.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 1(Absorptive ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : -60.00 deg Angle2 : 10.00 deg Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 7: StJoseph EB4 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 veh/TimePeriod *

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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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Number of Years of Growth: 0.00Medium Truck % of Total Volume: 7.00Heavy Truck % of Total Volume: 5.00Day (16 hrs) % of Total Volume: 92.00 Data for Segment # 7: StJoseph EB4 (day/night) _____ Angle1Angle2: 62.00 deg90.00 degWood depth: 0(No woods Wood depth:0(No woods.)No of house rows:0 / 0Surface:2(Reflective ground surface) Receiver source distance : 77.00 / 77.00 m Receiver height : 1.50 / 1.50 m Topography : 2 (Flat/gentle slope; with barrier) Barrier angle1 : 62.00 deg Angle2 : 85.00 deg Barrier receiver distance : 3.00 / 3.00 m Source elevation : 0.00 m Receiver elevation:0.00 mBarrier elevation:0.00 mReference angle:0.00 Road data, segment # 8: StJoseph WB4 (day/night) _____ Car traffic volume : 12144/1056 veh/TimePeriod * Medium truck volume : 966/84 veh/TimePeriod * Heavy truck volume : 690/60 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): 15000 Percentage of Annual Growth : 0.00 Number of Years of Growth : 0.00 Medium Truck % of Total Volume7.00Heavy Truck % of Total Volume5.00Day (16 hrs) % of Total Volume92.00 Data for Segment # 8: StJoseph WB4 (day/night) _____ Angle1Angle2: 62.00 deg90.00 degWood depth: 0(No woods.)No of house rows: 0 / 0Surface: 2(Reflective ground surface) Receiver source distance : 67.00 / 67.00 m Receiver height : 1.50 / 1.50 m

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Topography	:	2		(Flat/g	entle sl	ope;	with	barrier)
Barrier angle1	:	62.00	deg	Angle2	: 85.00	deg		
Barrier height	:	1.50	m					
Barrier receiver distance	:	3.00	/ 3.00) m				
Source elevation	:	0.00	m					
Receiver elevation	:	0.00	m					
Barrier elevation	:	0.00	m					
Reference angle	:	0.00						

Result summary (day)

	! ! !	source height (m)	! ! !	Road Leq (dBA)	! ! !	Total Leq (dBA)
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2 5.StJoseph_EB3 6.StJoseph_WB3 7.StJoseph_EB4	!	1.50 1.50 1.50 1.50 1.50 1.50	! ! ! ! ! !	35.52 36.13 33.33 33.79 51.08 52.05	! ! ! !	35.52 36.13 33.33 33.79 51.08 52.05 51.22
8.StJoseph_WB4	: ! +-	1.50 1.50	! ! -+-	51.23	! ! ·+-	51.23 51.83

Result summary (night)

	! ! !	source height (m)	! ! !	Road Leq (dBA)	! ! !	Total Leq (dBA)	
1.StJoseph_EB1 2.StJoseph_WB1 3.StJoseph_EB2 4.StJoseph_WB2 5.StJoseph_EB3 6.StJoseph_WB3 7.StJoseph_EB4 8.StJoseph_WB4	+- ! ! ! ! !	1.50 1.50 1.50 1.50 1.50 1.50 1.50 1.50	-+- ! ! ! !	27.93 28.53 25.73 26.19 43.48 44.45 43.63 44.24	-+ ! ! ! !	27.93 28.53 25.73 26.19 43.48 44.45 43.63 44.24	
	+-	 Total	-+-		-+-	50.08 dBA	7

TOTAL Leq FROM ALL SOURCES (DAY): 57.68 (NIGHT): 50.08