



105-109 Henderson Avenue

Ottawa, Ontario

Noise Impact Assessment Study

SACL #SW18026

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Submitted to:

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APPENDIX A: Sample Transportation Noise Results from STAMSON



1. Introduction

At the request of TC United Group (TCU), Swallow Acoustic Consultants Ltd. (SACL) is pleased to present this Noise Impact Assessment Study (NIAS) for the proposed 3-storey residential building (the Project) to be located at 105-109 Henderson Avenue in Ottawa, Ontario (the Site). This NIAS assesses noise impacts from nearby surface transportation sources. Based on observations made at the site and surrounding area, there are no significant stationary noise sources that may exceed the applicable sound level criteria for the Project.

The Project is a residential development consisting of both new and heritage construction. Two existing houses will contain a total of four residential units, and a new 3-storey building located behind the houses will contain 16 residential units. An Outdoor Living Area (OLA) is located at grade in the back yard on the east side of the building.

Adjacent properties consist of two- and three-storey residential buildings.

The main surface transportation corridor impacting on the Project is King Edward Avenue, based on its roadway classification per the City of Ottawa, and its proximity to the development.

Aerial photos of the area are presented in Figures 1 and 2. The site plan for the Project is presented in Figure 3, which has also been marked-up to show the Point of Assessment (PoA) locations. A 3D rendering of the Project has also been provided in Figure 4.

2. Noise Assessment Criteria

The City of Ottawa requirements for environmental noise impact assessments are outlined in the Environmental Noise Control Guidelines (ENCG) [1], which in turn reference the Environmental Noise Guideline, NPC-300 [2], prepared by the Ontario Ministry of the Environment and Climate Change (MOECC). The Project is located in a Class 1 area, which is defined as an area with an acoustical environment typical of a major population centre.

The sections below describe the applicable noise assessment criteria for surface transportation noise sources and stationary noise sources.

2.1. Surface Transportation Noise Assessment Criteria

Sound level limits values outlined in ENCG for road traffic noise impacting on noise-sensitive areas applicable to the Project are summarized in Table 1.



Table 1: Sound Level Limits for Noise-Sensitive Areas

Type of Point of Reception	Time Period	Sound Level Limit for Road Traffic Noise L_{eq} [dBA]
Outdoor Living Area (OLA)	Daytime (07:00 to 23:00)	55
Indoor Space (Living Quarters)	Daytime (07:00 to 23:00)	45
	Nighttime (23:00 to 07:00)	45
Indoor Space (Sleeping Quarters)	Daytime (07:00 to 23:00)	45
	Nighttime (23:00 to 07:00)	40

For outdoor living areas (OLA) where it is not technically or economically feasible to achieve the noise level criterion in Table 1, NPC-300 and the ENCG include a conditional tolerance of no more than 5 dB above the noise level criterion, and a warning clause requirement.

Furthermore, based on the plane of window calculations for indoor spaces, upgraded building components, ventilation systems and warning clauses may be required. The ENCG building component and ventilation requirements for road noise are shown in Tables 2 and 3, below.

Table 2: ENCG Building Component Requirements (Road Noise)

Assessment Location	Sound Level (time as noted)	Building Component Requirements
Plane of Living Room Window and/or Bedroom Window	Daytime $L_{EQ-16HR}$ Less than or equal to 65 dBA	Building compliant with the Ontario Building Code
	Daytime $L_{EQ-16HR}$ Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
Plane of Living Room Window and/or Bedroom Window	Night-time L_{EQ-8HR} Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
	Night-time L_{EQ-8HR} Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

(Reference: MOECC NPC-300, Section C7.1.3 – Indoor Living Areas: Building Components)



Table 3: ENCG Ventilation and Warning Clause Requirements (Road noise)

Assessment Location	Sound Level (time as noted)	Ventilation Requirement	Warning Clause Requirement
Plane of Living Room Window and/or Bedroom Window	Daytime $L_{EQ-16HR}$ Less than or equal to 55 dBA	None required	Not required
	Daytime $L_{EQ-16HR}$ Greater than 55 dBA to less than or equal to 65 dBA	Forced air heating with provision for central air conditioning	Required Type C
	Daytime $L_{EQ-16HR}$ Greater than 65 dBA	Central air conditioning	Required Type D
Plane of Living Room Window and/or Bedroom Window	Night-time L_{EQ-8HR} Greater than 50 dBA to less than or equal to 60 dBA	Forced air heating with provision for central air conditioning	Required Type C
	Night-time L_{EQ-8HR} Greater than 60 dBA	Central air conditioning	Required Type D

(Reference: MOECC NPC-300, Section C7.1.2 – Plane of a Window: Ventilation Requirements)

2.2. Neighbouring Stationary Source Noise Assessment Criteria

Stationary sources of noise include all sources of sound and vibration that exist or operate on nearby premises, excluding construction noise sources. The noise level criterion for noise from stationary sources in a given time period is the higher value between (1) the time period exclusion limit value prescribed by the MOECC, and (2) the corresponding minimum hourly background/ambient sound level ($L_{eq,1hr}$) due to traffic during the time period. Exclusion limit values outlined in the ENCG for new noise-sensitive land uses in proximity to existing stationary noise sources have been summarized in Table 4 for Class 1 areas.

Table 4: ENCG Exclusion Limit Values for Class 1 Areas (New Noise-Sensitive Land Uses in Proximity to Existing Stationary Sources)

Type of Point of Reception	Time Period	Time Period Description	Exclusion Limit $L_{eq,1hr}$ [dBA]
Outdoor Living Area (OLA)	07:00 to 23:00	Daytime	50
Plane of Window (Living Quarters)	07:00 to 23:00	Daytime	50
Plane of Window (Sleeping Quarters)	23:00 to 07:00	Night-time	45



3. Surface Transportation Noise

3.1. Surface Transportation Noise – Road Noise Levels

The surface transportation corridor impacting on the Project is King Edward Avenue, which is classified as an “Urban Arterial” roadway as per the City of Ottawa Transportation Master Plan (TMP) [3]. King Edward Avenue is located within 100 m of the Project’s limits. Other major transportation routes in the area such as Laurier Avenue, Highway 417, and the transitway are beyond the distance limits required for assessment, per the ENCG.

The “ultimate” road and traffic data information, including the Annual Average Daily Traffic (AADT), for King Edward Avenue was obtained from the ENCG based on its roadway classification and is summarized in Table 5. These parameters were used to predict the traffic noise levels following the prediction method outlined in the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) [4], developed by the MOECC. Software developed by the MOECC to perform ORNAMENT calculations, STAMSON Version 5.04, was used to predict the noise levels. Calculation results from STAMSON are available in Appendix A.

Table 5: ENCG Traffic and Road Parameters for STAMSON Modelling

Road	Implied Roadway Class	Speed Limit [km/h]	Ultimate AADT [Vehicles/day]	Day/Night Split [%]	Medium Trucks [%]	Heavy Trucks [%]
King Edward Avenue	2-Lane Urban Arterial (2-UAU)	40	15,000	92/8	7	5

Separation distances were taken from the centreline of the road segment to the PoA.

3.2. Surface Transportation Noise - Points of Assessment

PoAs were chosen to represent worst-case scenarios at the Plane of Window (PoW) of bedrooms and living spaces. An OLA is also located in the building’s backyard, PoA ‘D’, with the assessment location located approximately 3 m from the building façade, aligned with the midpoint of the subject façade. Table 6 contains a description of the location of each PoA, and their locations are shown in Figure 3.

Table 6: Points of Assessment (PoA) Locations

Point of Assessment (PoA)	Height (ref. Grade) [m]	Storey	Building Facade	Notes/Comments
PoA ‘A’	6.0	2 nd	West	PoW: Bedroom/Living Room exposed to King Edward Avenue.
PoA ‘B’	3.0	Ground	West	PoW: Bedroom/Living Room exposed to King Edward Avenue.
PoA ‘C’	9.0	3 rd	West	PoW: Bedroom/Living Room exposed to King Edward Avenue.
PoA ‘D’	1.5	Ground	N/A	OLA: Backyard area exposed to King Edward Avenue.



For PoAs located at the 2nd level or lower, noise from King Edward Avenue is partially obstructed by the 2-storey residences between the proposed development and the transportation corridor itself, modelled as two rows of houses (50% density) in STAMSON. For PoA 'D', representing the backyard OLA, noise from King Edward Avenue is partially obstructed by the Project itself, which was modelled by SACL as a noise barrier in STAMSON.

The ground surface between King Edward Avenue and the Project includes many backyards, and is therefore modelled as sound-absorptive in our analysis.

3.3. Surface Transportation Noise - Calculations

Sample STAMSON transportation noise calculations can be found in Appendix A. Table 7 shows the daytime and night-time noise level prediction results at each PoA, along with a comparison to the daytime and night-time criteria for noise control measures outlined in Section 2.

Table 7: Daytime and Night-time Calculated Noise Levels Due to Surface Transportation Noise

Point of Assessment (PoA)	Transportation Noise Level Calculation [dBA]		Building Component Requirement	Minimum Ventilation Requirement	Warning Clause
	Daytime	Nighttime			
PoA 'A'	49	42	OBC-compliant	OBC-compliant	None
PoA 'B'	48	41	OBC-compliant	OBC-compliant	None
PoA 'C'	54	46	OBC-compliant	OBC-compliant	None
PoA 'D'	39	N/A (OLA)	N/A (OLA)	N/A (OLA)	None

The calculated transportation noise levels are below the criteria limit for noise control measures at all residential PoAs. Therefore, no noise control measures are needed for the Project.

4. Neighbouring Stationary Source Noise

As noted during a site visit undertaken by SACL on April 27th 2018, there is a stationary noise source operated by Hydro Ottawa at 113 Henderson Avenue, which is the property directly adjacent to 109 Henderson Avenue. Further investigation of this stationary noise source is required, which is expected to be addressed in an addendum to this report.

5. The Project as Stationary Noise Source

The Project may also be considered a Stationary Source for adjacent land uses. Mechanical equipment selections have not yet been made, and therefore, a detailed analysis is not possible at this time. The final design will be required to comply with ENCG sound level limits from a Stationary Source at all nearby noise-sensitive land uses.



6. Concluding Comments

Our noise level calculations indicate that the impact of transportation noise on the proposed residential development will meet ENCG requirements. The proposed residential development located at 105-109 Henderson Avenue should therefore be approved from the noise aspect.

----- End -----



References

1. City of Ottawa Environmental Noise Control Guidelines (ENCG), approved by Ottawa City Council in January 2016.
2. Ministry of the Environment and Climate Change (MOECC) Publication NPC-300: Stationary and Transportation Sources - Approval and Planning, published in October 2013.
3. City of Ottawa Transportation Master Plan (TMP), published by the City of Ottawa on November 2013.
4. Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT), Technical document published by the MOECC in October 1989.



Figures



Figure 1. Site Aerial

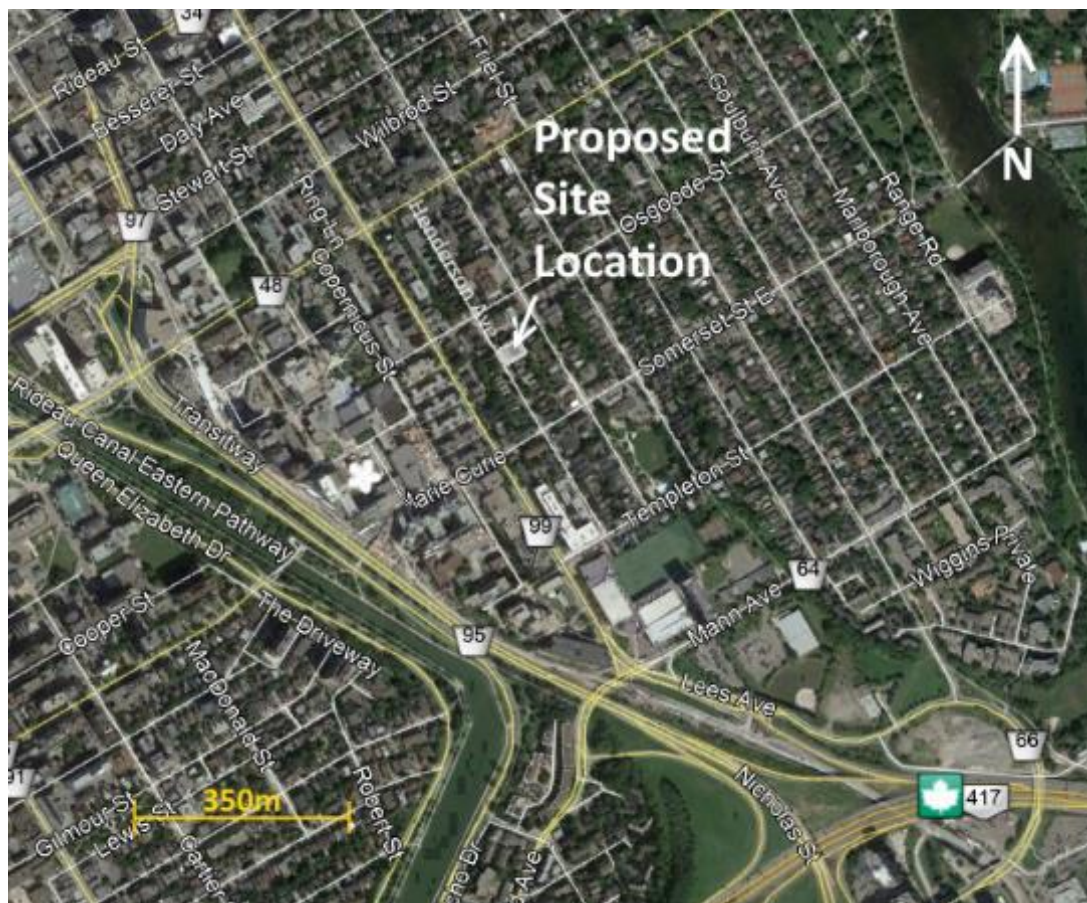


Figure 2. Site Aerial with Highway 417 shown.

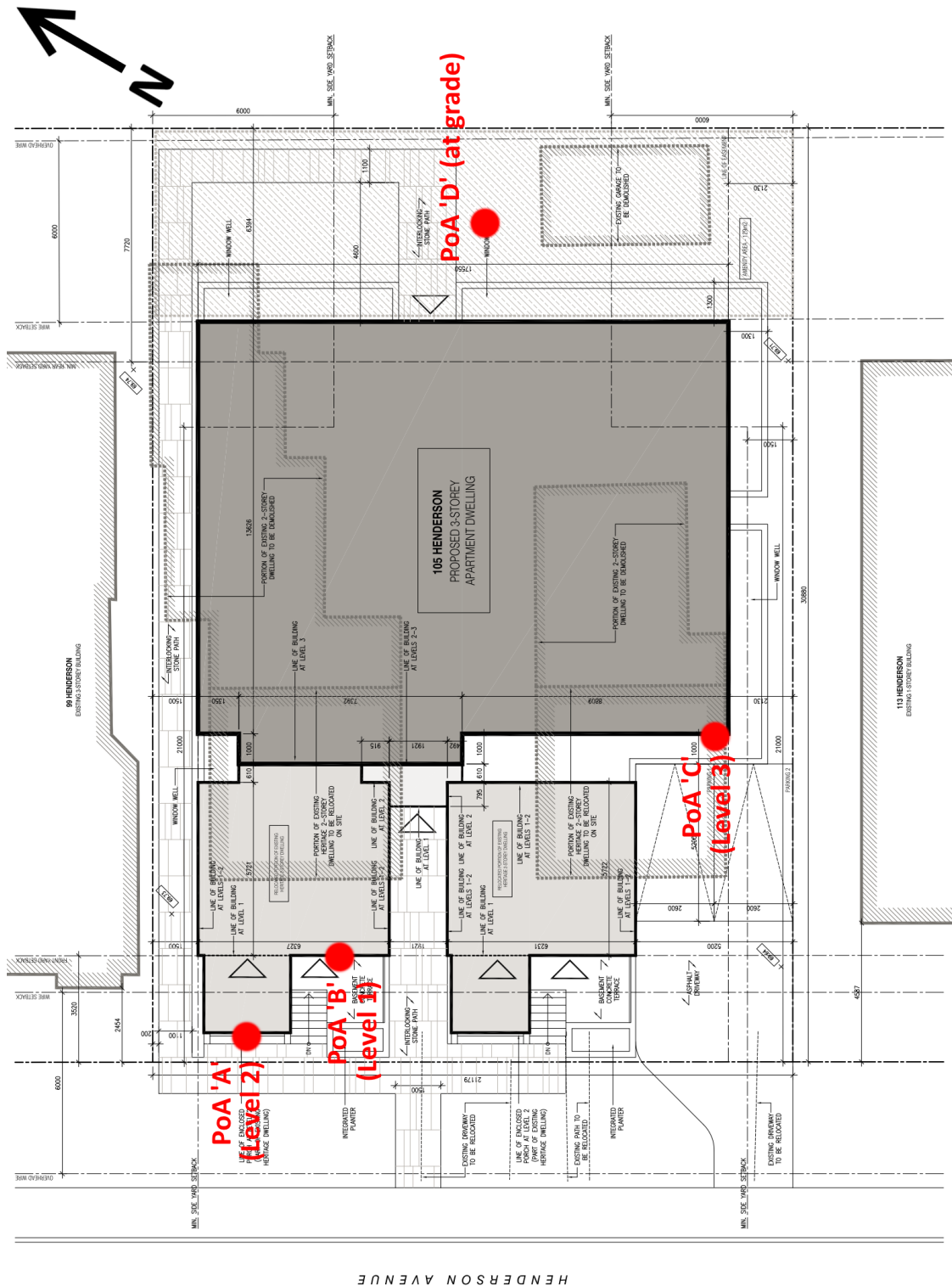


Figure 3. Site Plan, with Location of PoA 'A' to 'D'.



Figure 4. 3D Rendering of Project.



Appendices



APPENDIX A: Sample Transportation Noise Results from STAMSON

STAMSON 5.0 SUMMARY REPORT Date: 25-04-2018 15:16:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poaa.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at PoA 'A'.**

Road data, segment # 1: KingEdward (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 : 40 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 : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 92.00 / 92.00 m
Receiver height : 6.00 / 6.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Result summary (day)

! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)

1.KingEdward ! 1.50 ! 49.30 ! 49.30

Total 49.30 dBA

Result summary (night)



	! source !	Road !	Total !
	! height !	Leq !	Leq !
	! (m) !	(dBA) !	(dBA) !
1.KingEdward	1.50	41.71	41.71
Total			41.71 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 49.30
 (NIGHT): 41.71



STAMSON 5.0 SUMMARY REPORT Date: 25-04-2018 15:17:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poab.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at PoA 'B'.**

Road data, segment # 1: KingEdward (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 : 40 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 : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00
```

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

```
-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 94.00 / 94.00 m
Receiver height : 3.00 / 3.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+
1.KingEdward ! 1.50 ! 48.29 ! 48.29
-----+-----+-----+
Total 48.29 dBA
```

Result summary (night)

```
-----
! source ! Road ! Total
```



	! height !	Leq !	Leq !
	! (m) !	(dBA)	(dBA)
1.KingEdward	1.50	40.69	40.69
Total			40.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.29
 (NIGHT): 40.69



STAMSON 5.0 SUMMARY REPORT Date: 27-04-2018 11:28:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poac.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at PoA 'C'.**

Road data, segment # 1: KingEdward (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 : 40 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 : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00
```

Data for Segment # 1: KingEdward (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 : 100.00 / 100.00 m
Receiver height : 9.00 / 9.00 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Result summary (day)

```
-----
! source ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+-----
1.KingEdward ! 1.50 ! 53.81 ! 53.81
-----+-----+-----+-----
Total 53.81 dBA
```

Result summary (night)

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



	!	(m)	!	(dBA)	!	(dBA)
1.KingEdward	!	1.50	!	46.21	!	46.21
		Total				46.21 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.81
 (NIGHT): 46.21



STAMSON 5.0 SUMMARY REPORT Date: 25-04-2018 15:45:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: poad.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at PoA 'D'.**

Road data, segment # 1: KingEdward (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 : 40 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 : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00
```

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

```
-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 116.00 / 116.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -70.00 deg Angle2 : 70.00 deg
Barrier height : 10.50 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 ! Road ! Total
! height ! Leq ! Leq
! (m) ! (dBA) ! (dBA)
-----+-----+-----+
1.KingEdward ! 1.50 ! 39.24 ! 39.24
-----+-----+-----+
Total 39.24 dBA
```



Result summary (night)

	!	source	!	Road	!	Total
	!	height	!	Leq	!	Leq
	!	(m)	!	(dBA)	!	(dBA)
1.KingEdward	!	1.50	!	31.65	!	31.65
Total						31.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 39.24
 (NIGHT): 31.65