

## **Noise Impact Study**

### **Garner Road – Midrise (Block “A”) Niagara Falls, Ontario**

**SW23380.00**

**Prepared For**

**Jeremia Rudan  
1198815 Ontario Limited  
3767 Portage Rd  
Niagara Falls, ON, L2J 2L1  
jeremia@placemaker.co**

**Prepared By**

**Marc-André Bois  
Senior Scientist**

**Thornton Tomasetti  
300-116 Albert Street  
Ottawa, Ontario K1P 5G3  
Tel: +1 613.216.1247  
[MBois@ThorntonTomasetti.com](mailto:MBois@ThorntonTomasetti.com)  
[www.ThorntonTomasetti.com](http://www.ThorntonTomasetti.com)**

**Reviewed By**

**Marcus Li, P.Eng.  
Vice President**

**October 8, 2024**

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## 1.0 Introduction

At the request of 1198815 Ontario Limited (Client), Thornton Tomasetti (TT) presents this Noise Impact Study (NIS) regarding the proposed residential development (Block A) located on Garner Road, south of Lundy's Lane in the City of Niagara Falls, Ontario (the Project).

The purpose of this study is to assess the noise impacts on the Project from surrounding sources and the noise impact of the Project on surrounding noise sensitive areas. This report is intended to support the Zoning By-law Amendment (ZBA) application for the Project as a noise impact study.

Where applicable, this report will provide noise control recommendations to meet the requirements of the relevant Land Use Planning Authority (LUPA). LUPAs generally adopt the noise criteria developed by the Ontario Ministry of the Environment, Conservation and Parks (MECP), but may also have unique requirements.

## 2.0 Site and Surrounding Area

### 2.1 Project Location

The Project is located on the northeast corner of the Garner Road with Angie drive, and south of Lundy's Lane. The Project is generally surrounded by residential, open space, agricultural, development holding and environmental protection area land uses.

An illustration of the project location and surrounding area is provided in Figure 1.

### 2.2 Zoning & Official Plan

Under the City of Niagara Falls Zoning Bylaw 79-200 the Project is bordered on the north by "Tourist Commercial Zones" and "Camping Establishment Zones" land uses. The Project is bordered on the immediate east by "Residential 1F Density Zones" and "Residential 3 Density Zones" land uses, and immediate south by "Open Spaces" and "Development Holding" land uses. To the west, the Project is bordered by "Agricultural Zones" and "Open Spaces" land uses.

Based on public information available through the City of Niagara Falls, TT understands that other than the proposed residential development northeast of the site and mixed-use development located at 8885 Lundy's Lane there are no other significant developments or redevelopments are planned in the surrounding area that could potentially introduce new surrounding noise sources or receptors that might impact or be impacted by the development.

A zoning map is presented in Figure 2.

### 2.3 Planned Development

The proposed concept plans for the Project consist of a residential building, ranging from 4 to 6 stories tall. The building would generally include residential units, indoor amenity areas, and outdoor amenity areas. The Project is expected to include rooftop air handling units (RTUs) as part of the heating, ventilation and air-conditioning (HVAC) systems.

The proposed new site plan is provided in Figure 3.

## 2.4 Site Inspection

A site inspection was previously conducted by TT personnel in the vicinity of the Project site as part of the adjacent residential development's noise impact study titled "Garner Road Development – Noise Impact Study (SW19340.00)" dated June 7, 2021 (2021 Study).

## 2.1 Topography

For the purposes of predictive noise modelling conducted as part of this report, terrain heights on the Project itself are expected to not be significantly different of the surrounding terrain heights. Terrain heights outside the boundaries of the Project grading plan were referenced to publicly available topographic data from Google Earth.

## 3.0 Ministry of the Environment Conservation and Parks

The MECP does not have direct authority in approving land use planning decisions, but their guidance documents have been widely adopted by LUPAs. The MECP's *Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning* (NPC-300) provides province wide guidance regarding assessment standards and criteria for evaluating noise impacts from transportation sources such as roads, railways and aircraft; as well as stationary sources such as mechanical equipment, and industrial facilities. In preparing this report, TT has referred to *Part A Background* and *Part C Land Use Planning* of NPC-300.

This NIS report has been prepared to support land use planning decisions, and is not intended to support an application for an Environmental Compliance Approval (ECA) in accordance with *Part B Stationary Sources* of NPC-300, and Section 9 of the Environmental Protection Act.

## 4.0 Land Use Planning Authority

In addition to adopting the MECP's recommended standards and criteria, some LUPAs impose additional requirements on applications for development approval. The LUPA for this Project is the City of Niagara Falls.

In accordance with the City of Niagara Falls's *Noise Impact and Vibration Study Terms of Reference*, dated August 2022, the following considerations have been included in this report.

A Noise Study is normally required, when a noise-sensitive development is proposed adjacent or in close proximity to the following potential noise sources:

- Within 500 m of a Provincial Highway/Freeway;
- Within 250 m of a Regional Road whose future traffic volume may be greater than 10,000 vehicles/day;
- Within 500 m of a railway ROW;
- Within the 25 NEF contours of an Airport;

- Within the potential zone of influence, as defined in MOE documents D-1 and D-6, of a Stationary Source of noise (industrial/commercial/institutional); a detailed noise study is required for developments within the potential influence area of stationary sources;
- Within 500 m of extensive commercial operations (loading docks of supermarkets, large commercial buildings with prominent ventilation and air conditioning equipment, automatic car washes, etc.);
- Within 500 m of aggregate operations (pits, quarries, etc.); or
- Any other noise sources not mentioned above.

A vibration study is required for all proposed developments within 75 metres of a rail corridor.

## 5.0 Transportation Noise Assessment

### 5.1 Critical Transportation Noise Receptors

NPC-300 defines a point of reception for the assessment of transportation noise sources as either the Plane of Window (POW) of a noise sensitive indoor space or an Outdoor Living Area (OLA) representing an area of a noise sensitive land use intended for quiet enjoyment of the outdoor environment.

The POW receptors most likely to be affected by transportation noise are those representing the residential suites of the Project that have maximum exposure to Garner Road and Lundy's Lane. Specifically, POW receptors were assessed for the most north and west facades of the proposed residential building, at the highest elevation with windows.

Based on the provided site plans of the Project, TT understands that a total of 1 potential OLA will be present which includes the Level 5 rooftop outdoor amenity area.

The locations of the critical receptors for transportation noise are summarized in Table 1 and shown in Figure 4. POW elevations were taken to be the midpoint height of the highest floor with windows, and OLA elevations were taken to be 1.5m above the applicable level.

Table 1: Points of Reception – Transportation Noise

Receptor ID	Receptor Description	Receptor Location
POW01	West façade, highest window	Façade centre, 21.9m above ground
POW02	North façade, highest window	Façade centre, 21.9m above ground
OLA01	Level 5 Roof Terrace	Most exposed, 18.5m above ground

### 5.2 Transportation Noise Sources

#### 5.2.1 Road Noise Sources

Based on a review of the closest major roadways within the vicinity of the development, the most significant road noise sources for the Project would be Lundy's Lane and Garner Road located north and east respectively of the site. Traffic data was obtained from the City of Niagara Fall's Open Data platform,

which provides Turning Movement Count (TMC) information for the intersection of Garner Road and Lundy's Lane. This data is presented in Appendix B.

As the full study volumes are 8-hr totals, the 24-hr volumes were determined using a 1.9 multiplier determined from typical hourly traffic distributions for Ontario roads. Traffic volumes are summarized in Table 2.

Table 2: Traffic Data Summary

Street	Section	Time Period	Cars		Trucks		Total
			Year	Volume	Year	Volume	
Garner Road	North	8-hr	2023	2386	2023	38	2424
	South	8-hr	2023	2372	2023	31	2403
Lundy's Lane	East	8-hr	2023	6446	2023	280	6726
	West	8-hr	2023	5632	2023	265	5897

As indicated by the Niagara Region's Public Works Department Policy Manual PW5.N01.0, Regional Road Traffic Noise Control Policy, the total Annual Average Daily Traffic (AADT) was projected forward to 2044 (20 years after expected completion) using a growth rate of 2% per year from the noted year of measurement.

Medium and heavy truck percentages were estimated based on the volume of truck traffic as a % of total traffic, assuming that 25% of the volume would be considered "heavy trucks", and 75% of the volume would be considered "medium trucks".

Posted speed limits on Garner Road, and Lundy's Lane are 50 and 60 km/hr respectively. Road grades were assumed to be 0% in the area under review. The day/night split was assumed to be 90%/10%.

Table 3: Road Traffic Data Summary (2023)

Parameter	Garner Road North Section	Garner Road South Section	Lundy's Lane East Section	Lundy's Lane West Section
AADT	4606	4566	12779	11204
% Annual Growth	2%	2%	2%	2%
Years of Annual Growth	20	20	20	20
% Medium Trucks	1.2%	1.0%	3.1%	3.4%
% Heavy Trucks	0.4%	0.3%	1.0%	1.1%
% Day (16h) / Night (8h)	90% / 10%	90% / 10%	90% / 10%	90% / 10%
Speed Limit	50 km/hr	50 km/hr	60 km/hr	60 km/hr
Gradient	0%	0%	0%	0%

## 5.2.2 Rail Noise Sources

The closest rail line is located at approximately 350m from the property boundary of the Project Site and is located outside of the minimum requirements for inclusion outlined by CN, CP and FCM/RAC guidelines. No freight rail yards are located within 1000m of the Project.

Based on the City of Niagara Falls' term of reference, rail lines within 500m of the Project Site should be assessed for noise impacts. Given the large separation distance, railway noise impacts are not anticipated to be significant at the development. As part of the Site Plan Approval application, railway noise impacts can be assessed to confirm additional noise controls are not required for the development.

## 5.2.3 Aircraft Noise Sources

No airports located in the vicinity of the project have been identified.

## 5.3 Transportation Sound Level Limits

### 5.3.1 Outdoor Living Areas

Impacts to OLAs from road traffic is assessed against a 16-hour daytime (07:00 – 23:00) equivalent sound pressure level ( $L_{eq}$ ) reported in dBA. The MECP outdoor sound level limits and the sliding scale of required noise reduction measures for road noise at OLAs are listed in Table 4.

Table 4: MECP Outdoor Sound Level Limit & Mitigation for OLAs –Road Traffic

Category	Sound Level $L_{eq,16hr}$ (dBA)	Mitigation Measures	NPC-300 Warning Clause Required
Outdoor Limit	55	None	None
OLA Mitigation Threshold	56 - 60	Optional	Type A unless sound level brought below 55 dBA
OLA Mitigation Threshold	>60	Required to achieve sound level below 60 dBA	Type B unless sound level brought below 55 dBA

### 5.3.2 Indoor Living Areas

Impacts to indoor living areas are assessed against a 16-hour daytime (07:00 – 23:00) and 8-hour nighttime (23:00 – 07:00) equivalent sound pressure level ( $L_{eq}$ ) reported in dBA, at the relevant POW receptors.

Requirements for ventilation and warning clauses to address transportation noise impacts to the project façades are determined based on the impact of road transportation sources. The applicable POW sound level limits and the sliding scale of required ventilation measures and warning clauses are listed in Table 5.

Table 5: POW Sound Level Limit: Ventilation & Warning Clauses – Road Traffic

Category	Daytime $L_{eq,16hr}$ (dBA)	Nighttime $L_{eq,8hr}$ (dBA)	Mitigation Measures	NPC-300 Warning Clause Required
POW Limit	55	50	None	None
POW Mitigation Threshold Living & Bedrooms	56 - 65	51 – 60	Include forced air heating and provision for central air conditioning	Type C
POW Mitigation Threshold Living & Bedrooms	>65	>60	Include central air conditioning	Type D

Requirements for building construction to address transportation noise impacts to indoor sound levels are determined independently for road and rail noise. The applicable indoor and POW sound level limits and required construction measures for road noise at in the indoor environment are listed in Table 6.

Table 6: Indoor Sound Level Limit: Construction Requirements – Road Traffic

Category	Daytime $L_{eq,16hr}$ (dBA)	Nighttime $L_{eq,8hr}$ (dBA)	Mitigation Measures
Road Sound Level Indoor Limit Living Rooms / Bedrooms	45 / 45	45 / 40	Not Applicable
Road POW Sound Level Living & Bedrooms	>65	>60	Design building components to achieve indoor sound level limit

## 5.4 Transportation Sound Level Predictions

The predicted noise impacts described below are based on the conditions identified in current drawings and information provided to TT at the time of this report and include any barriers, or other measures currently planned for the Project, but do not include additional noise measures identified in Section 5.5 of this report.

### 5.4.1 Unmitigated Road Traffic

Calculations of road traffic sound levels were performed using STAMSON 5.04, the software implementation of the MECP ORNAMENT model, which was developed and published by the MECP for transportation noise prediction. Only daytime sound levels are considered for outdoor amenity areas. The calculated sound levels at the receptors are presented in Table 7.

Table 7: Calculated Sound Levels due to Road Sources

POR ID	Predicted Transportation Sound Levels (dBA)	
	Daytime (07:00–23:00) $L_{eq,16hr}$	Nighttime (23:00–07:00) $L_{eq,8hr}$
POW01	59	53
POW02	59	53
OLA01	53	-

The STAMSON calculation outputs for the traffic noise predictions are attached in Appendix C.

## 5.5 Transportation Noise Control Recommendations

Noise control recommendations for the identified critical receptors and the corresponding noise sensitive land uses that they represent in the proposed redevelopment are summarized in Table 8 and Figure 5 and discussed in the subsequent sections.

Table 8: Transportation Noise Control Measures Summary

POR ID	Noise Barrier	Ventilation	Warning Clause	Building Components
POW1	N/A	Forced-Air Heating	Type C	Meet OBC Requirements
POW2	N/A	Forced-Air Heating	Type C	Meet OBC Requirements
OLA1	None	N/A	None	N/A

### 5.5.1 Outdoor Living Areas – Barriers

Sound levels at OLA01 associated with 5<sup>th</sup> floor terrace are expected to be equal to or lower than 55 dBA, and no additional noise mitigation is required for this OLA.

### 5.5.2 Indoor Living Areas - Ventilation

Sensitive receptors along the west and north facades of the 6-storey portion of the proposed building are expected to face POW sound levels between 56 dBA and 57 dBA during the 16-hour day (07:00 – 23:00) and/or 50 dBA during the 8-hour night (23:00 – 07:00) due to road noise, therefore forced air heating with the provision for central air conditioning is the minimum requirement for these units.

### 5.5.3 Indoor Living Areas - Building Components

Unless otherwise specified, all building components must meet the minimum construction requirements set out in OBC.

### 5.5.4 Warning Clauses

The following examples of warning clause wordings are based on applicable guidance documents and TT's experience regarding common requests from stakeholders. Precise wordings may be modified by the Client with input from the relevant LUPA(s) and legal counsel if required.

The **Type C** warning clause is required to be included in the development agreements for specific dwelling units if one or more representative POW receptors is predicted to be exposed to transportation sound pressure levels greater than 55 dBA and less than or equal to 65 dBA during the 16-hour day

(07:00 – 23:00) or greater than 50 dBA and less than or equal to 60 dBA during the 8-hour night (23:00 – 07:00), and the Project includes forced air heating with the provision for installation of central air conditioning in the future. An example of a Type C warning clause is as follows:

*“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 closed, 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.”*

## **6.0 Stationary Noise Assessment**

### **6.1 Critical Stationary Noise Receptors**

NPC-300 defines a point of reception for the assessment of stationary noise sources as any location on a noise sensitive land use where noise from a stationary source is received. This typically includes both Points Of Reception on building façades, representing the plane-of-window of noise sensitive spaces (POR) and Outdoor Points Of Reception representing areas such as balconies, gardens, patios, and terraces (OPOR). These locations may be the same or different from the POW and OLA receptors identified as part of a transportation noise assessment.

### **6.2 Stationary Noise Sources**

NPC-300 defines a stationary source of noise as one or more sources of sound that are normally operated within a given property. Stationary sources typically include mechanical equipment such as Heating, Ventilation and Air Conditioning (HVAC) equipment, standby power generators with routine testing, and heavy vehicle traffic (truck idling, driving, and loading).

#### **6.2.1 Project Sources**

At the time of this assessment, the Project mechanical systems have not been sufficiently designed, and a detailed assessment could not be completed. Based on the information provided by the Client, the majority of the of the significant HVAC & mechanical noise sources associated with the Project are proposed to be located within a rooftop mechanical penthouse. With the appropriate placement of equipment/louvres, equipment selection, and noise controls (if required), the applicable guideline limits are expected to be met.

#### **6.2.2 Surrounding Sources**

Based on a review of the surrounding area, the BV Glazing Systems facility and commercial properties along Lundy Lane have the potential to impact the Project.

Stationary noise impacts from BV Glazing Systems facility are not anticipated to be a concern for the Project, as the NPC-300 guideline limits are expected to be met at closer intervening noise sensitive lands. These closer intervening noise sensitive lands include the adjacent trailer park/campground and the Kingsway Motel. Therefore, a detailed assessment is not considered necessary and was not completed.

Noise from the Dwnr and Seductions clubs were reviewed and assessed as part of the NIS completed for the adjacent residential neighborhood development, summarized in the 2021 Study. As stationary noise from rooftop equipment and break-out noise were addressed and the NPC-300 guideline limits are met at the property lines for each of the commercial establishments, compliance is also expected for this further development. Therefore, a detailed assessment of stationary noise impacts is not considered necessary and was not completed.

## **7.0 Concluding Comments**

Noise impacts associated with the proposed residential development (Block A) located on Garner Road, south of Lundy's Lane in the City of Niagara Falls, Ontario are expected to be able to meet all applicable LUPA noise requirements with the inclusion of noise control measures and warning clauses as summarized in Figure 5 and presented in Section 5.5 of this report for transportation noise sources. The proposed development should therefore be approved.

As the design of the development proceeds, and mechanical equipment is selected, acoustical modelling of the impacts of this equipment should be confirmed in order to evaluate compliance with applicable sound limits at surrounding sensitive receptors, and confirm that impacts to the Project itself will be acceptable.

Please do not hesitate to contact us if there are any questions.

Yours Truly,

Thornton Tomasetti

A handwritten signature in blue ink that reads "Marc-André Bois". The signature is fluid and cursive, with the first name "Marc" and last name "Bois" clearly legible.

Marc-André Bois  
Senior Scientist

Reviewed by:

Marcus Li, P.Eng.  
Vice President

## Disclaimer

This report is provided in accordance with the contractual agreement between TT and the Client. In addition to our contractual obligations TT notes the following general disclaimers and qualifications regarding the content of this report.

In preparing this report, TT has relied upon the accuracy and completeness of information provided by the Client and other third parties (manufacturers, other consultants, etc.) and accepts no responsibility for errors or omissions by other parties in the information provided to TT.

This report has been prepared solely for the benefit of the Client and the content of this report is intended for informational purposes only. This report shall not be relied upon by any other parties, including but not limited to other consultants retained by the Client, or utilized for any other purposes.

Ultimate responsibility for the design and construction remains solely with the architect/engineer of record and/or the contractor(s). Achieving the required mitigation requirements relies on correct incorporation of mitigation recommendations into Architectural and Mechanical drawings and specifications, as well as correct installation during construction. It is recommended that the implementation of mitigation measures be reviewed by a qualified acoustical consultant.

On request, TT will provide a proposal for additional work such as to peer review noise control measures or observe on-site conditions as appropriate; however, notwithstanding the foregoing, it is expressly understood and agreed that TT shall not have control or charge of, and shall not be responsible for the acts or omissions, including but not limited to means, methods, techniques, sequences and procedures, of the Design Professionals and/or Contractors performing design and/or construction on the Project. Accordingly, TT shall not be held responsible for the failure of any party to properly incorporate the mitigation measures stated in this report.

## **Appendix A: Figures**

Figure 1: Project Location & Surroundings

Figure 2: Land Use Zoning Map

Figure 3: Project Site Plan

Figure 4: Transportation Noise PORs

Figure 5: Recommended Mitigation Measures



**Thornton  
Tomasetti**

**Client Name**  
1198815 Ontario Limited

**Project Name**  
Garner Road - Block A  
Niagara Falls, Ontario

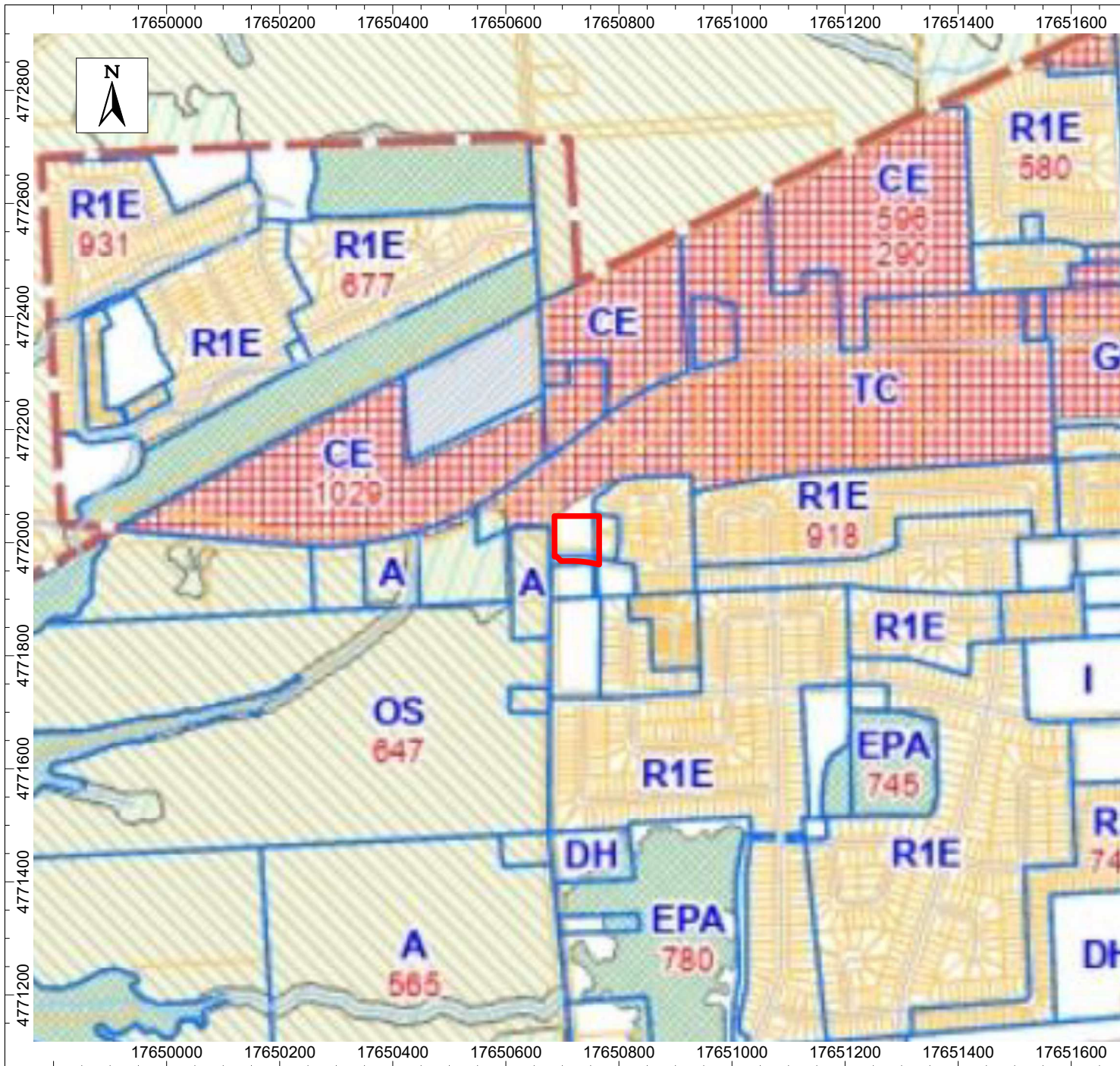
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Project Location & Surroundings

**Produced By**  
MAB

**TT Project #**  
SW23380.00

**Date**  
27/09/2024

**Figure #**  
**1**



# Thornton Tomasetti

## Client Name

1198815 Ontario Limited

## Project Name

Garner Road - Block A  
Niagara Falls, Ontario

## City of Niagara Falls Zoning Bylaw 79-200

Zone Code	Zone Name
A	Agricultural
CE	Camping Establishment
DH	Development Holding
EPA	Environmental Protection Area
GC	General Commercial
I	Institutional
OS	Open Space
R1E	Residential
TC	Tourist Commercial

## Figure Title

Land Use Zoning Map

## Produced By

MAB

## TT Project #

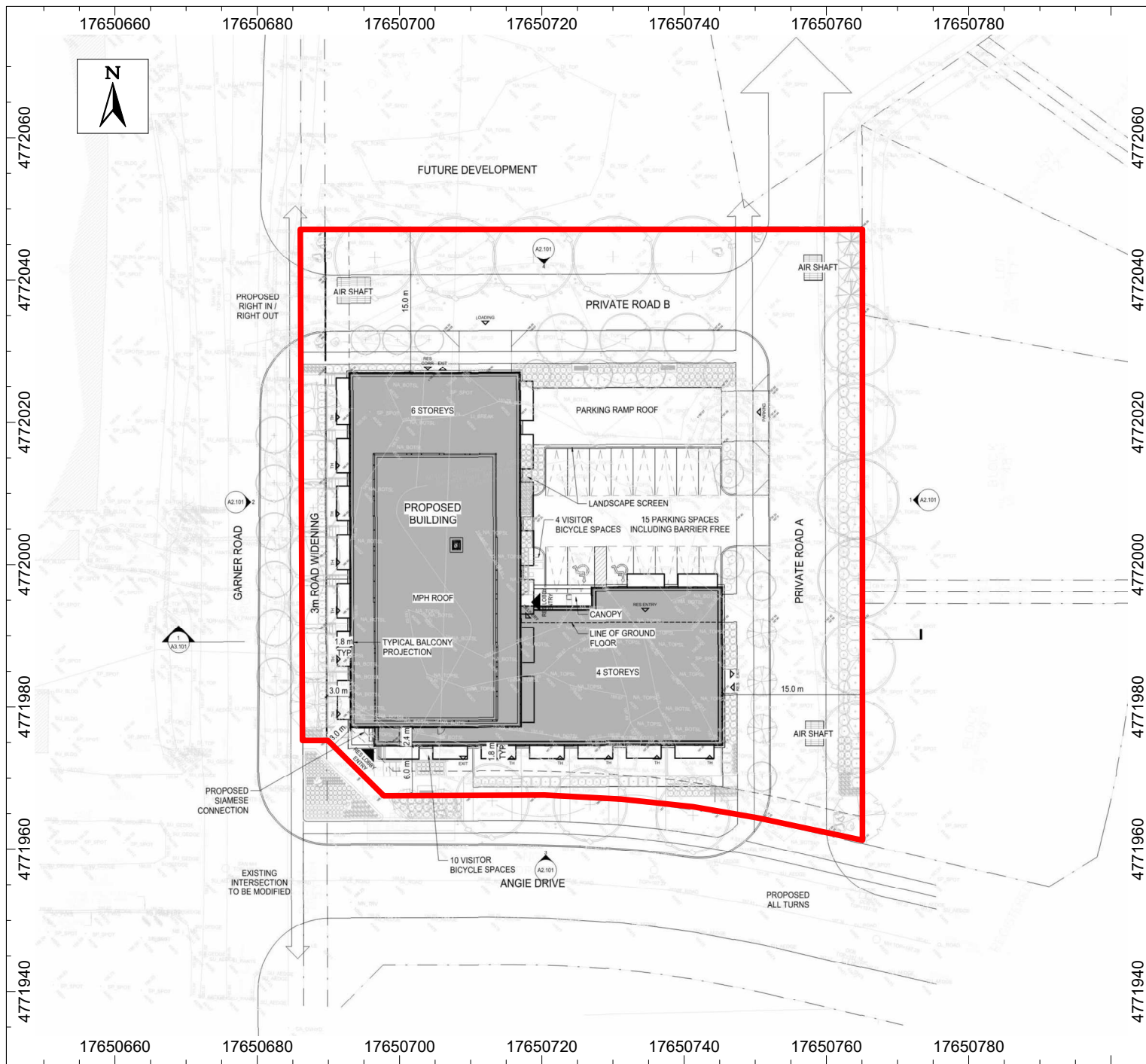
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## Date

27/09/2024

## Figure #

2



**Thornton  
Tomasetti**

**Client Name**

1198815 Ontario Limited

**Project Name**

Garner Road - Block A  
Niagara Falls, Ontario

**Figure Title**

Project Site Plan

**Produced By**

MAB

**TT Project #**

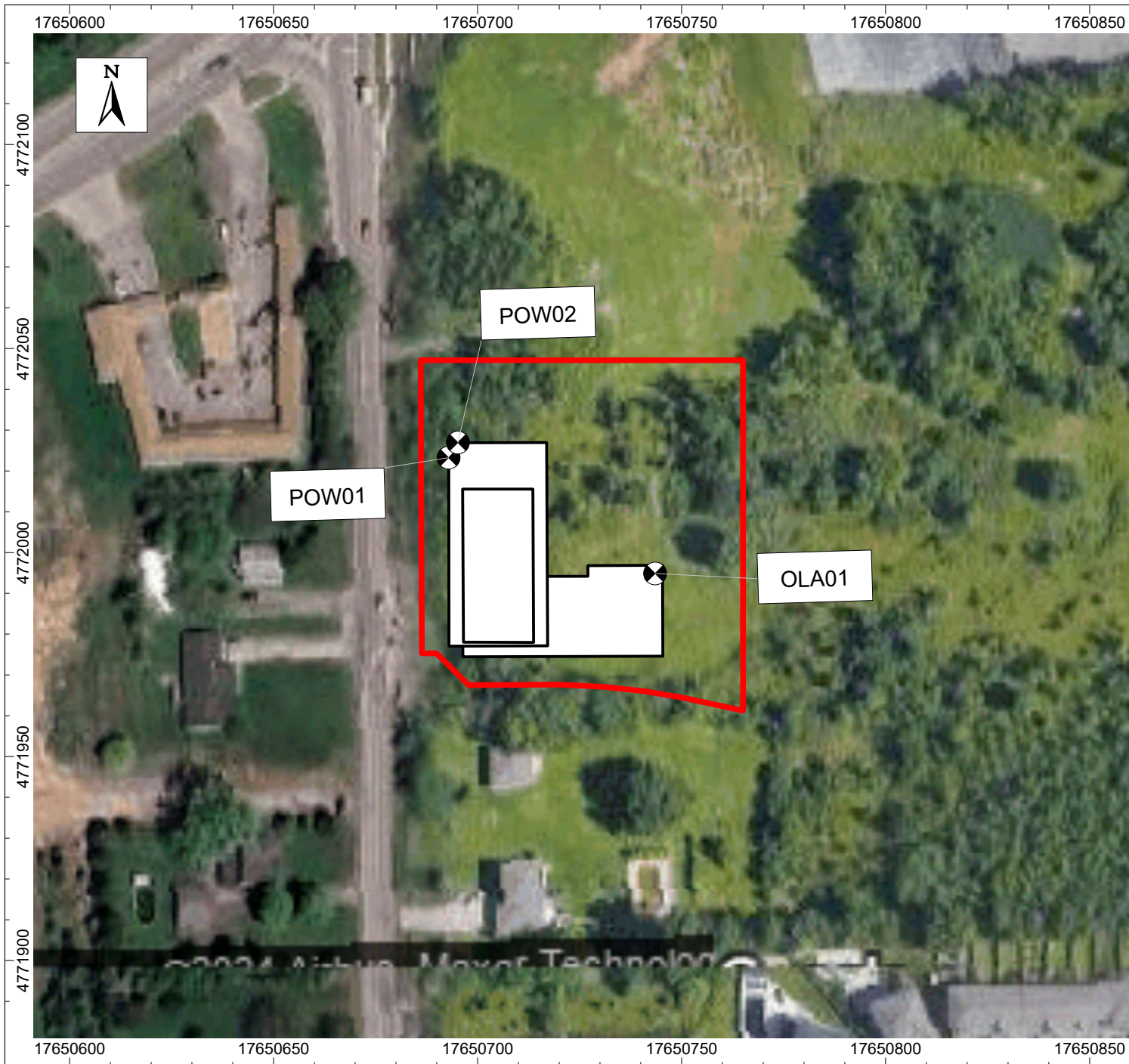
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**Date**

27/09/2024

**Figure #**

3



**Thornton  
Tomasetti**

**Client Name**

1198815 Ontario Limited

**Project Name**

Garner Road - Block A  
Niagara Falls, Ontario

**Figure Title**

Transportation Noise PORs

**Produced By**

MAB

**TT Project #**

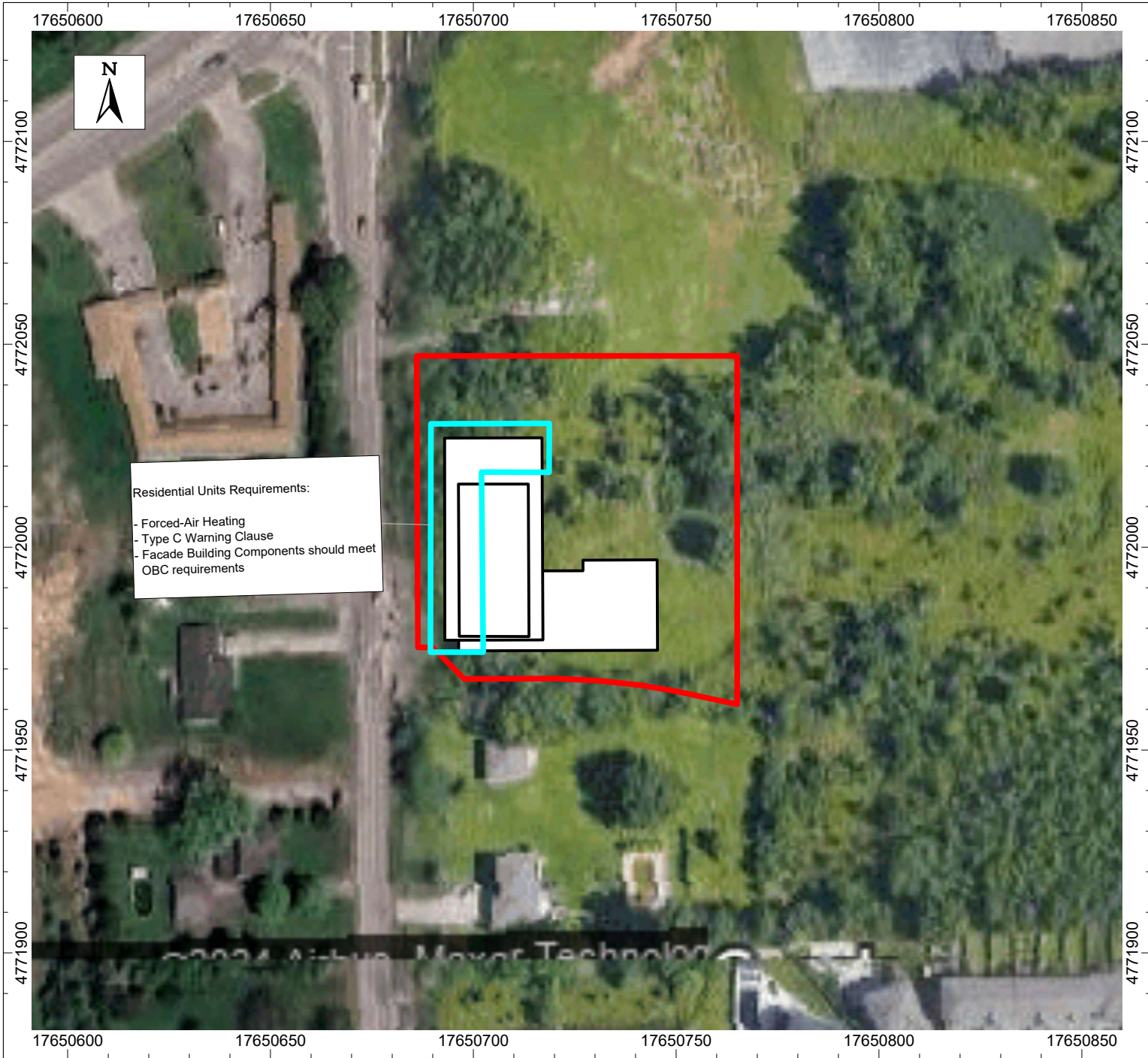
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**Date**

27/09/2024

**Figure #**

4



**Client Name**  
1198815 Ontario Limited

**Project Name**  
Garner Road - Block A  
Niagara Falls, Ontario

**Figure Title**  
Recommended Mitigation Measures

**Produced By**  
MAB

**TT Project #**  
SW23380.00

**Date**  
27/09/2024

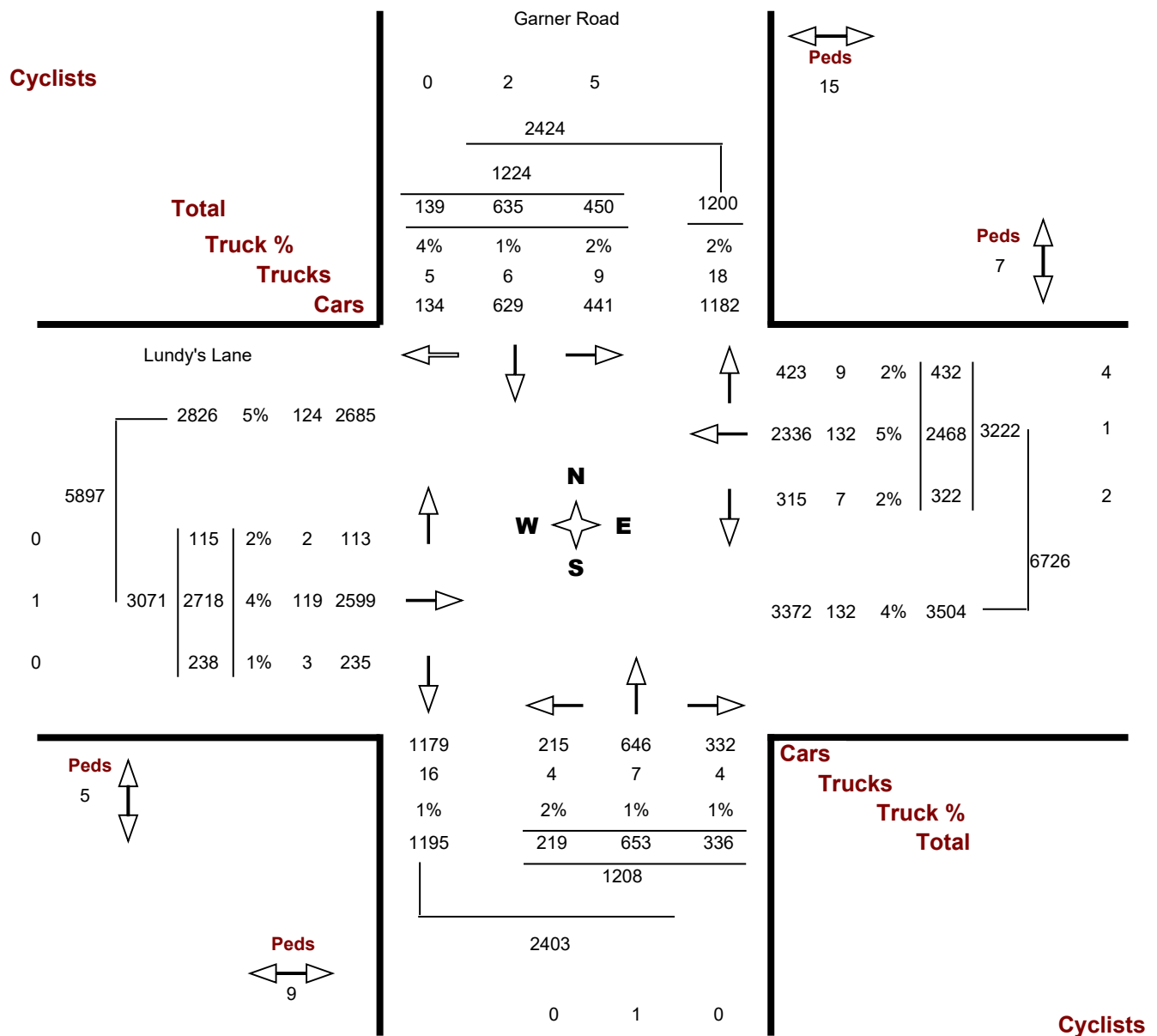
## **Appendix B: Traffic Data**

**Location.....** Garner Road @ Lundy's Lane

**Municipality.....** NIAGARA FALLS

**GeoID.....** 01501

**Count Date.....** Tuesday, 08 August, 2023



# Turning Movement Count - Details Report (15 min)

**Location.....** Garner Road @ Lundy's Lane

**Municipality.....** NIAGARA FALLS

**Count Date.....** Tuesday, August 08, 2023

Garner Road											Lundy's Lane									
North Approach						South Approach					East Approach					West Approach				
Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
07:00 07:15	3	4	1	0	8	4	7	5	0	16	2	35	5	0	42	0	17	2	0	19
07:15 07:30	11	12	5	0	28	3	12	7	0	22	6	36	4	0	46	3	75	3	0	81
07:30 07:45	9	10	2	0	21	6	13	7	0	26	5	71	13	0	89	8	71	4	0	83
07:45 08:00	9	7	3	0	19	10	21	6	0	37	5	49	8	0	62	4	65	3	0	72
Hourly Total	32	33	11	0	76	23	53	25	0	101	18	191	30	0	239	15	228	12	0	255
08:00 08:15	6	13	3	0	22	12	22	17	0	51	4	76	8	0	88	3	73	8	0	84
08:15 08:30	8	13	2	0	23	10	24	4	0	38	8	57	7	0	72	3	76	3	0	82
08:30 08:45	14	13	1	0	28	6	26	9	0	41	2	61	8	0	71	0	93	2	0	95
08:45 09:00	12	24	5	0	41	3	20	16	0	39	4	55	9	0	68	1	71	6	0	78
Hourly Total	40	63	11	0	114	31	92	46	0	169	18	249	32	0	299	7	313	19	0	339
11:00 11:15	16	10	6	0	32	5	19	15	0	39	14	75	11	0	100	2	94	7	0	103
11:15 11:30	17	17	0	0	34	3	14	8	0	25	11	58	14	0	83	2	44	6	0	52
11:30 11:45	10	14	2	0	26	5	24	14	0	43	4	84	12	0	100	4	102	6	0	112
11:45 12:00	18	15	3	0	36	5	19	12	0	36	9	83	9	0	101	2	93	2	0	97
Hourly Total	61	56	11	0	128	18	76	49	0	143	38	300	46	0	384	10	333	21	0	364
12:00 12:15	17	15	4	0	36	2	17	10	0	29	14	85	19	0	118	2	102	7	0	111
12:15 12:30	18	20	7	0	45	3	15	12	0	30	6	72	16	0	94	5	57	2	0	64
12:30 12:45	13	21	3	0	37	8	21	9	0	38	6	65	21	0	92	2	111	7	0	120
12:45 13:00	15	13	1	0	29	9	17	15	0	41	11	70	18	0	99	3	91	5	0	99
Hourly Total	63	69	15	0	147	22	70	46	0	138	37	292	74	0	403	12	361	21	0	394
13:00 13:15	8	13	3	0	24	11	12	10	0	33	8	73	13	0	94	5	93	9	0	107
13:15 13:30	8	23	4	0	35	9	19	9	0	37	10	86	16	0	112	2	81	3	0	86
13:30 13:45	12	17	4	0	33	6	24	6	0	36	7	66	11	0	84	5	89	10	0	104
13:45 14:00	14	22	4	0	40	3	19	10	0	32	8	54	16	0	78	8	80	13	0	101
Hourly Total	42	75	15	0	132	29	74	35	0	138	33	279	56	0	368	20	343	35	0	398
15:00 15:15	35	35	13	0	83	10	26	9	0	45	11	108	18	0	137	2	47	3	0	52
15:15 15:30	15	21	4	0	40	4	18	11	0	33	14	90	16	0	120	3	123	10	0	136
15:30 15:45	20	22	6	0	48	2	22	13	0	37	12	93	13	0	118	3	90	11	0	104
15:45 16:00	16	20	5	0	41	4	25	7	0	36	13	90	13	0	116	5	86	10	0	101
Hourly Total	86	98	28	0	212	20	91	40	0	151	50	381	60	0	491	13	346	34	0	393
16:00 16:15	17	24	4	0	45	7	21	7	0	35	20	108	24	0	152	8	99	10	0	117

## Garner Road

## Lundy's Lane

North Approach						South Approach					East Approach					West Approach				
Time Period	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT	LT	TH	RT	U-Turn	TOT
16:15 16:30	18	46	5	0	69	6	29	12	0	47	14	95	20	0	129	4	70	8	0	82
16:30 16:45	16	23	5	0	44	9	22	16	0	47	16	98	19	0	133	5	109	15	0	129
16:45 17:00	17	28	5	0	50	16	25	15	0	56	15	110	9	0	134	7	123	16	0	146
Hourly Total	68	121	19	0	208	38	97	50	0	185	65	411	72	0	548	24	401	49	0	474
17:00 17:15	23	36	13	0	72	5	28	10	0	43	16	86	20	0	122	2	97	11	0	110
17:15 17:30	13	33	6	0	52	15	30	14	0	59	17	118	20	0	155	1	91	17	0	109
17:30 17:45	11	21	7	0	39	9	23	11	0	43	17	89	10	0	116	8	121	11	0	140
17:45 18:00	11	30	3	0	44	9	19	10	0	38	13	72	12	0	97	3	84	8	0	95
Hourly Total	58	120	29	0	207	38	100	45	0	183	63	365	62	0	490	14	393	47	0	454
Grand Total	450	635	139	0	1224	219	653	336	0	1208	322	2468	432	0	3222	115	2718	238	0	3071
Truck %	2%	1%	4%	0%	2%	2%	1%	1%	0%	1%	2%	5%	2%	0%	5%	2%	4%	1%	0%	4%

## **Appendix C: Transportation Noise Predictions**

Filename: ola01.te                      Time Period: Day/Night 16/8 hours  
Description: Predicted Transportation Noise at OLA01

Road data, segment # 1: Garner S1 (day/night)

-----  
Car traffic volume : 6027/670    veh/TimePeriod    \*  
Medium truck volume : 61/7        veh/TimePeriod    \*  
Heavy truck volume : 18/2        veh/TimePeriod    \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4566  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 1.00  
Heavy Truck % of Total Volume : 0.30  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Garner S1 (day/night)

-----  
Angle1    Angle2 : -90.00 deg    -32.00 deg  
Wood depth : 0                      (No woods.)  
No of house rows : 0 / 0  
Surface : 1                      (Absorptive ground surface)  
Receiver source distance : 72.00 / 72.00    m  
Receiver height : 1.50 / 1.50    m  
Topography : 3                      (Elevated; no barrier)  
Elevation : 17.00 m  
Reference angle : 0.00

Road data, segment # 2: Garner S2 (day/night)

-----  
Car traffic volume : 5966/663    veh/TimePeriod    \*  
Medium truck volume : 122/14     veh/TimePeriod    \*  
Heavy truck volume : 18/2        veh/TimePeriod    \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4566  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 2.00  
Heavy Truck % of Total Volume : 0.30  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Garner S2 (day/night)

-----  
Angle1    Angle2 : -32.00 deg    52.00 deg  
Wood depth : 0                      (No woods.)  
No of house rows : 0 / 0  
Surface : 1                      (Absorptive ground surface)  
Receiver source distance : 72.00 / 72.00    m  
Receiver height : 1.50 / 1.50    m  
Topography : 4                      (Elevated; with barrier)

Barrier angle1 : -32.00 deg Angle2 : 52.00 deg  
 Barrier height : 11.80 m  
 Elevation : 17.00 m  
 Barrier receiver distance : 26.00 / 26.00 m  
 Source elevation : 0.00 m  
 Receiver elevation : 0.00 m  
 Barrier elevation : 0.00 m  
 Reference angle : 0.00

Road data, segment # 3: Garner S3 (day/night)

-----  
 Car traffic volume : 6027/670 veh/TimePeriod \*  
 Medium truck volume : 61/7 veh/TimePeriod \*  
 Heavy truck volume : 18/2 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4566  
 Percentage of Annual Growth : 2.00  
 Number of Years of Growth : 20.00  
 Medium Truck % of Total Volume : 1.00  
 Heavy Truck % of Total Volume : 0.30  
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 3: Garner S3 (day/night)

-----  
 Angle1 Angle2 : 52.00 deg 65.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)  
 Receiver source distance : 72.00 / 72.00 m  
 Receiver height : 1.50 / 1.50 m  
 Topography : 3 (Elevated; no barrier)  
 Elevation : 17.00 m  
 Reference angle : 0.00

Road data, segment # 4: Garner N1 (day/night)

-----  
 Car traffic volume : 6061/673 veh/TimePeriod \*  
 Medium truck volume : 74/8 veh/TimePeriod \*  
 Heavy truck volume : 25/3 veh/TimePeriod \*  
 Posted speed limit : 50 km/h  
 Road gradient : 0 %  
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4606  
 Percentage of Annual Growth : 2.00  
 Number of Years of Growth : 20.00  
 Medium Truck % of Total Volume : 1.20  
 Heavy Truck % of Total Volume : 0.40  
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 4: Garner N1 (day/night)

-----  
 Angle1 Angle2 : 65.00 deg 90.00 deg  
 Wood depth : 0 (No woods.)  
 No of house rows : 0 / 0  
 Surface : 1 (Absorptive ground surface)

Receiver source distance : 72.00 / 72.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 3 (Elevated; no barrier)  
Elevation : 17.00 m  
Reference angle : 0.00

Road data, segment # 5: Lundy W1 (day/night)

-----  
Car traffic volume : 14309/1590 veh/TimePeriod \*  
Medium truck volume : 509/57 veh/TimePeriod \*  
Heavy truck volume : 165/18 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): 11204  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.40  
Heavy Truck % of Total Volume : 1.10  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 5: Lundy W1 (day/night)

-----  
Angle1 Angle2 : -8.00 deg 5.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 165.00 / 165.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 3 (Elevated; no barrier)  
Elevation : 17.00 m  
Reference angle : 0.00

Road data, segment # 6: Lundy E1 (day/night)

-----  
Car traffic volume : 16389/1821 veh/TimePeriod \*  
Medium truck volume : 530/59 veh/TimePeriod \*  
Heavy truck volume : 171/19 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): 12779  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.10  
Heavy Truck % of Total Volume : 1.00  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 6: Lundy E1 (day/night)

-----  
Angle1 Angle2 : 5.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 165.00 / 165.00 m  
Receiver height : 1.50 / 1.50 m  
Topography : 3 (Elevated; no barrier)

Elevation : 17.00 m  
Reference angle : 0.00

Results segment # 1: Garner S1 (day)

Source height = 0.74 m

ROAD (0.00 + 45.48 + 0.00) = 45.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-32	0.17	59.12	0.00	-7.99	-5.65	0.00	0.00	0.00	45.48

Segment Leq : 45.48 dBA

Results segment # 2: Garner S2 (day)

Source height = 0.74 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
0.74	1.50	1.22	1.22

ROAD (0.00 + 29.42 + 0.00) = 29.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-32	52	0.00	59.55	0.00	-6.81	-3.31	0.00	0.00	-20.00	29.42

Segment Leq : 29.42 dBA

Results segment # 3: Garner S3 (day)

Source height = 0.74 m

ROAD (0.00 + 39.22 + 0.00) = 39.22 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
52	65	0.17	59.12	0.00	-7.99	-11.91	0.00	0.00	0.00	39.22

Segment Leq : 39.22 dBA

Results segment # 4: Garner N1 (day)

Source height = 0.80 m

ROAD (0.00 + 41.60 + 0.00) = 41.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
65	90	0.17	59.46	0.00	-7.98	-9.88	0.00	0.00	0.00	41.60

Segment Leq : 41.60 dBA

Results segment # 5: Lundy W1 (day)

-----  
Source height = 1.02 m

ROAD (0.00 + 43.41 + 0.00) = 43.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-8	5	0.16	66.95	0.00	-12.12	-11.42	0.00	0.00	0.00	43.41

-----

Segment Leq : 43.41 dBA

Results segment # 6: Lundy E1 (day)  
-----

Source height = 1.00 m

ROAD (0.00 + 51.46 + 0.00) = 51.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.16	67.33	0.00	-12.13	-3.74	0.00	0.00	0.00	51.46

-----

Segment Leq : 51.46 dBA

Total Leq All Segments: 53.44 dBA

Results segment # 1: Garner S1 (night)  
-----

Source height = 0.74 m

ROAD (0.00 + 38.96 + 0.00) = 38.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-32	0.17	52.60	0.00	-7.99	-5.65	0.00	0.00	0.00	38.96

-----

Segment Leq : 38.96 dBA

Results segment # 2: Garner S2 (night)  
-----

Source height = 0.74 m

Barrier height for grazing incidence  
-----

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
0.74 !	1.50 !	1.22 !	1.22

-----

ROAD (0.00 + 22.92 + 0.00) = 22.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-32	52	0.00	53.04	0.00	-6.81	-3.31	0.00	0.00	-20.00	22.92

-----

Segment Leq : 22.92 dBA

Results segment # 3: Garner S3 (night)  
-----

Source height = 0.74 m

ROAD (0.00 + 32.71 + 0.00) = 32.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
52	65	0.17	52.60	0.00	-7.99	-11.91	0.00	0.00	0.00	32.71

Segment Leq : 32.71 dBA

Results segment # 4: Garner N1 (night)

Source height = 0.81 m

ROAD (0.00 + 35.12 + 0.00) = 35.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
65	90	0.17	52.97	0.00	-7.97	-9.88	0.00	0.00	0.00	35.12

Segment Leq : 35.12 dBA

Results segment # 5: Lundy W1 (night)

Source height = 1.02 m

ROAD (0.00 + 36.87 + 0.00) = 36.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-8	5	0.16	60.41	0.00	-12.13	-11.42	0.00	0.00	0.00	36.87

Segment Leq : 36.87 dBA

Results segment # 6: Lundy E1 (night)

Source height = 1.00 m

ROAD (0.00 + 44.93 + 0.00) = 44.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.16	60.80	0.00	-12.13	-3.74	0.00	0.00	0.00	44.93

Segment Leq : 44.93 dBA

Total Leq All Segments: 46.92 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.44  
(NIGHT): 46.92

Filename: pow01.te                      Time Period: Day/Night 16/8 hours  
Description: Predicted Transportation Noise at POW01

Road data, segment # 1: Garner S1 (day/night)

-----  
Car traffic volume : 6027/670    veh/TimePeriod    \*  
Medium truck volume : 61/7        veh/TimePeriod    \*  
Heavy truck volume : 18/2        veh/TimePeriod    \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4566  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 1.00  
Heavy Truck % of Total Volume : 0.30  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Garner S1 (day/night)

-----  
Angle1    Angle2 : -90.00 deg    80.00 deg  
Wood depth : 0                      (No woods.)  
No of house rows : 0 / 0  
Surface : 1                      (Absorptive ground surface)  
Receiver source distance : 23.00 / 23.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1                      (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 2: Garner N1 (day/night)

-----  
Car traffic volume : 6061/673    veh/TimePeriod    \*  
Medium truck volume : 74/8        veh/TimePeriod    \*  
Heavy truck volume : 25/3        veh/TimePeriod    \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4606  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 1.20  
Heavy Truck % of Total Volume : 0.40  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Garner N1 (day/night)

-----  
Angle1    Angle2 : 80.00 deg    90.00 deg  
Wood depth : 0                      (No woods.)  
No of house rows : 0 / 0  
Surface : 1                      (Absorptive ground surface)  
Receiver source distance : 23.00 / 23.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1                      (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 3: Lundy W1 (day/night)

-----  
Car traffic volume : 14309/1590 veh/TimePeriod \*  
Medium truck volume : 509/57 veh/TimePeriod \*  
Heavy truck volume : 165/18 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): 11204  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.40  
Heavy Truck % of Total Volume : 1.10  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 3: Lundy W1 (day/night)

-----  
Angle1 Angle2 : -90.00 deg -60.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 115.00 / 115.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 4: Lundy W2 (day/night)

-----  
Car traffic volume : 14309/1590 veh/TimePeriod \*  
Medium truck volume : 509/57 veh/TimePeriod \*  
Heavy truck volume : 165/18 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): 11204  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.40  
Heavy Truck % of Total Volume : 1.10  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 4: Lundy W2 (day/night)

-----  
Angle1 Angle2 : -60.00 deg 0.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 115.00 / 115.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -60.00 deg Angle2 : 0.00 deg  
Barrier height : 5.00 m  
Barrier receiver distance : 40.00 / 40.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m

Reference angle : 0.00

Road data, segment # 5: Lundy W3 (day/night)

-----  
Car traffic volume : 14309/1590 veh/TimePeriod \*  
Medium truck volume : 509/57 veh/TimePeriod \*  
Heavy truck volume : 165/18 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): 11204  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.40  
Heavy Truck % of Total Volume : 1.10  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 5: Lundy W3 (day/night)

-----  
Angle1 Angle2 : 0.00 deg 20.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 115.00 / 115.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 6: Lundy E1 (day/night)

-----  
Car traffic volume : 16389/1821 veh/TimePeriod \*  
Medium truck volume : 530/59 veh/TimePeriod \*  
Heavy truck volume : 171/19 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): 12779  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.10  
Heavy Truck % of Total Volume : 1.00  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 6: Lundy E1 (day/night)

-----  
Angle1 Angle2 : 20.00 deg 30.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 115.00 / 115.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Results segment # 1: Garner S1 (day)

-----

Source height = 0.74 m

ROAD (0.00 + 56.71 + 0.00) = 56.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.07	59.12	0.00	-1.99	-0.42	0.00	0.00	0.00	56.71

Segment Leq : 56.71 dBA

Results segment # 2: Garner N1 (day)

Source height = 0.80 m

ROAD (0.00 + 44.11 + 0.00) = 44.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
80	90	0.07	59.46	0.00	-1.98	-13.37	0.00	0.00	0.00	44.11

Segment Leq : 44.11 dBA

Results segment # 3: Lundy W1 (day)

Source height = 1.02 m

ROAD (0.00 + 49.33 + 0.00) = 49.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-60	0.06	66.95	0.00	-9.40	-8.22	0.00	0.00	0.00	49.33

Segment Leq : 49.33 dBA

Results segment # 4: Lundy W2 (day)

Source height = 1.02 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.02 !	21.90 !	14.64 !	14.64

ROAD (0.00 + 52.73 + 0.00) = 52.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	0	0.00	66.95	0.00	-8.85	-4.77	0.00	0.00	0.00	53.34*
-60	0	0.06	66.95	0.00	-9.40	-4.83	0.00	0.00	0.00	52.73

\* Bright Zone !

Segment Leq : 52.73 dBA

Results segment # 5: Lundy W3 (day)

Source height = 1.02 m

ROAD (0.00 + 48.01 + 0.00) = 48.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	20	0.06	66.95	0.00	-9.40	-9.55	0.00	0.00	0.00	48.01

Segment Leq : 48.01 dBA

Results segment # 6: Lundy E1 (day)

Source height = 1.00 m

ROAD (0.00 + 45.35 + 0.00) = 45.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
20	30	0.06	67.33	0.00	-9.40	-12.58	0.00	0.00	0.00	45.35

Segment Leq : 45.35 dBA

Total Leq All Segments: 59.37 dBA

Results segment # 1: Garner S1 (night)

Source height = 0.74 m

ROAD (0.00 + 50.20 + 0.00) = 50.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.07	52.60	0.00	-1.99	-0.42	0.00	0.00	0.00	50.20

Segment Leq : 50.20 dBA

Results segment # 2: Garner N1 (night)

Source height = 0.81 m

ROAD (0.00 + 37.63 + 0.00) = 37.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
80	90	0.07	52.97	0.00	-1.98	-13.36	0.00	0.00	0.00	37.63

Segment Leq : 37.63 dBA

Results segment # 3: Lundy W1 (night)

Source height = 1.02 m

ROAD (0.00 + 42.79 + 0.00) = 42.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-60	0.06	60.41	0.00	-9.40	-8.22	0.00	0.00	0.00	42.79

Segment Leq : 42.79 dBA

Results segment # 4: Lundy W2 (night)

Source height = 1.02 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.02	21.90	14.64	14.64

ROAD (0.00 + 46.18 + 0.00) = 46.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	0	0.00	60.41	0.00	-8.85	-4.77	0.00	0.00	0.00	46.79*
-60	0	0.06	60.41	0.00	-9.40	-4.83	0.00	0.00	0.00	46.18

\* Bright Zone !

Segment Leq : 46.18 dBA

Results segment # 5: Lundy W3 (night)

Source height = 1.02 m

ROAD (0.00 + 41.46 + 0.00) = 41.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	20	0.06	60.41	0.00	-9.40	-9.55	0.00	0.00	0.00	41.46

Segment Leq : 41.46 dBA

Results segment # 6: Lundy E1 (night)

Source height = 1.00 m

ROAD (0.00 + 38.82 + 0.00) = 38.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
20	30	0.06	60.80	0.00	-9.40	-12.58	0.00	0.00	0.00	38.82

Segment Leq : 38.82 dBA

Total Leq All Segments: 52.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.37  
(NIGHT): 52.85

Filename: pow02.te                      Time Period: Day/Night 16/8 hours  
Description: Predicted Transportation Noise at POW02

Road data, segment # 1: Garner S1 (day/night)

-----  
Car traffic volume : 6027/670    veh/TimePeriod    \*  
Medium truck volume : 61/7        veh/TimePeriod    \*  
Heavy truck volume : 18/2        veh/TimePeriod    \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4566  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 1.00  
Heavy Truck % of Total Volume : 0.30  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Garner S1 (day/night)

-----  
Angle1    Angle2 : 0.00 deg    77.00 deg  
Wood depth : 0            (No woods.)  
No of house rows : 0 / 0  
Surface : 1            (Absorptive ground surface)  
Receiver source distance : 25.00 / 25.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1            (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 2: Garner N1 (day/night)

-----  
Car traffic volume : 6061/673    veh/TimePeriod    \*  
Medium truck volume : 74/8        veh/TimePeriod    \*  
Heavy truck volume : 25/3        veh/TimePeriod    \*  
Posted speed limit : 50 km/h  
Road gradient : 0 %  
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4606  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 1.20  
Heavy Truck % of Total Volume : 0.40  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Garner N1 (day/night)

-----  
Angle1    Angle2 : 77.00 deg    90.00 deg  
Wood depth : 0            (No woods.)  
No of house rows : 0 / 0  
Surface : 1            (Absorptive ground surface)  
Receiver source distance : 25.00 / 25.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1            (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 3: Lundy W1 (day/night)

-----  
Car traffic volume : 14309/1590 veh/TimePeriod \*  
Medium truck volume : 509/57 veh/TimePeriod \*  
Heavy truck volume : 165/18 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): 11204  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.40  
Heavy Truck % of Total Volume : 1.10  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 3: Lundy W1 (day/night)

-----  
Angle1 Angle2 : -90.00 deg -56.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 113.00 / 113.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 4: Lundy W2 (day/night)

-----  
Car traffic volume : 14309/1590 veh/TimePeriod \*  
Medium truck volume : 509/57 veh/TimePeriod \*  
Heavy truck volume : 165/18 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): 11204  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.40  
Heavy Truck % of Total Volume : 1.10  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 4: Lundy W2 (day/night)

-----  
Angle1 Angle2 : -56.00 deg 0.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 113.00 / 113.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 2 (Flat/gentle slope; with barrier)  
Barrier angle1 : -56.00 deg Angle2 : 0.00 deg  
Barrier height : 5.00 m  
Barrier receiver distance : 35.00 / 35.00 m  
Source elevation : 0.00 m  
Receiver elevation : 0.00 m  
Barrier elevation : 0.00 m

Reference angle : 0.00

Road data, segment # 5: Lundy W3 (day/night)

-----  
Car traffic volume : 14309/1590 veh/TimePeriod \*  
Medium truck volume : 509/57 veh/TimePeriod \*  
Heavy truck volume : 165/18 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): 11204  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.40  
Heavy Truck % of Total Volume : 1.10  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 5: Lundy W3 (day/night)

-----  
Angle1 Angle2 : 0.00 deg 22.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 113.00 / 113.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Road data, segment # 6: Lundy E1 (day/night)

-----  
Car traffic volume : 16389/1821 veh/TimePeriod \*  
Medium truck volume : 530/59 veh/TimePeriod \*  
Heavy truck volume : 171/19 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): 12779  
Percentage of Annual Growth : 2.00  
Number of Years of Growth : 20.00  
Medium Truck % of Total Volume : 3.10  
Heavy Truck % of Total Volume : 1.00  
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 6: Lundy E1 (day/night)

-----  
Angle1 Angle2 : 22.00 deg 90.00 deg  
Wood depth : 0 (No woods.)  
No of house rows : 0 / 0  
Surface : 1 (Absorptive ground surface)  
Receiver source distance : 113.00 / 113.00 m  
Receiver height : 21.90 / 21.90 m  
Topography : 1 (Flat/gentle slope; no barrier)  
Reference angle : 0.00

Results segment # 1: Garner S1 (day)

-----

Source height = 0.74 m

ROAD (0.00 + 52.94 + 0.00) = 52.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	77	0.07	59.12	0.00	-2.38	-3.81	0.00	0.00	0.00	52.94

Segment Leq : 52.94 dBA

Results segment # 2: Garner N1 (day)

Source height = 0.80 m

ROAD (0.00 + 44.94 + 0.00) = 44.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
77	90	0.07	59.46	0.00	-2.37	-12.15	0.00	0.00	0.00	44.94

Segment Leq : 44.94 dBA

Results segment # 3: Lundy W1 (day)

Source height = 1.02 m

ROAD (0.00 + 49.99 + 0.00) = 49.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-56	0.06	66.95	0.00	-9.32	-7.65	0.00	0.00	0.00	49.99

Segment Leq : 49.99 dBA

Results segment # 4: Lundy W2 (day)

Source height = 1.02 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.02 !	21.90 !	15.43 !	15.43

ROAD (0.00 + 52.52 + 0.00) = 52.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-56	0	0.00	66.95	0.00	-8.77	-5.07	0.00	0.00	0.00	53.11*
-56	0	0.06	66.95	0.00	-9.32	-5.12	0.00	0.00	0.00	52.52

\* Bright Zone !

Segment Leq : 52.52 dBA

Results segment # 5: Lundy W3 (day)

Source height = 1.02 m

ROAD (0.00 + 48.50 + 0.00) = 48.50 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	22	0.06	66.95	0.00	-9.32	-9.14	0.00	0.00	0.00	48.50

Segment Leq : 48.50 dBA

Results segment # 6: Lundy E1 (day)

Source height = 1.00 m

ROAD (0.00 + 53.54 + 0.00) = 53.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
22	90	0.06	67.33	0.00	-9.32	-4.47	0.00	0.00	0.00	53.54

Segment Leq : 53.54 dBA

Total Leq All Segments: 59.05 dBA

Results segment # 1: Garner S1 (night)

Source height = 0.74 m

ROAD (0.00 + 46.42 + 0.00) = 46.42 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	77	0.07	52.60	0.00	-2.38	-3.81	0.00	0.00	0.00	46.42

Segment Leq : 46.42 dBA

Results segment # 2: Garner N1 (night)

Source height = 0.81 m

ROAD (0.00 + 38.46 + 0.00) = 38.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
77	90	0.07	52.97	0.00	-2.37	-12.14	0.00	0.00	0.00	38.46

Segment Leq : 38.46 dBA

Results segment # 3: Lundy W1 (night)

Source height = 1.02 m

ROAD (0.00 + 43.44 + 0.00) = 43.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-56	0.06	60.41	0.00	-9.32	-7.65	0.00	0.00	0.00	43.44

Segment Leq : 43.44 dBA

Results segment # 4: Lundy W2 (night)

Source height = 1.02 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.02	21.90	15.43	15.43

ROAD (0.00 + 45.97 + 0.00) = 45.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-56	0	0.00	60.41	0.00	-8.77	-5.07	0.00	0.00	0.00	46.57*
-56	0	0.06	60.41	0.00	-9.32	-5.12	0.00	0.00	0.00	45.97

\* Bright Zone !

Segment Leq : 45.97 dBA

Results segment # 5: Lundy W3 (night)

Source height = 1.02 m

ROAD (0.00 + 41.96 + 0.00) = 41.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	22	0.06	60.41	0.00	-9.32	-9.14	0.00	0.00	0.00	41.96

Segment Leq : 41.96 dBA

Results segment # 6: Lundy E1 (night)

Source height = 1.00 m

ROAD (0.00 + 47.01 + 0.00) = 47.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
22	90	0.06	60.80	0.00	-9.32	-4.47	0.00	0.00	0.00	47.01

Segment Leq : 47.01 dBA

Total Leq All Segments: 52.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.05  
(NIGHT): 52.51