REPORT
PROJECT: 137404-6.04-01

ENVIRONMENTAL NOISE IMPACT ASSESSMENT
1515 Earl Armstrong Road

Prepared for Urbandale Corporation
by ARCADIS IBI Group

December 15, 2022

Table of Contents

List of Tables

List of Appendices

List of Figures & Exhibits

1 Introduction

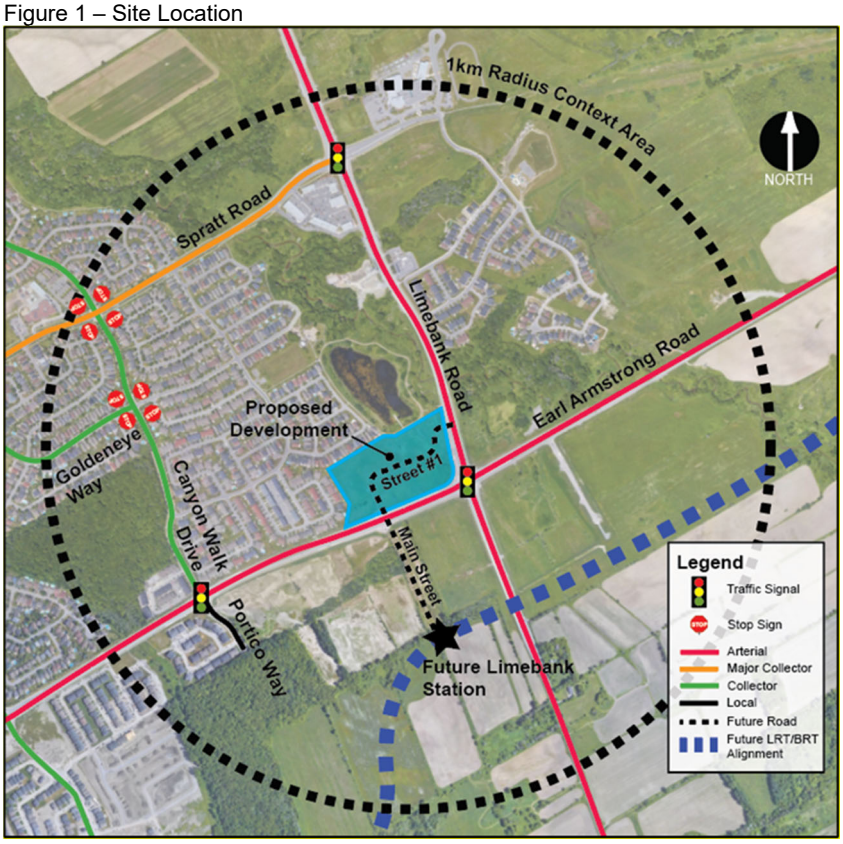
This Environmental Noise Impact Assessment has been prepared in support of a Site Plan Control application for a proposed commercial and office development at 1515 Earl Armstrong Road, Ottawa. This study evaluated the expected noise levels from transportation (dynamic) noise sources on the adjacent road network, as well as any on- and off-site stationary noise sources. The results of the noise analysis conducted for this study informed recommendations regarding appropriate warning clauses and associated noise abatement measures to include in the Tenancy or Lease Agreement for each 'noise sensitive' land use.

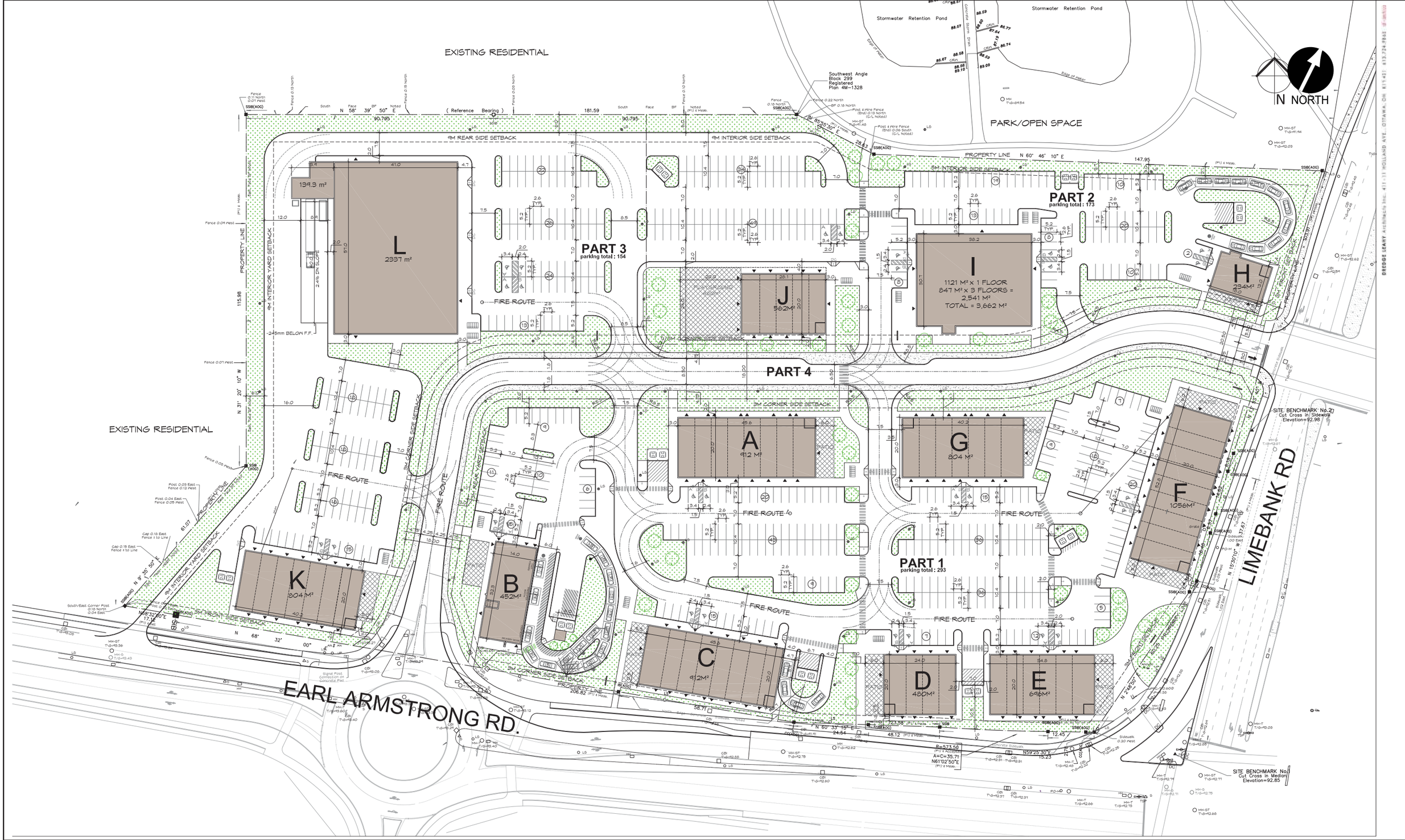
The site occupies the northwestern quadrant of the Earl Armstrong & Limebank intersection and is bound by Earl Armstrong Road to the south, Limebank Road to the east, a stormwater pond to the north, as well as existing low-rise residential uses to the north and west. The site location and its surrounding context are shown in **Figure 1**, while the proposed development is presented in **Figure 2** below.

The proposed development consists of only one 'noise sensitive' land use, a daycare centre located in Building 'J' and playground amenity area which are located approximately 150 metres west of Limebank Road and 130 metres north of Earl Armstrong Road. As such, the dynamic noise review conducted as part of this study was limited to the daycare land use.

The stationary noise component of this ENIA evaluated the impact of proposed on-site buildings and considered potential sources such as rooftop mechanical equipment (all buildings) and a loading dock frequented by refrigerated trucks (Building 'L'). No off-site noise sources of significance were identified through a desktop review of the existing buildings and land uses adjacent to the site.

Figure 1 – Site Location





ARCADIS
IBI GROUP

1515 Earl Armstrong Road
Environmental Noise Impact Assessment

Figure 2 - Proposed Development

PROJECT No. 137404

SCALE: 0m 10m 20m

2 Background

2.1 Noise Sources

2.1.1 Transportation (Dynamic) Noise

The study area is primarily subjected to roadway noise from both Limebank Road and Earl Armstrong Road which abut the site to the east and south, respectively. There are no other collector or higher-order roadways within close enough proximity to generate on-site noise sources of any significance.

The subject property is entirely located within the Airport Vicinity Development Zone (AVDZ), as shown on Schedule C-14 of the 2021 Draft Official Plan. As such, consideration will be given to aircraft noise in this study.

In accordance with the City of Ottawa Environmental Noise Control (ENC) Guidelines (January 2016), any passenger or freight rail lines within 500 metres of the site is typically considered in the noise analysis.

A review of the study area identified the Limebank LRT Station, which is expected to be fully operational by late 2023 and is located an approximate 470-metre distance south of the indoor/outdoor daycare land use (i.e. Building 'J'). Given that the future LRT alignment will operate just on the periphery of the 500-metre radius from Building 'J' and that the site abuts two, undivided high-speed arterial roads with significant traffic volumes, these roads are much more likely to have a bearing on any vehicular noise impacts within the subject site. As such, no further consideration will be given to rail noise in this study.

2.1.2 Stationary Noise

Cadna A v2022, produced by DataKustik, was employed for the stationary noise evaluation carried as part of this ENIA. This software is recognized in the industry for noise modeling and utilizes ISO 9613-2.

2.1.2.1 On-Site Stationary Noise

On review of the site plan in **Figure 2** above, the following potential stationary noise sources were identified. Assumptions were made as to the position and type of equipment based on the proposed building layouts and using typical sound power levels and operating times for such equipment.

Building 'A' (assumed to include multiple commercial units): The building rooftop equipment assumed is eight medium rooftop chiller units (one per commercial unit), each with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'B': The building rooftop equipment assumed is one large rooftop chiller unit, with a sound power level of 90 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'C' (assumed to include multiple commercial units): The building rooftop equipment assumed is eight medium rooftop chiller units (one per commercial unit), each with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'D' (assumed to include multiple commercial units): The building rooftop equipment assumed is four medium rooftop chiller units (one per commercial unit), each

with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'E' (assumed to include multiple commercial units): The building rooftop equipment assumed is eight medium rooftop chiller units (one per commercial unit), each with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'F' (assumed to include multiple commercial units): The building rooftop equipment assumed is nine medium rooftop chiller units (one per commercial unit), each with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'G' (assumed to include multiple commercial units): The building rooftop equipment assumed is seven medium rooftop chiller units (one per commercial unit), each with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'H' (assumed to be a restaurant with a drive-thru): The building rooftop equipment assumed is one medium rooftop chiller unit, with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime, one electric fan with a sound power level of 70 dBA operating in steady-state during the daytime, and one drive-thru speaker with a sound power level of 75 dBA operating for 30 minutes per hour during the daytime and nighttime.

Building 'I': The building rooftop equipment assumed is two large rooftop chiller units, each with a sound power level of 90 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime, and two electric fans each with a sound power level of 70 dBA operating in steady-state during the daytime.

Building 'J': The building rooftop equipment assumed is five medium rooftop chiller units, each with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'K' (assumed to include multiple commercial units): The building rooftop equipment assumed is seven medium rooftop chiller units (one per commercial unit), each with a sound power level of 82 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

Building 'L' (assumed to be a grocery store): The equipment assumed is one (1) idling truck at the west side building loading area. It is assumed that the truck engine has a sound power level of 90 dBA operating at 15 minutes per hour during the daytime and 10 minutes per hour during the nighttime. It is assumed that the trailer refrigeration unit has a sound power level of 97 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime.

The building rooftop equipment assumed is two large rooftop chiller units, each with a sound power level of 90 dBA operating in steady-state during the daytime and 30 minutes per hour during the nighttime, and two electric fans each with a sound power level of 70 dBA operating in steady-state during the daytime.

2.1.2.2 Off-Site Stationary Noise

Based upon a review of the site's environs using aerial photography, no off-site stationary noise sources are present that would impact on-site sensitive noise receivers.

2.2 Sound Level Limits for Road Noise

Sound level criteria for road traffic were extracted from the ENC Guidelines. Noise levels are expressed in the form Leq (T) which refers to a weighted level of a steady sound carrying the same total energy in the time period T (in hours) as the observed fluctuation sound.

2.2.1 Indoor sound level criterion – ventilation and warning clause requirements

The recommended indoor sound level criteria from Table 2.2b of the ENC Guidelines are as follows:

- Daycare – 07:00 to 23:00 – 45 dBA Leq (16 hours)

The sound levels are based on the windows and doors to an indoor space being closed. Daycares are exempt from night-time land analysis, given that these facilities are not expected to be occupied or in use overnight.

As discussed previously, Building 'J' consists of a single-storey daycare and an adjacent playground (i.e. outdoor living area). For the purpose of assessing the most significant indoor noise in this study, receptor locations were observed at 1.5 metres above the ground for the plane of window and outdoor living area (OLA) with the highest exposure to the arterial road network.

As per NPC-300 C7.1.3, if the daytime outdoor sound levels exceed 65 dBA at the plane of the window, then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria, then the Building Component (walls, windows, etc.) must be designed to achieve indoor sound level criteria.

In accordance with NPC-300 C7.1.2.1 and C7.1.2.2, when the outdoor noise levels are greater than 55 dBA and less than or equal to 65 dBA at the plane of the window, then a warning clause is compulsory. This warning clause specifies that forced air heating with a provision for central air conditioning is required. Should the outdoor sound levels exceed this criteria, central air conditioning is mandatory, and a warning clause is required.

2.2.2 Outdoor sound level criterion

As per Table 2.2a of the ENC Guidelines, the sound level criterion for the outdoor living area (OLA) for the daytime period between 07:00 and 23:00 hours is 55 dBA Leq (16). Sound levels for the OLA are calculated at locations with the highest potential exposure to traffic noise from the adjacent road network, as indicated on the **Transportation Noise Plan** (see **Appendix B**), at a height of 1.5 metres above the ground.

If the Leq sound level is less than or equal to 55 dBA (daytime), no further action is required by the proponent. In the event that the sound level exceeds the criteria by less than 5 dBA, a warning clause may be provided to prospective tenants or the proponent may install physical attenuation. For sound levels greater than 5 dBA above the criteria (i.e. greater than 60 dBA), control measures are required to reduce the noise levels as close to 55 dBA as technically, economically and administratively possible. Should the sound levels with the barrier in place exceed 55 dBA, a warning clause is also required.

2.2.3 Indoor Sound Level Criterion – Building Components

As per NPC-300 C7.1.3, when the outdoor sound levels are less than or equal to 65 dBA at the plane of the window and/or less than or equal to 60 dBA at the bedroom level, then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria then the Building Components, including windows, walls and doors must be designed to

achieve indoor sound level criteria described previously and extracted from Table 2.2b of the ENC Guidelines.

2.3 Sound Level Limits for Aircraft Noise

An aircraft noise impact assessment is based on the Noise Exposure Forecast (NEF) and Noise Exposure Projection (NEP) methods approved by Transport Canada. The noise contours were used to define the Airport Operating Influence Zone (AOIZ) and Airport Vicinity Development Zone (AVDZ) which is shown on Schedule C14 of the 2021 Draft Official Plan.

No new noise sensitive developments are permitted within the AOIZ. Noise sensitive development is permitted within the AVDZ and outside of the AOIZ, subject to a noise study, or under the Prescribed Measures for Aircraft Noise in Part 6 of the ENC Guidelines. Indoor and outdoor sound level limits for aircraft noise is included in Table 4.2a of the ENC Guidelines.

2.4 Sound Level Limits for Stationary Noise

The potential stationary noise sources that may impact the existing adjacent residential sensitive receivers are mechanical equipment and delivery vehicles from proposed on-site sources.

The MECP criteria for noise levels resulting from stationary noise sources is the greater of the ambient background noise level or the exclusionary noise levels summarized in **Table 2-1** below.

Table 2-1 – Stationary Noise Level Criteria

TIME PERIOD	LOCATION	CLASS 1	CLASS 2	CLASS 3	CLASS 4
0700 – 1900	Outdoor Living Area	**50 dBA**	50 dBA	45 dBA	55 dBA
1900 – 2300	Outdoor Living Area	**50 dBA**	45 dBA	40 dBA	55 dBA
0700 – 1900	Plane of Window	**50 dBA**	50 dBA	45 dBA	60 dBA
1900 – 2300	Plane of Window	**50 dBA**	50 dBA	40 dBA	60 dBA
2300 – 0700	Plane of Window	**45 dBA**	45 dBA	40 dBA	55 dBA

Given the subject property is located in an urban population center where the background sound level is dominated by urban hum, it will be assumed that the development and surroundings are located in a ‘Class 1’ area (urban) as defined in NPC-300. For the purposes of this study, it will also be assumed that the exclusionary limits for ‘Class 1’ will be the applicable noise level criteria for this study. It is possible that the ambient noise level may be higher and, as such, this can be considered a conservative assumption.

3 Noise Analysis

3.1 Road Traffic Data Parameters

Based on the configuration of the road transportation network in relation to the proposed development, it is assumed that the major sources of transportation noise impacting the site will originate externally from Earl Armstrong Road and Limebank Road, as described in **Table 3-1** below:

Table 3-1 - Existing Roadways

NAME	CLASS	JURISDICTION	ORIENTATION & EXTENTS	CROSS-SECTION	ROW (m)	SPEED LIMIT (km/h)
Earl Armstrong Road	Arterial	City of Ottawa	East-West, River Road to High Road	4-Lane, Urban, Divided	44.5	80
Limebank Road	Arterial	City of Ottawa	North-South, River Road to Mitch Owens Road	4-Lane, Urban, Divided	44.5	80

Table 3-2 below summarizes the traffic and road parameters used in this report for both Earl Armstrong and Limebank. These parameters were extracted from Appendix B: Table B1 of the ENC Guidelines.

Table 3-2 – Traffic & Road Data Summary

NOISE PARAMETERS	EARL ARMSTRONG ROAD & LIMEBANK ROAD (4-UAD)
Annual Average Daily Traffic (AADT)	35,000
Posted Speed Limit (km/h)	80
% Medium Trucks	7%
% Heavy Trucks	5%
% Daytime Traffic	92%

All other collector or higher-order roads are separated from the subject property by a significant distance which is well in excess of the 100-metre threshold specified in the ENC Guidelines, therefore the transportation-related noise impacts from these roads were not considered explicitly in the analysis for this study.

3.2 Unattenuated Traffic Noise Analysis

Roadway noise was calculated using the STAMSON v5.04 computer program, an industry-standard program which applies the ORNAMENT methodology developed by the Ontario Ministry of the Environment, Conservation and Parks (MECP).

Unattenuated daytime and nighttime noise levels at the building face, calculated to determine indoor sound levels, are presented in **Table 3-3** below. Parameters applied to determine the noise levels, including the perpendicular distance from source to receiver and the roadway segment angles, are also indicated. As per standard practice for four-lane arterial, divided roads, the noise levels are calculated separately for opposing directions of travel and then combined.

STAMSON noise calculations conducted for this study are included in **Appendix A**.

Table 3-3 – Unattenuated Noise Levels at Building Face

LOCATION	ROADWAY	SOURCE - RECEIVER DISTANCE (m) NB/SB LANES	SEGMENT ANGLES		INDOOR NOISE LEVELS (dBA)
			LEFT	RIGHT	DAYTIME
Building 'J' – N/E Corner	Limebank NB	174.5	-90.00	-40.00	51.87
	Limebank SB	162.0	-90.00	-40.00	
	Earl Armstrong EB	157.0	-15.00	-5.00	
	Earl Armstrong WB	169.5	-15.00	-5.00	
Building 'J' – N/W Corner	Limebank NB	201.5	-90.00	-30.00	51.93
	Limebank SB	189.0	-90.00	-30.00	
	Earl Armstrong EB	173.5	15.00	25.00	
	Earl Armstrong WB	156.5	15.00	25.00	

As indicated in **Table 3-3** above, both of the critical receptor locations will remain well within the 55 dBA threshold established by the City of Ottawa/MECP.

The **Transportation Noise Plan** (see **Appendix B**) identifies one outdoor living area (OLA), the playground immediately west of Building 'J'. An analysis has been conducted of this OLA, and is presented in **Table 3-4** below. Receptors P1 and P2 were selected to evaluate locations with the highest noise exposure with respect to the surrounding arterial road network.

Table 3-4 – Unattenuated Noise Levels at OLA

LOCATION	ROADWAY	SOURCE - RECEIVER DISTANCE (m) NB/ SB LANES	SEGMENT ANGLES		OUTDOOR NOISE LEVELS (dBA)
			LEFT	RIGHT	
Playground – P1	Limebank NB	221.0	-25.00	-90.00	49.24
	Limebank SB	208.5	-25.00	-90.00	
	Earl Armstrong EB	174.0	-5.00	15.00	
	Earl Armstrong WB	160.0	-5.00	15.00	
Playground – P2	Limebank NB	215.5	-20.00	-10.00	52.14
	Limebank SB	203.0	-20.00	-10.00	
	Earl Armstrong EB	150.0	-5.00	20.00	
	Earl Armstrong WB	136.0	-5.00	20.00	

As identified in **Table 3-4** above, the noise levels are expected to remain within the acceptable threshold of 55dBA across the Outdoor Living Area (OLA) and therefore no further consideration of abatement measures with respect to the Playground amenity area are required.

The screening of the OLA by other buildings proposed within subject development is expected to help maintain noise levels below the 55 dBA across the vast majority of the OLA. As such, no physical attenuation measures were considered as part of this study.

3.3 Stationary Noise Analysis

3.3.1 On-Site & Off-Site Receiver Locations

The off-site and on-site stationary noise sensitive receiver locations are summarized in **Table 3-5** and **Table 3-6**, respectively and represent the worst-case sensitive receiver locations.

Table 3-5– Off-Site Stationary Noise Receiver Locations

RECEIVER	LOCATION	FLOORS
Receiver R1	Residential Building 218 Eye Bright Crescent - East Façade	1 to 2
Receiver R2	Residential Building 224 Eye Bright Crescent - East Façade	1 to 2
Receiver R3	Residential Building 232 Eye Bright Crescent - East Façade	1 to 2
Receiver R4	Residential Building 238 Eye Bright Crescent - East Façade	1 to 2
Receiver R5	Residential Building 248 Eye Bright Crescent - East Façade	1 to 2
Receiver R6	Residential Building 254 Eye Bright Crescent - East Façade	1 to 2
Receiver R7	Residential Building 580 Dusty Miller - East Façade	1 to 2
Receiver R8	Residential Building 572 Dusty Miller - East Façade	1 to 2
Receiver R9	Residential Building 554 Dusty Miller - East Façade	1 to 2

Table 3-6 – On-Site Stationary Noise Receiver Locations

RECEIVER	LOCATION	FLOOR(S)
Receiver R10	Daycare Playground Outdoor Living Area (OLA)	1

3.3.2 On- & Off-Site Stationary Receiver Results (Unattenuated)

The noise levels produced by on-site stationary noise sources were modeled/predicted utilizing Cadna A v2022 by DataKustik. This software is recognized in the industry for noise modeling and utilizes ISO 9613-2. The following sections review the modelled/predicted on-site and off-site noise impacts.

Table 3-7 below summarizes the unattenuated noise levels from on-site sources for each of the ten ‘noise sensitive’ receiver locations selected for the stationary noise evaluation.

The Cadna A output which includes sound-level bands for unattenuated on-site noise sources is provided in **Appendix C-1**.

Table 3-7 – Unattenuated Noise Levels from On & Off-Site Stationary Noise Sources

RECEIVER	RECEIVER NOISE LEVEL (DBA)			
	FLOOR 1		FLOOR 2	
	DAY	NIGHT	DAY	NIGHT
R1	43.5	40.5	47.6	44.6
R2	48.4	45.4	**52.3**	**49.3**
R3	48.4	45.4	**52.3**	**49.3**
R4	**52.6**	**49.7**	**55.5**	**52.5**
R5	**52.9**	**49.9**	**55.7**	**52.7**
R6	47.4	44.4	**51.2**	**48.2**
R7	43.9	40.9	48.5	**45.5**
R8	43.8	40.8	48.9	**45.9**
R9	43.4	40.3	47.6	44.6
R10	46.9	-	-	-

As shown in **Table 3-7** above, the noise levels produced by the proposed on-site stationary sources exceed 50 dBA during the daytime and 45 dBA during the nighttime at Receivers 2 to 8. Accordingly, noise mitigation will be required as a result of the on-site stationary noise sources.

4 Abatement Measures

4.1 Indoor Sound Levels

As per the indoor noise analysis presented in **Table 3-3** above, noise levels in Building 'J' (daycare) are expected to remain within acceptable City of Ottawa/MECP standards and therefore no abatement measures such as warning clauses, ventilation upgrades or a building component review are required as part of this study.

4.2 Outdoor Living Area (OLA)

With respect to the noise results summarized in **Table 3-4** above, noise levels in the playground amenity area associated with Building 'J' are expected to remain within acceptable City of Ottawa/MECP standards. As such, no abatement measures such as warning clauses or physical mitigation measures (e.g. berms, barriers) are required as part of this study.

4.3 Aircraft Sound Levels

As stated in Section 2.1, the subject site is entirely located within the Airport Vicinity Development Zone (AVDZ). The site is, however, outside of the 25 NEF/NEP contour line and therefore the Building Components and ventilation requirements, presented in Part 6: Prescribed Measures for Aircraft Noise of the ENC Guidelines, do not apply. A warning clause is required for 'noise-sensitive' uses inside the AVDZ, which in this case applies to Building 'J' and its accompanying playground amenity area.

4.4 Stationary Noise Sound Levels

As summarized in Section 3.3, noise levels from off-site stationary sources at Receiver A are marginally above MECP exclusion limits for a Class 1 designation, therefore mitigation measures have been considered.

4.4.1 Physical Mitigation

In order to achieve the exclusionary noise limits specified previously in **Table 2-1** at Receiver Locations R1 to R10, 1.8m high noise barriers for rooftop chiller units on Building 'I' and Building 'L' could be utilized. A 6.0m high barrier would also be required to mitigate noise from the truck loading area for Building 'L'. The results of these mitigation measures are provided in **Table 4-1** below.

The Cadna A output which considers the physical attenuation measures described above is provided in **Appendix C-2**. These physical mitigation measures are indicated on the **Stationary Noise Plan** in **Appendix D**.

Table 4-1 – Attenuated Noise Levels from On- & Off-Site Stationary Noise Sources

RECEIVER	RECEIVER NOISE LEVEL (DBA)			
	FLOOR 1		FLOOR 2	
	DAY	NIGHT	DAY	NIGHT
R1	43.0	40.0	47.1	44.0
R2	44.5	41.5	47.8	44.8
R3	44.5	41.5	47.8	44.8
R4	43.1	40.1	45.7	42.7
R5	42.3	39.3	45.2	42.2
R6	40.6	37.6	41.7	38.7
R7	41.1	38.1	43.6	40.6
R8	41.4	38.3	44.7	41.7
R9	42.8	39.7	46.5	43.5
R10	46.8	-	-	-

5 Summary of Attenuation Measures

5.1 Warning Clauses

A noise warning clause must appear on the Tenancy or Lease Agreement for applicable 'noise sensitive' buildings and outdoor living areas (OLAs) indicated on the **Transportation Noise Plan** (**Appendix B**) and listed in **Table 5-1** below.

Table 5-1 – Warning Clause Summary

WARNING CLAUSE	OLA	APPLICABLE BUILDING/FAÇADE/UNITS
Aircraft Warning Clause	Playground Amenity Area	Building 'J'

The warning clause for aircraft noise is as follows:

"Tenants are advised that due to the proximity of the Ottawa Macdonald-Cartier International Airport, noise from the airport and individual aircraft may at times interfere with indoor or outdoor activities".

5.2 Ventilation Requirements and Building Components

The indoor noise analysis presented in Section 3 did not identify any critical receptor locations in exceedance of the 55 dBA threshold. As such, there are no specific ventilation requirements regarding forced air heating systems or central air conditioning for Building 'J' to satisfy MECP noise requirements. It is noted that all buildings within the proposed development will be designed and constructed in accordance with the Ontario Building Code.

5.3 Noise Barrier

Based on the foregoing analysis results, it is anticipated that noise barriers, as identified on the **Stationary Noise Plan** (see **Appendix D**) will be required at the following locations to allow the receptor locations to experience noise levels below the noise exclusionary thresholds:

- 1.8m high barrier to screen rooftop chillers on Buildings 'I' and 'L'; and
- A 6.0m high barrier to mitigate noise from the truck loading area for Building 'L'.

It should be noted that the above barrier locations are preliminary and will need to be confirmed during the detailed design stage.

6 Conclusion

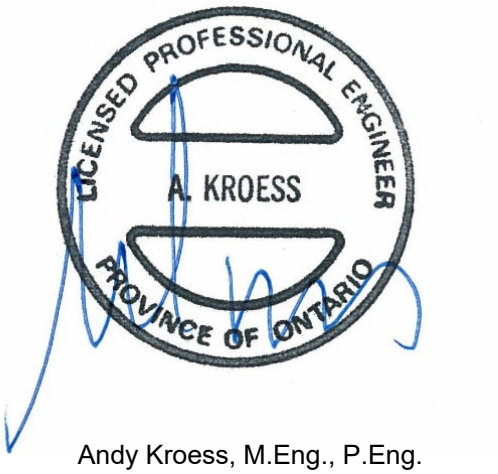
This Environmental Noise Impact Assessment was conducted in support of a Site Plan Control application for a proposed commercial and office development at 1515 Earl Armstrong Road, within the Riverside South community of Ottawa. The impacts of traffic noise within the proposed development were evaluated and, based on the analysis conducted for this study, it is expected that noise levels will remain within the standards established by the City of Ottawa and Ministry of the Environment, Conservation and Parks (MECP). Given that the subject site is located entirely within the Airport Vicinity Development Zone (AVDZ), however, an aircraft warning clause will be required for both indoor and outdoor 'noise sensitive' land uses which are limited to Building 'J' and its accompanying playground amenity area.

In terms of stationary noise, the analysis conducted as part of this study indicated that a 6.0-metre barrier on the west side of the truck loading dock for Building 'L' and 1.8-metre barriers surrounding rooftop chillers on both Buildings 'I' and 'L' may be effective in achieving exclusionary limits for Class 1 at each of the 'noise sensitive' receiver locations. It is recommended, however, that on-site noise sources including truck loading docks, rooftop HVAC equipment, drive-thru speakers, and any other potential stationary sources be confirmed at the final site design stage and that this ENIA be updated to reflect actual noise levels and required mitigation measures.

7 Professional Authorization

Prepared by:

Ben Pascolo-Neveu, P. Eng.



Andy Kroess, M.Eng., P.Eng.

137404 Earl Armstrong Road and Limebank Road (EP2020-013) - Internal Documents\6.0_Technical\6.04_Civil\01_Brief_Noise\ENIA\Stationary Noise

Appendix A – STAMSON Noise Calculations

- Appendix A-1 – Indoor Noise Levels at Building Face
- Appendix A-2 – Outdoor Living Area (OLA)

```
STAMSON 5.0        NORMAL REPORT        Date: 12-12-2022 23:04:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bjne.te              Time Period: Day/Night 16/8 hours
Description: building 'j' northeast indoor


Road data, segment # 1: limebank nb (day/night)
-----------------------------------------------
Car traffic volume  : 14168/1232  veh/TimePeriod  *
Medium truck volume :  1127/98    veh/TimePeriod  *
Heavy truck volume  :   805/70    veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  17500
    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: limebank nb (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   -40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 174.50 / 174.50 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 2: limbank sb (day/night)
----------------------------------------------
Car traffic volume  : 14168/1232  veh/TimePeriod  *
Medium truck volume :  1127/98    veh/TimePeriod  *
Heavy truck volume  :   805/70    veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  17500
    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 # 2: limbank sb (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   -40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 162.00 / 162.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

FF
Road data, segment # 3: ea eb (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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 # 3: ea eb (day/night)

Angle1 Angle2 : -15.00 deg -5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 157.00 / 157.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Road data, segment # 4: ea wb (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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 # 4: ea wb (day/night)

Angle1 Angle2 : -15.00 deg -5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 169.50 / 169.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: limebank nb (day)

Source height = 1.50 m

ROAD (0.00 + 47.14 + 0.00) = 47.14 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-40	0.66	73.16	0.00	-17.69	-8.32	0.00	0.00	0.00	47.14

Segment Leq : 47.14 dBA

FF

Results segment # 2: limbank sb (day)

Source height = 1.50 m

ROAD (0.00 + 47.68 + 0.00) = 47.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-40	0.66	73.16	0.00	-17.15	-8.32	0.00	0.00	0.00	47.68

Segment Leq : 47.68 dBA

FF

Results segment # 3: ea eb (day)

Source height = 1.50 m

ROAD (0.00 + 43.63 + 0.00) = 43.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	-5	0.66	73.16	0.00	-16.93	-12.60	0.00	0.00	0.00	43.63

Segment Leq : 43.63 dBA

FF

Results segment # 4: ea wb (day)

Source height = 1.50 m

ROAD (0.00 + 43.07 + 0.00) = 43.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	-5	0.66	73.16	0.00	-17.48	-12.60	0.00	0.00	0.00	43.07

Segment Leq : 43.07 dBA

Total Leq All Segments: 51.87 dBA

FF

Results segment # 1: limebank nb (night)

Source height = 1.50 m

ROAD (0.00 + 40.83 + 0.00) = 40.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-40	0.57	65.56	0.00	-16.73	-8.00	0.00	0.00	0.00	40.83

Segment Leq : 40.83 dBA

FF
Results segment # 2: limbank sb (night)

Source height = 1.50 m

ROAD (0.00 + 41.33 + 0.00) = 41.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-40	0.57	65.56	0.00	-16.23	-8.00	0.00	0.00	0.00	41.33

Segment Leq : 41.33 dBA

FF
Results segment # 3: ea eb (night)

Source height = 1.50 m

ROAD (0.00 + 36.95 + 0.00) = 36.95 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	-5	0.57	65.56	0.00	-16.01	-12.59	0.00	0.00	0.00	36.95

Segment Leq : 36.95 dBA

FF
Results segment # 4: ea wb (night)

Source height = 1.50 m

ROAD (0.00 + 36.43 + 0.00) = 36.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-15	-5	0.57	65.56	0.00	-16.53	-12.59	0.00	0.00	0.00	36.43

Segment Leq : 36.43 dBA

Total Leq All Segments: 45.45 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 51.87
(NIGHT): 45.45
FF
FF

```
STAMSON 5.0        NORMAL REPORT        Date: 13-12-2022 10:24:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: bjnw.te              Time Period: Day/Night 16/8 hours
Description: building 'j' northwest corner indoor


Road data, segment # 1: limebank nb (day/night)
-----------------------------------------------
Car traffic volume  : 14168/1232  veh/TimePeriod  *
Medium truck volume :  1127/98    veh/TimePeriod  *
Heavy truck volume  :   805/70    veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  17500
    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: limebank nb (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   -30.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 201.50 / 201.50 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

FF
Road data, segment # 2: limbank sb (day/night)
----------------------------------------------
Car traffic volume  : 14168/1232  veh/TimePeriod  *
Medium truck volume :  1127/98    veh/TimePeriod  *
Heavy truck volume  :   805/70    veh/TimePeriod  *
Posted speed limit  :    80 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  17500
    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 # 2: limbank sb (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   -30.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 189.00 / 189.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

FF
Road data, segment # 3: ea eb (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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 # 3: ea eb (day/night)

Angle1 Angle2 : 15.00 deg 25.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 173.50 / 173.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Road data, segment # 4: ea wb (day/night)

Car traffic volume : 14168/1232 veh/TimePeriod *
Medium truck volume : 1127/98 veh/TimePeriod *
Heavy truck volume : 805/70 veh/TimePeriod *
Posted speed limit : 80 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 17500
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 # 4: ea wb (day/night)

Angle1 Angle2 : 15.00 deg 25.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 156.50 / 156.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

FF
Results segment # 1: limebank nb (day)

Source height = 1.50 m

ROAD (0.00 + 47.35 + 0.00) = 47.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.66	73.16	0.00	-18.73	-7.08	0.00	0.00	0.00	47.35

Segment Leq : 47.35 dBA

FF

Results segment # 2: limbank sb (day)

Source height = 1.50 m

ROAD (0.00 + 47.81 + 0.00) = 47.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.66	73.16	0.00	-18.27	-7.08	0.00	0.00	0.00	47.81

Segment Leq : 47.81 dBA

FF

Results segment # 3: ea eb (day)

Source height = 1.50 m

ROAD (0.00 + 42.77 + 0.00) = 42.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
15	25	0.66	73.16	0.00	-17.65	-12.73	0.00	0.00	0.00	42.77

Segment Leq : 42.77 dBA

FF

Results segment # 4: ea wb (day)

Source height = 1.50 m

ROAD (0.00 + 43.52 + 0.00) = 43.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
15	25	0.66	73.16	0.00	-16.91	-12.73	0.00	0.00	0.00	43.52

Segment Leq : 43.52 dBA

Total Leq All Segments: 51.93 dBA

FF

Results segment # 1: limebank nb (night)

Source height = 1.50 m

ROAD (0.00 + 41.03 + 0.00) = 41.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.57	65.56	0.00	-17.71	-6.82	0.00	0.00	0.00	41.03

Segment Leq : 41.03 dBA

FF
Results segment # 2: limbank sb (night)

Source height = 1.50 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
-90	-30	0.57	65.56	0.00	-17.28	-6.82	0.00	0.00	0.00	41.46

Segment Leq : 41.46 dBA

FF
Results segment # 3: ea eb (night)

Source height = 1.50 m

ROAD (0.00 + 36.16 + 0.00) = 36.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
15	25	0.57	65.56	0.00	-16.69	-12.71	0.00	0.00	0.00	36.16

Segment Leq : 36.16 dBA
p
FF
Results segment # 4: ea wb (night)

Source height = 1.50 m

ROAD (0.00 + 36.86 + 0.00) = 36.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
15	25	0.57	65.56	0.00	-15.99	-12.71	0.00	0.00	0.00	36.86

Segment Leq : 36.86 dBA

Total Leq All Segments: 45.52 dBA

FF

TOTAL Leq FROM ALL SOURCES (DAY): 51.93
(NIGHT): 45.52
FF
FF

Appendix B – Transportation Noise Plan

EXISTING RESIDENTIAL

Note: Building 'J' and the Playground both require an Aircraft Warning Clause on the Tenancy or Lease Agreement as specified in Section 5.1 of the ENIA report.

PART 1
parking total : 293

PART 2
parking total : 173

PART 3
parking total : 154

PART 4

PARK/OPEN SPACE

EXISTING RESIDENTIAL

EARL ARMSTRONG RD.

LIMEBANK RD

LEGEND:

- OUTDOOR LIVING AREA (OLA) NOISE RECEPTOR
- INDOOR NOISE RECEPTOR

DREDGE LEAHY ARCHITECTS

1515 - EARL ARMSTRONG PLAZA | 2022/12/09

Site Plan

APPENDIX B - TRANSPORTATION NOISE PLAN

Urbandale CORPORATION

DREDGE LEAHY Architects Inc. 411 - 11 HOLLAND AVE., OTTAWA, ON K1Y 4S1 613.724.9865 dl-arch.ca

Appendix C – Cadna A Output

- Appendix C-1 – Unattenuated On-Site Stationary Noise Sources
- Appendix C-2 – Attenuated On-Site Stationary Noise Sources

APPENDIX C-1 - UNATTENUATED ON-SITE STATIONARY NOISE SOURCES

APPENDIX C-2 - ATTENUATED ON-SITE STATIONARY NOISE SOURCES

Appendix D – Stationary Noise Plan

Dusty Miller Crescent

Eye Bright Crescent

Limebank Road

Earl Armstrong Road

254

248

238

232

224

218

580

572

554

REC 6
Daytime
Floor 1: 40.6 dBA
Floor 2: 41.7 dBA
Nighttime
Floor 1: 37.6 dBA
Floor 2: 38.7 dBA

REC 7
Daytime
Floor 1: 41.1 dBA
Floor 2: 43.6 dBA
Nighttime
Floor 1: 38.1 dBA
Floor 2: 40.0 dBA

REC 8
Daytime
Floor 1: 41.4 dBA
Floor 2: 44.7 dBA
Nighttime
Floor 1: 38.3 dBA
Floor 2: 41.7 dBA

REC 9
Daytime
Floor 1: 42.8 dBA
Floor 2: 46.5 dBA
Nighttime
Floor 1: 39.7 dBA
Floor 2: 43.5 dBA

REC 5
Daytime
Floor 1: 42.3 dBA
Floor 2: 45.2 dBA
Nighttime
Floor 1: 39.3 dBA
Floor 2: 42.2 dBA

REC 4
Daytime
Floor 1: 43.1 dBA
Floor 2: 45.7 dBA
Nighttime
Floor 1: 40.1 dBA
Floor 2: 42.7 dBA

REC 3
Daytime
Floor 1: 44.5 dBA
Floor 2: 47.8 dBA
Nighttime
Floor 1: 41.5 dBA
Floor 2: 44.8 dBA

REC 2
Daytime
Floor 1: 44.5 dBA
Floor 2: 47.8 dBA
Nighttime
Floor 1: 41.5 dBA
Floor 2: 44.8 dBA

REC 1
Daytime
Floor 1: 43.0 dBA
Floor 2: 47.1 dBA
Nighttime
Floor 1: 40.0 dBA
Floor 2: 44.0 dBA

REC 10 (OLA)
46.8 dBA

HVAC Large
Electric Fan
1.8m High Barrier
Building L
Refrigerator Unit
Idling Truck
6.0m High Barrier
Building J
Daycare Playground
HVAC Medium X 5
Building I
1.8m High Barrier
Electric Fan
HVAC Large X 2
Drive-Thru Speaker
Building H
HVAC Medium
Building G
HVAC Medium X 7
HVAC Medium X 8
Building A
HVAC Medium X 9
Building F
Building K
HVAC Medium X 7
Building B
HVAC Large
Building C
HVAC Medium X 8
Building D
HVAC Medium X 4
Building E
HVAC Medium X 6

> -99.0 dB
> 35.0 dB
> 40.0 dB
> 45.0 dB
> 50.0 dB
> 55.0 dB
> 60.0 dB
> 65.0 dB
> 70.0 dB
> 75.0 dB
> 80.0 dB
> 85.0 dB

APPENDIX D - STATIONARY NOISE PLAN