REPORT
PROJECT: 122283-6.2.1

NOISE CONTROL FEASIBILITY STUDY
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
LEITRIM DEVELOPMENT AREA

Prepared for Tartan Land Corporation
by IBI GROUP

JANUARY 2020

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1 INTRODUCTION

This report has been prepared to determine the impact of roadway traffic on the residential lands of the Findlay Creek Stage 5 development area in the Leitrim Community of Ottawa. The report analyses the expected noise levels in the development and any required noise control measures.

The current draft plan of subdivision for Findlay Creek Stage 5 is shown on **Figure 1**. The property, which is located south of Leitrim Road and west of Kelly Farm Drive, occupies approximately 18 ha and consists of single-family lots and street townhomes.

2 BACKGROUND

2.1 Noise Sources

The study area is primarily subject to roadway noise from existing Kelly Farm Drive and Leitrim Road. Ultimately, Leitrim Road will be re-aligned to follow the curvature of the northern and western property boundaries.

The subject site is located within Airport Vicinity Development Zone (AVDZ), as shown on Annex 10 and Schedule K of the 2013 Official Plan, therefore aircraft noise from the Ottawa International Airport has the potential to impact these lands as well.

There are no rail lines within 500 metres of the site, therefore no consideration has been given to the noise impacts from rail traffic in accordance with the City of *Ottawa Environmental Noise Control Guidelines (January 2016)*, hereafter referred to as the ENC Guidelines.

2.2 Sound Level Limits for Road Traffic

Sound level criteria for road traffic is taken from the *City of Ottawa Environmental Noise Control Guidelines* and the *Ministry of Environment Publication NPC-300 (August 2013)*. 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

Similar to outdoor noise levels, the recommended indoor sound, the sound level criteria from Table 2.2b of the ENC Guidelines are as follows:

- Bedrooms – 23:00 to 07:00 – 40 dBA Leq (8)
- Other areas – 07:00 to 23:00 – 45 dBA Leq (16)

The sound levels are based on the windows and doors to an indoor space being closed.

For the purpose of assessing indoor sound levels, the outdoor sound levels are observed at the plane of the living room window at 1.5 metres above the ground for daytime noise and at the plane of the bedroom window 4.5 metres above the ground for nighttime noise.

As per NPC-300 C7.1.2.1 and C7.1.2.2, when the outdoor noise levels at the living room are greater than 55 dBA and less than or equal to 65 dBA and/or greater than 50 dBA and less than or equal to 60 dBA at the bedroom window then a warning clause is required and forced air heating with provision for central air conditioning is required.

Should the outdoor noise levels exceed 65 dBA at the living room and/or exceed 60 dBA at the bedroom then central air conditioning is mandatory and a warning clause is required.

2.2.2 Outdoor sound level criterion

As per Table 2.2a of NPC-300, the sound level criteria 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 3 metres from the building face at the centre of the unit or within the centre of the OLA at a height of 1.5 metres above the ground.

If the Leq sound level is less than or equal to the above criteria then no further action is required by the developer. If the sound level exceeds the criteria by less than 5 dBA then the developer may, with City approval, either provide a warning clause to prospective purchasers or install physical attenuation. For sound levels greater than 5 dBA above the criteria 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 living room 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 component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

2.3 Sound Level Limits for Aircraft Noise

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 K of the 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.

3 ROADWAY NOISE

3.1 Road Traffic Data

The major sources of road noise impacting the site are expected to originate from the traffic flows along Leitrim Road and Kelly Farm Drive.

Kelly Farm Drive

Kelly Farm Drive is a recently-constructed two-lane, undivided urban collector (2-UCU) roadway with a posted speed limit of 50km/h.

Leitrim Road

Leitrim Road is currently a two-lane, undivided rural roadway and a posted speed limit of 80 km/h adjacent to the subject site. The *Leitrim Road Realignment and Widening Environmental Assessment Study* (approved by Transportation Committee and Council in May 2018) recommends reconstructing the roadway as a four-lane, undivided arterial with a posted speed limit of 60 km/h within the vicinity of the site. In the future, Leitrim Road is planned to realigned along the western property boundary of the site. Traffic volume projections for Leitrim Road were extracted from Appendix B: Table B1 of the ENC Guidelines for a four-lane, undivided urban arterial (4-UAU) roadway, and are conservatively based on the capacity of the roadway with its ultimate configuration. The timing of the realignment and widening of Leitrim Road is currently unknown and will be dictated by the future southern expansion of the Ottawa International Airport. This Draft Plan has been developed with a long term lens that provisions for the future Leitrim Road realignment.

Table 3.1 summarizes the traffic and road parameters are used to assess the noise levels.

TABLE 3.1: TRAFFIC AND ROAD DATA SUMMARY

	LEITRIM ROAD	KELLY FARM DRIVE
Annual Average Daily Traffic (AADT)	30,000	8,000
Posted Speed Limit (km/h)	60	50
% Medium Trucks	7%	7%
% Heavy Trucks	5%	5%
% Daytime Traffic	92%	92%

3.2 Calculation Methods

Roadway noise is calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment.

This study will identify the noise contours generated by the traffic for various scenarios. To determine the indoor noise level requirements for ventilation and noise clauses, the contours for the 55 dBA daytime and 50 dBA nighttime levels are used. For the indoor noise level requirement to evaluate building components, mandatory air conditioning and warning clauses, the 65 dBA daytime and 60 dBA night time contours are used. To determine the requirements for outdoor noise levels on the outdoor living area, the 55 dBA and 60 dBA daytime noise contours are used. The following table provides the offset from centreline of the roadway to the noise contours. The distances in **Table 3.2** are measured from the centreline of the right-of-way for Leitrim Road and the centreline of the road for Kelly Farm Drive.

TABLE 3.2: NOISE CONTOUR OFFSETS

NOISE CRITERIA		DISTANCE FROM CENTRELINE (M)	
		LEITRIM ROAD 4-UAU	KELLY FARM DRIVE 2-UAU
Indoor Daytime	65 dBA	37.2	<15
	55 dBA	149.0	54.4
Indoor Nighttime	60 dBA	27.4	<15
	50 dBA	118.7	41.0
Outdoor Living Area (Daytime Only)	60 dBA	74.4	27.2
	55 dBA	149.0	54.4

Based on **Table 3.2** above for the indoor noise evaluation, the daytime contours are further from centreline than the nighttime levels for each criterion; therefore, only the daytime levels will be used in the evaluation. Noise contours for both indoor (daytime only) and outdoor noise evaluation are shown on **Figure 2** for the existing Leitrim Road alignment and on **Figure 3** for the future realignment. The noise contours have not been adjusted to reflect screening from proposed buildings. For clarity purposes, the noise contours have not been extended where they intersect with the noise contours from the larger roadway.

The exact distances for the 65 dBA indoor daytime contour and the 60 dBA indoor nighttime contour on Kelly Farm Drive are less than 15 metres from the road centreline and therefore cannot be determined using the STAMSON noise software. It should be noted, however, that these contours would be located within close proximity to or within the Kelly Farm Drive right-of-way. As well, there is a large ditch along the west side of Kelly Farm Drive, further separating lots backing onto Kelly Farm Drive from these critical noise contours.

4 RESULTS

4.1 Indoor Sound Levels

The daytime indoor 55 dBA contour shown on **Figure 2** and **Figure 3** represent the limit in which a Type 'C' Warning Clause and forced air heating with provision for central air conditioning are required for the residential units.

The daytime indoor 65 dBA contour is the limit in which a Type 'D' warning clause, central air conditioning and an acoustical review/ design of the building components are required. As noted in Section 3.2, the noise contours have not been adjusted to account for screening by the proposed buildings. A summary of the results of each roadway is as follows:

Leitrim Road – The 65 dBA indoor contour, located 37.2 metres from the centreline of the existing Leitrim Road alignment, impacts only a select number of dwelling units within closest proximity to roadway. In the future, when Leitrim Road is realigned, all units adjacent to the road will be impacted. The 55 dBA noise contour, extending 149.0 metres from centreline, impacts a large number of units, however the noise impacts will be reduced due to screening from the buildings closer to the road in both the interim and ultimate scenarios.

Any residential units that cross or are located within the 65 dBA contour in either the interim or ultimate scenarios require mandatory central air conditioning, a review of building components and a Type 'D' warning clause. Units that fall between 65 dBA and 55 dBA, requiring alternative means of ventilation and a Type 'C' warning clause, will be determined during detailed design.

Kelly Farm Drive – Although not explicitly shown on **Figure 2** or **Figure 3**, the 65 dBA contour would be within 3 metres of the Kelly Farm right-of-way. This represents a significant distance from the nearest residential units in the subdivision, which are separated from the collector road by a stormwater drainage area.

All units directly backing onto or flanking Kelly Farm Drive will be above 55 dBA, requiring alternative means of ventilation and a Type 'C' warning clause. The exact number of units that exceed 55 dBA will be determined during detailed design stage.

Warning clauses for indoor noise are as follows:

Type 'C'

"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property."

Type 'D'

"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria."

4.2 Outdoor Sound Levels

The outdoor 60 dBA contour on **Figure 2** and **Figure 3** represents the limit in which physical attenuation is required in the outdoor living areas of residential units. For units between the 60 dBA and 55 dBA contours, physical attenuation may not be required but should be considered as

stated in Part 4, Section 3.4 of the guidelines. A summary of the results for each roadway is as follows:

Leitrim Road – As the 60 dBA outdoor contour is located 74.4 m from the centreline of the road, all outdoor living areas (OLA) in this range will require physical alteration. Appropriate noise barrier locations for the existing Leitrim Road alignment and its future realignment are shown in **Figure 2** and **Figure 3,** respectively. Gaps in the potential noise barrier locations along the Leitrim Road realignment are indicated for service access roads or pathway connections.

In order to reduce the noise below 55 dBA, the barriers may need to be up to four metres in height. If this is not practical, then a barrier height of 2.5 metres would likely reduce the noise level below 60 dBA and a Type 'B' warning clause will be required.

There are a few locations where the noise level is below 60 dBA but above 55 dBA. At these locations, a Type 'A' warning clause could be considered in lieu of a noise barrier.

Kelly Farm Drive – The 60 dBA contour was determined to be within the stormwater drainage area immediately west of Kelly Farm Drive, which acts as a buffer between the collector road and the nearest proposed dwelling units. Therefore, no dwelling units are impacted by the 60 dBA noise contour for Kelly Farm Drive.

There are a number of locations where the noise level is below 60 dBA but above 55 dBA. At these locations, a Type 'A' warning clause could be considered in lieu of a noise barrier.

Warning clauses for outdoor noise are as follows:

Type 'A'

"Purchasers/tenants are advised that sound levels due to increasing Leitrim Road and Kelly Farm Drive traffic volumes may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

Type 'B'

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing Leitrim Road and Kelly Farm Drive traffic volumes may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the City's and the Ministry of the Environment's noise criteria."

4.3 Aircraft Sound Levels

As stated in Section 2.1, the site is entirely located within the Airport Vicinity Development Zone (AVDZ). The site is, however, located outside of the 25 NEF/NEP contour line, so the building components and ventilation requirements of Part 6: Prescribed Measures for Aircraft Noise of the ENC Guidelines do not apply. A warning clause is required for the residential units inside the AVDZ.

The warning clause for aircraft noise is as follows:

"Purchasers/tenants are advised that due to the proximity of the airport, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities".

5 CONCLUSION

This report outlines the impact of roadway noise on the Findlay Creek Stage 5 development located at 3100 Leitrim Road in Ottawa. The exact location of residential units requiring noise warning clauses, ventilation, air conditioning requirements, acoustical review/design of building components, and the location and size of noise barriers will be determined during the detailed design phase when the Draft Plan and grading plan are finalized.

Prepared by:

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Reviewed by:

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Associate

DRAFT PLAN OF SUBDIVISION

PART OF LOTS 16 AND 17 CONCESSION 4 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF GLOUCESTER)

CITY OF OTTAWA

Scale 1:1250

20 0 20 40 60 80 METRES

METRIC CONVERSION

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 OF THE PLANNING ACT.

(A)-AS SHOWN ON DRAFT PLAN
(B)-AS SHOWN ON DRAFT PLAN
(C)-AS SHOWN ON DRAFT AND KEY PLANS
(D)-SEE PROPOSED LAND USE BELOW
(E)-AS SHOWN ON DRAFT PLAN
(F)-AS SHOWN ON DRAFT PLAN
(G)-AS SHOWN ON DRAFT PLAN
(H)-CITY WATER AVAILABLE
(I)-SEE SOIL REPORT
(J)-SEE TOPOGRAPHICAL INFORMATION
(K)-ALL CITY SERVICES AVAILABLE
(L)-NO REGISTERED EASEMENTS ON TITLE

LAND USE

AREA OF LOTS (SINGLES 1-169) = 7.16 Hectares (17.7 Acres)
AREA OF BLOCKS (TOWNHOMES 170-223) = 4.88 Hectares (12.1 Acres)
AREA OF BLOCK (PARK 224) = 0.9 Hectares (2.2 Acres)
AREA OF BLOCK (REALIGNMENT 225) = 3.89 Hectares (9.6 Acres)
AREA OF BLOCKS (WALKWAYS 226-227) = 0.06 Hectares (0.15 Acres)
AREA OF ROADS = 4.99 Hectares (12.3 Acres)
TOTAL AREA OF SUBDIVISION = 21.90 Hectares (54.1 Acres)

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE SUBJECT LANDS AND THEIR RELATIONSHIP TO ADJOINING LANDS HAVE BEEN ACCURATELY AND CORRECTLY SHOWN.

DATE

T. HARTWICK
ONTARIO LAND SURVEYOR

Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL. (613)722-4420 FAX. (613)722-2799
stantec.com

DRAWN: ME	CHECKED: *	PM: FL	FIELD: -	PROJECT No.: 161614109-131

Scale
N.T.S.

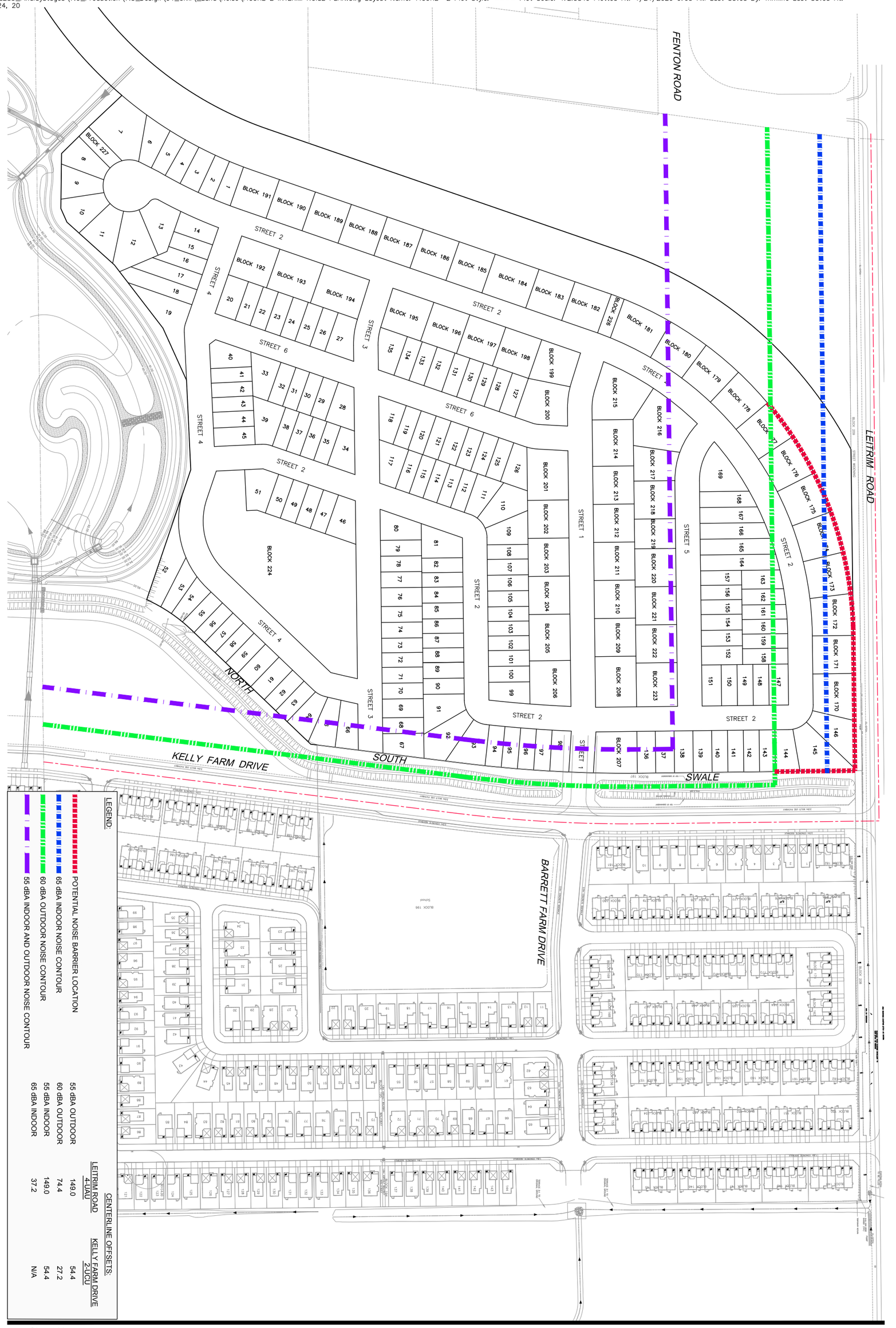
Project Title
NOISE CONTROL FEASIBILITY STUDY
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
TARTAN LAND CORPORATION
LEITRIM DEVELOPMENT AREA

Drawing Title
DRAFT PLAN

Sheet No.
FIGURE 1

J:\122283_FindlayStage5\7.0_Production\7.3_Design\04_Civil_Land\Noise\FIGURE 1 DRAFT PLAN.dwg Layout Name: FIGURE 1 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 1/21/2020 8:06 AM Last Saved By: mmline Last Saved At: Jan. 20, 20

J:\122283_FindlayStage5\7.0_Production\7.3_Design\04_Civil_Land\Noise\FIGURE 2 INTERIM NOISE PLAN.dwg Layout Name: FIGURE 2 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 1/24/2020 9:03 AM Last Saved By: mmilne Last Saved At: Jan. 24, 20



Sheet No.

FIGURE 2

Drawing Title

NOISE PLAN

Project Title

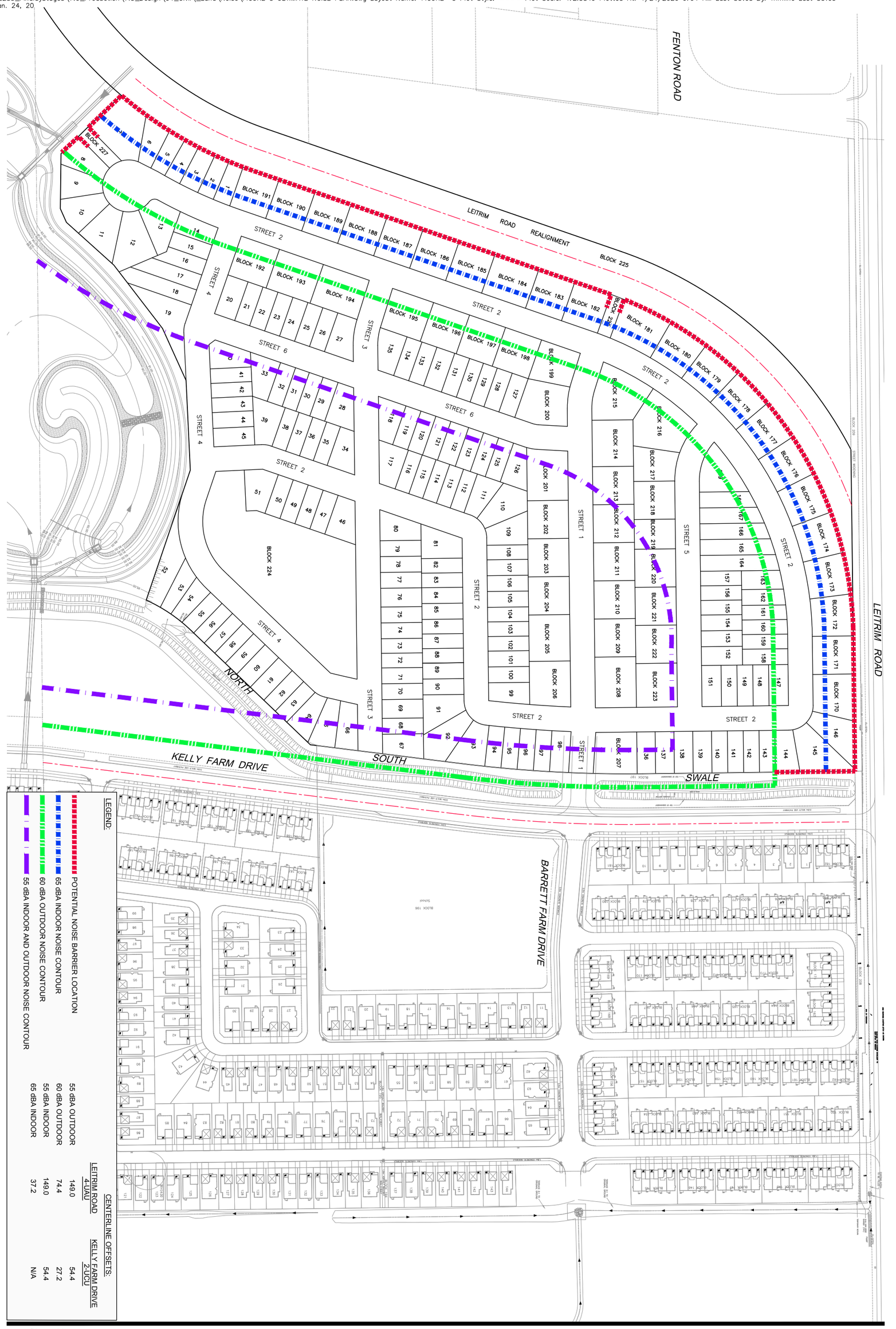
NOISE CONTROL FEASIBILITY STUDY
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
TARTAN LAND CORPORATION
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI

J:\122283_FindlayStage5\7.0_Production\7.3_Design\04_Civil_Land\Noise\FIGURE 3 ULTIMATE NOISE PLAN.dwg Layout Name: FIGURE 3 Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 1/24/2020 9:04 AM Last Saved By: mmilne Last Saved At: Jan. 24, 20



Sheet No.

FIGURE 3

Drawing Title

NOISE PLAN
FUTURE
REALIGNMENT

Project Title

NOISE CONTROL FEASIBILITY STUDY
FINDLAY CREEK VILLAGE - STAGE 5
3100 LEITRIM ROAD
TARTAN LAND CORPORATION
LEITRIM DEVELOPMENT AREA

Scale

N.T.S.

IBI

APPENDIX

FCSTG5

STAMSON 5.0 NORMAL REPORT Date: 16-01-2020 17:16:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: FCSTG5.te Time Period: Day/Night 16/8 hours
Description: KELLY FARM DRIVE 55dBA/60 dBA

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 50 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): 8000
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: KELLY FARM (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 54.43 / 40.99 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: KELLY FARM (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.75	0.00	-9.29	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: KELLY FARM (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.16	0.00	-6.86	-1.30	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

FCSTG5

STAMSON 5.0 NORMAL REPORT Date: 17-01-2020 13:42:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: fcstg5.te Time Period: Day/Night 16/8 hours
Description: Kelly Farm Drive 60 dBA

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

Car traffic volume	: 6477/563	veh/TimePeriod *
Medium truck volume	: 515/45	veh/TimePeriod *
Heavy truck volume	: 368/32	veh/TimePeriod *
Posted speed limit	: 50	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)	: 8000
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: KELLY FARM (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 27.20 / 27.20	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Results segment # 1: KELLY FARM (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.75	0.00	-4.29	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: KELLY FARM (night)

Source height = 1.50 m

ROAD (0.00 + 52.80 + 0.00) = 52.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.16	0.00	-4.06	-1.30	0.00	0.00	0.00	52.80

Segment Leq : 52.80 dBA

Total Leq All Segments: 52.80 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 52.80

FCSTG5

STAMSON 5.0 NORMAL REPORT Date: 17-01-2020 14:22:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: fcstg5.te Time Period: Day/Night 16/8 hours
Description: Kelly Farm Drive 15m src rcvr

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

Car traffic volume	:	6477/563	veh/TimePeriod *
Medium truck volume	:	515/45	veh/TimePeriod *
Heavy truck volume	:	368/32	veh/TimePeriod *
Posted speed limit	:	50 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)	:	8000
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: KELLY FARM (day/night)

Angle1 Angle2	:	-90.00 deg	90.00 deg
Wood depth	:	0	(No woods.)
No of house rows	:	0 / 0	
Surface	:	1	(Absorptive ground surface)
Receiver source distance	:	15.00 / 15.00	m
Receiver height	:	1.50 / 4.50	m
Topography	:	1	(Flat/gentle slope; no barrier)
Reference angle	:	0.00	

Results segment # 1: KELLY FARM (day)

Source height = 1.50 m

ROAD (0.00 + 64.29 + 0.00) = 64.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	65.75	0.00	0.00	-1.46	0.00	0.00	0.00	64.29

Segment Leq : 64.29 dBA

Total Leq All Segments: 64.29 dBA

Results segment # 1: KELLY FARM (night)

Source height = 1.50 m

ROAD (0.00 + 56.85 + 0.00) = 56.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	58.16	0.00	0.00	-1.30	0.00	0.00	0.00	56.85

Segment Leq : 56.85 dBA

Total Leq All Segments: 56.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.29
(NIGHT): 56.85

FCSTG51

STAMSON 5.0 NORMAL REPORT Date: 17-01-2020 13:46:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: fcstg5~2.te Time Period: Day/Night 16/8 hours
Description: Leitrim Road 55/ 50 dBA

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

```
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   veh/TimePeriod  *
Posted speed limit  :    60 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):  30000
    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: LEITRIM (day/night)

```
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 149.04 / 118.73 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Results segment # 1: LEITRIM (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.01	0.00	-16.55	-1.46	0.00	0.00	0.00	55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: LEITRIM (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.41	0.00	-14.11	-1.30	0.00	0.00	0.00	50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 50.00

FCSTG51

STAMSON 5.0 NORMAL REPORT Date: 17-01-2020 13:49:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: fcstg5~2.te Time Period: Day/Night 16/8 hours
Description: Leitrim Road 60 dBA

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

```
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   veh/TimePeriod  *
Posted speed limit  :    60 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):  30000
    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: LEITRIM (day/night)

```
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  74.44 / 27.40  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

Results segment # 1: LEITRIM (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.01	0.00	-11.55	-1.46	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: LEITRIM (night)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.41	0.00	-4.11	-1.30	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 16-01-2020 17:27:35
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: FCSTG5.te Time Period: Day/Night 16/8 hours
Description: LEITRIM ROAD 65dBA/60 dBA

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

Car traffic volume	: 24288/2112	veh/TimePeriod *
Medium truck volume	: 1932/168	veh/TimePeriod *
Heavy truck volume	: 1380/120	veh/TimePeriod *
Posted speed limit	: 60	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)	:	30000
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: LEITRIM (day/night)

Angle1 Angle2	: -90.00 deg	90.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 37.20 / 27.40	m
Receiver height	: 1.50 / 4.50	m
Topography	: 1	(Flat/gentle slope; no barrier)
Reference angle	: 0.00	

Results segment # 1: LEITRIM (day)

Source height = 1.50 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.01	0.00	-6.55	-1.46	0.00	0.00	0.00	65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

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Results segment # 1: LEITRIM (night)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	65.41	0.00	-4.11	-1.30	0.00	0.00	0.00	60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

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TOTAL Leq FROM ALL SOURCES (DAY): 65.00
(NIGHT): 60.00

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