aercoustics

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NOISE IMPACT STUDY – **Project: 23234.00**

6640 7th Line (Belwood Subdivision)

Township of Centre Wellington, Ontario

Prepared for:

BelCal Inc.
2907 Upper James St.
Mt Hope, Ontario, L0R 1W0

Prepared by:

Hillary Fung, B.A.Sc.

Derek Flake, M. Sc., P.Eng.

August 16, 2023

Revision History

Version	Description	Author	Reviewed	Date
- -	Initial Report	HF	DF	August 16, 2023

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1 Introduction

BelCal Inc. has retained Aercoustics Engineering Limited to prepare an Environmental Noise Impact Study (ENIS) to support an application for a proposed residential subdivision in the Township of Centre Wellington, located at 6640 7th Line, Belwood, Ontario.

The purpose of this study was to examine the existing and future noise environment in the surrounding area and evaluate its impact potential on the expected noise sensitive receptors in the proposed development. This study also investigates any noise controls required for the development in order to abide by the noise guidelines of Ontario's Ministry of the Environment, Conservation and Parks (MECP) and to satisfy the requirements of the Township of Centre Wellington. This report considered the MECP guideline NPC-300 "Stationary and Transportation Sources – Approval and Planning" (August 2013).

The proposed residential development consists of 107 lots. The proposed site is located on the northwest corner of 7th Line / Road 26 and County Road 19 in the Township of Wellington. The adjacent land-uses include existing residential uses to the east and south as well as agricultural uses to the west and north.

This report is based on the following information:

- Conceptual plan prepared by Stovel and Associates Inc., dated May 15, 2023;
- Traffic Impact Study provided by WSP, dated May 2023; and
- Township of Centre Wellington Noise Control By-Law.

The dominant road traffic sources in the subject study area include 7th Line / Road 26 and County Road 19.

This site is not significantly affected by stationary sources, aircraft traffic or rail traffic. Zoning maps showing surrounding land use are included in Appendix B.

Figure 1 provides a key plan showing the development location and surrounding area. Figure 2 shows the proposed development and location of noise sources assessed.

2 Guidelines and Criteria

2.1 Transportation Noise – Outdoor Living Area (OLA)

MECP Guidelines recommend that equivalent noise levels (L_{eq}-16hr) in outdoor living areas should not exceed 55 dBA. If it is not technically, economically, or administratively feasible to achieve a level of 55 dBA, predicted noise levels between 55 dBA and 60 dBA may be acceptable provided that the future occupants of the building are made aware of the potential noise problems through appropriate warning clauses. Noise levels above 60 dBA are generally not acceptable and will warrant noise control measures.

All unenclosed balconies that are less than 4 m in depth and outside the exterior of the building façade are exempt from meeting the MECP outdoor noise criteria with regards to transportation noise sources. Should the depth of the future balconies and terraces be greater than 4 m, they will be subject to the MECP noise level limit of 55 dBA.

2.2 Transportation Noise – Indoor Living Spaces

Indoor noise levels due to road traffic were also examined with respect to the MECP Guidelines. Bedrooms are required to meet an indoor noise level (L_{eq}-8hr) of 40 dBA from road traffic during nighttime hours. The indoor daytime noise level (L_{eq}-16hr) due to road traffic should not exceed 45 dBA for living or dining rooms. Lounges, lobbies, retail or general office spaces should meet the indoor noise level of 50 dBA from road traffic. In order to achieve these levels, the MECP Guidelines provide a basis for the types of windows, exterior walls, and doors that will be required based on projected outdoor noise levels.

The MECP also requires that a central air conditioning system be installed for dwellings when the daytime or nighttime outdoor transportation noise levels at the façade of the dwelling are above 65 dBA or 60 dBA, respectively. The provision for the future installation of central air conditioning must be made if:

- the nighttime sound level is greater than 50 dBA and less than or equal to 60 dBA on the outside face of a bedroom window;
- the daytime sound level is greater than 55 dBA and less than or equal to 65 dBA on the outside face of a bedroom window or of a living/dining room window.

This provision involves a ducted heating system sized to accommodate the addition of central air conditioning by the occupant.

The required limits as per NPC-300 are summarized in Table 1.

Table 1: Noise Limits Due to Road Traffic

Type of Space	Time Period	Minimum L_{eq} (dBA) Road Traffic
Living/dining, den areas of residences, hospitals, nursing homes, schools, day-care centres (Indoor)	07:00 – 23:00	45 dBA
Living/dining, den areas of residences, hospitals, nursing homes (Indoor)	23:00 – 07:00	45 dBA
Sleeping quarters (Indoor)	07:00 – 23:00	45 dBA
	23:00 – 07:00	40 dBA
Outdoor Living Areas (OLA)	07:00 – 23:00	55 dBA

3 Noise Level Predictions

3.1 Road Traffic Noise Calculations Procedure

The dominant road traffic noise sources in the subject study area include 7th Line / Road 26 and County Road 19.

The proposed site is considered an MECP Class 2 area due to existing road traffic and density of dwellings in the subdivision.

Noise level calculations were performed in accordance with the MECP Guidelines and using the U.S. Department of Transportation's Traffic Noise Model (TNM) Version 2.5 within DataKustik's CadnaA environmental noise prediction software.

The equivalent sound levels (L_{eq}) due to road traffic were calculated at worst-case noise sensitive residential receptors in the proposed development. Calculations were performed for both daytime and nighttime conditions at receiver heights representing the worst-case residential storey. Noise levels were also predicted at critical outdoor living areas (OLAs) throughout the development. It was assumed each lot on the conceptual plan would include a single detached 3-storey dwelling with a back and front yard. Refer to Appendix A for plans showing the locations of each lot.

3.2 Road Traffic Data

Road traffic noise predictions were based on the road traffic data outlined in Table 2. The road traffic volume-counts were obtained from the Traffic Study conducted by WSP. Truck percentages and projected AADT were calculated from this data. This data was measured in 2022 and the projected time frame of 2042 and is meant to account for 10 years after the full buildout of the future community. Full buildout is understood to be 2032. Copies of the correspondence and received data are included in Appendix C.

Table 2: Road Traffic Volumes

	7th Line / Road 26	County Road 19
24-hour Volumes (AADT)	2,109	3,494
Projected AADT (year 2042)	3,134	5,192
No. of Lanes	2	2
Day/Night Split (%)	90/10	80/20
Percentage of Trucks (%)	4.6	6.9
Medium/Heavy Split (%)	50/50	50/50
Grade (%)	Up to 2 %	Up to 2 %
Posted Speed (km/hr)	50	50

3.3 Stationary Noise Impact

In a site visit conducted by Aercoustics' personnel on June 30, 2023, it was confirmed that there are no significant stationary noise sources in the vicinity of the development that need to be assessed as part of this noise impact study.

It is understood that the surrounding lands are designated for agricultural use. While farming will occur, the noise associated with farming activities was not assessed as Part B and Part C of NPC-300 do not apply to the noise impact of stationary sources associated with agricultural operations during the course of normal farm practice which are addressed through the Farming and Food Production Protection Act, 1998.

It is expected that the stationary noise sources that will be introduced as part of this development are limited to residential air conditioning devices which are not considered stationary noise sources for the purposes of a noise impact study as outlined in NPC-300. In addition, air conditioning devices are not addressed in the Township of Centre Wellington Noise Control By-law.

4 Transportation Noise Predictions

Table 3 lists the daytime and nighttime L_{eq}s due to road traffic as predicted at noise sensitive locations within the development, labelled as locations C01 to C03 in blue on the site plan in Figure 2. The potential outdoor amenity area (OLA) locations are also shown in Figure 2. Sample calculations are provided in Appendix C.

Table 3: Calculated Unmitigated Noise Levels Due to Road Traffic

Calculation Location (Figure 2)	Receptor Height (m)	Description	Distance to 7th Line / Road 26 (m)	Distance to County Road 19 (m)	L_{eq} (dBA)	
					Day	Night
C01	7.5	Lot 107, 3-storey dwelling, Southeast façade	25	40	61	58
C02	7.5	Lot 99, 3-storey dwelling, Northeast façade	45	380	58	55
C03	7.5	Lot 2, 3-storey dwelling, Southeast façade	260	20	52	46
OLA 1	1.5	Lot 107 backyard	30	20	57	---
OLA 2	1.5	Lot 99 backyard	30	380	56	---
OLA 3	1.5	Lot 2 backyard	240	25	49	---

The noise levels listed in the table above were used to determine the window glazing as well as exterior wall requirements for each designated point of reception.

5 Noise Control Recommendations

5.1 Transportation Noise – Outdoor Living Areas

The road noise level predictions, as listed in Table 3, indicate that the future noise levels at the outdoor point of reception that are directly exposed to road traffic along County Road 19 are above 55 dBA.

It is recommended that the client include warning clause Type A for all the residential units which advise future owners that noise from road traffic may at times be audible. See sample wording of Warning Clauses in Section 7 of this document.

Any changes to outdoor living areas associated with the proposed residential development should be analysed in further detail at a later stage.

5.2 Transportation Noise – Indoor Living Spaces

Indoor sound levels were examined with respect to MECP Guidelines as summarized in Section 2 of this report. The recommendations discussed below were estimated based on assumed dimensions and floor-to-window ratio of a typical room. Calculations were performed with the noise insulation modelling software IBANA. Sample calculations are included in Appendix C.

The worst-case impact of the daytime road traffic is predicted to be 61 dBA along the southeast façade of the east-most dwelling. At this noise level, upgraded windows or construction is not required for any dwellings.

However, due to the elevated levels at the plane of window of above 55 dBA during daytime and 50 dBA during nighttime, the future provision for central air conditioning is mandatory for the lots along County Road 19. Warning Clause C as found in Section 7 is required. If central air is installed on these units, Warning Clause C is still required.

5.3 Noise Mitigation Recommendation Summary

Table 4 below provides the recommended noise controls for the development.

Table 4: Recommended Noise Mitigation

Location	Central Air Conditioning	Window STC Upgrades	Exterior Wall STC Upgrades	Sound Barrier	Warning Clauses
Lot 1 to 2	Future provision	--*	--*	--	A, C
Lot 3 to 32	--	--*	--*	--	--
Lot 33 to 38	Future provision	--*	--*	--	A, C
Lot 39 to 104	--	--*	--*	--	--
Lot 105 to 107	Future provision	--*	--*	--	A, C

* Exterior wall and window components meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate acoustical protection for the future indoor daytime living spaces. The assumed minimum performance of these assemblies is STC-27 for windows and STC-45 for walls.

The noise impact of traffic on the development is shown in Figure 3a and 3b.

Figure 4 shows the recommended noise controls on the site plan.

6 Conclusions

The results of this study indicate that no construction upgrades are required for compliance with the MECP criteria for indoor sound levels. No acoustic barriers are required based on the proposed OLA locations and the updated AADT information measured by WSP.

With the incorporation of the noise controls discussed in this report, the sound levels at the sensitive receptors of the proposed residential development will comply with the noise guidelines of the MECP. As indicated in the Township of Centre Wellington and MECP implementation guidelines, where mitigation is required or where noise may be a concern, future occupants will be advised through warning clauses. Notes and sample wording for the warning clauses is provided in Section 7 of this report.

7 Warning Clauses

Purchase, rental and lease agreements for all units in the proposed residential buildings are recommended to include the following warning clauses:

Type A:

"*Purchasers/tenants are advised that sound levels due to increasing road traffic may be audible and may occasionally interfere with some activities of the dwelling occupants.*"

Type C:

"*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 Township of Centre Wellington and the Ministry of the Environment, Conservation and Parks.*"

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Project ID: 23234.00

Scale: NTS
Drawn by: HF
Reviewed by: DF
Date: Jul 18, 2023
Revision: 1

Project Name
6640 7th Line (Belwood Subdivision)

Figure Title
Key site plan showing proposed site location and surrounding land uses

Figure 1

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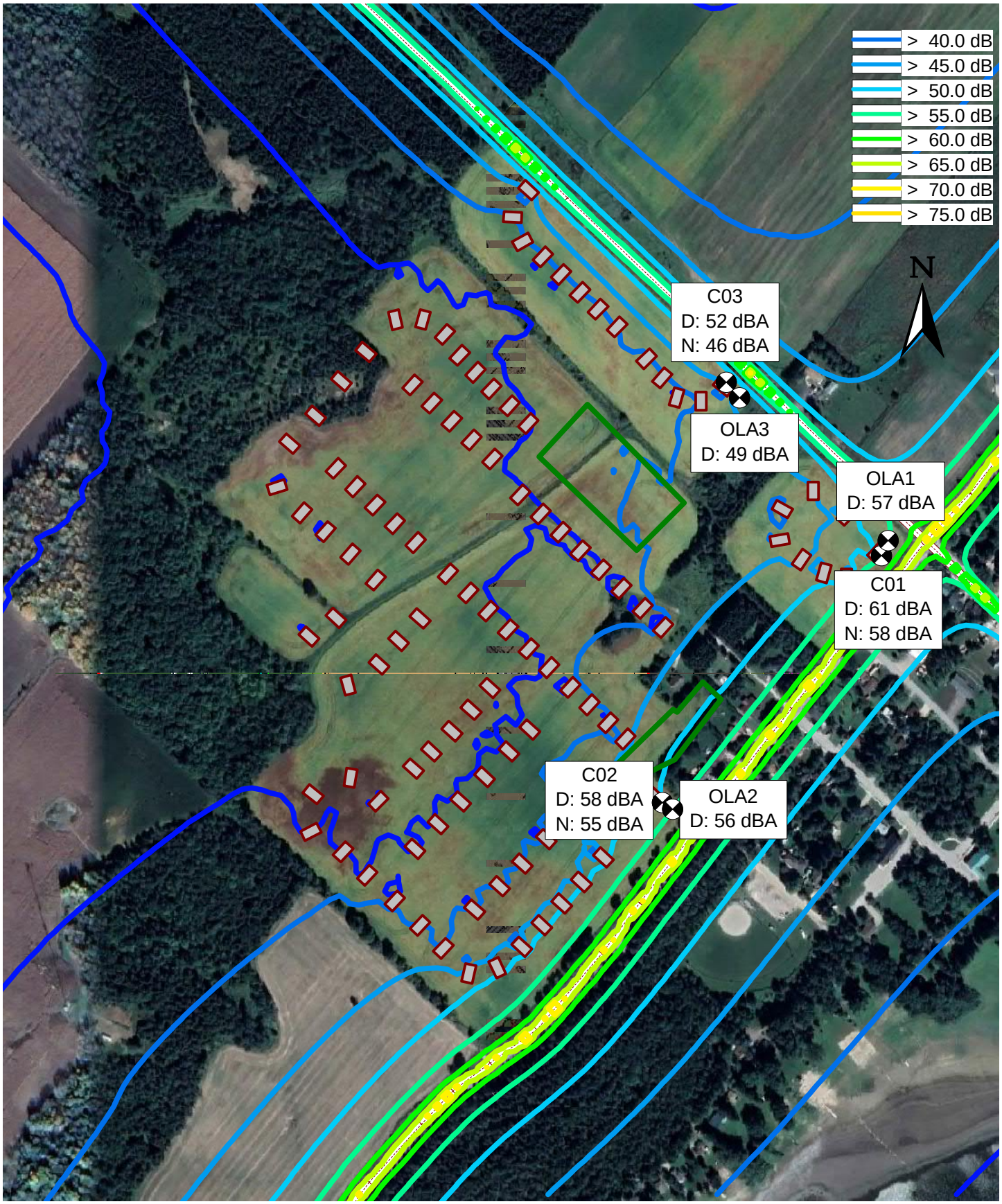
Project ID: 23234.00	**Project Name**
Scale: NTS Drawn by: HF Reviewed by: DF Date: Jul 18, 2023 Revision: 1	6640 7th Line (Belwood Subdivision)
	Figure Title Location of receptors and traffic sources

Figure 2



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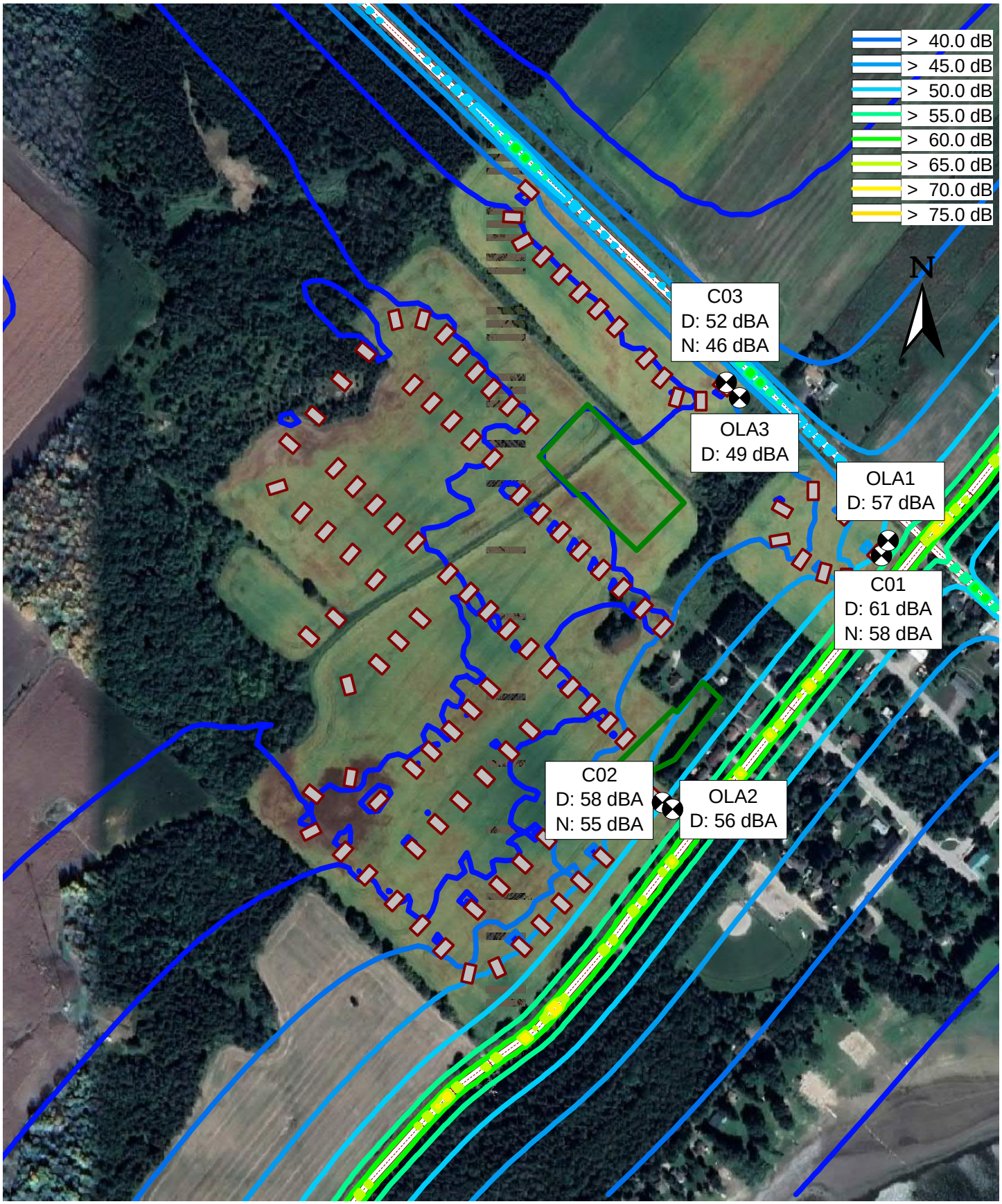
Project ID: 23234.00

Scale: NTS
Drawn by: HF
Reviewed by: DF
Date: Jul 18, 2023
Revision: 1

Project Name
6640 7th Line (Belwood Subdivision)

Figure Title
Unmitigated Daytime Traffic Noise - 7.5 m Height Contours

Figure 3a



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Project ID: 23234.00

Scale: NTS
Drawn by: HF
Reviewed by: DF
Date: Jul 18, 2023
Revision: 1

Project Name
6640 7th Line (Belwood Subdivision)

Figure Title
Unmitigated Nighttime Traffic Noise - 7.5 m Height Contours

Figure 3b

Legend

- Future provision for central air conditioning and Warning Clause A and C
- Analysed Lots

aercoustics	Project ID: 23234.00 Scale: NTS Drawn by: DAF Reviewed by: DAF Date: Aug 11, 2023 Revision: 1	**Project Name** 6640 7th Line (Belwood Subdivision) **Figure Title** Site plan showing lots with required noise controls and analysed lots

Figure 4

Appendix A
Site Plan & Drawings

Group/Block	Lot #'s	Area (±)	Land Use
Group A	1-21	4.25ha	Residential Lots
Group B	22-33	2.60ha	Residential Lots
Group C	34-58	6.17ha	Residential Lots
Group D	59-77	4.98ha	Residential Lots
Group E	78-87	2.16ha	Residential Lots
Group F	88-100	3.45ha	Residential Lots
Group G	101-107	2.92ha	Residential Lots
Block I	-	4.31ha	Open Space / Parkland / Environmental Enhancements
Block J	-	1.37ha	Stormwater Management Facilities
Block K	-	0.26ha	Path / Trail
Block L	-	3.80ha	Existing Forest
Block M	-	5.28ha	Proposed Roadway
Block N	-	0.8ha	Existing Wooded Area

Group	Average Lot Size (m^2) (±)	Minimum Lot Size (m^2) (±)	Minimum Lot Frontage (m) (±)
Group A	2125.19	2025.59	24.0
Group B	2165.80	2046.35	32.0
Group C	2469.24	2028.40	24.0
Group D	2609.26	2062.80	22.0
Group E	2163.88	2033.04	28.0
Group F	2652.44	2036.50	21.0
Group G	3662.10	2059.07	22.0

Conceptual Plan

107 Proposed Lots

6640 Seventh Line Belwood, Ontario
Lot 12, Concession 7
Township of Centre Wellington
County of Wellington

Notes

1. All Coordinates Were Determined Using NAD83 CSRS - Zone 17.
2. Structural Locations Have Not Been Confirmed.
3. This is Not a Plan Of Survey.
4. Locations of Natural Features Have Been Extracted From The Government of Ontario: Land Information Ontario Open Data.
5. Aerial Imagery Provided By Microsoft Corporation @ 2022 Maxar CNES (2022) Distribution Airbus DS.
6. Distances Shown on This Plan Are Adjusted Ground Distances and Can Be Converted To Grid Distances by Multiplying by An Averaged Combined Scale Factor of 0.999636.
7. Coordinates on This Plan Are UTM, ZONE 17, NAD83 (CSRS-2010) Adjustment and Are Based on GPS Observations From a Network of Permanent GPS Reference Stations.

Legend

- Subject Lands
- Existing Lot Line
- Proposed Lot Line
- Proposed Roadway
- Open Space / Parkland / Environmental Ehancements
- Proposed Path / Trail
- Proposed Stormwater Management Facility
- Environmental Buffer
- Watercourse (G.R.C.A)
- Wetland (G.R.C.A)
- Floodplain (G.R.C.A)
- Regulation Limit (G.R.C.A)
- Wooded Area
- Existing Forest
- Lands Not Part Of Development

Client: Belcal Inc.

SAI
PLANNING. AGROLOGY. ENVIRONMENTAL.

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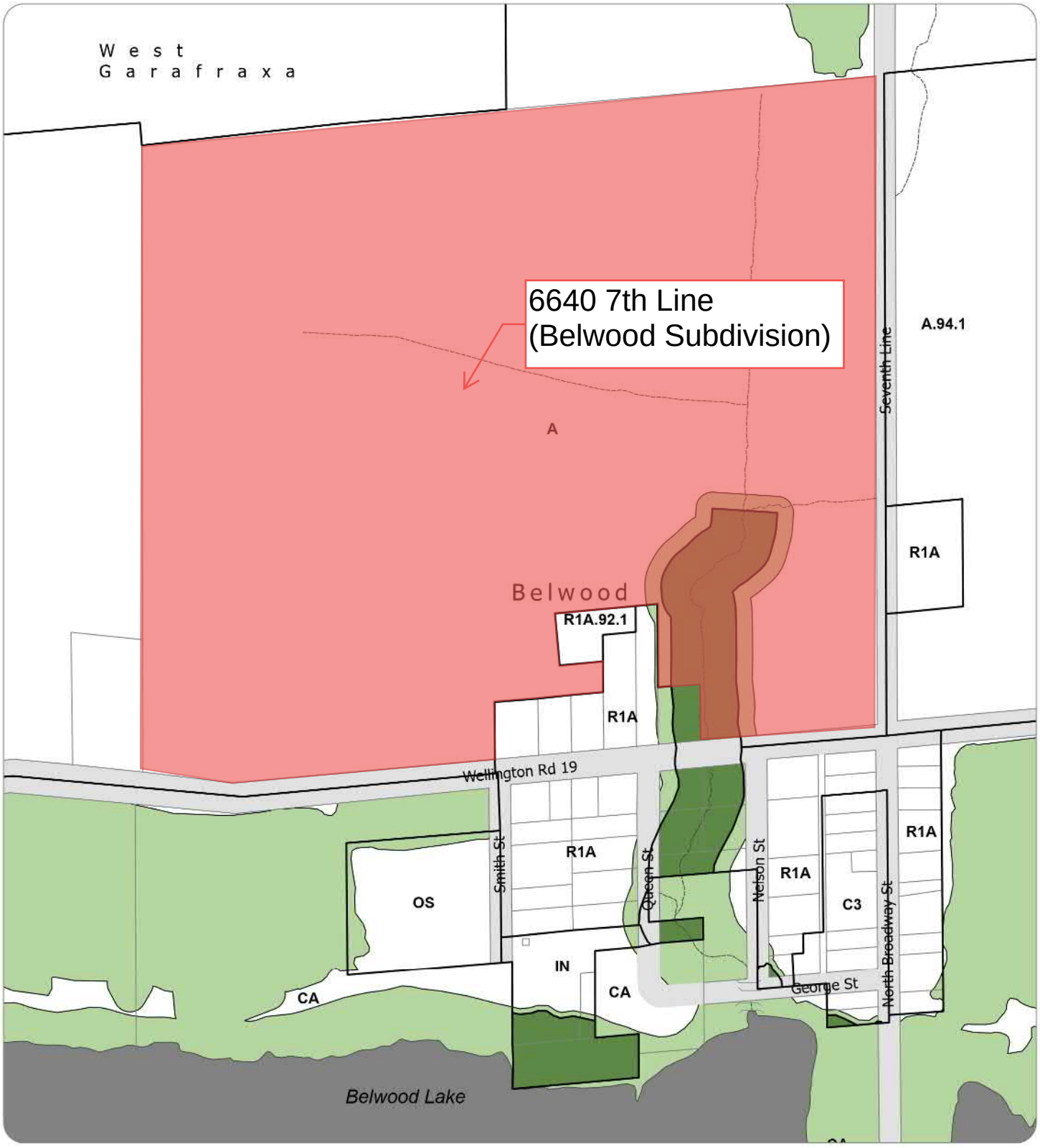
DRAFT

Date : 05/15/2023

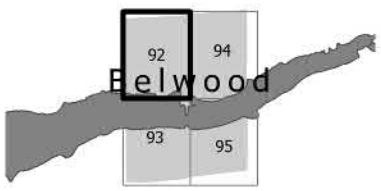
0 100 200 Meters

Scale 1:3000

Appendix B
Zoning Map



Zone Boundary
Environmental Protection
Environmental Protection Overlay
Heritage Area Overlay
Parcel Fabric
Floodplain
Flood Fringe
Waterbody
Watercourse
Road



Township of Centre Wellington
Zoning By-Law
Schedule "A"

Map 92

Belwood

Path: O:\DATA_ENTERPRISE\ZONING\ARPX\Zoning_ByLaw_Maps\Zoning_ByLaw_Maps.aprx

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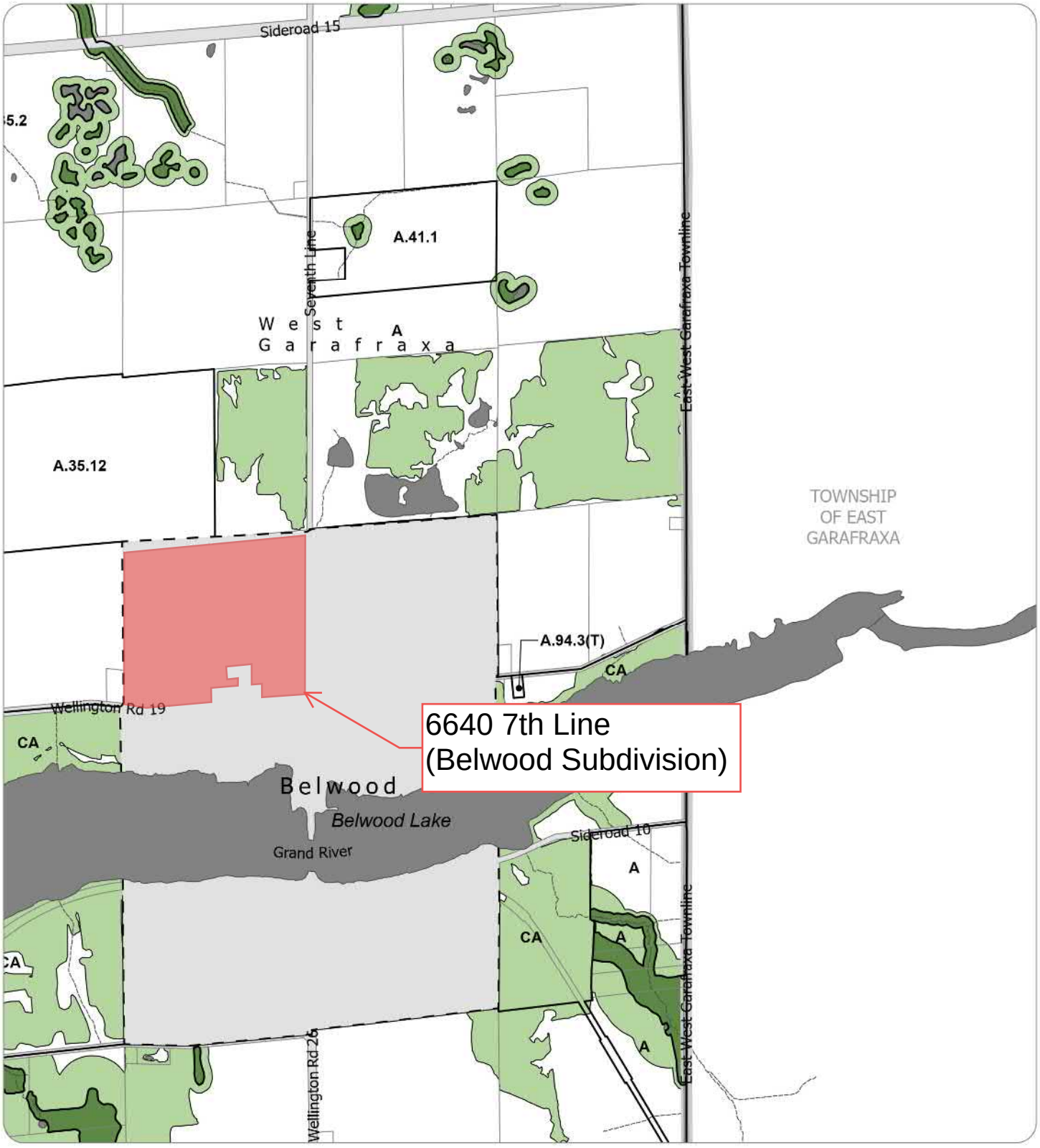

Zone Boundary
Environmental Protection
Environmental Protection Overlay
Urban Area
Parcel Fabric
Floodplain
Flood Fringe
Waterbody
Watercourse
Road

				21	27	33	39	
1	6	11	16	22	28	34	40	
2	7	12	17	23	29	35	41	
3	8	13	18	24	30	36	42	
4	9	14	19	25	31	37	43	
5	10	15	20	26	32	38	44	

Township of Centre Wellington
Zoning By-Law
Schedule "A"

Map 41

West Garafraxa

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Author: gwolowich
Date Saved: 2022-07-04 3:35 PM

Appendix C
Road Traffic Data & Sample Calculations

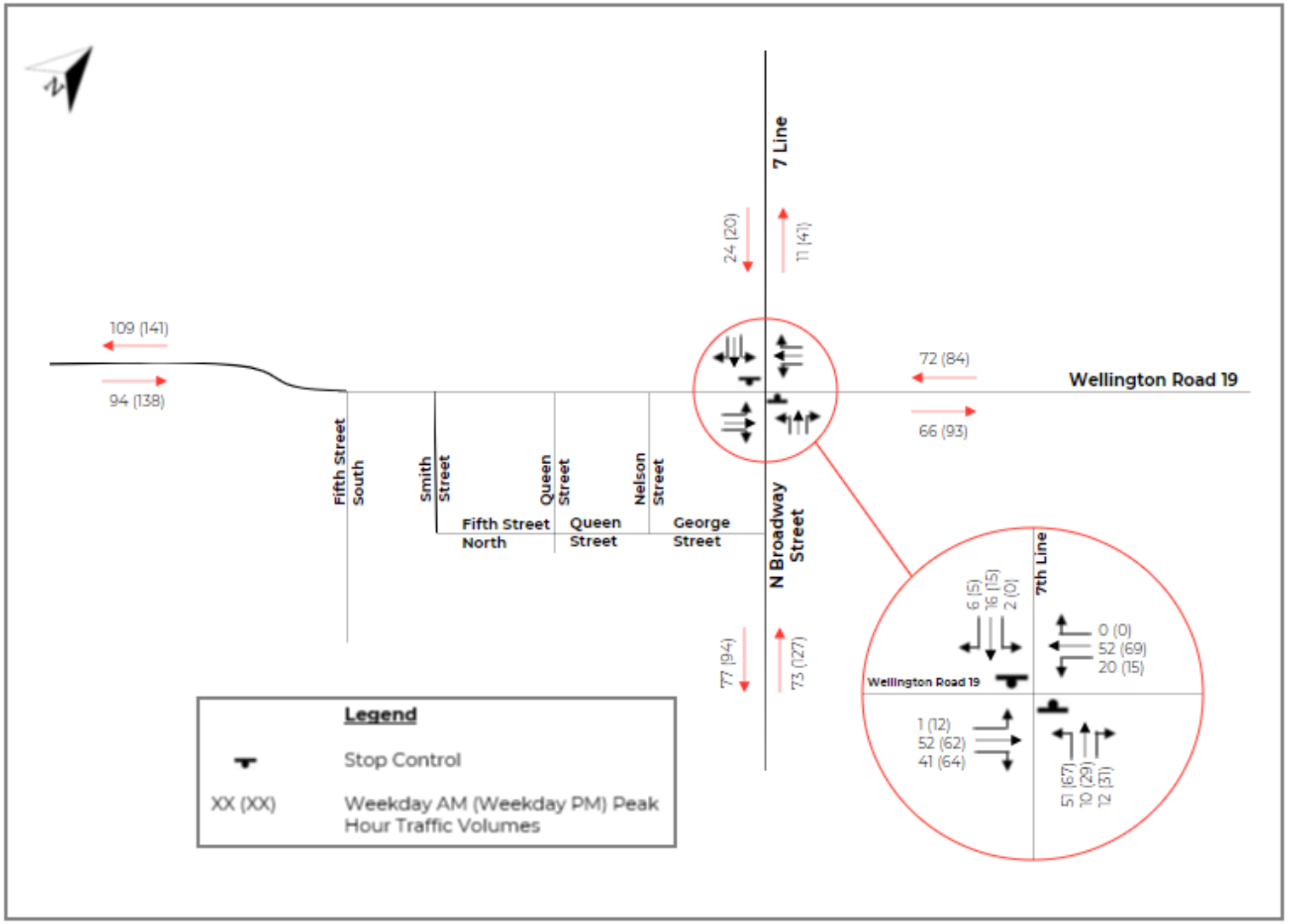


Figure 3. Weekday Morning and Weekday Afternoon Peak Hour Turning Movement Volumes

Aircraft Noise Sound Insulation - Scenario Calculation Results

Project: C01 - Nighttime

Date:2023-06-22 **ProjectID:** 23234

Outdoor level: NEF 26 or Leq24 58 or Ldn 59 dBA

Source Spectrum details:

100% Mixed Road Traffic

Corrections:

Receiving room:

Floor Area: 10 m²
Absorbtion: 120% of floor area

Construction Description:

Element 1: VIN1_OSB11_WS140(406)_GFB152_RC13(610)_G13

Construction Type: 2by6 Wall+RC
Area: 5.00 m²
Test ID: TLA-99-061a
Test Date: 1999-02-10

Vinyl siding, 11 mm OSB, 140 mm wood studs on 406 mm centre with glass fibre cavity insulation, 1 of 13 mm gypsum board on resilient channels spaced 610 mm on centre.

Element 2: GL3_AIR13_GL3

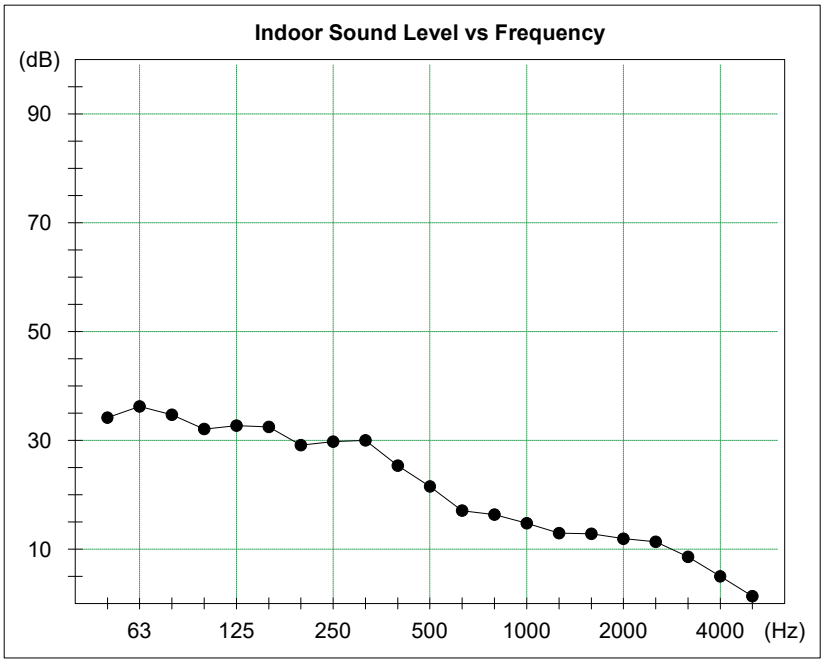
Construction Type: Window
Area: 5.00 m²
Test ID: TLA-99-157a
Test Date: 1999-04-16

Vinyl double slider window (seals not taped).

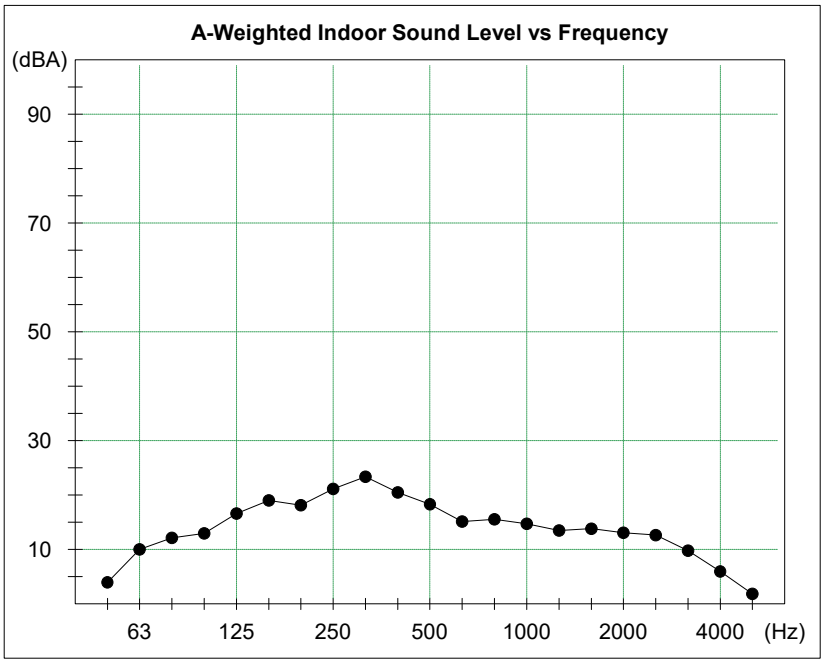
Aircraft Noise Sound Insulation - Scenario Calculation Results

Project: C01 - Nighttime

Date:2023-06-22 **ProjectID:** 23234



Frequency (Hz)	Sound Level (dB)
50	34.1
63	36.2
80	34.7
100	32.1
125	32.7
160	32.4
200	29.1
250	29.7
315	30.0
400	25.3
500	21.5
630	17.1
800	16.3
1000	14.8
1250	12.9
1600	12.8
2000	11.9
2500	11.4
3150	8.6
4000	4.9
5000	1.3



Frequency (Hz)	Sound Level (dBA)
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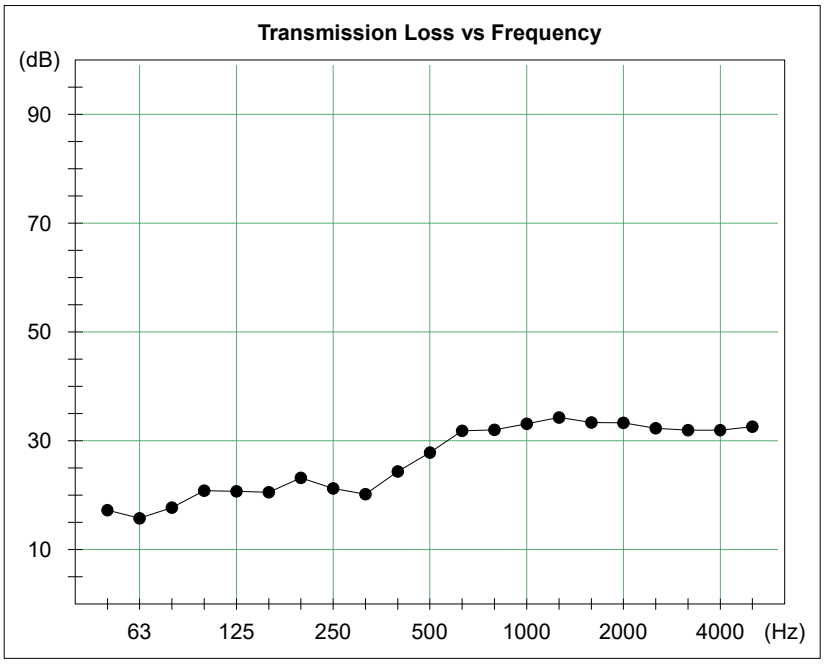
63	10.0
80	12.2
100	13.0
125	16.6
160	19.0
200	18.2
250	21.1
315	23.4
400	20.5
500	18.3
630	15.2
800	15.5
1000	14.8
1250	13.5
1600	13.8
2000	13.1
2500	12.7
3150	9.8
4000	5.9
5000	1.8

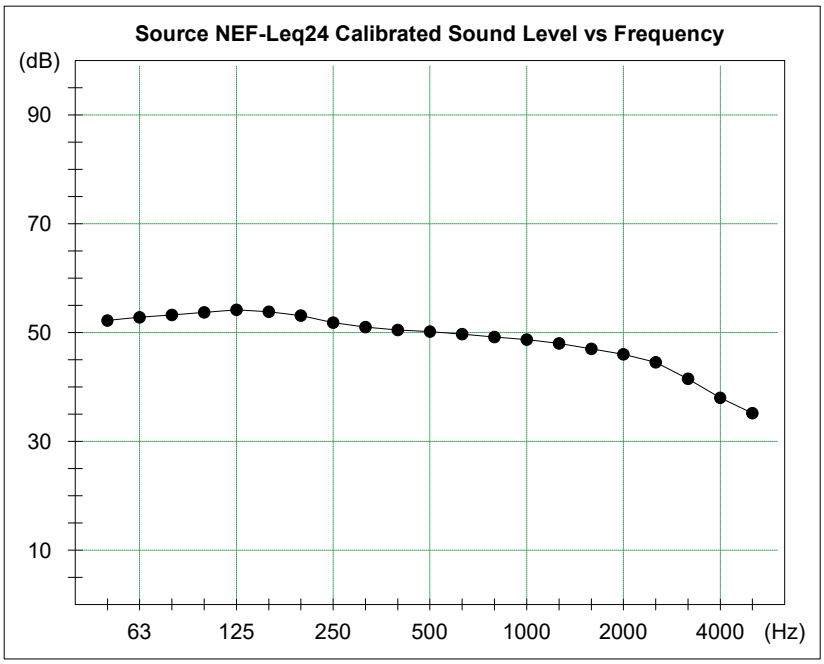
Aircraft Noise Sound Insulation - Scenario Calculation Results

Project: C01 - Nighttime

Date:2023-06-22 **ProjectID:** 23234



Frequency (Hz)	TL (dB)
50	17
63	16
80	18
100	21
125	21
160	21
200	23
250	21
315	20
400	24
500	28
630	32
800	32
1000	33
1250	34
1600	33
2000	33
2500	32
3150	32
4000	32
5000	33



Frequency (Hz)	Sound Level (dB)
50	52.2
63	52.8
80	53.2
100	53.7
125	54.2
160	53.8
200	53.1
250	51.8
315	51.0
400	50.5
500	50.2
630	49.7
800	49.2
1000	48.7
1250	48.0
1600	47.0
2000	46.0
2500	44.5
3150	41.5
4000	38.0
5000	35.2

Single Number Ratings:

Outdoor Sound Level:	58 dBA
Indoor Sound Level:	30 dBA
A-wtd Level Reduction:	28 dB
A-wtd Reduction re Standard Source:	27 dB
OITC Rating:	26 dB

Aircraft Noise Sound Insulation - Scenario Calculation Results

Project: C01 - Daytime

Date:2023-06-22 **ProjectID:** 23234

Outdoor level: NEF 29 or Leq24 61 or Ldn 62 dBA

Source Spectrum details:

100% Mixed Road Traffic

Corrections:

Receiving room:

Floor Area: 10 m²
Absorbtion: 100% of floor area

Construction Description:

Element 1: VIN1_OSB11_WS140(406)_GFB152_RC13(610)_G13

Construction Type: 2by6 Wall+RC
Area: 5.00 m²
Test ID: TLA-99-061a
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Vinyl siding, 11 mm OSB, 140 mm wood studs on 406 mm centre with glass fibre cavity insulation, 1 of 13 mm gypsum board on resilient channels spaced 610 mm on centre.

Element 2: GL3_AIR13_GL3

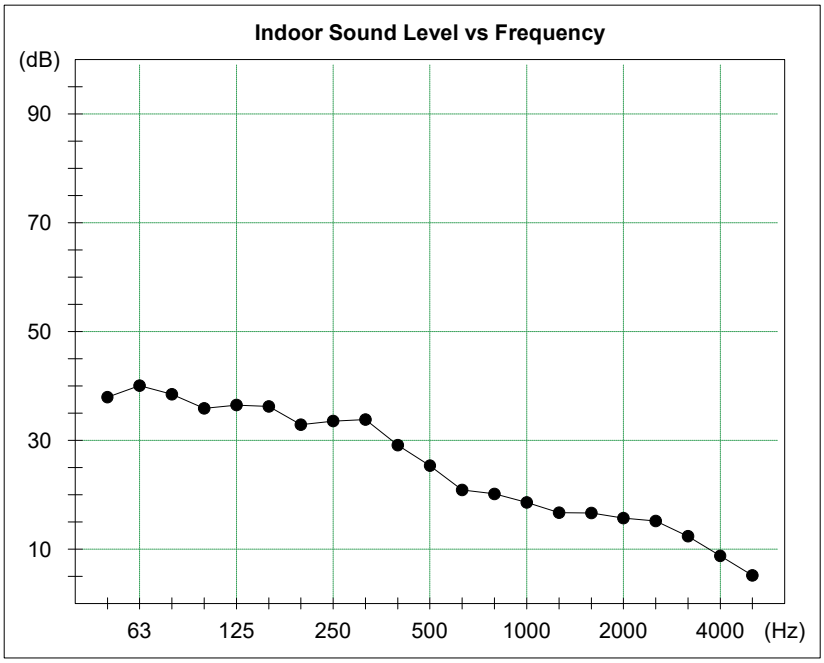
Construction Type: Window
Area: 5.00 m²
Test ID: TLA-99-157a
Test Date: 1999-04-16

Vinyl double slider window (seals not taped).

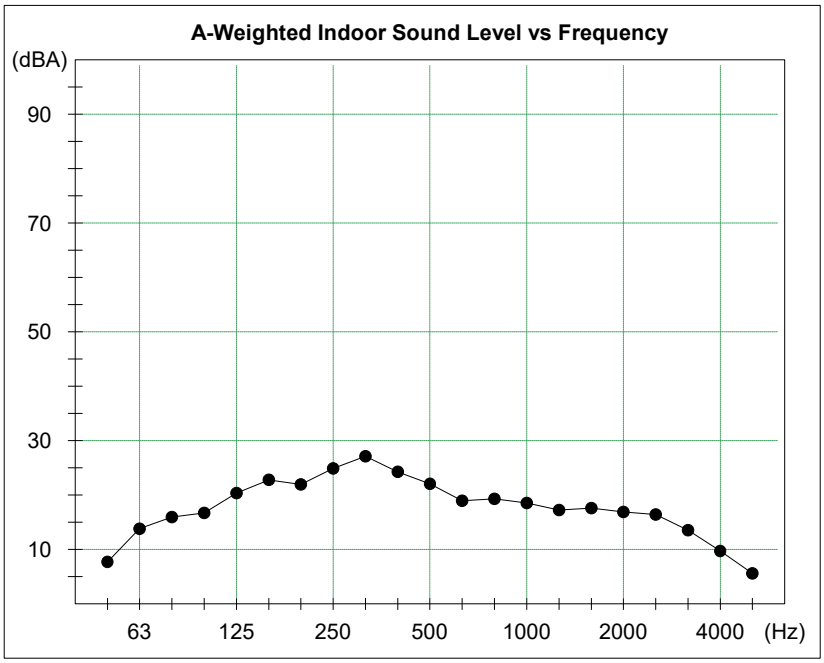
Aircraft Noise Sound Insulation - Scenario Calculation Results

Project: C01 - Daytime

Date:2023-06-22 **ProjectID:** 23234



Frequency (Hz)	Sound Level (dB)
50	37.9
63	40.0
80	38.5
100	35.8
125	36.5
160	36.2
200	32.9
250	33.5
315	33.8
400	29.1
500	25.3
630	20.8
800	20.1
1000	18.5
1250	16.7
1600	16.6
2000	15.7
2500	15.1
3150	12.4
4000	8.7
5000	5.1

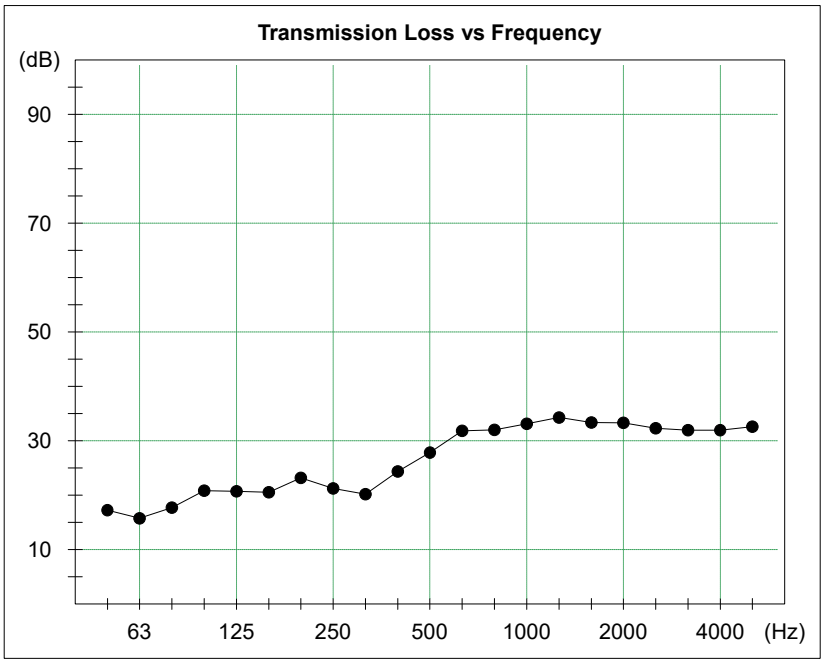


Frequency (Hz)	Sound Level (dBA)
50	7.7
63	13.8
80	16.0
100	16.7
125	20.4
160	22.8
200	22.0
250	24.9
315	27.2
400	24.3
500	22.1
630	18.9
800	19.3
1000	18.5
1250	17.3
1600	17.6
2000	16.9
2500	16.4
3150	13.6
4000	9.7
5000	5.6

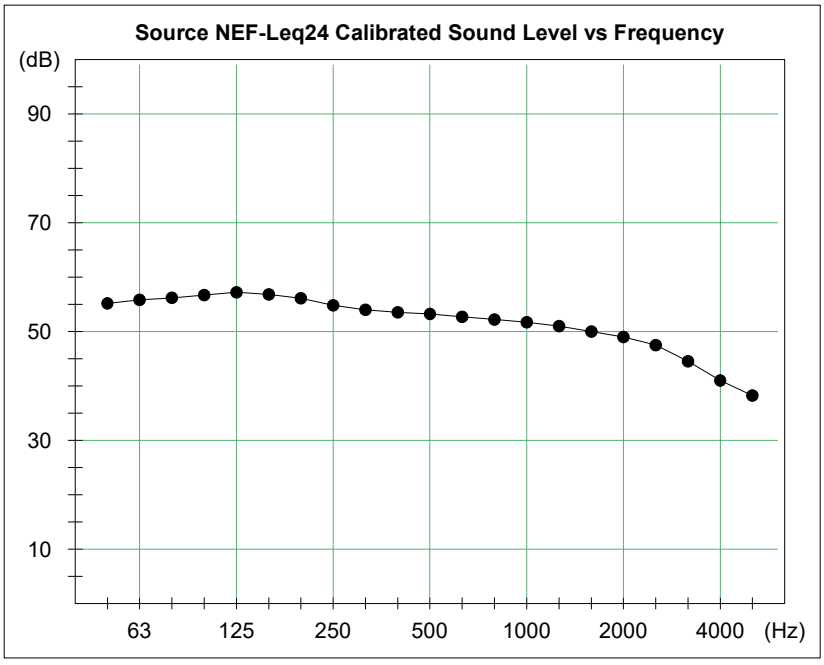
Aircraft Noise Sound Insulation - Scenario Calculation Results

Project: C01 - Daytime

Date:2023-06-22 **ProjectID:** 23234



Frequency (Hz)	TL (dB)
50	17
63	16
80	18
100	21
125	21
160	21
200	23
250	21
315	20
400	24
500	28
630	32
800	32
1000	33
1250	34
1600	33
2000	33
2500	32
3150	32
4000	32
5000	33



Frequency (Hz)	Sound Level (dB)
50	55.2
63	55.8
80	56.2
100	56.7
125	57.2
160	56.8
200	56.1
250	54.8
315	54.0
400	53.5
500	53.2
630	52.7
800	52.2
1000	51.7
1250	51.0
1600	50.0
2000	49.0
2500	47.5
3150	44.5
4000	41.0
5000	38.2

Single Number Ratings:

Outdoor Sound Level:	61 dBA
Indoor Sound Level:	34 dBA
A-wtd Level Reduction:	27 dB
A-wtd Reduction re Standard Source:	26 dB
OITC Rating:	26 dB

End of Report