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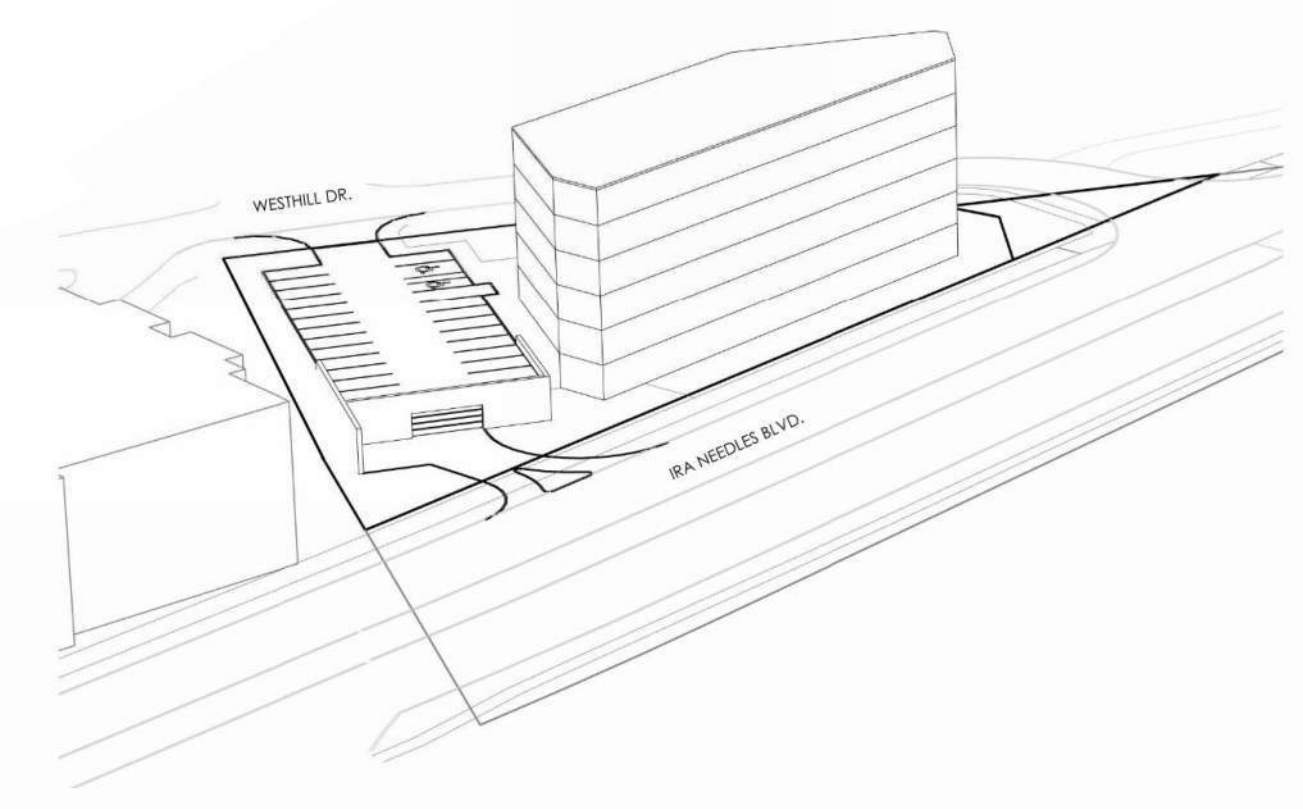
Environmental Noise Study

41 WESTHILL DRIVE
Waterloo, Ontario



Prepared for:

Region of Waterloo

May 12, 2026 (rev.1)

JPE-1070

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1 Introduction

JPE Engineering (JPE) was retained to undertake an environmental noise study to examine the potential impacts of environmental noise on, and resulting from, a proposed residential development at 41 Westhill Drive, Waterloo, Ontario (henceforth the "Site").

Assuming Ira Needles Blvd. runs north-south, the Site is bounded by Ira Needles Blvd. to the west and Westhill Drive to the east and south. A mix of residential and commercial (retail) uses surround the Site. Refer to **Plate 1**.



PLATE 1: Site Location
(source: Region of Waterloo GIS)

The Site is currently vacant. It is proposed to construct one six (6)-storey residential building. The Site will include auxiliary driveways, parking areas and landscape spaces. For more information, refer to **Appendix A** for the site and architectural plans.

This report documents the environmental noise analysis and findings related to the feasibility of the development from an environmental noise perspective and recommends mitigation measures as required.

2 Noise Sources and Criteria

The City of Waterloo and Region of Waterloo have established environmental noise guidelines to govern development with sensitive noise receivers. The City's and Region's guidelines generally mirror the Ministry of Environment, Conservation and Parks (MECP, formerly MOE and MOECC) NPC-300 guidelines entitled "Stationary and Transportation Sources – Approval and Planning" (August 2013). The City, Region and MECP guidelines were utilized to guide this environmental noise study. Further, the guidance provided in MECP's D-6 Guideline were considered when identifying potential noise sources.

On review of potential environmental noise sources within the subject development's environs, the following sources were identified:

- **Road traffic**: Ira Needles Blvd. and Erb Street West are in proximity to the Site and may impact the proposed sensitive receivers. Other nearby roads have small volumes or are distant and are thus assumed to not have significant impact on the Site.
- **Rail and Airports**: The proposed development is outside the zone of influence of railways and airports and therefore these noise sources are deemed not to be an issue and will not be considered further in this study.
- **On-Site Stationary noise**: The proposed development will contain HVAC equipment to service the proposed building. This type of equipment produces noise and therefore needs consideration.
- **Off-Site Stationary noise**: The Site's environs have residential and commercial uses. On review of aerial imagery, rooftop HVAC systems were observed on the nearby multi-storey residential buildings to the north and northeast, and the commercial building to the northwest. In addition, loading docks exist on the southern side of this noted commercial site. These noise sources will be reviewed as to their stationary noise impact on the proposed Site.

2.1 Transportation Noise Criteria

For transportation noise, Sections C6 and C7 of NPC-300 are used to determine the noise criteria for the development. The road and rail traffic criteria are shown in **Table 1**, and the mitigation and warning clause requirements are tabulated in **Table 2**.

Table 1 – Transportation Indoor Noise Level Criteria

INDOOR SPACE	TIME PERIOD	CRITERIA (dBA)	
		Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
	23:00 – 07:00	40	35

Table 2 – MECP Road & Rail Traffic Noise Mitigation and Warning Clause Requirements

LOCATION	NOISE LEVELS (dBA)	REQUIREMENT
Outdoor Living Areas **(Daytime 0700 to 2300)**	Less than 55	i) No control required
	55-60	i) Physical control required -or- ii) Type A warning clause required
	Greater than 60	i) Physical control required -and- ii) Type B warning clause required
Outside Window **(Daytime 0700 to 2300)** Per NPC300-C.7.1.2.1	Less than 55	i) No control required
	55 to 65	i) Forced air heating or air conditioning required -and- ii) Type C warning clause required
	Greater than 65	i) Central air conditioning required -and- ii) Type D warning clause required -and- iii) Special building components required
Outside Window **(Nighttime 2300 to 0700)** Per NPC300-C.7.1.2.2	Less than 50	i) No control required
	50 to 60	i) Forced air heating or air conditioning required -and- ii) Type C warning clause required
	Greater than 60	i) Central air conditioning required -and- ii) Type D warning clause required -and- iii) Special building components required

Notes:

1. *Assessment of indoor noise levels required if the criteria in Table 2 requires special building components.*
2. *Residence area Dens, Hospitals, Nursing Homes, Schools, Daycares are included. During the nighttime period, Schools and Daycares are excluded if they have no nighttime sensitive uses.*
3. *Road and Rail noise impacts are combined for assessment of OLA impacts and ventilation requirements.*
4. *Train whistle noise is excluded for OLA noise assessment, and included for Living / Dining Room and Sleeping Quarter assessment.*
5. *The warning clauses cited refer to MECP warning clauses. If the municipality has augmented clause, these shall be utilized.*
6. *If noise levels (Leq, 24 hours) are greater than 60 dBA at a receiver during nighttime hours, or if the receiver is located within 100 meters of a track, then exterior walls are to be brick veneer or a masonry equivalent.*

2.2 Stationary Noise Criteria

Part C4 of MECP's NPC-300 guideline applies to Land Use Planning and stationary noise. The guideline specifies exclusionary noise limits below which the noise is considered acceptable for a sensitive use.

The sound level limit criteria for a point of reception (expressed as the one-hour Equivalent Sound Level) is the greater of the exclusionary limit or the quietest one-hour sound level (i.e., ambient noise) in each time period. **Table 3** summarizes the exclusionary limits.

Table 3 – Stationary Noise Level Exclusionary Limits (dBA)

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

Notes:

1. *The Noise criteria for emergency generators that operate during non-emergency times (e.g., for testing and maintenance) is 5 dBA greater than listed.*
2. *Noise from emergency equipment is to be assessed independent of other stationary noise sources.*

With respect to stationary noise, a sensitive noise receptor can be located in one of four area classifications described as follows (refer to Section A5 of NPC 300):

a) **"Class 1 area"**: An area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as "urban hum."

b) **"Class 2 area"**: An area with an acoustical environment that has qualities representative of both Class 1 and Class 3 areas:

- Sound levels characteristic of Class 1 during daytime (07:00 to 19:00 or to 23:00 hours); and
- Low evening and night background sound level defined by natural environment and infrequent human activity starting as early as 19:00 hours (19:00 or 23:00 to 07:00 hours).

c) **"Class 3 area"**: A rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as:

- A small community;
- Agricultural area;
- A rural recreational area such as a cottage or a resort area; or
- A wilderness area.

d) **"Class 4 area"**: An area or specific site that would otherwise be defined as Class 1 or 2 and which:

- Is an area intended for development with new noise sensitive land use(s) that are not yet built;
- Is in proximity to existing, lawfully established stationary source(s); and
- Has formal confirmation from the land use planning authority with the Class 4 area classification which is determined during the land use planning process.

On review of the subject development's environs, it is assumed that "**Class 1**" is appropriate given it is located within an established urban area of the City of Waterloo, and is close in proximity to a significant arterial roads (i.e., Ira Needles Blvd. and Erb Street West).

Finally, while the ambient noise level may very well exceed the exclusionary limit (especially given the proximity to Ira Needles Blvd.), for ease and conservativeness, the exclusionary limit will be assumed to govern, unless otherwise noted.

3 Noise Sources

3.1 Transportation (Road)

Road traffic data for the significant roadways in proximity to the subject development were obtained from the Region of Waterloo. The road traffic data is summarized in **Table 4,** and the "raw data" is included in **Appendix B**.

Table 4 – Traffic Data for Municipal Roads

DESCRIPTION	Ira Needles Blvd.	Erb Street West
AADT (2035)	23,700	26,900
% Medium Trucks of total	1.0%	2.0%
% Heavy Trucks of total	2.0%	1.0%
Speed Limit	60 kph	60 kph
% Day/Night Split	90 / 10	90 / 10
Road gradient	1.2%	2.0%

3.2 Stationary

3.2.1 OnSite Sources

With new development, it is important to consider any new onsite noise sources which may cause impact to either onsite or existing offsite sensitive noise receivers.

On review of the proposed development the only significant noise generating source may be HVAC equipment needed to heat and cool the building. At the time of writing, the building design is in early stages and specific HVAC systems have not been selected. However, it is assumed three pieces of HVAC equipment will be located centrally on the rooftops. The assumed sound power levels of this equipment is noted in **Table 5**.

Table 5 – Onsite Stationary Noise Sources

DESCRIPTION	LOCATION	SOUND POWER LEVEL (dBA)	TIME ACTIVE
HVAC equipment	On proposed rooftop	81.9	Daytime: 100% Nighttime: 50%

3.2.2 OffSite Sources

On review of the Site's environs a number of noise sources were identified:

- 25 Westhill Drive: Residential apartment building with rooftop HVAC;
- 28 Westhill Drive: Residential apartment building with rooftop HVAC; and,
- 663 Erb Street West: Shopping Mall with rooftop HVAC and loading docks.

A historic noise study was completed October 26, 2020 for 635 Erb Street West, Waterloo by JJ Acoustic Engineering Ltd. This study reviewed stationary noise from 25 Westhill Drive. The source noise levels from this study were utilized for this current study with the power levels summarized in **Table 6** and their locations shown on **Drawings N2 through N7** in **Appendix C**.

Table 6 – Offsite Stationary Noise Sources

DESCRIPTION	SOUND POWER LEVEL (dBA)	TIME ACTIVE
HVAC equipment	81.9	Daytime: 100% Nighttime: 50%
Chiller	92.8	Daytime: 100% Nighttime: 50%
Idling transport truck	90.0	25% (15min/hr)

4 Sensitive Noise Receiver Locations

To facilitate analysis and description, sensitive noise Receiver locations were established at worst-case locations. These worst-case locations are assumed to represent the entire sensitive noise receiver area – for example, a receiver located in the "worst-case" corner of an Amenity Area is deemed to represent the entire Amenity Area (unless a separate Receiver is identified).

For the analysis of indoor noise, Receivers are assumed to be located flush with the outside of living room and bedroom windows.

In all cases, Receiver locations are assumed to be located 1.5m above ground or floor elevation to represent ear level.

4.1 Transportation

One indoor noise Receiver location (i.e., Receivers 'A') was determined to be worst-case receiver location on the Site. This receiver is closest and most exposed to both Ira Needles Blvd. (the primary noise source) and Erb Street West. All other locations would be more distant or have more protection from buildings acting as barriers to noise sources. Note, the Receiver represents the location in plan view – where required, elevation descriptors will be included to represent the different floor elevations of the building.

The receiver locations are shown on **Drawing N1** in **Appendix B**.

4.2 Stationary

The modelling for stationary noise produces a noise contour plan that shows noise levels throughout the study area at specified elevations (which are referenced). Accordingly specific Receiver Locations are not required unless there is a critical location that is close to criteria.

5 Analysis and Results

5.1 Transportation Noise

MECP's STAMSON v5 software (based on MECP's ORNAMENT algorithm) was used to model and predict noise levels resulting from road traffic at the identified Receiver locations. It was conservatively assumed that the intermediate surfaces between the traffic sources and the receivers was a reflective surface.

The STAMSON modelling output is included in **Appendix B** and the resulting noise levels are summarized in **Table 7**.

Table 7 – Predicted Un-Attenuated Traffic Noise Levels (dBA)

RECEIVER	DAYTIME		NIGHTTIME	
	Level *	Threshold **	Level *	Threshold **
A	67	55	60	50
B	60	55	54	50
C (OLA)	59	55	n/a	n/a

* *Red numbers (if shown) indicate failure of the threshold criteria.*
** *Threshold = minimum criteria below which no requirements for warning clauses or protection.*

As demonstrated in **Table 7**, predicted noise levels for indoor receivers exceed the minimum threshold criteria and thus controls are required to ensure the living and sleeping environments meet guidelines.

From review of the requirements presented in **Table 2** and the results summarized in **Table 7**, it is determined that the following controls are required:

- Central air conditioning;
- Special Building Components; and,
- Type 'D' warning clause.

Given the exceedance of the noise criteria for indoor areas resulting from road traffic noise, special building components may be required to ensure the indoor living and sleeping spaces are protected in accordance with MECP guidelines.

To calculate the required building components the dimensions of the rooms and their wall/window sizes is required. A typical bedroom/living area was assumed the dimensions are shown in **Table 8**. Note, bedrooms were taken into consideration during both nighttime and daytime hours to account for residents who may be asleep during any hour of the day.

Table 8 – Building Component Sizes (m2)

WINDOW AREA	WALL AREA	FLOOR AREA
3	8	12

The following building components were assumed:

- Minimum OBC requirements for the building Windows (i.e., STC = min 27); and,
- Minimum OBC requirements for the building Exterior Walls (STC = min 37).

The worst-case exceedance of the noise level criteria was 12 dBA at Receiver A during the daytime (i.e., 67 - 55 dBA – refer to **Table 7**).

The IBANA-Calc software was utilized to predict indoor noise levels based on the preceding assumptions and facts. The results of this analysis show that the predicted indoor sound level is 31 dBA which is well below the indoor criteria required (min criteria = 40). Refer to IBANA-Calc output in **Appendix D** for details.

Based on the preceding, it is concluded that the interior living and sleeping areas of the subject development can be appropriately mitigated from traffic noise by using building components compliant with the Ontario Building Code (OBC). Note, this conclusion assumes the occupant keeps doors and windows closed, and hence air conditioning is required to facilitate this.

Finally, the OLA exceeds the minimum criteria level and thus a Type 'A' warning clause is recommended to notify users that increasing traffic noise may occasionally interfere with some activities.

5.2 Stationary Noise

The noise modelling software program DBMap (utilizing algorithms based on ISO 9613 and 17534) was used to model stationary noise.

As described previously, there are a number of stationary noise sources that may impact either onsite or offsite sensitive receivers. The following general assumptions were made and used in the model:

- Temperature: 15c
- Relative humidity: 70%
- Application of reflections: 1st and 2nd order of reflections
- ISO reflector size check: Yes
- Ground surface characteristics: G=0 (i.e., hard ground) – conservative assumption.

Note, the MECP exclusionary limit has been assumed initially for the noise level criteria. This is a conservative assumption as the ambient noise levels are likely higher given the urban environment and especially given the proximity of Ira Needles Boulevard and Erb Street which are major arterial roads. Should noise levels exceed the exclusionary limit, further analysis of the ambient noise will be undertaken as that then becomes the governing noise level criteria.

The results of the modelling for the stationary equipment are shown graphically on **Drawing N2 through N5** in **Appendix C,** and sample model output is also included**.** **Table 9** shows the worst-case receptors' noise levels.

Table 9 – Predicted Un-Attenuated Stationary Noise Levels (dBA)

RECEIVER	DAYTIME		NIGHTTIME	
	Level *	Threshold **	Level *	Threshold **
B @ 1.5m	49	50	46	45
B @ 16.5m	54	50	51	45
C (OLA) @ 1.5m	47	50	n/a	n/a

* *Red numbers (if shown) indicate failure of the exclusionary threshold criteria.*
*** Threshold = minimum criteria below which no requirements for warning clauses or protection.*

As will be observed, some noise levels exceed the exclusionary limit. Accordingly, review of the ambient noise level is required to determine if mitigation is required. Stamson was used to estimate the minimum hour noise level resulting from traffic noise during the daytime and nighttime periods; 63 dBA and 53 dBA respectively (refer to **Appendix B**). On review of **Table 8** it is observed that stationary noise levels are below the ambient noise levels and thus stationary noise is within criteria and mitigation is not required for stationary noise.

6 Conclusions and Recommendations

Given the results of the noise analysis presented herein, the following recommendations are made to ensure the proposed development complies with municipal and provincial noise guidelines:

Recommendation #1 (All units)

All residential units within the Site shall include the following Warning Clauses (per NPC-300) in the Site's Development Agreement, registered on title, and be included in all Offers of Purchase and Sale:

1. *Type 'A': ""Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."*
2. *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 sound level limits of the Municipality and the Ministry of the Environment."*
3. *Type 'E': "Purchasers/tenants are advised that due to the proximity of adjacent commercial and/or industrial land uses that noise from these uses may at times be audible."*

Recommendation #2 (All units)

All units within the Site shall be designed and constructed with central air conditioning.

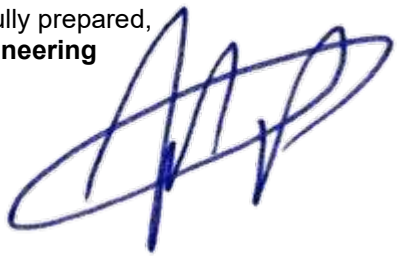
Recommendation #3

If during final design of the Site any deviations are made from the assumptions made herein, the noise analysis should be updated to determine if any changes to this report's conclusions or recommendations are required.

Based on the preceding, and with the implementation of the recommendations herein made, we conclude that the subject Site can be developed in compliance with municipal environmental noise guidelines.

* * * * * * * * * * * * * * * *

Respectfully prepared,
JPE Engineering



John Perks, MBA, P.Eng.
Senior Engineer, President

APPENDIX A:

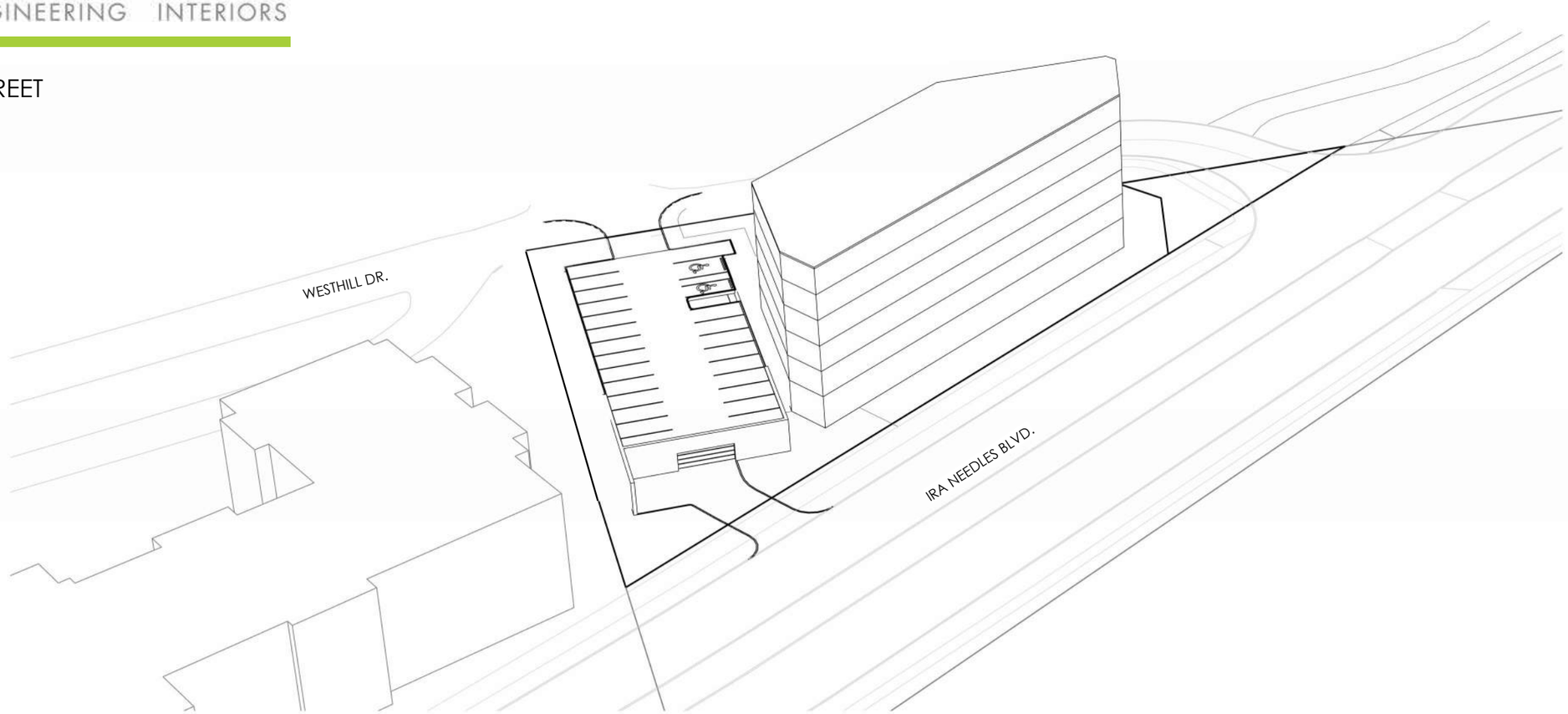
Site & Architectural Plans

mcCallumSather

ARCHITECTURE ENGINEERING INTERIORS

210-137 GLASGOW STREET
KITCHENER, ON
N2G 4X8

mccallumsather.com



DESIGN REPORT

24078 - 41 WESTHILL DR MID-RISE - 26.04.09



SITE CONTEXT / AERIAL VIEW



SITE CONTEXT / VIEW FROM IRA NEEDLES BLVD



SITE CONTEXT / VIEW FROM WESTHILL DR



SITE CONTEXT / VIEW FROM WESTHILL DR

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ARCHITECTURE ENGINEERING INTERIORS

LEGEND

- SUBJECT PROPERTY
- TRANSIT ROUTE/ HUB
- TRAILS
- BIKE LANES
- WALKING RADIUS
- (1) RECREATION
- (2) - RESERVED -
- (3) MEDICAL
- (4) EDUCATION
- (5) PUBLIC PARK
- (6) RETAIL/ GROCERY
- (7) RELIGIOUS

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

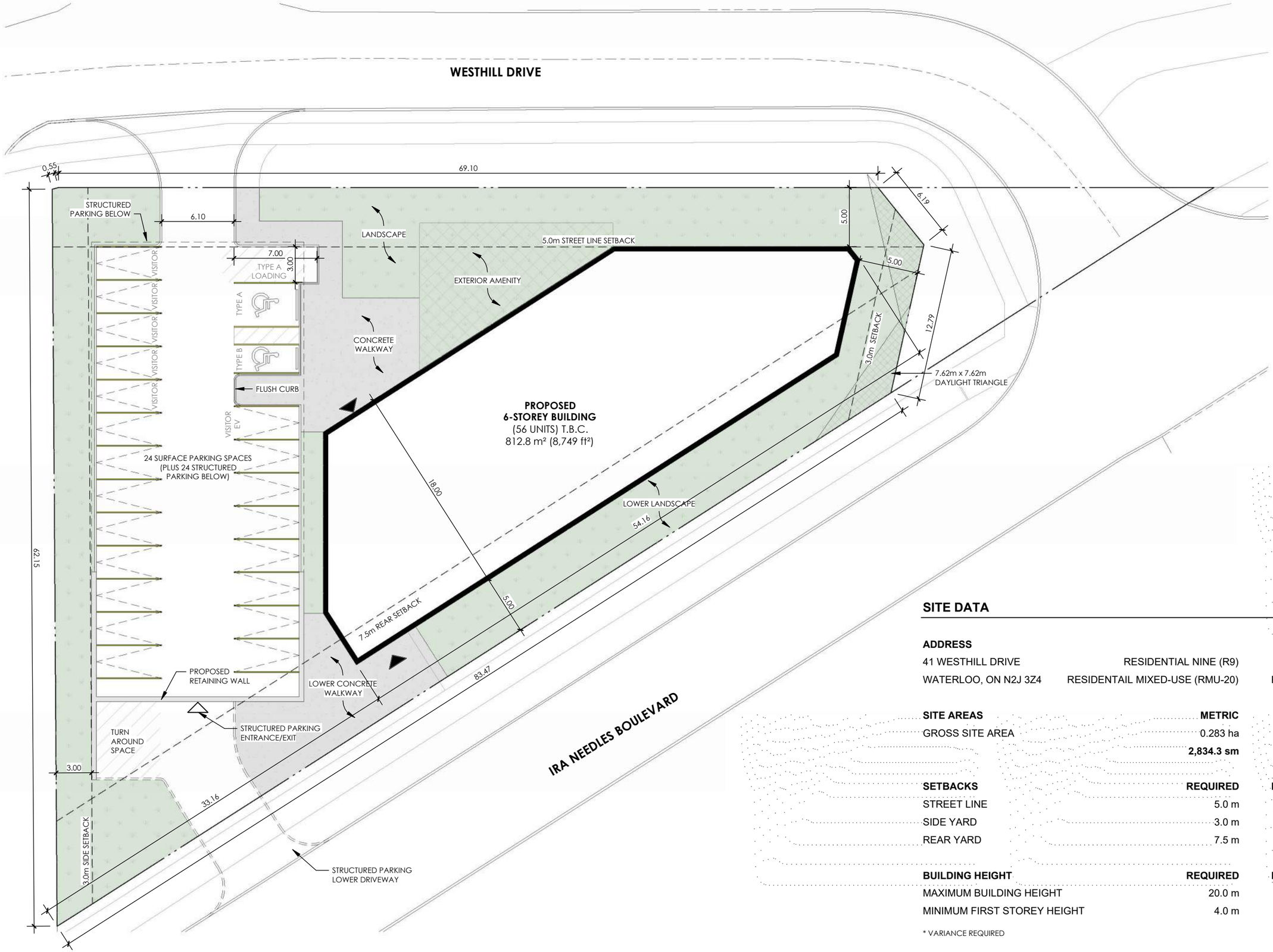
DRAWING TITLE
SITE CONTEXT

SCALE N.T.S.

ISSUED FOR
PRELIMINARY
DESIGN

DATE 26.04.09

1.1



mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS

TRUE PROJECT

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

DRAWING TITLE
SITE PLAN

SITE DATA

ADDRESS	ZONING	
41 WESTHILL DRIVE	RESIDENTIAL NINE (R9)	CURRENT
WATERLOO, ON N2J 3Z4	RESIDENTAIL MIXED-USE (RMU-20)	PROPOSED

SITE AREAS	METRIC	IMPERIAL
GROSS SITE AREA	0.283 ha	0.7 acres
	2,834.3 sm	**30,508 sf**

SETBACKS	REQUIRED	PROPOSED
STREET LINE	5.0 m	5.0 m
SIDE YARD	3.0 m	5.0 m
REAR YARD	7.5 m	5.0 m*

BUILDING HEIGHT	REQUIRED	PROPOSED
MAXIMUM BUILDING HEIGHT	20.0 m	20.0 m
MINIMUM FIRST STOREY HEIGHT	4.0 m	4.0 m

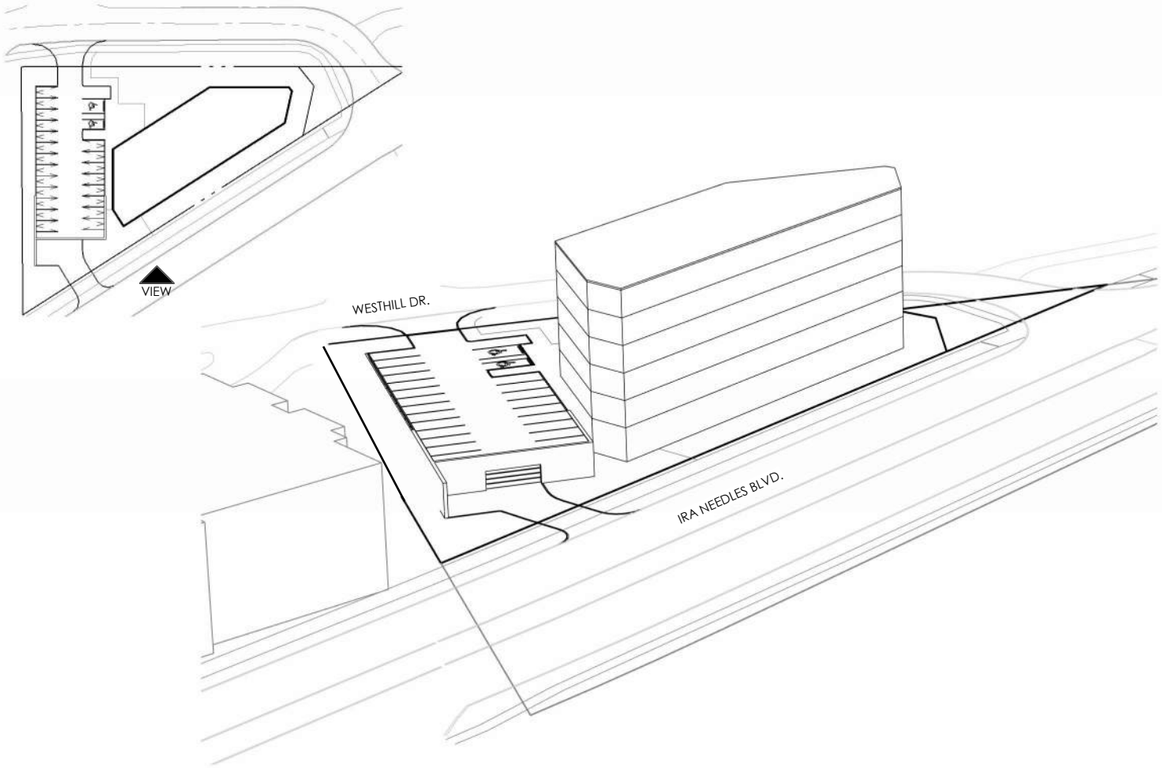
* VARIANCE REQUIRED

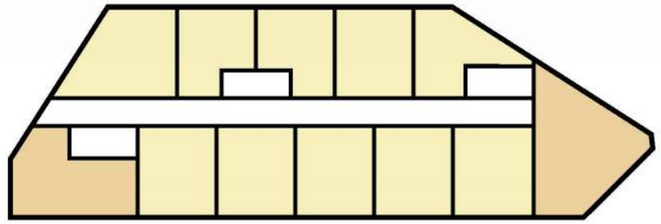
SCALE 1 : 300

ISSUED FOR
PRELIMINARY DESIGN

DATE 26.04.09

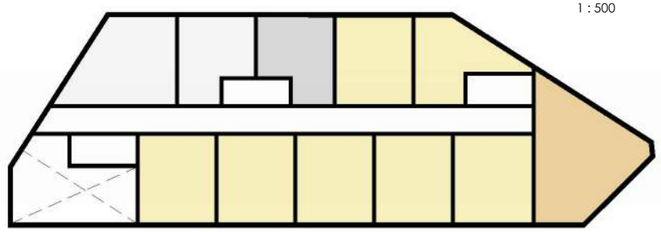
1.2





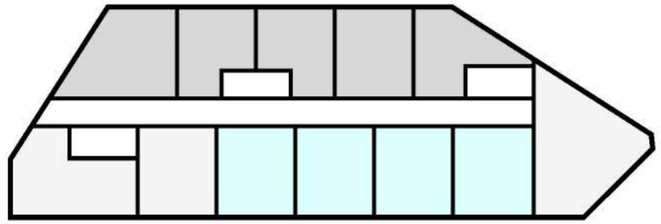
FLOOR PLAN - LEVEL TYPICAL

1 : 500



FLOOR PLAN - LEVEL 2

1 : 500



FLOOR PLAN - LEVEL 1

1 : 500

PROPOSED BUILDING DATA

	METRIC	IMPERIAL
BUILDING FOOTPRINT AT GRADE	**812.8 sm**	**8,749 sf**
GROSS FLOOR AREA (LEVEL 1-6)	**4,876.9 sm**	**52,495 sf**
ASPHALT AREA	768.5 sm	8,272 sf
CONCRETE AREA	262.8 sm	2,829 sf
TOTAL IMPERVIOUS AREA	**1,031.3 sm**	**11,100 sf**
LANDSCAPED AREA	967.4 sm	10,413 sf
TOTAL PERMEABLE AREA	**967.4 sm**	**10,413 sf**
(30% min.)	34%	

DENSITY	**REQUIRED**	**PROPOSED**
BEDS (X/ha)	450	230
FLOOR SPACE RATIO	---	1.72

PROPOSED UNIT DATA

SUITE TYPE	QUANTITY	QUANTITY %	BEDROOMS
1 BEDROOM	47	84%	47
2 BEDROOM	9	16%	18
TOTAL	**56**	**100%**	**65**
AFFORDABLE	17	30%	
MARKET RATE	39	70%	

AMENITY SPACE	**REQUIRED**	**PROPOSED**
3.0 sm/ 1ST BED + 2.0 sm/ 2ND BED	186 sm	350 sm

PARKING DATA

OVERALL PARKING		**REQUIRED**	**PROPOSED**
VISITOR PARKING SPACES	0.1/UNIT	6	6
STANDARD PARKING SPACES	0.9/UNIT	50	42*
TOTAL		**56**	**48***
PROPOSED PARKING RATIO			0.75/UNIT*
EV PARKING SPACES		1	1
BARRIER-FREE PARKING SPACES		1-TYPE A; 1-TYPE B	1-TYPE A 1-TYPE B
SURFACE PARKING			24
STRUCTURED PARKING			24
TOTAL (w/ VISITOR & B.F.)			**48***

BICYCLE STORAGE	**REQUIRED**	**PROPOSED**
BICYCLE TYPE 'A' SPACE	0.3/UNIT	TBD
BICYCLE TYPE 'B' SPACE	0.3/UNIT	TBD
LOADING SPACE: TYPE 'A'	1 SPACE	1 SPACE

* VARIANCE REQUIRED

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ARCHITECTURE ENGINEERING INTERIORS

LEGEND

- COMMON AREAS
- SERVICE/ PARKING
- 1 BEDROOM
- 2 BEDROOM
- AMENITY

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

DRAWING TITLE
STATISTICS

SCALE N.T.S.

ISSUED FOR
PRELIMINARY DESIGN

DATE 26.04.09

1.3



mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS

TRUE PROJECT

LEGEND

- COMMON AREAS
- SERVICE/ PARKING
- 1 BEDROOM
- 2 BEDROOM
- AMENITY

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

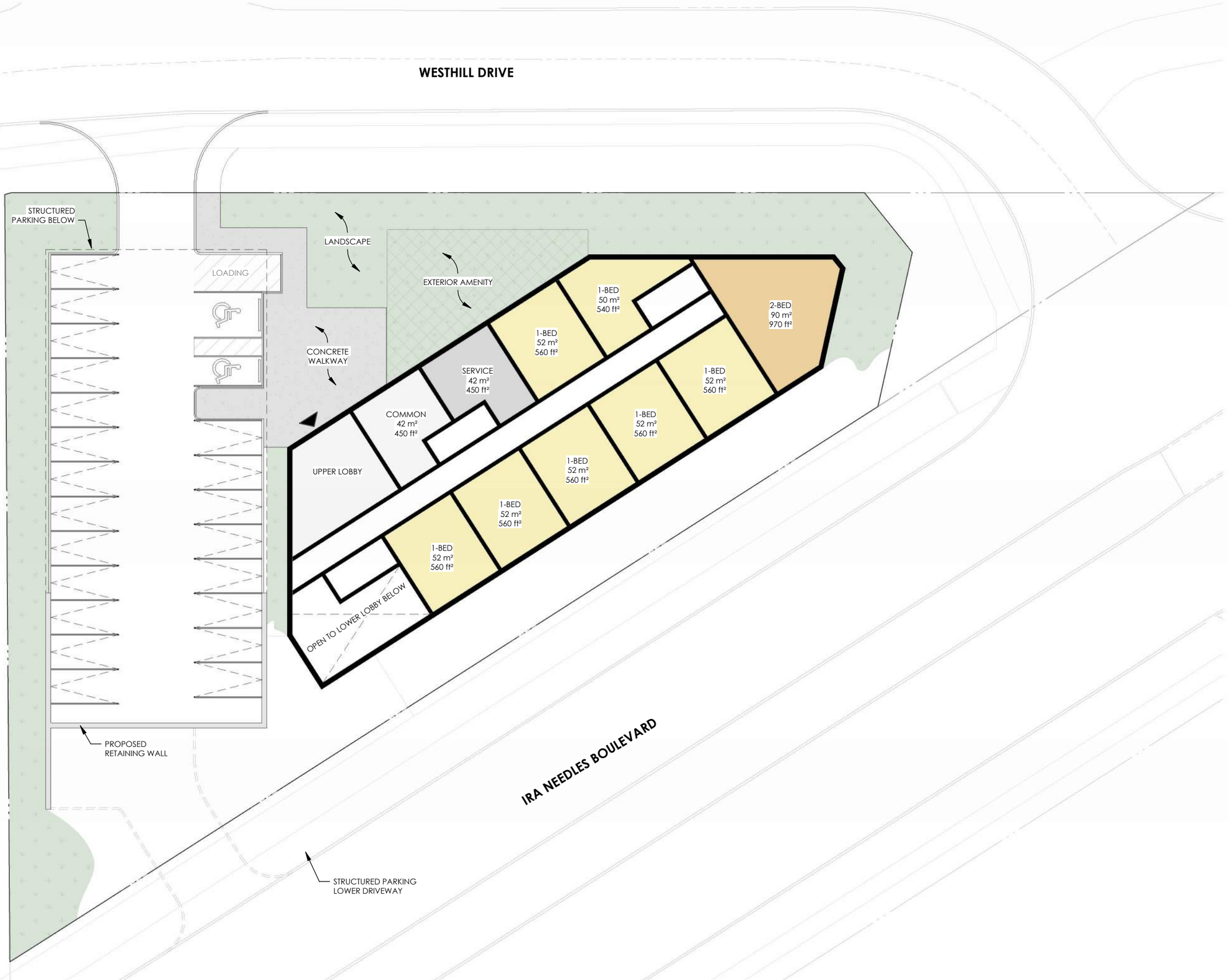
DRAWING TITLE
FLOOR PLAN -
LEVEL 1

SCALE 1:300

ISSUED FOR
PRELIMINARY
DESIGN

DATE 26.04.09

1.4



mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS

TRUE PROJECT

LEGEND

- COMMON AREAS
- SERVICE/ PARKING
- 1 BEDROOM
- 2 BEDROOM
- AMENITY

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

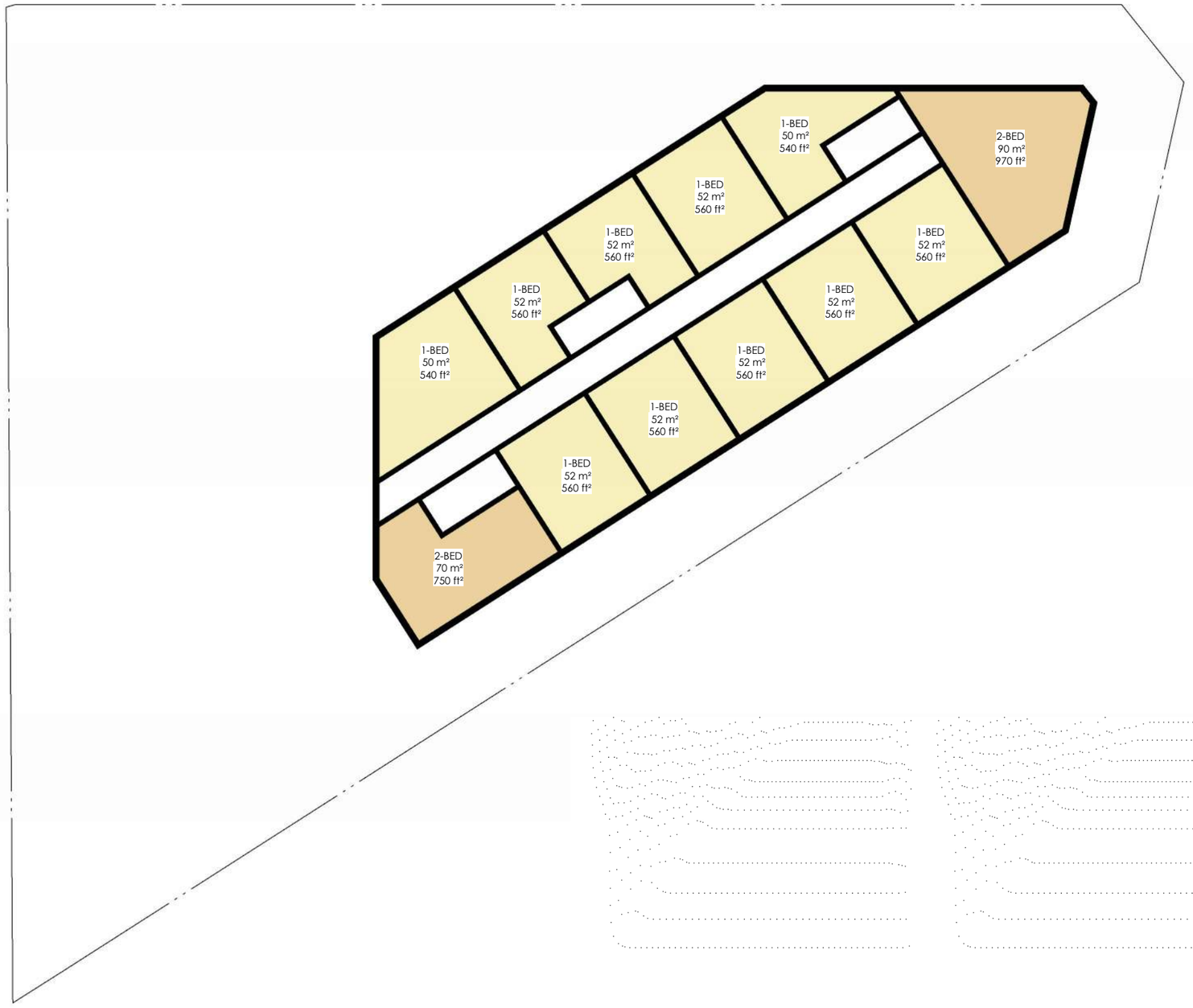
DRAWING TITLE
FLOOR PLAN -
LEVEL 2

SCALE 1:300

ISSUED FOR
PRELIMINARY
DESIGN

DATE 26.04.09

1.5



mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS

TRUE PROJECT

LEGEND

- COMMON AREAS
- SERVICE/ PARKING
- 1 BEDROOM
- 2 BEDROOM
- AMENITY

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

DRAWING TITLE
FLOOR PLAN -
TYPICAL LEVEL
(3-6)

SCALE 1:300

ISSUED FOR
PRELIMINARY
DESIGN

DATE 26.04.09

1.6









mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

DRAWING TITLE
REFERENCE
IMAGES

SCALE N.T.S.

ISSUED FOR
PRELIMINARY
DESIGN

DATE 26.04.09

1.7









mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

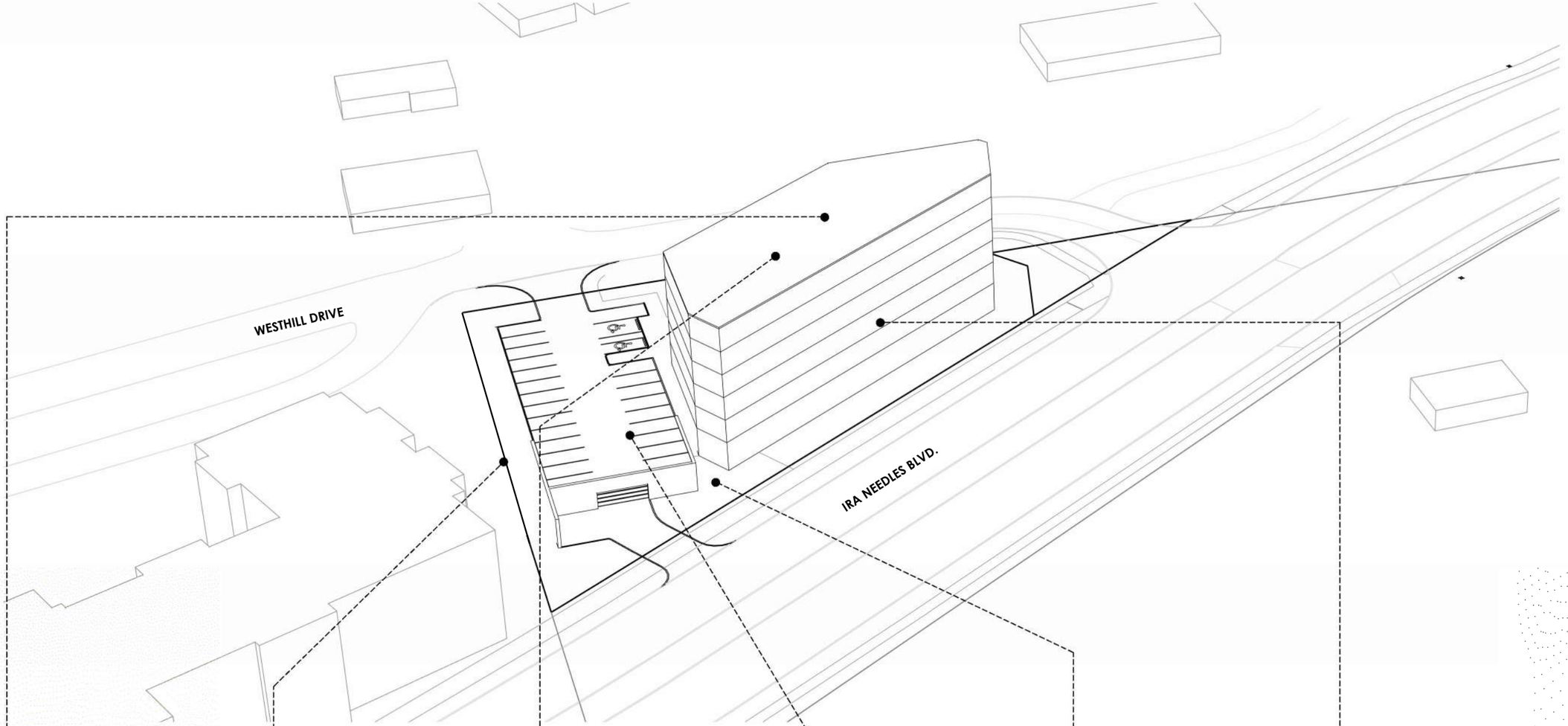
DRAWING TITLE
REFERENCE
IMAGES

SCALE N.T.S.

ISSUED FOR
PRELIMINARY
DESIGN

DATE 26.04.09

1.8



1 **GREEN ROOF**



2 **STORM WATER MANAGEMENT**



3 **SOLAR COLLECTION**



4 **EV CHARGING STATIONS**



5 **PERMEABLE PAVERS**



6 **ALTERNATIVE CONSTRUCTION SYSTEMS**



mcCallumSather
ARCHITECTURE ENGINEERING INTERIORS

PROJECT NO.
24078

PROJECT NAME
41 WESTHILL DR
MID-RISE

41 WESTHILL DR.,
WATERLOO, ON

DRAWING TITLE
SUSTAINABILITY

SCALE N.T.S.

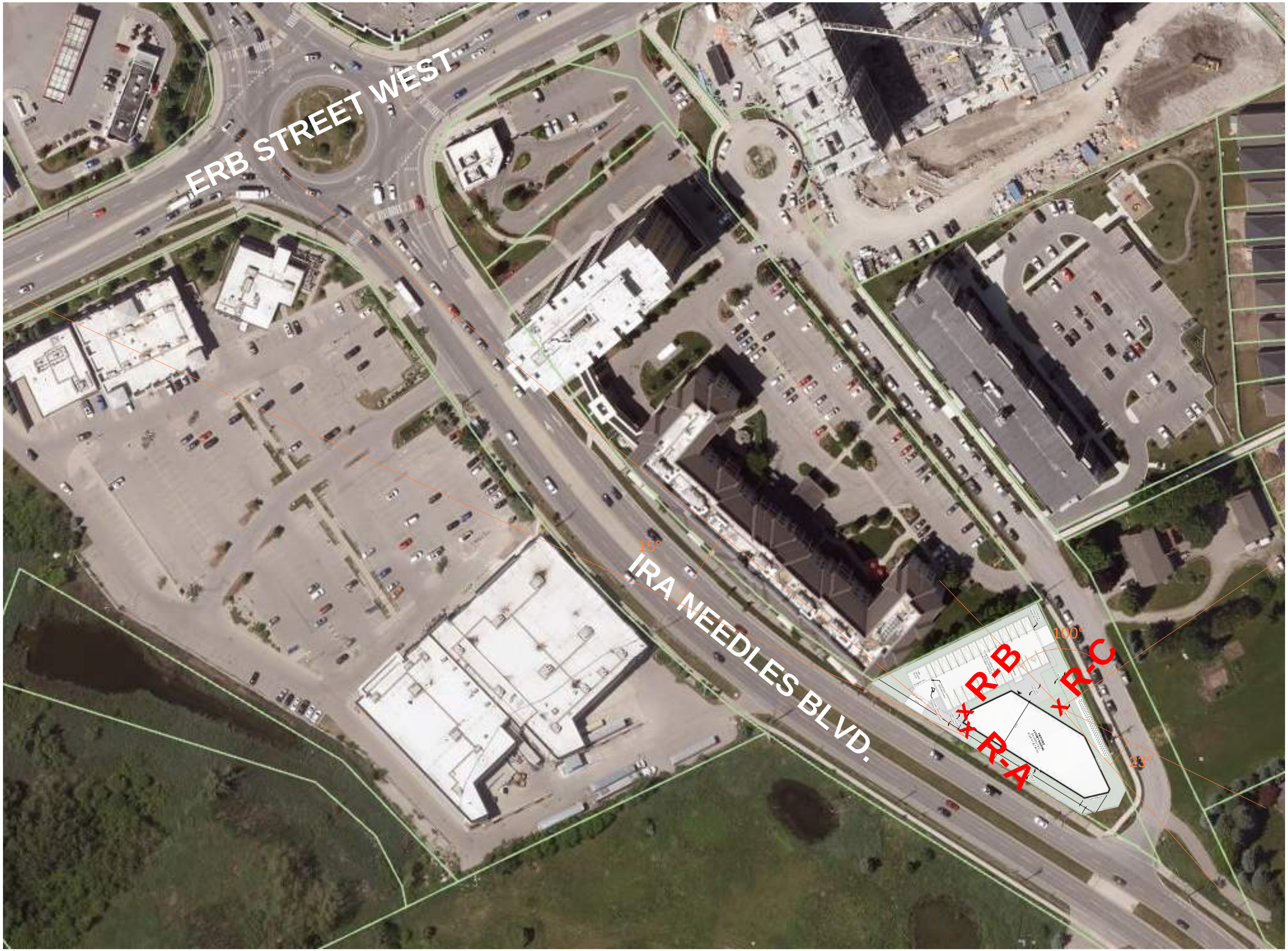
ISSUED FOR
PRELIMINARY
DESIGN

DATE 26.04.09

1.9

APPENDIX B:

Traffic Noise Information



SCALE:

1:1250

scale is approx. when plotted on 11x17 paper

N

#	REVISION	BY	DATE
1	First Submission	JRP	2025-03-18
2	Second Submission	JRP	2026-05-12

LEGEND:

x R-A Noise Receiver A

23 m Worst case distance receiver to source

125° Angle of exposure to line source

BASE MAPPING SOURCES:
- RofW GIS (imagery)
- mcCallumSather Architects

JPE ENGINEERING
info@jpe-engineering.ca
519-577-2238
www.jpe-engineering.ca

41 WESTHILL DRIVE
Waterloo, ON

TRAFFIC NOISE INFORMATION

SHEET 1 of 5

DWG JPE-1070 N-1

Region of Waterloo AADT Forecast for Noise Studies

1. Development/Location: 41 Westhill Dr, Kitchener

	Ira Needles Blvd	Erb St W
2. Current AADT (2025)	19,500	22,100

	Ira Needles Blvd	Erb St W
3. Forecast AADT (2035)	23,700	26,900

4. Commercial Vehicle Rates	Ira Needles Blvd	Erb St W
% Medium Trucks	1%	2%
% Heavy Trucks	2%	1%

	Ira Needles Blvd	Erb St W
5. Posted Speed Limit	60 km/h	60 km/h

6. Day/Night Splits: Regional Standard 90/10 Day/Night Split

7. Expiry: Dec 31 2027

8. Notes

This forecast is intended for the purpose of carrying out a noise study for 41 Westhill Dr, Kitchener, only. The above AADTs represent the traffic volumes on Ira Needles Blvd to the southwest of the property, and Erb St W to the northwest of the property. This forecast remains valid up to the date indicated above. The Region of Waterloo should be contacted for an updated forecast if there are plans to use this forecast beyond the above validity period.

```
STAMSON 5.0         NORMAL REPORT         Date: 12-05-2026 14:04:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: westh_a.te            Time Period: Day/Night 16/8 hours
```

Description: 41 WESTHILL - Receiver A

```
Road data, segment # 1: Ira Needles (day/night)
-----------------------------------------------
Car traffic volume  : 20690/2299  veh/TimePeriod  *
Medium truck volume :   213/24    veh/TimePeriod  *
Heavy truck volume  :   427/47    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):  23700
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ira Needles (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  23.00 / 23.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Erb Street (day/night)
----------------------------------------------
Car traffic volume  : 23484/2609  veh/TimePeriod  *
Medium truck volume :   484/54    veh/TimePeriod  *
Heavy truck volume  :   242/27    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  26900
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   1.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Erb Street (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   -75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 275.00 / 275.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Ira Needles (day)
--------------------------------------
Source height = 1.19 m
ROAD (0.00 + 66.91 + 0.00) = 66.91 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  68.77   0.00  -1.86   0.00   0.00   0.00   0.00  66.91
-------------------------------------------------------------------------------
Segment Leq : 66.91 dBA

Results segment # 2: Erb Street (day)
-------------------------------------
Source height = 1.00 m
ROAD (0.00 + 45.38 + 0.00) = 45.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -75   0.00  68.80   0.00 -12.63 -10.79   0.00   0.00   0.00  45.38
-------------------------------------------------------------------------------
Segment Leq : 45.38 dBA
Total Leq All Segments: 66.94 dBA

Results segment # 1: Ira Needles (night)
----------------------------------------
Source height = 1.19 m
ROAD (0.00 + 60.36 + 0.00) = 60.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  62.22   0.00  -1.86   0.00   0.00   0.00   0.00  60.36
-------------------------------------------------------------------------------
Segment Leq : 60.36 dBA

Results segment # 2: Erb Street (night)
---------------------------------------
Source height = 1.00 m

ROAD (0.00 + 38.86 + 0.00) = 38.86 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -75   0.00  62.28   0.00 -12.63 -10.79   0.00   0.00   0.00  38.86
-------------------------------------------------------------------------------
Segment Leq : 38.86 dBA
Total Leq All Segments: 60.39 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 66.94
(NIGHT): 60.39

```
STAMSON 5.0         NORMAL REPORT         Date: 12-05-2026 14:04:58
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: westh_b.te            Time Period: Day/Night 16/8 hours
```

Description: 41 WESTHILL - Receiver B

```
Road data, segment # 1: Ira Needles (day/night)
-----------------------------------------------
Car traffic volume  : 20690/2299  veh/TimePeriod  *
Medium truck volume :   213/24    veh/TimePeriod  *
Heavy truck volume  :   427/47    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):  23700
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ira Needles (day/night)
---------------------------------------------
Angle1   Angle2           : -65.00 deg   -25.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  23.00 / 23.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Erb Street (day/night)
----------------------------------------------
Car traffic volume  : 23484/2609  veh/TimePeriod  *
Medium truck volume :   484/54    veh/TimePeriod  *
Heavy truck volume  :   242/27    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  26900
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   1.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Erb Street (day/night)
-------------------------------------------
Angle1   Angle2           :   0.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 275.00 / 275.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Ira Needles (day)
-------------------------------------
Source height = 1.19 m
ROAD (0.00 + 60.38 + 0.00) = 60.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65    -25   0.00  68.77   0.00  -1.86  -6.53   0.00   0.00   0.00  60.38
-------------------------------------------------------------------------------
Segment Leq : 60.38 dBA

Results segment # 2: Erb Street (day)
-------------------------------------
Source height = 1.00 m
ROAD (0.00 + 43.62 + 0.00) = 43.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     10   0.00  68.80   0.00 -12.63 -12.55   0.00   0.00   0.00  43.62
-------------------------------------------------------------------------------
Segment Leq : 43.62 dBA
Total Leq All Segments: 60.47 dBA

Results segment # 1: Ira Needles (night)
---------------------------------------
Source height = 1.19 m
ROAD (0.00 + 53.83 + 0.00) = 53.83 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65    -25   0.00  62.22   0.00  -1.86  -6.53   0.00   0.00   0.00  53.83
-------------------------------------------------------------------------------
Segment Leq : 53.83 dBA

Results segment # 2: Erb Street (night)
---------------------------------------
Source height = 1.00 m
ROAD (0.00 + 37.10 + 0.00) = 37.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     10   0.00  62.28   0.00 -12.63 -12.55   0.00   0.00   0.00  37.10
-------------------------------------------------------------------------------
Segment Leq : 37.10 dBA
Total Leq All Segments: 53.92 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 60.47
(NIGHT): 53.92

```
STAMSON 5.0         NORMAL REPORT         Date: 12-05-2026 17:40:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: westh_c.te            Time Period: Day/Night 16/8 hours
```

Description: 41 WESTHILL - Receiver C

```
Road data, segment # 1: Ira Needles1 (day/night)
-----------------------------------------------
Car traffic volume  : 20690/2299  veh/TimePeriod  *
Medium truck volume :   213/24    veh/TimePeriod  *
Heavy truck volume  :   427/47    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):  23700
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   1.00
    Heavy Truck  % of Total Volume     :   2.00
    Day (16 hrs) % of Total Volume     :  90.00

Data for Segment # 1: Ira Needles1 (day/night)
-----------------------------------------------
Angle1   Angle2           : -90.00 deg   -67.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  23.00 / 23.00  m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Erb Street (day/night)
-----------------------------------------------
Car traffic volume  : 23484/2609  veh/TimePeriod  *
Medium truck volume :   484/54    veh/TimePeriod  *
Heavy truck volume  :   242/27    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):  26900
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   2.00
    Heavy Truck  % of Total Volume     :   1.00
    Day (16 hrs) % of Total Volume     :  90.00
```

```
Data for Segment # 2: Erb Street (day/night)
-------------------------------------------
Angle1   Angle2           : -10.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 275.00 / 275.00 m
Receiver height           :   1.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Ira Needles1 (day)
---------------------------------------
Source height = 1.19 m
ROAD (0.00 + 57.97 + 0.00) = 57.97 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -67   0.00  68.77   0.00  -1.86  -8.94   0.00   0.00   0.00  57.97
-------------------------------------------------------------------------------
Segment Leq : 57.97 dBA

Results segment # 2: Erb Street (day)
-------------------------------------
Source height = 1.00 m
ROAD (0.00 + 53.62 + 0.00) = 53.62 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -10     90   0.00  68.80   0.00 -12.63  -2.55   0.00   0.00   0.00  53.62
-------------------------------------------------------------------------------
Segment Leq : 53.62 dBA
Total Leq All Segments: 59.33 dBA

Results segment # 1: Ira Needles1 (night)
-----------------------------------------
Source height = 1.19 m
ROAD (0.00 + 51.43 + 0.00) = 51.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90    -67   0.00  62.22   0.00  -1.86  -8.94   0.00   0.00   0.00  51.43
-------------------------------------------------------------------------------
Segment Leq : 51.43 dBA

Results segment # 2: Erb Street (night)
---------------------------------------
Source height = 1.00 m
ROAD (0.00 + 47.10 + 0.00) = 47.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -10     90   0.00  62.28   0.00 -12.63  -2.55   0.00   0.00   0.00  47.10
-------------------------------------------------------------------------------
Segment Leq : 47.10 dBA
Total Leq All Segments: 52.79 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 59.33
(NIGHT): 52.79

```
STAMSON 5.0         NORMAL REPORT         Date: 12-05-2026 11:38:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wsth_b2d.te           Time Period: 1 hours
```

Description: 41 WESTHILL - Receiver B (min hour daytime)

```
Road data, segment # 1: Ira Needles
----------------------------------
Car traffic volume  :  2370 veh/TimePeriod
Medium truck volume :    20 veh/TimePeriod
Heavy truck volume  :    50 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Ira Needles
---------------------------------
Angle1   Angle2           : -65.00 deg   -25.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  23.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Erb Street
----------------------------------
Car traffic volume  :  2690 veh/TimePeriod
Medium truck volume :    50 veh/TimePeriod
Heavy truck volume  :    30 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: Erb Street
--------------------------------
Angle1   Angle2           :   0.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 275.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Ira Needles
--------------------------------
Source height = 1.20 m

ROAD (0.00 + 63.00 + 0.00) = 63.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65    -25   0.00  71.39   0.00  -1.86  -6.53   0.00   0.00   0.00  63.00
-------------------------------------------------------------------------------
Segment Leq : 63.00 dBA

Results segment # 2: Erb Street
--------------------------------
Source height = 1.02 m

ROAD (0.00 + 46.31 + 0.00) = 46.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     10   0.00  71.49   0.00 -12.63 -12.55   0.00   0.00   0.00  46.31
-------------------------------------------------------------------------------
Segment Leq : 46.31 dBA
Total Leq All Segments: 63.09 dBA
```

TOTAL Leq FROM ALL SOURCES: 63.09

```
STAMSON 5.0         NORMAL REPORT         Date: 12-05-2026 11:37:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: wsth_b2n.te           Time Period: 1 hours
Description: 41 WESTHILL - Receiver B (min hour nighttime)

Road data, segment # 1: Ira Needles
----------------------------------
Car traffic volume  :   237 veh/TimePeriod
Medium truck volume :     2 veh/TimePeriod
Heavy truck volume  :     5 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     1 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Ira Needles
---------------------------------
Angle1   Angle2           : -65.00 deg   -25.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  23.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Erb Street
----------------------------------
Car traffic volume  :   269 veh/TimePeriod
Medium truck volume :     5 veh/TimePeriod
Heavy truck volume  :     3 veh/TimePeriod
Posted speed limit  :    60 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: Erb Street
---------------------------------
Angle1   Angle2           :   0.00 deg   10.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 275.00 m
Receiver height           :   1.50 m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
Results segment # 1: Ira Needles
--------------------------------
Source height = 1.20 m

ROAD (0.00 + 53.00 + 0.00) = 53.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -65    -25   0.00  61.39   0.00  -1.86  -6.53   0.00   0.00   0.00  53.00
-------------------------------------------------------------------------------
Segment Leq : 53.00 dBA

Results segment # 2: Erb Street
--------------------------------
Source height = 1.02 m

ROAD (0.00 + 36.31 + 0.00) = 36.31 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     10   0.00  61.49   0.00 -12.63 -12.55   0.00   0.00   0.00  36.31
-------------------------------------------------------------------------------
Segment Leq : 36.31 dBA
```

Total Leq All Segments: 53.09 dBA

Appendix C:

Stationary Noise Information

Noise map height 1.5m (A-weighted)

dBmap.net

Point-19 [16.5m]

Building-4 [15m]

Point-7 [16.5m]

Point-6 [16.5m]

Point-5 [16.5m]

Point-4 [16.5m]

Building-2 [15m]

Point-3 [16.5m]

Point-2 [16.5m]

Point 1 [16.5m]

Building-3 [15m]

Point-10 [7.5m]

Point-11 [7.5m]

Point-8 [7.5m]

Point-9 [7.5m]

Point-13 [7.5m]

Building [6m]

Point-17 [2m]

Point-12 [7.5m]

Point-18 [2m]

NEEDLES BLVD.

Receiver [1.5m]
49 dB(A)

R-B

Point-14 [19.5m]

Building-6 [18m]

Receiver-2 [1.5m]
49 dB(A)

R-C

Point-15 [19.5m]

Building-5 [18m]

Point-16 [19.5m]

Building-8 [18m]

Building-9 [18m]

50m

100m

150m

200m

250m

300m

30 dB(A)
35 dB(A)
40 dB(A)
45 dB(A)
50 dB(A)
55 dB(A)
60 dB(A)
65 dB(A)
70 dB(A)
75 dB(A)
80+ dB(A)

HVAC = Points 1 through 16
Chiiler = Points 1 and 19
Idle Truck = Points 17 & 18

SCALE:

1:900

scale is approx. when plotted on 11x17 paper

N

#	REVISION	BY	DATE
1	First Submission	JRP	2025-03-18
2	Second Submission	JRP	2026-05-12

LEGEND:

x R-A Noise Receiver

Point-12 [7.5m]

Noise Source (& Height)

16.3 m

Worst case distance receiver to source

125°

Angle of exposure to line source

BASE MAPPING SOURCES:
- RofW GIS (imagery)
- mcCallumSather Architects

JPE ENGINEERING
info@jpe-engineering.ca
519-577-2238
www.jpe-engineering.ca

41 WESTHILL DRIVE
Waterloo, ON

STATIONARY NOISE
Day @ Ht = 1.5m

SHEET 2 of 5

DWG JPE-1070 N-2



HVAC = Points 1 through 16
Chiiler = Points 1 and 19
Idle Truck = Points 17 & 18

SCALE:
1:900
scale is approx. when plotted on 11x17 paper

N

#	REVISION	BY	DATE
1	First Submission	JRP	2025-03-18
2	Second Submission	JRP	2026-05-12

LEGEND:

x R-A Noise Receiver

Point-12 [7.5m]
Noise Source (& Height)

16.3 m
Worst case distance receiver to source

125°
Angle of exposure to line source

BASE MAPPING SOURCES:
- RofW GIS (imagery)
- mcCallumSather Architects

JPE ENGINEERING
info@jpe-engineering.ca
519-577-2238
www.jpe-engineering.ca

41 WESTHILL DRIVE
Waterloo, ON

STATIONARY NOISE
Day @ Ht = 16.5m

SHEET 3 of 5

DWG JPE-1070
N-3

Noise map height 1.5m (A-weighted)

dBmap.net

Point-19 [16.5m]

Building-4 [15m]

Point-7 [16.5m]

Point-6 [16.5m]

Point-5 [16.5m]

Point-4 [16.5m]

Point-3 [16.5m]

Point 1 [16.5m]

Point-2 [16.5m]

Building-3 [15m]

Point-10 [7.5m]

Point-11 [7.5m]

Point-8 [7.5m]

Point-9 [7.5m]

Point-13 [7.5m]

Building [6m]

Point-17 [2m]

Point-12 [7.5m]

Point-18 [2m]

NEEDLES BLVD.

Receiver [1.5m]
46 dB(A)

Receiver-2 [1.5m]
47 dB(A)

R-B

R-C

Point-14 [19.5m]

Building-7 [18m]

Building-6 [18m]

Point-15 [19.5m]

Building-5 [18m]

Point-16 [19.5m]

Building-8 [18m]

Building-9 [18m]

50m

100m

150m

200m

250m

300m

30 dB(A)
35 dB(A)
40 dB(A)
45 dB(A)
50 dB(A)
55 dB(A)
60 dB(A)
65 dB(A)
70 dB(A)
75 dB(A)
80+ dB(A)

HVAC = Points 1 through 16
Chiiler = Points 1 and 19
Idle Truck = Points 17 & 18

SCALE:

1:900

scale is approx. when plotted on 11x17 paper

N

#	REVISION	BY	DATE
1	First Submission	JRP	2025-03-18
2	Second Submission	JRP	2026-05-12

LEGEND:

x R-A Noise Receiver

Point-12 [7.5m]

Noise Source (& Height)

16.3 m

Worst case distance receiver to source

125°

Angle of exposure to line source

BASE MAPPING SOURCES:
- RofW GIS (imagery)
- mcCallumSather Architects

JPE ENGINEERING
info@jpe-engineering.ca
519-577-2238
www.jpe-engineering.ca

41 WESTHILL DRIVE
Waterloo, ON

STATIONARY NOISE
Night @ Ht = 1.5m



HVAC = Points 1 through 16
Chiiler = Points 1 and 19
Idle Truck = Points 17 & 18

SCALE:

1:900

scale is approx. when plotted on 11x17 paper

N

#	REVISION	BY	DATE
1	First Submission	JRP	2025-03-18
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LEGEND:

x R-A Noise Receiver

Point-12 [7.5m]

Noise Source (& Height)

16.3 m

Worst case distance receiver to source

125°

Angle of exposure to line source

BASE MAPPING SOURCES:
- RofW GIS (imagery)
- mcCallumSather Architects

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41 WESTHILL DRIVE
Waterloo, ON

STATIONARY NOISE
Night @ Ht = 16.5m

SHEET 5 of 5

DWG JPE-1070
N-5

Appendix D:

Building Component Review

Aircraft Noise Sound Insulation - Scenario Calculation Results

Date:2026-05-12

Outdoor level: NEF 35 or Leq24 67 or Ldn 68 dBA

Source Spectrum details:

100% Road Traffic

Corrections:

Receiving room:

Floor Area: 12 m²
Absorbtion: 120% of floor area

Construction Description:

Element 1: VIN1_WFUR19(406)_OSB11_WS140(406)_GFB152_G13

Construction Type: 2by6 Wall
Area: 8.00 m²
Test ID: TLA-99-019a
Test Date: 1999-01-19

Vinyl siding, 19 mm wood furring strips on 406 mm centre, 11 mm OSB, 140 mm wood studs on 406 mm centre with glass fibre cavity insulation, 1 of 13 mm gypsum board.

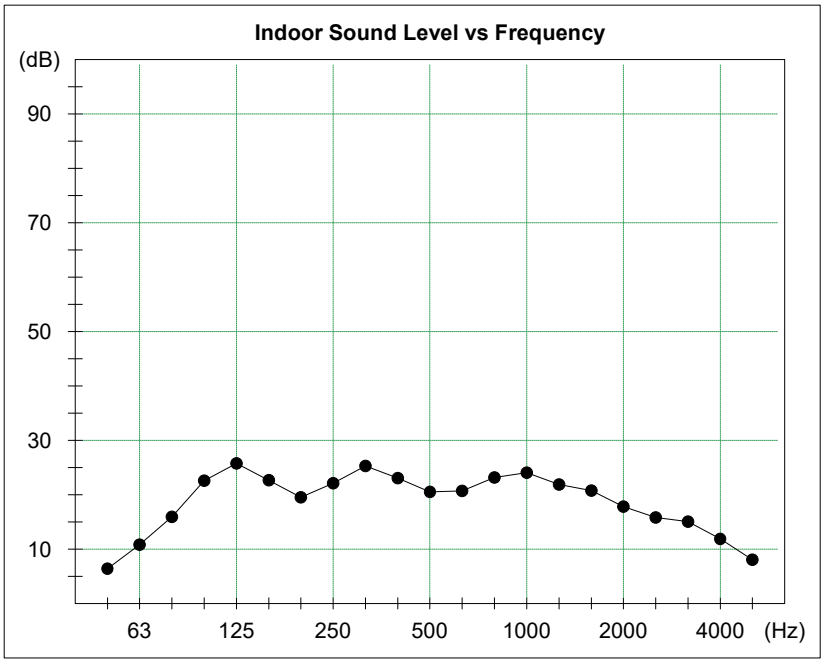
Element 2: GL3_AIR13_GL3

Construction Type: Window
Area: 3.00 m²
Test ID: TLA-99-157a
Test Date: 1999-04-16

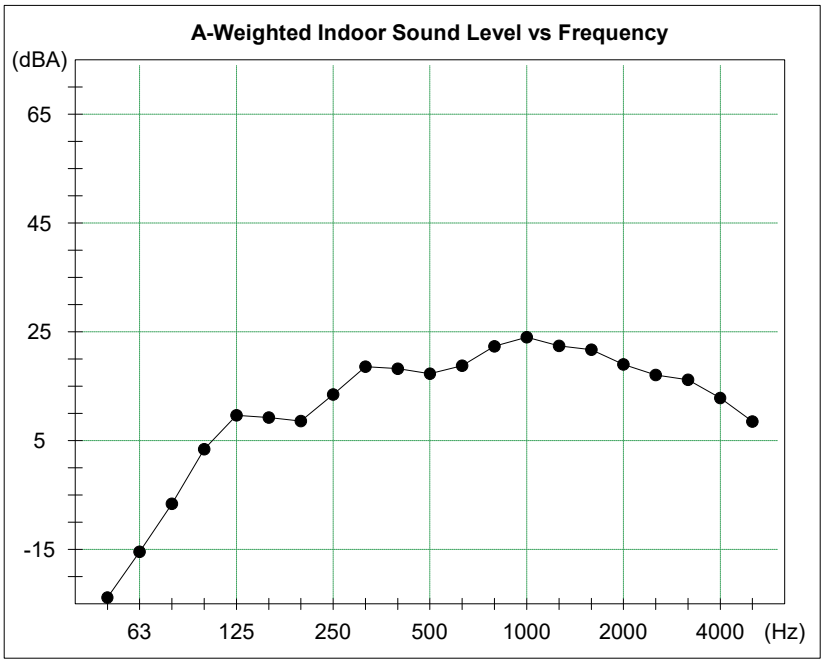
Vinyl double slider window (seals not taped).

Aircraft Noise Sound Insulation - Scenario Calculation Results

Date:2026-05-12



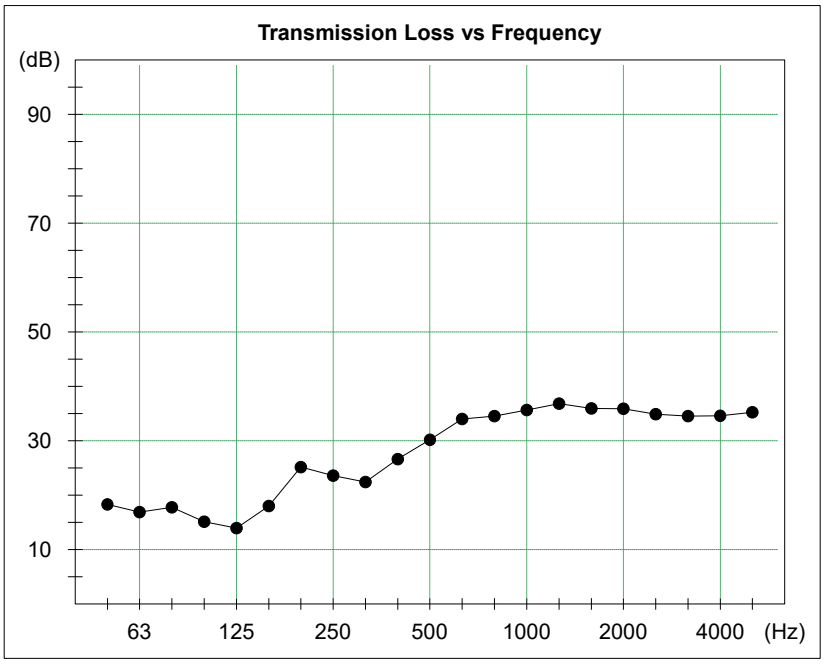
Frequency (Hz)	Sound Level (dB)
50	6.4
63	10.8
80	15.9
100	22.6
125	25.7
160	22.6
200	19.5
250	22.1
315	25.2
400	23.0
500	20.5
630	20.7
800	23.1
1000	24.0
1250	21.8
1600	20.7
2000	17.8
2500	15.8
3150	15.0
4000	11.8
5000	8.0



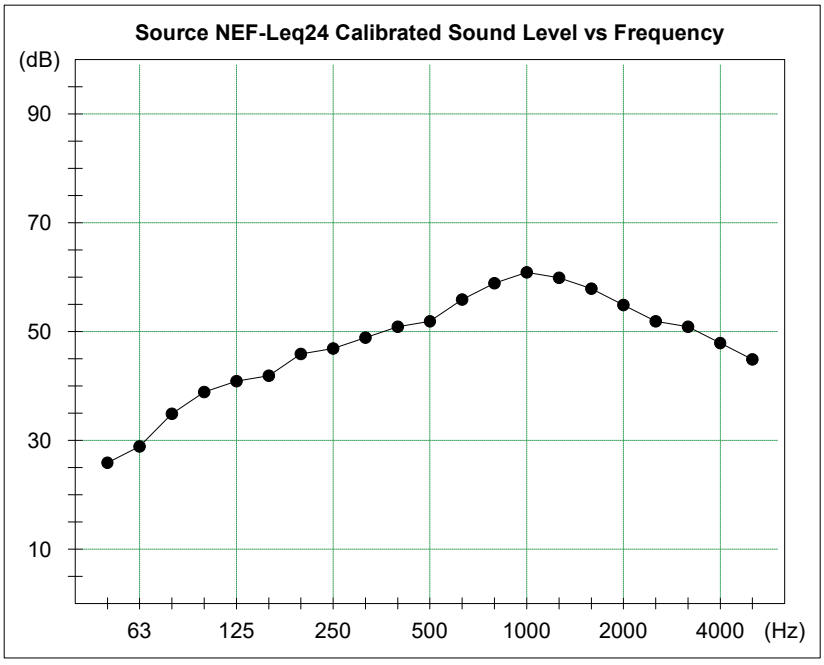
Frequency (Hz)	Sound Level (dBA)
50	-23.8
63	-15.4
80	-6.6
100	3.5
125	9.6
160	9.2
200	8.6
250	13.5
315	18.6
400	18.2
500	17.3
630	18.8
800	22.3
1000	24.0
1250	22.4
1600	21.7
2000	19.0
2500	17.1
3150	16.2
4000	12.8
5000	8.5

Aircraft Noise Sound Insulation - Scenario Calculation Results

Date:2026-05-12



Frequency (Hz)	TL (dB)
50	18
63	17
80	18
100	15
125	14
160	18
200	25
250	24
315	22
400	27
500	30
630	34
800	35
1000	36
1250	37
1600	36
2000	36
2500	35
3150	35
4000	35
5000	35



Frequency (Hz)	Sound Level (dB)
50	25.9
63	28.9
80	34.9
100	38.9
125	40.9
160	41.9
200	45.9
250	46.9
315	48.9
400	50.9
500	51.9
630	55.9
800	58.9
1000	60.9
1250	59.9
1600	57.9
2000	54.9
2500	51.9
3150	50.9
4000	47.9
5000	44.9

Single Number Ratings:

Outdoor Sound Level:	67 dBA
Indoor Sound Level:	31 dBA
A-wtd Level Reduction:	36 dB
A-wtd Reduction re Standard Source:	28 dB
OITC Rating:	25 dB