Updated Environmental Noise & Vibration Assessment

170 Northfield Drive West, Waterloo

Forgestone Capital Management L.P.

130 King Street West, Suite 2350, Toronto, ON M5X 2A1

Prepared by:

SLR Consulting (Canada) Ltd.

100 Stone Road West, Suite 201, Guelph, ON N1G 5L3

SLR Project No.: 241.030968.00001

April 2, 2025

Revision: 1

Revision Record

Revision	Date	Prepared by	Checked by	Authorized by
0	March 14, 2024	Keni Mallinen	Scott Penton	Scott Penton
1	April 2, 2025	Keni Mallinen Dylan Diebolt	Keni Mallinen	Scott Penton

Statement of Limitations

This report has been prepared by SLR Consulting (Canada) Ltd. (SLR) for Forgestone Capital Management L.P. (Client) in accordance with the scope of work and all other terms and conditions of the agreement between such parties. SLR acknowledges and agrees that the Client may provide this report to government agencies, interest holders, and/or Indigenous communities as part of project planning or regulatory approval processes. Copying or distribution of this report, in whole or in part, for any other purpose other than as aforementioned is not permitted without the prior written consent of SLR.

Any findings, conclusions, recommendations, or designs provided in this report are based on conditions and criteria that existed at the time work was completed and the assumptions and qualifications set forth herein.

This report may contain data or information provided by third party sources on which SLR is entitled to rely without verification and SLR does not warranty the accuracy of any such data or information.

Nothing in this report constitutes a legal opinion nor does SLR make any representation as to compliance with any laws, rules, regulations, or policies established by federal, provincial territorial, or local government bodies, other than as specifically set forth in this report. Revisions to legislative or regulatory standards referred to in this report may be expected over time and, as a result, modifications to the findings, conclusions, or recommendations may be necessary.

Table of Contents

Statement of Limitations ..... **ii**
Table of Contents **1**
Acronyms and Abbreviations ..... **x**
1.0 Introduction **1**
1.1 Focus of Report 1
1.2 Nature of the Surroundings 1
1.3 Nature of the Subject Lands 1
2.0 Transportation Noise Assessment **1**
2.1 Transportation Noise Sources 1
2.2 Surface Transportation Noise Criteria 2
2.2.1 Ministry of Environment Publication NPC-300 2
2.2.2 RMOW Noise Policy Implementation Guideline 4
2.2.3 City of Waterloo – Terms of Reference 4
2.3 Traffic Data and Future Projections 4
2.3.1 Roadway Traffic Data 4
2.3.2 Rail Traffic Data 6
2.4 Predicted Sound Levels 7
2.4.1 Façade Sound Levels 8
2.4.2 Outdoor Living Area Sound Levels 10
2.5 Noise Control Measures 11
2.5.1 Façade Assessment 11
2.5.2 Outdoor Living Area Assessment 13
3.0 Environmental Vibration Assessment **14**
3.1 Transportation Vibration 14
3.1.1 Transportation Vibration Sources 14
3.1.2 Transportation Vibration Assessment Guidelines 14
3.1.3 Vibration Measurement Program 14
3.1.4 Transportation Vibration Assessment 15
3.2 Industrial Vibration 16
4.0 Stationary Source Noise Assessment **16**
4.1 Stationary Source Noise Guidelines 16
4.1.1 Minimum Exclusionary Limits 16
4.1.2 Ambient Sound Levels from Road Traffic 17

4.2 Site Visits and Stationary Source Inventory 18
4.2.1 Site Visit Observations 18
4.2.2 Stationary Source Inventory 19
4.2.3 ION LRT Operation Maintenance and Storage Facility 19
4.3 Modelled Stationary Sources 21
4.4 Stationary Source Modelling 23
4.5 Predicted Stationary Source Sound Levels 23
4.5.1 Office Building – 565 Kumpf Drive 23
4.5.2 Teledyne DALSA – 575 Kumpf Drive 24
4.5.3 Office/Commercial Building – 101-139 Northfield Drive West 25
4.5.4 Waterloo Nissan – 141 Northfield Drive West 25
4.5.5 Heffner Cabinetry & Woodworking – 145 Northfield Drive West 26
4.5.6 Greystone Club – 155 Northfield Drive West 27
4.5.7 Shoppers Drug Mart – 190 Northfield Drive West 27
4.5.8 Sobeys – 640 Parkside Drive 28
4.5.9 Onward Manufacturing Company Limited/Broil King – 585 Kumpf Drive 29
4.5.10 Waterloo Fire Station 3 30
4.5.11 All Stationary Sources 31
4.6 Proposed Mitigation Measures 31
4.6.1 Mitigation to Meet Class 1 Area Noise Guideline Limits 31
4.6.2 Class 4 Designation & Warning Clauses Recommendations 33
5.0 Stationary Source Noise from the Development on Itself 34
5.1 Residential and Mixed Uses 34
5.2 Proposed Flex Commercial and Industrial Building Uses 34
6.0 Stationary Source Noise from the Development on the Surroundings 35
6.1 Residential and Mixed Uses 35
6.2 Proposed Flex Commercial and Industrial Building Uses 36
7.0 Conclusions and Recommendations 36
8.0 Closure 38
9.0 References 39

Tables in Text

Table 1: NPC-300 Sound Level Criteria for Road and Rail Noise 2
Table 2: NPC-300 OLA Sound Level Criteria for Road and Rail Noise 3
Table 3: NPC-300 Ventilation and Warning Clause Recommendations 3
Table 4: NPC-300 Building Component Assessment Requirements 4
Table 5: Summary of Road Traffic Data Used in Transportation Analysis 5
Table 6: Summary of Rail Traffic Data Used in Transportation Analysis 6
Table 7: Summary of Data Used to Assess ION LRT Crossing Bells 7
Table 8: Summary of Predicted Worst-Case Transportation Façade Sound Levels 8
Table 9: Summary of Predicted Transportation OLA Sound Levels 11
Table 10: Summary of Façade Glazing Requirements for Proposed Development 12
Table 11: Measured Vibration Levels at Proposed Development from Rail Pass By Events 15
Table 12: NPC-300 Class 1 Continuous, (Steady, Non-Impulsive) Sound Level Limits 17
Table 13: Summary of Road Traffic Data Used to Determine Minimum 1-hr Ambient Sound Levels 18

Appended Figures

Figure 1: Context Plan
Figure 2: Site Plan Excerpt
Figure 3: Predicted Façade Sound Levels – Road Traffic – Daytime
Figure 4: Predicted Façade Sound Levels – Road Traffic – Night-time
Figure 5: Predicted Façade Sound Levels – Rail Sources – Daytime
Figure 6: Predicted Façade Sound Levels – Rail Sources – Night-time
Figure 7: Predicted Façade Sound Levels – Transportation Sources – Daytime
Figure 8: Predicted Façade Sound Levels – Transportation Sources – Night-time
Figure 9: Predicted Outdoor Living Area Sound Levels – Transportation Sources – Daytime
Figure 10: Vibration Measurement Location and Setback Distances
Figure 11: Surrounding Stationary Source Locations
Figure 12: Predicted Façade Sound Levels – Stationary Sources – Office Building, 565 Kumpf Drive – Daytime/Evening
Figure 13: Predicted Façade Sound Levels – Stationary Sources – Office Building, 565 Kumpf Drive – Night-time
Figure 14: Predicted Façade Sound Level Excesses – Stationary Sources – Office Building, 565 Kumpf Drive – Daytime

Figure 15: Predicted Façade Sound Level Excesses – Stationary Sources – Office Building, 565 Kumpf Drive – Evening

Figure 16: Predicted Façade Sound Level Excesses – Stationary Sources – Office Building, 565 Kumpf Drive – Night-time

Figure 17: Predicted OPOR Sound Levels – Stationary Sources – Office Building, 565 Kumpf Drive – Daytime/Evening

Figure 18: Predicted Façade Sound Levels – Stationary Sources – Teledyne DALSA – 575 Kumpf Drive – Daytime/Evening

Figure 19: Predicted Façade Sound Levels – Stationary Sources – Teledyne DALSA – 575 Kumpf Drive – Night-time

Figure 20: Predicted OPOR Sound Levels – Stationary Sources – Teledyne DAlSA, 575 Kumpf Drive – Daytime

Figure 21: Predicted OPOR Sound Levels – Stationary Sources – Teledyne DALSA, 575 Kumpf Drive – Evening

Figure 22: Predicted Façade Sound Levels – Stationary Sources – Office/Commercial Building, 101-139 Northfield Drive West – Daytime/Evening

Figure 23: Predicted Façade Sound Levels – Stationary Sources – Office/Commercial Building, 101-139 Northfield Drive West – Night-time

Figure 24: Predicted OPOR Sound Levels – Stationary Sources – Office/Commercial Building, 101-139 Northfield Drive West – Daytime/Evening

Figure 25: Predicted Façade Sound Levels – Stationary Sources – Waterloo Nissan, 141 Northfield Drive West – Daytime/Evening

Figure 26: Predicted Façade Sound Levels – Stationary Sources – Waterloo Nissan, 141 Northfield Drive West – Night-time

Figure 27: Predicted OPOR Sound Levels – Stationary Sources – Waterloo Nissan, 141 Northfield Drive West – Daytime/Evening

Figure 28: Predicted Façade Sound Levels – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Daytime

Figure 29: Predicted Façade Sound Levels – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Evening

Figure 30: Predicted Façade Sound Levels – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Night-time

Figure 31a: Predicted Façade Sound Level Excesses – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Daytime – Unmitigated

Figure 31b: Predicted Façade Sound Level Excesses – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Daytime – Unmitigated – 3D (From South)

Figure 32: Predicted Façade Sound Level Excesses – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Evening – Unmitigated

Figure 33a:.. Predicted Façade Sound Level Excesses – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Night-time – Unmitigated

Figure 33b: Predicted Façade Sound Level Excesses – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Night-time – Unmitigated – 3D (From South)

Figure 34: Predicted OPOR Sound Levels – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Daytime

Figure 35: Predicted OPOR Sound Levels – Stationary Sources – Heffner Cabinetry & Woodworking, 145 Northfield Drive West – Evening

Figure 36: Predicted Façade Sound Levels – Stationary Sources – Greystone Club, 155 Northfield Drive West – Daytime/Evening

Figure 37: Predicted Façade Sound Levels – Stationary Sources – Greystone Club, 155 Northfield Drive West – Night-time

Figure 38: Predicted OPOR Sound Levels – Stationary Sources – Greystone Club, 155 Northfield Drive West – Daytime/Evening

Figure 39: Predicted Façade Sound Levels – Stationary Sources – Shoppers Drug Mart, 190 Northfield Drive West – Daytime

Figure 40: Predicted Façade Sound Levels – Stationary Sources – Shoppers Drug Mart, 190 Northfield Drive West – Evening

Figure 41: Predicted Façade Sound Levels – Stationary Sources – Shoppers Drug Mart, 190 Northfield Drive West – Night-time

Figure 42: Predicted Façade Sound Level Excesses – Stationary Sources – Shoppers Drug Mart, 190 Northfield Drive West – Daytime

Figure 43: Predicted Façade Sound Level Excesses – Stationary Sources – Shoppers Drug Mart, 190 Northfield Drive West – Evening

Figure 44: Predicted Façade Sound Level Excesses – Stationary Sources – Shoppers Drug Mart, 190 Northfield Drive West – Night-time

Figure 45: Predicted OPOR Sound Levels – Stationary Sources – Shoppers Drug Mart, 190 Northfield Drive West – Daytime

Figure 46: Predicted OPOR Sound Levels – Stationary Sources – Shoppers Drug Mart, 190 Northfield Drive West – Evening

Figure 47: Predicted Façade Sound Levels – Stationary Sources – Sobeys, 640 Parkside Drive – Daytime

Figure 48: Predicted Façade Sound Levels – Stationary Sources – Sobeys, 640 Parkside Drive – Evening

Figure 49: Predicted Façade Sound Levels – Stationary Sources – Sobeys, 640 Parkside Drive – Night-time

Figure 50a: Predicted Façade Sound Level Excesses – Stationary Sources – Sobeys, 640 Parkside Drive – Daytime

Figure 50b: Predicted Façade Sound Level Excesses – Stationary Sources – Sobeys, 640 Parkside Drive – Daytime – Unmitigated – 3D (from Northwest)

Figure 51: Predicted Façade Sound Level Excesses – Stationary Sources – Sobeys, 640 Parkside Drive – Evening

Figure 52: Predicted Façade Sound Level Excesses – Stationary Sources – Sobeys, 640 Parkside Drive – Night-time

Figure 53: Predicted OPOR Sound Levels – Stationary Sources – Sobeys, 640 Parkside Drive – Daytime

Figure 54: Predicted OPOR Sound Levels – Stationary Sources – Sobeys, 640 Parkside Drive – Evening

Figure 55: Predicted Façade Sound Levels – Stationary Sources – Onward Manufacturing, 585 Kumpf Drive – Daytime

Figure 56: Predicted Façade Sound Levels – Stationary Sources – Onward Manufacturing, 585 Kumpf Drive – Evening

Figure 57: Predicted Façade Sound Levels – Stationary Sources – Onward Manufacturing, 585 Kumpf Drive – Night-time

Figure 58: Predicted OPOR Sound Levels – Stationary Sources – Onward Manufacturing, 585 Kumpf Drive – Daytime

Figure 59: Predicted OPOR Sound Levels – Stationary Sources – Onward Manufacturing, 585 Kumpf Drive – Evening

Figure 60: Predicted Façade Sound Levels – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Daytime – Emergency Generator Testing

Figure 61: Predicted Façade Sound Level Excesses – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Daytime – Emergency Generator Testing

Figure 62: Predicted OPOR Sound Levels – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Emergency Generator Testing - Daytime

Figure 63: Predicted Façade Sound Levels – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Daytime/Evening – Continuous Sources

Figure 64: Predicted Façade Sound Levels – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Night-time – Continuous Sources

Figure 65: Predicted Façade Sound Level Excesses – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Daytime – Continuous

Figure 66: Predicted Façade Sound Level Excesses – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Evening – Continuous

Figure 67: Predicted Façade Sound Level Excesses – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Night-time – Continuous

Figure 68: Predicted OPOR Sound Levels – Stationary Sources – Fire Station 3, 150 Northfield Drive West – Continuous – Daytime/Evening

Figure 69: Predicted Façade Sound Levels – Stationary Sources – All Sources – Daytime

Figure 70: Predicted Façade Sound Levels – Stationary Sources – All Sources – Evening

Figure 71: Predicted Façade Sound Levels – Stationary Sources – All Sources – Night-time

Figure 72: Predicted Façade Sound Level Excesses – Stationary Sources – All Sources – Daytime

Figure 73: Predicted Façade Sound Level Excesses – Stationary Sources – All Sources – Evening

Figure 74: Predicted Façade Sound Level Excesses – Stationary Sources – All Sources – Night-time

Figure 75: Predicted OPOR Sound Levels – Stationary Sources – All Sources – Daytime/Evening

Appendices

Appendix A Declaration Statements

Appendix B Development Drawings

Appendix C Traffic Data and Calculations

Appendix D STAMSON Output File

Appendix E Ventilation, Warning Clause and Mitigation Summary

Appendix F Ambient Road Traffic Sound Levels

Appendix G Surrounding Stationary Sources – Facility Review

Appendix H Stationary Source Modelling Information

Appendix I Stationary Source Assessment Tables

Appendix J Stationary Source Sample Calculations

Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
BPN	National Research Council Building Practice Note 56
CN	Canadian National Railway
dBA	Decibels (A-weighted)
FCM	Federation of Canadian Municipalities
FTA	Federal Transit Administration
FRA	Federal Railroad Association
HVAC	Heating Ventilation and Air Conditioning
ISO	International Organization for Standardization
L_{eq}	Energy Equivalent Sound Level
LRT	Light Rail Transit
MECP	Ministry of the Environment, Conservation and Parks
NPC-300	MECP Publication NPC-300
OBC	Ontario Building Code
OLA	Outdoor Living Area
OPA	Official Plan Amendment
OPOR	Outdoor Point of Reception
ORNAMENT	Ontario Road Noise Analysis Method for Environment and Transportation
POR	Point of Reception
PWL	Sound Power Level
RAC	Railway Association of Canada
RMOW	Regional Municipality of Waterloo
SPL	Sound Pressure Level
TMC	Turning Movement Count
ToR	Terms of Reference
ZBA	Zoning By-law Amendment

1.0 Introduction

SLR Consulting (SLR) was retained by Forgestone Capital Management L.P. to prepare an updated environmental noise and vibration assessment for the proposed development at 170 Northfield Drive West in Waterloo, Ontario (the Project site). This report is in support of Official Plan Amendment (OPA) and Zoning Bylaw Amendment (ZBA) application resubmissions for the development. It is an update to the following original report prepared by SLR:

- "Environmental Noise & Vibration Assessment, 170 Northfield Drive West, Waterloo, Ontario, SLR Project No: 241.030968.00001", dated March 14, 2024.

Copies of Regional Municipality of Waterloo (RMOW) Declaration Statements are included in Appendix A.

1.1 Focus of Report

In keeping with Regional Municipality of Waterloo (RMOW) and City of Waterloo requirements and Terms of Reference, this report examines the potential for:

- Noise impacts of the environment on the proposed development;
- Vibration impact of the environment on the proposed development; and
- Noise impacts of the proposed development on the environment and on itself.

Mechanical systems associated with the development (e.g., cooling and ventilation equipment) have not been sufficiently designed at this stage and should be assessed at a future date. A general discussion has been included in this report

1.2 Nature of the Surroundings

The Project site is bounded by the following:

- The Waterloo Central Railway, lands containing employment land uses (e.g., office uses, Teledyne DALSA and Onward Manufacturing Company/Broil King), and Conestoga Parkway/Highway 85 to the east;
- Northfield Drive West and lands containing employment uses (e.g., office uses, vehicle dealerships, Heffner Cabinetry & Woodworking) to the south;
- Existing commercial/retail uses, Weber Street North, and residential dwellings to the west; and
- Employment land uses to the north.

A context plan is shown in Figure 1.

1.3 Nature of the Subject Lands

The Project site is located at 170 Northfield Drive West, Waterloo, near the intersection of Northfield Drive West and Weber Street North. The Project site is currently vacant to the east and northeast of Parkside Drive and contains single-storey commercial/retail/office buildings on the west side of Parkside Drive. These will be demolished in the future to accommodate the proposed development.

The full build-out of the proposed development will include the following mixed-use structures:

- Building A
  - Podium – 5-storey height
  - Tower – 20-storey height
- Building B
  - Podium – 5-to-6 storey height
  - Tower B1 – 36-storey height
  - Tower B2 – 36-storey height
- Building C
  - Podium – 5-storey height
  - Tower C1 – 31-storey height
  - Tower C2 – 32-storey height
- Building D
  - Podium – 5-storey height
  - Tower D1 – 35-storey height
  - Tower D2 – 28-storey height
- Building E
  - Podium – 5-storey height
  - Tower E – 26-storey height
- Building F
  - Podium – 5-storey height
  - Tower F1– 25-storey height
  - Tower F2– 28-storey height
- Building G
  - Podium – 5-storey height
  - Tower G1 – 26-storey height
  - Tower G2– 26-storey height
- Building H
  - Podium – 5-storey height
  - Tower H1 – 27-storey height

In addition to the mixed-use residential buildings, three single-storey Flex Commercial buildings (Flex Commercial I1, Flex Commercial I2 and Flex Commercial J) are proposed north of Buildings A/B and E/F, and two single-storey Industrial buildings are proposed at the north extent of the Project site (Building K and Building L).

Access to the proposed development will be via Parkside Drive. Access to Buildings K and L will be via a private road extending north from the existing Parkside Drive right of way.

A copy of the site plans, elevations, and preliminary floor plans are included for reference in Appendix B. A site plan is also provided for reference as Figure 2.

Part 1: Impacts of the Environment on the Development

In assessing potential impacts of the environment on the proposed development, the focus of this report is to assess:

- Transportation (road, rail, light rail transit (LRT)) noise impacts on the proposed development;
- Environmental vibration (transportation rail, LRT) impacts on the proposed development;
- Stationary noise impacts from the surrounding land uses on the proposed development; and
- Stationary noise impacts from the proposed development mechanical equipment onto the development itself, and onto surrounding noise-sensitive receptors.

The nearest airport is located more than 12 km southeast of the proposed development. Therefore, aircraft noise impacts have not been considered further in this study.

2.0 Transportation Noise Assessment

2.1 Transportation Noise Sources

Transportation sources with the potential to produce noise at the proposed development are:

- Roadway noise from Northfield Drive West, Weber Street North, Kumpf Drive, Parkside Drive and Highway 85;

- Rail noise from freight trains along the Waterloo Central Railway Guelph spur line; and
- Rail noise from the Grand River Transit ION LRT.

Transportation noise from these sources has been predicted, and this information has been used to determine façade, ventilation, and warning clause requirements for the proposed development.

2.2 Surface Transportation Noise Criteria

2.2.1 Ministry of Environment Publication NPC-300

Noise-Sensitive Development

Ministry of the Environment, Conservation and Parks (MECP) Publication NPC-300 provides sound level criteria for noise-sensitive developments. The applicable portions of NPC-300 are Part C – Land Use Planning and the associated definitions outlined in Part A – Background. Tables 1 to 4 summarize the applicable surface transportation (road and rail) criteria.

Location-Specific Criteria

Table 1 summarizes criteria in terms of energy equivalent sound exposure levels (L_{eq}) for specific noise-sensitive locations. Both outdoor and indoor locations are identified, with the focus of outdoor areas being amenity spaces. Indoor criteria vary with sensitivity of the space. As a result, Sleeping Quarters have more stringent criteria than Living/Dining Room spaces.

Table 1: NPC-300 Sound Level Criteria for Road and Rail Noise

Type of Space	Time Period	Energy Equivalent Sound Exposure Level L_{eq} [5] (dBA)		Assessment Location
		Road	Rail [1]	
Outdoor Amenity Area	Daytime (0700-2300h)	55	55	Outdoors [2]
Living/Dining Room [3]	Daytime (0700-2300h)	45	40	Indoors [4]
	Night-time (2300-0700h)	45	40	Indoors [4]
Sleeping Quarters	Daytime (0700-2300h)	45	40	Indoors [4]
	Night-time (2300-0700h)	40	35	Indoors [4]

Notes: [1] Whistle noise is excluded for OLA noise assessments and included for Living/Dining Room and Sleeping Quarter assessments, where applicable.

[2] Road and Rail noise impacts are to be combined for assessment of OLA impacts.

[3] Residence area Dens, Hospitals, Nursing Homes, Schools, Daycares are also included. During the nighttime period, Schools and Daycares are excluded.

[4] An assessment of indoor noise levels is required only if the criteria in **Table 4** are exceeded.

[5] L_{eq} – the energy equivalent sound level, integrated over the time period shown.

Outdoor Living Areas

Table 2 summarizes the noise mitigation requirements for outdoor amenity areas (“Outdoor Living Areas” or “OLAs”).

For the assessment of OLA sound levels, total surface transportation noise is determined by combining road and rail traffic sound levels. Whistle noise from trains is not included in the determination of outdoor sound levels.

Table 2: NPC-300 OLA Sound Level Criteria for Road and Rail Noise

Time Period	OLA Energy Equivalent Sound Exposure Level L_{eq} (dBA)	Mitigation/Warning Clause Requirements
Daytime (0700-2300h)	≤ 55	• None
	56 to 60 inc.	• Noise barrier OR Type A warning clause
	> 60	• Noise barrier to reduce noise to 55 dBA OR • Noise barrier to reduce noise to 60 dBA and Type B warning clause

Ventilation and Warning Clauses

Table 3 summarizes requirements for ventilation where windows would potentially have to remain closed as a means of noise control. Despite implementation of ventilation measures where required, if sound levels exceed the guideline limits in Table 1, warning clauses advising future occupants of the potential excesses are also recommended. Warning clauses also apply to OLAs.

Table 3: NPC-300 Ventilation and Warning Clause Recommendations

Assessment Location	Time Period	Energy Equivalent Sound Exposure Level – L_{eq} (dBA)		Ventilation and Warning Clause Requirements [2]
		Road	Rail [1]	
Outdoor Living Area	Daytime (0700-2300h)	56 to 60 incl.		Type A Warning Clause
Plane of Window	Daytime (0700-2300h)	≤ 55		None
		56 to 65 incl.		Forced Air Heating with provision to add air conditioning + Type C warning clause
		> 65		Central Air Conditioning + Type D warning clause
	Night-time (2300-0700h)	51 to 60 incl.		Forced Air Heating with provision to add air conditioning + Type C Warning Clause
		> 60		Central Air Conditioning + Type D Warning Clause

Notes: [1] Whistle noise is excluded from assessment.
[2] Road and Rail noise is combined for determining Ventilation and Warning Clause requirements

Building Component Requirements

Table 4 provides sound level thresholds which, if exceeded, trigger a requirement for the building shell components (i.e., exterior walls, windows) to be designed accordingly to meet the applicable indoor sound criteria.

Table 4: NPC-300 Building Component Assessment Requirements

Assessment Location	Time Period	Energy Equivalent Sound Exposure Level – L_{eq} (dBA)		Component Requirements
		Road	Rail [1]	
Plane of Window	Daytime (0700-2300h)	> 65	> 60	Designed/ Selected to Meet Indoor Requirements [2]
	Night-time (2300-0700h)	> 60	> 55	

Notes: [1] Whistle noise is included in assessment.
[2] Building component requirements are assessed separately for Road and Rail, and then combined for a resultant sound isolation parameter.

2.2.2 RMOW Noise Policy Implementation Guideline

The RMOW has published Noise Policy Implementation Guidelines (last updated October 22, 2019) for assessment of surface transportation (road and rail) sound levels. The applicable portions for new developments are outlined in Part A – New Development Impacted by Noise from Roads and Railways.

The RMOW Noise Policy Implementation Guidelines and associated sound level limits, ventilation requirements and building component requirements generally follow those in MECP Publication NPC-300. The exception is that night-time indoor sound level limits are not prescribed for living/dining room spaces. Therefore, for these indoor spaces, guideline limits from MECP Publication NPC-300 have been conservatively applied.

In the absence of specific warning clause language published by the RMOW, MECP warning clauses have been recommended in this assessment (where warranted).

2.2.3 City of Waterloo – Terms of Reference

The City of Waterloo has published a document entitled Terms of Reference: Noise Study, last updated June 30, 2023. The Terms of Reference indicate that road traffic shall be evaluated under the RMOW Noise Policy Implementation Guideline discussed above. The Terms of Reference were considered in this assessment with respect to approved models for assessment of road and rail sound levels.

2.3 Traffic Data and Future Projections

2.3.1 Roadway Traffic Data

Future average annual daily traffic (AADT) volumes and vehicle percentages for Northfield Drive West, Kumpf Drive, Parkside Drive and Weber Street North were provided by the RMOW Transportation Division. Day/night splits were also provided. Parkside Drive and Kumpf Drive are under the jurisdiction of the City of Waterloo, who were contacted to verify the forecasts

provided by the RMOW. The City of Waterloo could not verify the forecasts, but provided AADT estimates for these roadways. For Kumpf Drive, the data from RMOW were determined to be more conservative than that from the City, and it was therefore used in the assessment. For Parkside Drive, the higher AADT provided by the City was used in the assessment, along with the medium and heavy truck percentages provided by the RMOW.

Due to topographic variability and roadway width, eastbound and westbound lands of Northfield Drive West were considered separately, with 50% of roadway volumes applied to each direction of traffic.

Highway 85 AADT and average annual daily truck traffic (AADTT) volumes for 2019 were obtained from the Ministry of Transportation (MTO) iCorridor database. Segments north and south of Northfield Drive West were considered individually, as the total traffic volumes varied. The maximum annual growth rate for the segments was calculated to be approximately 1.4% per year from 2009 to 2019, north of Northfield Drive West. This was conservatively applied to all Highway 85 traffic data for the purposes of the assessment. The 2019 AADT volumes were projected to future year 2034 at the 1.4% annual growth rate. Commercial vehicle percentages were based on the Annual Average Daily Truck Traffic (AADTT) relative to the AADT, and a medium/heavy truck ratio of 25%/75% and it was assumed. A day/night split of 85%/15% was assumed.

Copies of all traffic data, correspondence and related calculations are provided for reference in Appendix C. Correspondence from the RMOW confirming the validity of provided traffic data to December 31, 2025 is also provided.

Table 5 summarizes the road traffic volumes and associated details used in the analysis.

Table 5: Summary of Road Traffic Data Used in Transportation Analysis

Roadway	Future Traffic Volumes (AADT)	% Day/Night Volume Split		Commercial Vehicle Breakdown		Vehicle Speed (km/hr)
		Daytime	Night-time	% Medium Trucks	% Heavy Trucks	
Kumpf Drive	2,600	90	10	3.0	6.0	50
Parkside Drive	10,142	90	10	2.0	6.0	50 [1]
Weber Street North	15,500	90	10	2.0	3.0	60
Northfield Drive West	32,700	90	10	1.0	2.0	60
Highway 85 – North of Northfield Drive West	28,333	85	15	3.2	9.7	90
Highway 85 – South of Northfield Drive West	52,355	85	15	1.8	5.3	90

Notes: [1] The current posted speed limit of Parkside Drive north of Northfield Drive West is 20 km/hr. The City of Waterloo has indicated a speed limit of 50 km/hr, which has been used in the assessment.

2.3.2 Rail Traffic Data

2.3.2.1 Train Movements

The Waterloo Central Railway Guelph Spur line is located along the eastern portion of the Project site. SLR has requested rail traffic volume forecasts from CN, which have not been received as of the date of this report.

Based on observations collected during site visits to the Project site/surrounding area, and a review of the Government of Canada Rail-Road Grade Crossings Inventory, existing freight train volumes were estimated. It was observed that two freight trains (one northbound and south southbound) pass by the Project site during night-time hours, between 2300 hours and 0700 hours. A night-time volume of two trains was forecasted to future year 2034 at a 2.5% annual growth rate, which is typical in rail noise assessments.

In the absence of information directly from CN, trains were considered as typical 'way freight' trains with up to 4 locomotives and up to 25 rail cars. A travel speed of 24 km/hr was assumed, based on information contained in the Grade Crossings Inventory for the Northfield Drive West crossing, and typical maximum allowable CN travel speeds along spur lines. CN rail traffic data considered in the analysis is summarized in Table 6. Once (or if) rail traffic data is provided by CN, the rail traffic noise assessment should be updated.

In accordance with bylaw restrictions in the City of Waterloo, rail whistles are not permitted until trains travel north of Farmers Market Road, more than 1 km north of the residential buildings in the proposed development. Therefore, whistle noise from freight trains was not considered further in the assessment.

Headway times for Grand River ION LRT trains were obtained from the RMOW Transportation Division. Headway volumes are provided for reference in Appendix C and are based on Baseline Service Plan 2 (2021-2024) of the Rapid Transit's Project Agreement. Current daytime and night-time volumes were calculated based on the headway times during the operational hours of the LRT, between 0500 hours and 0100 hours the following day.

In the absence of future service plans/headway time estimates for the ION LRT, current total volumes were projected to future year 2034 at a 2.5% annual growth rate, which is typically applied in rail noise assessments. An LRT travel speed of 50 km/hr was used in the assessment. As wheel squeal was occasionally audible for LRT trains turning southbound into Northfield Station or turning eastbound onto Northfield Drive West, a 5 dB tonality penalty was conservatively applied to all ION rail movements.

Rail traffic data used in the assessment is summarized in Table 6, with rail modelling inputs included for reference in Appendix C.

Table 6: Summary of Rail Traffic Data Used in Transportation Analysis

Railway Source	Train Type	Max. Locomotives per Train	Max. Cars per Train	Forecasted Train Volumes		Train Speed (km/hr)
				Daytime	Night-time	
CN	Way Freight	4	25	0	3	24
ION	LRT	0	1	134	22	50

2.3.2.2 ION LRT Crossing Bell

During site visits by SLR staff to the Project site, it was noted that two crossing bells sound on the south side of the Northfield Drive West crossing when LRT trains approach or depart Northfield Station. Crossing arms are lowered to restrict eastbound traffic along Northfield Drive West, and the crossing bells ring from the time the arms begin lowering until they are raised again.

SLR obtained a sound level measurement of the crossing bell during a site visit on February 1, 2024. Based on the measurement, each crossing bell is estimated to have a sound power level of approximately 105 dBA.

To account for noise impacts from the crossing bells, their sound levels at the proposed development were assessed as train whistles would typically be assessed. It was estimated that the crossing bells will ring for 120 seconds (2 minutes) per future LRT train movement. Table 7 presents the estimated total duration of crossing bell operating time assessed during daytime and night-time periods.

Table 7: Summary of Data Used to Assess ION LRT Crossing Bells

Source	Sound Power Level (dBA)	Forecasted Train Volumes		Modelled Duration of Crossing Bell Noise (minutes)	
		Daytime	Night-time	Daytime	Night-time
LRT Crossing Bell	105	134	22	269	43

2.4 Predicted Sound Levels

Future road traffic sound levels at the proposed development were predicted using Cadna/A, a commercially available noise propagation modelling software. Roadways were modelled as line sources of sound (using the ISO-9613-2 (1996) implementation in Cadna/A). Sound emission rates were calculated using the ORNAMENT algorithms, the road traffic noise model of the MECP. These predictions were validated and are equivalent to those made using the MECP's ORNAMENT or STAMSON v5.04 road traffic noise models. A STAMSON validation file is included for reference in **Appendix D**.

Rail traffic sound levels at the proposed development were predicted using the U.S. Department of Transportation Federal Transit Administration ("FTA") and Federal Railway Administration ("FRA") rail noise modelling algorithms included in Cadna/A software. The FTA/FRA algorithms are the replacement models for the former MECP "STEAM" model and are written into the current draft version of MECP Publication NPC-306, which will replace the current NPC-206 guideline on transportation noise prediction. The FTA/FRA algorithms have been used in numerous Environmental Assessments ("EAs") for CN railway projects, as well as in numerous land use planning projects across the province. The City of Waterloo ToR also identifies the FTA/FRA models as acceptable methods for Modelling and Assessment.

Sound levels were predicted along the facades of the proposed development using the "building evaluation" feature of Cadna/A. This feature allows for noise levels to be predicted across the entire façade of a structure. OLA sound levels were predicted at a height of 1.5 m above the building podium rooftops, at the centre of the identified terraces (in line with NPC-300 definitions).

2.4.1 Façade Sound Levels

Predicted worst-case façade sound levels are presented in Table 8. The transportation façade sound levels at the proposed development, showing the ranges of predicted daytime and night-time sound levels are shown in Figure 3 (roadway, daytime) Figure 4 (roadway, night-time), Figure 5 (rail, daytime), Figure 6 (rail, night-time), Figure 7 (road and rail total, daytime) and Figure 8 (road and rail total, night-time).

Table 8: Summary of Predicted Worst-Case Transportation Façade Sound Levels

Building	Façade[1]	Predicted Road Traffic Sound Level[2]		Predicted Rail Traffic Sound Level[2]		Predicted Total Transportation Sound Level	
		L_{eq} Day (dBA)	L_{eq} Night (dBA)	L_{eq} Day (dBA)	L_{eq} Night (dBA)	L_{eq} Day (dBA)	L_{eq} Night (dBA)
Building A Podium	North	63	56	27	29	63	56
	South	63	56	29	27	63	56
	West	67	60	28	25	67	60
Building A Tower	North	61	55	28	33	61	55
	East	54	50	33	33	54	50
	South	60	54	45	41	60	54
	West	64	58	28	25	64	58
Building B1 Tower	North	59	53	29	36	59	53
	East	57	52	46	42	57	53
	South	56	51	35	32	56	51
	West	56	49	29	27	56	49
Building B2 Tower	North	59	54	30	39	59	54
	East	63	58	50	47	63	58
	South	61	56	48	44	61	56
	West	52	46	33	30	52	46
Building C1 Tower	North	55	50	31	33	55	50
	East	58	53	51	46	59	54
	South	60	54	51	47	61	55
	West	53	47	32	29	53	47
Building C2 Tower	North	59	54	33	39	59	54
	East	64	59	54	50	64	59
	South	64	58	55	50	64	59
	West	58	52	38	34	58	52
Building D	North	62	56	31	28	62	56

Building	Façade[1]	Predicted Road Traffic Sound Level[2]		Predicted Rail Traffic Sound Level[2]		Predicted Total Transportation Sound Level	
		L_{eq} Day (dBA)	L_{eq} Night (dBA)	L_{eq} Day (dBA)	L_{eq} Night (dBA)	L_{eq} Day (dBA)	L_{eq} Night (dBA)
Podium	South	69	63	49	44	69	63
	West	68	61	30	26	68	61
Building D1 Tower	North	59	53	29	29	59	53
	East	63	57	49	45	63	57
	South	67	60	49	44	67	60
	West	65	59	30	27	65	59
Building D2 Tower	North	54	48	34	30	54	48
	East	63	57	53	48	64	58
	South	66	60	52	48	66	60
	West	61	55	33	29	61	55
Building E Podium	North	63	56	27	28	63	56
	East	67	60	29	28	67	60
	South	63	56	30	28	63	56
Building E Tower	North	61	55	28	32	61	55
	East	64	58	38	35	64	58
	South	60	54	36	32	60	54
	West	56	50	26	23	56	50
Building F Podium	East	52	46	26	23	52	46
	South	55	48	26	23	55	48
	West	58	51	26	22	58	51
Building F1 Tower	North	60	54	25	29	60	54
	East	58	52	33	31	58	52
	South	58	51	33	28	58	51
	West	60	53	25	22	60	53
Building F2 Tower	North	56	50	26	28	56	50
	East	55	49	34	32	55	50
	South	59	52	33	30	59	52
	West	60	53	25	22	60	53
Building G Podium	North	53	46	26	23	53	46
	South	70	63	46	41	70	63



Building	Façade[1]	Predicted Road Traffic Sound Level[2]		Predicted Rail Traffic Sound Level[2]		Predicted Total Transportation Sound Level	
		L_{eq} Day (dBA)	L_{eq} Night (dBA)	L_{eq} Day (dBA)	L_{eq} Night (dBA)	L_{eq} Day (dBA)	L_{eq} Night (dBA)
	West	63	57	27	23	63	57
Building G1 Tower	North	55	49	26	23	55	49
	East	62	56	38	34	62	56
	South	67	60	44	39	67	60
	West	63	56	26	23	63	56
Building G2 Tower	North	55	49	27	25	55	49
	East	63	56	39	36	63	56
	South	67	60	45	40	67	60
	West	62	55	27	24	62	55
Building H1 Podium	East	69	63	47	43	69	63
	South	70	64	48	43	70	64
Building H1 Tower	North	59	52	28	27	59	52
	East	66	59	47	42	66	59
	South	67	61	47	42	67	61
	West	62	55	28	25	62	55

Notes: [1] Building façade roadway sound levels are shown in **Figure 3** through **Figure 8** inclusive for the transportation noise assessment.

[2] Sound levels presented are the highest for the identified building facade.

The façade road traffic sound levels are predicted to exceed 65 dBA during the daytime (i.e., the threshold identified in Table 4) along portions of Building A, Building D, Building E, Building G and Building H (podiums and/or towers). Therefore, an assessment of building components is required. Refer to Section 2.5.1.

2.4.2 Outdoor Living Area Sound Levels

The proposed development will have common outdoor amenity terraces at Floor 6 for all Buildings, between and adjacent to residential towers. Planned terrace locations are shown in Appendix B development drawings.

The predicted total transportation sound levels at the proposed development OLAs are shown in Figure 9 and summarized in Table 9.

Table 9: Summary of Predicted Transportation OLA Sound Levels

OLA Assessment Location	Assessment Location Description	Predicted Sound Level, L_{eq}(16-hr), Daytime (dBA)
OLA A-1	Building A – North Terrace	59
OLA B-1	Building B – Central Terrace	55
OLA B-2	Building B – Southeast Terrace	59
OLA C-1	Building C – North Terrace	49
OLA C-2	Building C – Southeast Terrace	60
OLA D-1	Building D – West Terrace	58
OLA D-2	Building D – East Terrace	54
OLA E-1	Building E – South Terrace	51
OLA F-1	Building F – North Terrace	52
OLA F-2	Building F – South Terrace	50
OLA G-1	Building G – West Terrace	49
OLA G-2	Building G – East Terrace	50
OLA H-1	Building H – Terrace	50

Predicted daytime transportation sound levels exceed 55 dBA but are below 60 dBA at Building A (OLA A-1), Building B (OLA B-2), Building C (OLA C-2), and Building D (OLA D-1 and OLA D-2). For these buildings, warning clauses are required. Refer to Section 2.5.2. At all other locations (Buildings E, F, G and H), predicted sound levels are below 56 dBA, and no warning clauses or mitigation are required.

As the proposed development includes common amenity spaces for all occupants, private terraces/ balconies are not considered to be the only outdoor amenity spaces available. Therefore, an assessment of private terraces and balconies was excluded based on the definitions outlined in MECP Publication NPC-300.

2.5 Noise Control Measures

2.5.1 Façade Assessment

2.5.1.1 Building Components

An assessment of indoor noise levels is required because façade sound levels due to road traffic exceed 65 dBA during the daytime period on the south facades of buildings along Northfield Drive West, and interior facades facing Parkside Drive.

Indoor sound levels and required facade Sound Transmission Classes (STCs) were estimated using the procedures outlined in National Research Council Building Practice Note 56 (BPN-56). Detailed floor plans and elevation drawings were not available at the time of the assessment. The preliminary façade requirements analysis is therefore based on the following assumptions.

- Non-glazing portions of the exterior walls are assumed to have a rating of STC 45 (i.e., representing a spandrel panel construction);

- For living/dining rooms, 70% of the exterior facade is vision glass/patio doors and rooms have intermediate absorption; and
- For bedrooms, 70% of the exterior wall is vision glass and rooms have intermediate absorption.

Upgraded building façade requirements based on the total transportation façade sound levels and assumptions listed above are outlined in Table 10.

Table 10: Summary of Façade Glazing Requirements for Proposed Development

Building	Applicable Façade(s)/ Location(s)	Non-Glazing Components [1]	Glazing STC Requirements [1]	
			Living/Dining Room	Bedroom
Building D Podium	South Façade	45	OBC	30
	Southwest Corner	45	30	33
Building D1 Tower	Southwest Corner	45	OBC	31
Building D2 Tower	Southeast Corner	45	OBC	30
Building E Podium	Northeast/ Southeast Corners	45	OBC	31
Building G Podium	South Façade	45	OBC	31
	Southwest Corner	45	31	34
Building G1 Tower	Southwest/ Southeast Corners	45	OBC	31
Building G2 Tower	Southwest/ Southeast Corners	45	OBC	31
Building H Podium	South Façade	45	OBC	31
	East Façade	45	OBC	30
	Southeast Corner	45	31	34
Building H1 Tower	Southeast Corner	45	OBC	31

Notes: [1] OBC = meeting the minimum non-acoustical requirements of the Ontario Building Code, with a rating of STC 29 for windows and STC 45 for exterior walls.

It is predicted that, with a non-glazing component meeting STC 45, windows constructed to the minimum non-acoustical requirements of the OBC will be sufficient to meet the indoor noise guidelines of the MECP at all other locations within the proposed development that are not noted in Table 10.

The building façade requirements should be reviewed by an Acoustical Consultant when detailed suite layouts and elevation drawings are available later in the planning process.

2.5.1.2 Ventilation and Warning Clause Requirements

The requirements for warning clauses are summarized in Table 3. Where required, the warning clauses should be included in agreements registered on Title for the residential units, in all agreements of purchase and sale or lease, and all rental agreements.

Based on the total predicted transportation façade sound levels, forced air heating with provisions for future installation of central air conditioning, and an MECP Type C warning clause, is required for all units with façade sound levels from road and rail traffic that are between 56 and 65 dBA during the daytime, or between 51 and 60 dBA during night-time hours. This applies to residential units in the following buildings:

- Building A Tower;
- Building B1 Tower and Building B2 Tower;
- Building C1 Tower and Building C2 Tower;
- Building E Tower; and
- Building F Podium; and
- Building F1 Tower and Building F2 Tower.

Central air conditioning and an MECP Type D warning clause is required for units with façade sound levels from road and rail traffic exceeding 65 dBA during the daytime or 60 dBA during the night-time. This applies to residential units in the following buildings:

- Building A Podium;
- Building D Podium;
- Building D1 Tower and Building D2 Tower;
- Building E Podium;
- Building G Podium;
- Building G1 Tower and Building G2 Tower; and
- Building H1 Podium; and
- Building H1 Tower.

All ventilation requirements and warning clauses are summarized in Appendix E.

Note, if Class 4 is provided for the proposed development, central air conditioning will be required (along with an MECP Type F warning clause). Refer to Section 4.6.

2.5.2 Outdoor Living Area Assessment

Predicted daytime transportation sound levels exceed 55 dBA but are below 60 dBA at some OLA locations in the proposed development. Therefore, an MECP Type A warning clause is required for residential units in the following buildings:

- Building A Podium, Building A Tower;
- Building B Podium, Building B1 Tower, Building B2 Tower;
- Building C Podium, Building C1 Tower, Building C2 Tower; and
- Building D Podium, Building D1 Tower, Building D2 Tower.

At all other locations, predicted OLA sound levels are at or below 55 dBA; warning clauses and physical mitigation measures are not required.

All OLA warning clauses are summarized in Appendix E.

3.0 Environmental Vibration Assessment

3.1 Transportation Vibration

3.1.1 Transportation Vibration Sources

Transportation vibration sources with the potential to produce vibration at the proposed development are the Waterloo Central Railway Guelph Spur rail line and the Grand River ION LRT. Both transportation vibration sources are located within 75 m of the nearest buildings associated with the proposed development.

3.1.2 Transportation Vibration Assessment Guidelines

There are no Ministry of the Environment guidelines with respect to railway vibration for land use approvals. The Railway Association of Canada and Federation of Canadian Municipalities (RAC/FCM), in conjunction with CN, have published guidelines and recommend that vibration impact assessments be conducted to evaluate potential for adverse vibration impacts. These guidelines are considered in this assessment.

The following are outlined in the RAC/FCM guidelines:

- Ground-borne vibration transmission is to be evaluated through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vertical vibration velocity in excess of 0.14 mm/sec root mean square (RMS) between 4 Hz and 200 Hz.
- The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz, +/- 3 dB, with an RMS averaging time constant of 1 second.
- If excesses are predicted, mitigation measures should be recommended to lower vibration levels in sensitive areas to below 0.14 mm/sec RMS on and above the first floor of the dwelling.

3.1.3 Vibration Measurement Program

The Waterloo Central Railway Guelph Spur line runs north-south, perpendicular to Northfield Drive West and immediately east of the proposed development.

The railway tracks are located approximately 22 m from the nearest proposed development building footprints. The Grand River Transit ION LRT westbound/southbound tracks are also located approximately 65 m southeast of the nearest proposed development building footprint.

A site visit was conducted on January 26, 2024 by SLR staff to deploy a vibration monitor and record measurements of rail-induced ground-borne vibration at the Project site. Vibration data were recorded on the existing 170 Northfield Drive West property towards the southeastern portion of the Project site. The measurement location is shown in Figure 10.

Vibration velocity amplitudes were collected using a Sigicom C22 monitoring unit, and a trail camera was used to obtain confirmatory photographs/videos of freight rail movements during the monitoring period. The vibration monitors were set to trigger when the peak vibration levels

exceeded 0.10 mm/s (peak particle velocity, PPV). The geophone signals were sampled at 4096 Hz. When the preset trigger levels were exceeded, time histories were recorded between a frequency range of 1 Hz to 500 Hz. The geophone has a calibrated sensitivity within +/- 2%.

The collected vibration data were post-processed in MATLAB to compute the 1-second sliding window RMS amplitudes of vertical vibration velocity in units of mm/s.

3.1.4 Transportation Vibration Assessment

Eight (8) measurements of freight train pass by events were recorded between January 26 and February 1, 2024. During this time the Grand River Transit ION LRT was also operating between the hours of 0500 hours and 0100 hour the following day.

All pass by events of the ION LRT were below the 0.10 mm/s PPV threshold trigger for the unit, below the vibration levels induced by freight rail traffic, and well below the 0.14 mm/s RMS guideline limit. Recorded vibration levels from the freight movements were significantly higher in magnitude compared to the ION LRT movements. Therefore, further detailed assessment of the ION LRT vibration impacts was not completed.

Based on the proposed height of the nearest development buildings, the foundation is expected to be constructed using masonry on piles. Using estimated (screening-level) values provided in the U.S. Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (2018), losses from coupling of the building foundation to the surrounding soil were considered. A coupling loss of -10 VdB was applied to the raw measured vibration levels. The nearest proposed development buildings to the rail tracks are also shown in the development drawings (Appendix B) to contain five storeys of parking, with the vibration-sensitive (residential) units starting on the 7th floor of the towers (i.e., Towers C2 and B2). Floor-to-floor attenuation losses were not considered in the calculated vibration levels. Losses associated with floor-to-floor attenuation are expected to result in lower vibration levels than those presented in the following table; therefore, the assessment is considered conservative.

The calculated vertical vibration velocities near the southeast corner of the proposed development were found to range between approximately 0.08 mm/s RMS to 0.115 mm/s RMS with coupling losses applied. These are below the guideline limit of 0.14 mm/s RMS. Detailed results are provided below in Table 11. Both raw measurements and calculated values are presented.

Table 11: Measured Vibration Levels at Proposed Development from Rail Pass By Events

Measurement Location	Description	Approximate Distance to Track (m)	Rail Pass By Time Stamp	Raw Data, RMS Vertical Vibration Velocity (mm/s)	Calculated, RMS Vertical Vibration Velocity (mm/s)
Location 1	Near Closest Building Foundation	15	01/26/2024 23:13	0.365	0.115
			01/27/2024 01:25	0.252	0.080
			01/29/2024 23:14	0.292	0.092
			01/30/2024 01:39	0.263	0.083
			01/30/2024 23:13	0.348	0.110
			01/31/2024 01:26	0.244	0.077

Measurement Location	Description	Approximate Distance to Track (m)	Rail Pass By Time Stamp	Raw Data, RMS Vertical Vibration Velocity (mm/s)	Calculated, RMS Vertical Vibration Velocity (mm/s)
			01/31/2024 23:17	0.311	0.098
			02/01/2024 01:17	0.322	0.102
Guideline Limit					**0.14 mm/s**

Vertical vibration levels are below the 0.14 mm/s RMS FCM/RAC guidelines at a location closer than the nearest residential setback. Mitigation of rail-induced vibration is not required.

3.2 Industrial Vibration

Based on observations collected during site visits by SLR staff (January 26, 2024 and February 1, 2024) and review of other land uses in the surrounding area, there are no existing or proposed significant industrial vibration sources in proximity to the proposed development. A detailed industrial vibration assessment was therefore not completed, and industrial vibration is not of concern for the proposed development.

4.0 Stationary Source Noise Assessment

4.1 Stationary Source Noise Guidelines

4.1.1 Minimum Exclusionary Limits

MECP noise guidelines for stationary source noise impacting residential developments are given in MECP Publication NPC-300. The applicable portions of NPC-300 are Part C – Land Use Planning and the associated definitions outlined in Part A – Background. The City of Waterloo document Terms of Reference: Noise Study also references Publication NPC-300; these guidelines have been considered in this assessment.

The acoustic environment surrounding the proposed development is generally dominated by roadway noise from Northfield Drive West, Weber Street North, Highway 85, Parkside Drive and Kumpf Drive during all periods of the day. Therefore, the proposed development is considered to be located in a Class 1 area.

The sound level limits for steady sound sources are expressed as a 1-hr equivalent sound level (L_{eq}(1-hr) values, in dBA) and is the higher of the NPC-300 exclusionary limits and the existing background sound level. The NPC-300 stationary source noise guidelines in a Class 1 Area are summarized in Table 12 for steady (continuous) sound sources.

Table 12: NPC-300 Class 1 Continuous, (Steady, Non-Impulsive) Sound Level Limits

Point of Reception Category	Time Period	Minimum Exclusionary Sound Level Limit L_{eq}(1-hr), dBA[1]
Outdoors	Daytime (0700-1900h) Evening (1900-2300h) Night-time (2300-0700h)	50 50 N/A[3]
Plane of Window [2]	Daytime (0700-1900h) Evening (1900-2300h) Night-time (2300-0700h)	50 50 45

Notes: [1] Or minimum hourly L_{eq} of background noise; whichever is higher.
[2] Applicable for windows opening into "noise-sensitive spaces" as defined in NPC-300.
[3] Sound level limits during night-time hours are not applicable at outdoor points of reception.

Sound level limits for assessing noise produced by emergency equipment operating in non-emergency situations, such as during routine monthly testing or maintenance, are 5 dB greater than the limits otherwise applicable to stationary sources. Additionally, emergency equipment operating in non-emergency situations is to be assessed independently of all other stationary noise sources.

4.1.2 Ambient Sound Levels from Road Traffic

Since the ambient sound levels were anticipated to exceed the NPC-300 exclusionary limits for most facades and time periods within the proposed development, sound levels from roadway noise were assessed and the corresponding applicable guideline limits were determined.

Table 13 summarizes the existing road traffic volumes and details applied in the ambient noise modelling.

The minimum daytime, evening and night-time hourly values (as a percentage of the AADT) are based on established distributions and historical information in the SLR database. The percentages used in the calculations have been used on other projects in the RMOW for similar types of roadways.

As with the Transportation Noise Assessment (refer to Section 2.0), ambient roadway noise was modelled as line sources of sound using the Cadna/A computer model. The minimum hourly Leq for the ambient sound levels were found to exceed the NPC-300 default guideline limits during most periods of the day at assessment locations on the facades of the proposed development. Current road traffic volumes were obtained from the following sources, provided for reference in Appendix C:

- Kumpf Drive, Weber Street North, Northfield Drive West – RMOW Year 2023 data;
- Parkside Drive – City of Waterloo Year 2023 data; and
- Highway 85 – MTO iCorridor Year 2019 data.

Table 13: Summary of Road Traffic Data Used to Determine Minimum 1-hr Ambient Sound Levels

Roadway	Existing Traffic Volumes (AADT)[1]	Minimum Day/Evening/Night Hour Volume % of AADT			Commercial Vehicle Breakdown		Vehicle Speed (km/hr)
		Daytime	Evening	Night-time	% Medium Trucks	% Heavy Trucks	
Kumpf Drive	2,400	4.3	3.1	0.4	3.0	6.0	50
Parkside Drive	9,009	4.3	3.1	0.4	2.0	6.0	50 [1]
Weber Street North	13,300	4.3	3.1	0.4	2.0	3.0	60
Northfield Drive West	28,100	4.3	3.1	0.4	1.0	2.0	60
Highway 85 – North of Northfield Drive West	23,000	4.3	3.1	0.4	3.2	9.7	90
Highway 85 – South of Northfield Drive West	42,500	4.3	3.1	0.4	1.8	5.3	90

Notes: [1] The current posted speed limit of Parkside Drive north of Northfield Drive West is 20 km/hr. The City of Waterloo has indicated a speed limit of 50 km/hr, which has been used in the assessment.

Surrounding facility noise impacts were assessed against the higher of the modelled ambient noise levels and the exclusionary limits calculated using road traffic data summarized in Table 13.

Predicted ambient road traffic sound levels at the proposed development for daytime, evening and night-time hours are summarized in Appendix F.

4.2 Site Visits and Stationary Source Inventory

4.2.1 Site Visit Observations

Site visits to the Project site and surrounding area were completed by SLR acoustics personnel on several occasions, including the following:

- January 26, 2024 (daytime hours);
- February 1, 2024 (early morning and daytime hours);
- December 19, 2024 (daytime hours);
- January 15, 2025 (daytime hours); and
- January 23, 2025 (night-time hours, approximately 12:00AM – 1:30 AM timeframe).

The Project site was found to be primarily surrounded by employment lands in all directions, with sound levels at the Project site generally dominated by ambient road traffic from Northfield Drive West, Weber Road, and Highway 85.

SLR conducted detailed walk-arounds of the lands surrounding the proposed development to identify audible sources of sound and inventory facilities requiring additional investigation or assessment.

At the northeast portion of the Project site, sound levels from rooftop sources atop the Onward Manufacturing Company Limited/Broil King facility at 585 Kumpf Drive were slightly audible. SLR provided a 'Letter to Industry' to the Environmental Manager at the facility, requesting information specific to the operations of and sources at the facility. A follow up phone call was placed to the facility. No information was received as of the date of this report.

Along the southern portion of the Project site, sound levels were generally dominated by road traffic along Northfield Drive West. Sound levels from Heffner Cabinetry & Woodworking at 145 Northfield Drive West were not audible at the Project site at -grade, but sound from a dust collector along the west side of the facility, and rooftop exhaust stacks, were audible on the sidewalk on the south side of the roadway during site visits.

Along Randall Drive north of the Project site, light and medium industrial facilities are located along the north and south (Randall Drive) sides of the road. Other industrial facilities such as Ultra Manufacturing, the Waterloo Hauling & Transfer Station and J.D. Sweid Foods are located along Conrad Place and Kumpf Drive, respectively. These facilities were not audible at the north end of the Project site during the site visits conducts by SLR staff, and are located more than 300 m from noise sensitive portions of the proposed development.

4.2.2 Stationary Source Inventory

Facilities in all directions surrounding the proposed development were classified in accordance with the MECP D-series guidelines, based on the site visit observations and further desktop review. The proposed development is primarily surrounded by Class I facilities (commercial/retail), and all facilities within 70 m of the noise sensitive portions of the proposed development were modelled and compared to applicable sound level limits. Class II facilities including Onward Manufacturing Limited/Broil King, Teledyne DALSA, and Heffner Cabinetry & Woodworking were also assessed in detail. Facilities modelled and assessed in further detail are summarized in Section 4.3.

There were no Class III facilities in proximity to the proposed development without closer, more exposed points of reception where applicable sound level limits must be met. No Class III facilities were assessed further.

All facilities reviewed with respect to the MECP D-series of guidelines are shown in Figure 11 and summarized in Appendix G. The facilities and associated classifications in Appendix G are based on potential noise impacts only. Setback distances and industrial classifications related to air quality are addressed in a separate report.

4.2.3 ION LRT Operation Maintenance and Storage Facility

4.2.3.1 Site Visit Observations and Review

SLR acoustics staff conducted two additional site visits to the area to observe activities at the ION LRT Operation Maintenance and Storage Facility; one during the daytime period, and one during the night-time period. Based on received correspondence with the RMOW in efforts to try and obtain the AAR, SLR understands that maintenance activities at the Facility can occur at any time.

No activity was observed outdoors at the Facility during the daytime-hours site visit on December 19, 2024, which is consistent with observations from previous site visits (January 26, 2024 and February 1, 2024). At the Ontario Teachers Insurance Plan building parking lot located to the north (125 Northfield Drive West), noise from the facility was not audible above ambient road traffic from Highway 85.

SLR staff also conducted an overnight site visit from Thursday January 23 to Friday January 24, 2025. Observations were made from the publicly available parking lot immediately west of the Facility, south of the Crunch Fitness – Waterloo building (560 Parkside Drive). Activities observed during the site visit included LRT vehicle movements into the Facility grounds, including into/out of the buildings at the west side of the Facility through bay doors. Noise during the overnight period observations (between approximately 1:00 AM to 2:00 AM) was barely audible above the ambient/background sound level, which was dominated by snow clearing activities and road traffic from Highway 85 and Northfield Drive West. Noise from indoor activities breaking out through the bay doors was minimal. The background sound level measured at the observation location was approximately 45 dBA.

4.2.3.2 Acoustic Assessment Report Information

The ION LRT Operation Maintenance and Storage Facility holds an Environmental Compliance Approval (ECA), Number 3478-9YWNHR, issued 05/07/2016. The RMOW provided SLR with the Acoustic Assessment Report (AAR) prepared as part of obtaining the approval. The AAR was prepared by AECOM, dated August, 2014 and approved by the MECP.

Sound level contours generated at a 7.5 m height were obtained from the AAR for four different assessment scenarios:

- Emergency Generator Testing – Daytime scenario only;
- Typical Operating Scenario – Daytime/Evening and Night-time scenarios;
- 0500 Hour Rollout Scenario – Daytime/Evening and Night-time scenarios; and
- 0600 Hour Rollout Scenario – Daytime/Evening and Night-time scenarios.

For the sound level contour predictions, no buildings/screening were included in the model north of the facility itself, between the facility and the proposed development at 170 Northfield Drive West. In the absence of any barrier effects, the contours at 7.5 m above grade are expected to provide a reasonable estimate of facility sound levels at elevated locations within the Project site.

Each of the above-noted scenarios are discussed below as they pertain to potential impacts at the proposed development, with accompanying figures in Appendix G.

Emergency Generator Testing Scenario

The emergency generator is tested during daytime hours only. The sound level contours at 7.5 m above grade indicate the highest predicted sound levels at the proposed development are approximately 52 dBA, below applicable sound level limits. See Appendix G, Figure G1.

Typical Operating Scenario

The typical operating scenario was modelled for the AAR during daytime/evening and night-time hours, and included sources such as LRT vehicle crossovers, compressors, carwash, bay door breakout maintenance shop air conditioning units/exhaust fans, a paint booth exhaust stack, and others.

The sound level contours at 7.5 m above grade indicate the highest predicted sound levels at the proposed development would be approximately 52-53 dBA(daytime)/51-52 dBA (night-time), below applicable limits defined by ambient road traffic (and below a 55 dBA night-time limit applicable with Class 4 designation). The worst-case impacts are predicted at the south facades of Building Tower D2 and Building Tower C2. See Appendix G, Figure G2 (night-time only).

0500 Hour Rollout Scenario

The 0500 hour rollout scenario considered an additional three LRT vehicle movements, plus the Typical Operating Scenario. This scenario was modelled during daytime/evening and night-time hours.

The sound level contours at 7.5 m above grade indicate the highest predicted sound levels at the proposed development would be approximately 52-53 dBA(daytime)/ 52 dBA (night-time), below applicable limits defined by ambient road traffic (and below a 55 dBA night-time limit applicable with Class 4 designation). The worst-case impacts are predicted at the south facades of Building Tower D2 and Building Tower C2. See Appendix G, Figure G3 (night-time only).

0600 Hour Rollout Scenario

The 0600 hour rollout scenario considered an additional three LRT vehicle movements to the Typical Operating Scenario. This scenario was modelled during daytime/evening and night-time hours.

The sound level contours at 7.5 m above grade indicate the highest predicted sound levels at the proposed development would be approximately 52-53 dBA(daytime)/ 52 dBA (night-time), below applicable limits defined by ambient road traffic (and below a 55 dBA night-time limit applicable with Class 4 designation). See Appendix G, Figure G4 (night-time only).

Overall Assessment

Predicted sound levels due to the ION LRT Maintenance/Storage Facility operations during worst-case night-time periods are shown in the contour figures (Figure G1 through Figure G4 inclusive) to be approximately 52 dBA at the worst-case (most exposed) locations within the proposed development. These contours were calculated without any intervening buildings included in the model between the proposed development and the facility; therefore, sound levels are expected to be representative of those at more elevated receptors.

If Class 4 designation is provided for the Project site, sound levels during the critical night-time periods/scenarios will be well below applicable limits at all locations within the proposed development. See Section 4.6 for additional information.

4.3 Modelled Stationary Sources

The significant sources of noise with the potential to impact the proposed development have been identified. Modelled noise sources considered in this assessment, along with D-series industrial classification and operating hours and, are as follows:

- Office Building – 565 Kumpf Drive:
  - Class I Light Industry.
  - Includes businesses such as Strong Start Charitable Organization.
  - Operating hours from 0900 hours to 1700 hours based on available information.
- Teledyne DALSA – 575 Kumpf Drive:
  - Class I Light Industry (included for completeness due to number of rooftop units that residential towers are overlooking).
  - Drone Manufacturing.
  - Operating from 0900 hours to 1700 hours.

- Office Building – 101-139 Northfield Drive West:
  - Class I Light Industry.
  - Includes businesses such as Hiddentree Entertainment (video game store), MNP LLP (Accounting, Business Consulting) and Government of Canada Federal Economic Development Agency for Southern Ontario.
  - Operating range from 0830 hours to 1700 hours based on available information.
- Waterloo Nissan – 141 Northfield Drive West:
  - Class I Light Industry.
  - Vehicle dealership and service centre.
  - Operating hours from 0900 hours to 2000 hours.
- Heffner Cabinetry & Woodworking – 145 Northfield Drive West:
  - Class II Medium Industry.
  - Cabinet maker/manufacturer.
  - Operating from 0800 hours to 1630 hours based on available information.
  - Building also contains Drayton Entertainment Youth Academy.
- Greystone Club – 155 Northfield Drive West:
  - Class I Light Industry.
  - Fitness/wellness club.
  - Operating from 0530 hours to 2200 hours (currently temporarily closed for renovations).
- Shoppers Drug Mart – 190 Northfield Drive West:
  - Class I Light Industry.
  - Pharmacy/retail.
  - Operating from 0800 hours to 2200 hours.
- Sobeys Northfield – 640 Parkside Drive:
  - Class I Light Industry.
  - Grocery store.
  - Operating from 0700 hours to 2300 hours.
- Onward Manufacturing Company Limited/Broil King – 585 Kumpf Drive:
  - Class II Medium Industry.
  - Manufacturer of barbecues.
  - Operating from 0830 hours to 1630 hours based on available information.
- Waterloo Fire Station 3 – 150 Northfield Drive West:
  - Class I Light Industry.
  - Fire station.

- Open 24 hours per day, 7 days per week.

4.4 Stationary Source Modelling

Sound levels from stationary sources were modelled using Cadna/A, a software implementation of the internationally recognized ISO-9613-2 (1996) environmental noise propagation algorithms. Cadna/A / ISO-9613 is the preferred noise model of the MECP. The ISO-9613 equations account for:

- Source to receiver geometry;
- Distance attenuation;
- Atmospheric absorption;
- Reflections off of the ground and ground absorption;
- Reflections off of vertical walls; and
- Screening effects of buildings, terrain, and purpose-built noise barriers (noise walls, berms, etc.).

The following additional parameters were used in the modelling, which are consistent with providing a conservative (predictable worst-case assessment of noise levels):

- Temperature: 10°C;
- Relative Humidity: 70%;
- Ground Absorption G: G = 0.0 (reflective) as the default global parameter, with localized absorptive ground considered in select locations;
- Reflection: One (1) order of reflection was used (accounts for noise reflecting from walls);
- Wall Absorption Coefficients: Set to 0.37 or 0.21 (37% or 21% of energy is absorbed, 63% or 79% is reflected); and
- Terrain: 1 m topographic contours for the Project site and surrounding area.

Sound level data from site visit measurements and generic SLR historical sound level data were applied in the stationary noise modelling. A summary of the sound levels used in the analysis and equipment operating conditions is provided in Appendix H. All stationary sources modelled are shown in Figure 11 and discussed further in Section 4.5.

The “building evaluation” feature of Cadna/A was used to assess sound levels at the facades of the proposed development podium and towers. This feature allows for sound levels to be predicted across the entire façade of a structure. Outdoor points of reception were assessed with both discrete outdoor points of reception at amenity terrace locations most exposed to the respective surrounding stationary sources and also using sound level contours 1.5 m above the most exposed amenity terrace elevations.

4.5 Predicted Stationary Source Sound Levels

4.5.1 Office Building – 565 Kumpf Drive

Predictable worst-case modelling of sound associated with the Office Building at 565 Kumpf Drive considered the following:

- 8x 5-ton Rooftop HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 7x 10-ton Rooftop HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 3x 15-ton Rooftop HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 2x Rooftop Exhaust Fan:
  - Operating 60 minutes per daytime/evening/night-time hour.

A summary of the predicted sound levels on each proposed development façade are shown in Figure 12 (daytime/evening) and Figure 13 (night-time). Predicted sound levels relative to the higher of ambient sound levels/minimum exclusionary limits for a Class 1 area are shown in Figure 14 (daytime), Figure 15 (evening) and Figure 16 (night-time). Outdoor point of reception sound levels are shown in Figure 17 (daytime/evening).

A summary table of predicted façade sound levels is provided in Appendix I, Table I1.

Predicted stationary sound levels from 565 Kumpf Drive were found to be at or below established sound level limits at all locations within the proposed development during daytime, evening and night-time periods.

4.5.2 Teledyne DALSA – 575 Kumpf Drive

Predictable worst-case modelling of sound associated with the Teledyne DALSA facility at 575 Kumpf Drive considered the following:

- 6x 5-ton Rooftop HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 4x 10-ton Rooftop HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x 15-ton Rooftop HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x Rooftop Exhaust Fan:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1 truck movement per daytime hour, travelling at 10 km/hr to the main shipping door.
- 1 heavy truck idling for 5 minutes during a daytime hour (incidental idling).

Truck movements and idling were limited to occurring during only the posted operating hours of the facility.

A summary of the predicted sound levels on each proposed development façade are shown in Figure 18 (daytime/evening) and Figure 19 (night-time). Outdoor point of reception sound levels are shown in Figure 20 (daytime) and Figure 21 (evening).

A summary table of predicted façade sound levels is provided in Appendix I, Table I2.

Predicted stationary sound levels from Teledyne DALSA were found to be below both ambient sound level limits and Class 1 minimum exclusionary limits at all locations within the proposed development during daytime, evening and night-time periods.

4.5.3 Office/Commercial Building – 101-139 Northfield Drive West

Predictable worst-case modelling of sound associated with the Office/Commercial Building at 101-139 Northfield Drive West considered the following:

- 5x Rooftop Exhaust Fans:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 2x Rooftop Make Up Air Units:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1x Rooftop Fluid Cooler:
  - Operating 60 minutes per daytime/evening hour, and 30 minutes per night-time hour.

A summary of the predicted sound levels on each proposed development façade are shown in Figure 22 (daytime/evening) and Figure 23 (night-time). Outdoor point of reception sound levels are shown in Figure 24 (daytime/evening).

A summary table of predicted façade sound levels is provided in Appendix I, Table I3.

Predicted stationary sound levels from 101-139 Northfield Drive West were found to be below both ambient sound level limits and Class 1 minimum exclusionary limits at all locations within the proposed development during daytime, evening and night-time periods.

4.5.4 Waterloo Nissan – 141 Northfield Drive West

Predictable worst-case modelling of sound associated with Waterloo Nissan at 141 Northfield Drive West considered the following:

- 3x Rooftop 5-ton HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 2x Rooftop 10-ton HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x Rooftop Make Up Air Unit:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 3x Rooftop Exhaust Fans:
  - Operating 60 minutes per daytime/evening hour when the facility and service centre are open.

- 2x Open Bay Doors (breakout noise):
  - Impact wrench 1 minute per daytime/evening hour when the facility and service centre are open.
  - Compressed air sources 10 minutes per daytime/evening hour when the facility and service centre are open.

A summary of the predicted sound levels on each proposed development façade are shown in Figure 25 (daytime/evening) and Figure 26 (night-time). Outdoor point of reception sound levels are shown in Figure 27 (daytime/evening).

A summary table of predicted façade sound levels is provided in Appendix I, Table I4.

Predicted stationary sound levels from Waterloo Nissan were found to be below both ambient sound level limits and Class 1 minimum exclusionary limits at all locations within the proposed development during daytime, evening and night-time periods.

4.5.5 Heffner Cabinetry & Woodworking – 145 Northfield Drive West

Predictable worst-case modelling of sound associated with Heffner Cabinetry & Woodworking (and other tenants including Drayton Youth Academy) at 145 Northfield Drive West considered the following:

- 6x Rooftop 5-ton HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 3x Rooftop 10-ton HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 3x Rooftop 15-ton HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 4x Rooftop Make Up Air Units:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1x Dust Collector:
  - Operating 60 minutes per daytime hour when the facility is open.
- 7x Paint Booth Exhaust Stacks:
  - Operating 60 minutes per daytime hour when the facility is open.
- 2x Building Exhaust Fans:
  - Operating 60 minutes per daytime hour when the facility is open.
- 2 truck movements per daytime hour, travelling at 10 km/hr to the south shipping doors.
- 2 heavy truck idling for 5 minutes each during a daytime hour (incidental idling).

A summary of the predicted sound levels on each proposed development façade are shown in Figure 28 (daytime), Figure 29 (evening) and Figure 30 (night-time). Predicted sound levels relative to the higher of ambient sound levels/minimum exclusionary limits for a Class 1 area are

shown in Figure 31a (daytime), Figure 32 (evening) and Figure 33a (night-time). Outdoor point of reception sound levels are shown in Figure 34 (daytime) and Figure 35 (evening).

A summary table of predicted façade sound levels is provided in Appendix I, Table I5.

Predicted daytime stationary sound levels from Heffner Cabinetry & Woodworking were found to exceed applicable limits at the west side of Building H1 Tower (by up to 5 dB) and the east side of Building G1 Tower (by up to 2 dB). During the night-time, and excess of 1 dB is predicted along the west side of Building H1 tower. See Figure 31b and Figure 33b. The excesses are due primarily to the operation of the dust collector, paint booth exhaust stacks, and 15-ton HVAC units. Therefore, further investigation is required; refer to Section 4.6.1.

Applicable sound level limits are predicted to be met at all other locations within the proposed development during daytime, evening and night-time periods.

4.5.6 Greystone Club – 155 Northfield Drive West

Predictable worst-case modelling of sound associated with the Greystone Club considered the following:

- 7x 5-ton Rooftop HVAC units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x 10-ton Rooftop HVAC unit:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x 15-ton Rooftop HVAC unit:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x Rooftop Exhaust Fan:
  - Operating 60 minutes per daytime/evening/ hour when the facility is open.

A summary of the predicted sound levels on each proposed development façade are shown in Figure 36 (daytime/evening) and Figure 37 (night-time). Outdoor point of reception sound levels are shown in Figure 38 (daytime/evening).

A summary table of predicted façade sound levels is provided in Appendix I, Table I6.

Predicted stationary sound levels from Greystone Club were found to be at or below established sound level limits at all locations within the proposed development during daytime, evening and night-time periods.

4.5.7 Shoppers Drug Mart – 190 Northfield Drive West

Predictable worst-case modelling of sound associated with Shoppers Drug Mart considered the following:

- 2x 5-ton Rooftop HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 4x 10-ton Rooftop HVAC Units:

  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x Rooftop Refrigeration Unit:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1x Rooftop Exhaust Fan:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1 truck movement per daytime hour, travelling at 10 km/hr to the main shipping door.
- 1 small reefer truck idling for 30 minutes during a daytime hour.

Truck movements and idling were limited to occurring during only daytime hours (0700 hours to 1900 hours) in accordance with the City of Waterloo Noise By-Law. The Noise By-Law prohibits loading/unloading/shipping/delivering and similar activities from being audible at points of reception in residential areas, such as those located immediately west and southwest of the Shoppers Drug Mart off Weber Street North/Northfield Drive West.

A summary of the predicted sound levels on each proposed development façade are shown in Figure 39 (daytime), Figure 40 (evening) and Figure 41 (night-time). Predicted sound levels relative to the higher of ambient sound levels/minimum exclusionary limits for a Class 1 area are shown in Figure 42 (daytime), Figure 43 (evening) and Figure 44 (night-time). Outdoor point of reception sound levels are shown in Figure 45 (daytime) and Figure 46 (evening).

A summary table of predicted facade sound levels is provided in Appendix I, Table I7.

Predicted stationary sound levels from Shoppers Drug Mart were found to be below established sound level limits at all locations within the proposed development during daytime, evening and night-time periods.

4.5.8 Sobeys – 640 Parkside Drive

Predictable worst-case modelling of sound associated with Sobeys considered the following:

- 2x 5-ton Rooftop HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 30 minutes per night-time hour.
- 1x 10-ton Rooftop Make Up Air Unit:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1x Rooftop Refrigeration Unit:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1x Rooftop 4-Fan Packaged Chiller/Cooler:
  - Operating 60 minutes per daytime/evening hour, 30 minutes per night-time hour.
- 1x Rooftop 8-fan Air Cooled Chiller:
  - Operating 60 minutes per daytime/evening hour, 30 minutes per night-time hour.
- 2x Rooftop Exhaust Fans:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1x Garbage Compactor

  - Operating 10 minutes per daytime hour
- 2 truck movement per daytime hour, travelling at 10 km/hr to the main shipping door.
- 1 heavy truck idling for 60 minutes during a daytime hour.
- 1 reefer truck idling for 40 minutes during a daytime hour.

Truck movements and idling were limited to occurring during only daytime hours (0700 hours to 1900 hours) in accordance with the City of Waterloo Noise By-Law. The Noise By-Law prohibits loading/unloading/shipping/delivering and similar activities from being audible at points of reception in residential areas, such as those located immediately west of Sobeys off Weber Street North. Based on information provided by Sobeys during a site visit on January 15, 2025, it was confirmed receiving/unloading activities are limited to daytime hours (i.e., between 0800 hours and 1700 hours). It was also confirmed that reefer trucks would not idle for 60 minutes of an hour, with a conservative estimate of 40 minutes per hour indicated by facility staff. The modelling therefore considers one reefer unit idling for 40 minutes of an hour at one receiving dock, and a heavy truck idling continuously at the second loading dock.

Source measurement data that could be obtained during the site visit on January 15, 2024 were used in the analysis (see Appendix H).

A summary of the predicted sound levels on each proposed development façade are shown in Figure 47 (daytime), Figure 48 (evening) and Figure 49 (night-time). Predicted sound levels relative to the higher of ambient sound levels/minimum exclusionary limits for a Class 1 area are shown in Figure 50a (daytime), Figure 51 (evening) and Figure 52 (night-time). Outdoor point of reception sound levels are shown in Figure 53 (daytime) and Figure 54 (evening).

A summary table of predicted façade sound levels is provided in Appendix I, Table I8.

Predicted stationary sound levels from Sobeys were found to be at or below established sound level limits at all locations within the proposed development during evening hours.

During daytime hours, minor excesses of up to 2 dB are predicted on lower floors of the Building E Tower west façade (see Figure 50a and Figure 50b). The predicted excesses are discussed further in Section 4.6.2.

SLR also identified a rooftop residential-sized emergency generator (10 kW) on the building rooftop during the site visit on January 15, 2024. Due to the size of the generator, sound levels from routine daytime testing are anticipated to be insignificant relative to ambient sound levels. Detailed modelling/assessment was not completed.

4.5.9 Onward Manufacturing Company Limited/Broil King – 585 Kumpf Drive

Predictable worst-case modelling of sound associated with Onward Manufacturing Company Limited/Broil King considered the following:

- 5x Rooftop 5-ton HVAC Units:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x Rooftop 20-ton HVAC Unit:
  - Operating 60 minutes per daytime/evening hour, and 15 minutes per night-time hour (outside facility operating hours).
- 1x Rooftop Make Up Air Unit:

  - Operating 60 minutes per daytime/evening/night-time hour.
- 17x Rooftop Exhaust Fans:
  - Operating 60 minutes per daytime/evening/night-time hour.
- 3x Rooftop Process Exhaust Fans:
  - Operating 60 minutes per daytime hour when the facility is open.
- 6x Rooftop Process Exhaust Stacks:
  - Operating 60 minutes per daytime hour when the facility is open.
- 5 outdoor forklift movements at the south (most exposed) location during a daytime hour.
- 2 heavy truck idling for 5 minutes each at east and west shipping doors during a daytime hour (incidental idling).
- 2 truck movement per daytime hour, travelling at 10 km/hr to the main shipping doors at the west and east sides of the facility.

Truck movements and idling were limited to occurring during only the posted operating hours of the facility.

A summary of the predicted sound levels on each proposed development façade are shown in Figure 55 (daytime), Figure 56 (evening) and Figure 57 (night-time). Outdoor point of reception sound levels are shown in Figure 58 (daytime) and Figure 59 (night-time).

A summary table of predicted façade sound levels is provided in Appendix I, Table I9.

Predicted stationary sound levels from Onward Manufacturing Company Limited/Broil King were found to be below both ambient sound level limits and Class 1 minimum exclusionary limits at all locations within the proposed development during daytime, evening and night-time periods.

4.5.10 Waterloo Fire Station 3

4.5.10.1 Emergency Generator Testing

Predictable worst-case modelling of sound associated with emergency generator testing at Waterloo Fire Station 3 considered the following:

- 1x 35 kW Emergency Generator (CofA Number 8495-7HMQZ5):
  - Testing for 60 minutes of a daytime hour.

A summary of the predicted sound levels on each proposed development façade are shown in Figure 60 (daytime), with predicted sound levels relative to the higher of ambient sound levels/minimum exclusionary limits shown in Figure 61. Outdoor point of reception sound levels are shown in Figure 62.

A summary table of predicted façade sound levels is provided in Appendix I, Table I10a.

Predicted sound levels at all locations due to emergency generator testing are shown to meet applicable sound level limits during daytime hours.

4.5.10.2 Continuous Sources

Predictable worst-case modelling of sound associated with the Waterloo Fire Station 3 continuous (non-emergency) sources considered the following:

- 2x Rooftop Exhaust Fans
  - Operating 60 minutes per daytime/evening/night-time hour.
- 1x Rooftop Split-System Condenser Units
  - Operating 60 minutes per daytime/evening hour, and 30 minutes per night-time hour.

Sources associated with routine maintenance of fire trucks or other safety equipment were not assessed, as they are exempt in Section 6.0 of the City of Waterloo Noise By-Law (Schedule 3).

A summary of the predicted sound levels on each proposed development façade are shown in Figure 63 (daytime/evening) and Figure 64 (night-time). Predicted sound levels relative to the higher of ambient sound levels/minimum exclusionary limits for a Class 1 area are shown in Figure 65 (daytime), Figure 66 (evening) and Figure 67 (night-time). Outdoor point of reception sound levels are shown in Figure 68 (daytime/evening).

A summary table of predicted façade sound levels is provided in Appendix I, Table I10b.

Predicted stationary sound levels from continuous sources at Waterloo Fire Station 3 were found to be at or below established sound level limits at all locations within the proposed development during daytime, evening and night-time periods.

4.5.11 All Stationary Sources

All sources discussed in Section 4.5.1 through Section 4.5.10 inclusive (with the exception of the emergency generator) were modelled cumulatively for informational purposes. Operating scenarios and sources considered were modelled as discussed in the preceding report Sections.

It is unlikely that predictable worst-case operations associated with all ten (10) facilities considered in this assessment will ever occur simultaneously. Furthermore, facilities are permitted through the MECP on an individual basis, assessed against the NPC-300 guideline limits. Cumulative sound levels from other stationary sources are not considered in the MECP environmental approvals process.

A summary of the cumulative predicted sound levels on each proposed development façade are shown in Figure 69 (daytime), Figure 70 (evening) and Figure 71 (night-time). Predicted sound levels relative to the higher of ambient sound levels/minimum exclusionary limits for a Class 1 area are shown in Figure 72 (daytime), Figure 73 (evening) and Figure 74 (night-time). Outdoor point of reception sound levels are shown in Figure 67 (daytime) and Figure 68 (evening).

A complete summary table of predicted façade sound levels from all sources is provided in Appendix I, Table I11.

Sample calculations from simultaneous modelling of all stationary sources (excluding the emergency generator at Waterloo Fire Station 3) is provided in Appendix J.

4.6 Proposed Mitigation Measures

4.6.1 Mitigation to Meet Class 1 Area Noise Guideline Limits

Based on the Based on the preliminary assessment of stationary source noise from the facility, sound levels at the proposed development are predicted to exceed the Class 1 Area noise guideline limits due to operations at:

- Heffner Cabinetry & Woodworking – 145 Northfield Drive West; and

- Sobeys – 640 Parkside Drive.

The potential for source-based mitigation measures to reduce sound levels to meet the Class 1 Area limits has been investigated, as discussed below:

4.6.1.1 Heffner Cabinetry & Woodworking – 145 Northfield Drive West

Based on the preliminary assessment of stationary source noise from the facility, sound levels at the proposed development are predicted to exceed applicable daytime limits as follows:

- West side of Building H1 Tower – sound levels 1 to 5 dB in excess of the Class 1 Area guideline limits; and
- East side of Building G1 Tower – sound levels 2 dB in excess of the Class 1 Area limits.

Predicted sound levels relative to the higher of ambient sound levels/minimum exclusionary limits for a Class 1 area are shown in Figure 31b (daytime) and Figure 33b (night-time).

The predicted excesses result from the following sound sources, which were modelled based on SLR measurements during the site visits (dust collector), and SLR historical data for similar sources (Paint Booth Exhaust Stacks and 15-ton HVAC units):

- Dust Collector along the west side of the facility;
- 7x Paint Booth Exhaust Stacks at the northwest portion of the facility rooftop; and
- 3x 15-ton HVAC units located on the north half of the facility rooftop.

To meet the applicable sound level limits (higher of ambient road traffic sound levels/Class 1 Area minimum exclusionary limits), the following maximum allowable sound levels would be required for the sources:

- Dust Collector – 92 dBA (overall reduction of 10 dB);
  - Potential mitigation measures (if needed): motor casing/enclosure, lagging of ductwork and silo.
- Paint Booth Exhaust Stacks – 86 dBA per stack (overall reduction of 4 dB per stack compared to the modelled SLR database sound levels);
  - Potential mitigation measures (if needed): silencers.
- 15-ton HVAC units – 90 dBA (overall reduction of 3 dB per unit)
  - Potential mitigation measures (if needed): compressor blankets, barriers.

The potential mitigation measures noted above are potentially technically feasible. However, cooperation would be required by Heffner Cabinetry & Woodworking to allow for access to conduct source measurements, which is required to confirm mitigation measures. Cooperation would also be required to implement and maintain source mitigation measures.

SLR (on behalf of Forgestone) has attempted to contact Heffner Cabinetry & Woodworking to obtain measurements. Responses regarding access to the facility/site or further indication of cooperation has not been provided as of the date of this report. It is therefore not currently feasible to proceed with either measurements or detailed investigation of source based mitigation measures.

4.6.1.2 Sobeys – 640 Parkside Drive

As noted in Section 4.5.8, excesses of up to 2 dB are predicted at locations on Floors 7 and 8 of the Building E Tower west façade due to sources at Sobeys. These excesses are shown in Figure 50b.

To meet the applicable sound level limits (higher of ambient road traffic sound levels/Class 1 Area minimum exclusionary limits), noise mitigation would be required for the following sources:

- Idling refrigeration truck;
- Rooftop 4-fan Packaged Air Cooled Chiller/Condenser; and
- Rooftop 8-fan Air Cooled Condenser.

Sound level measurements of the Air Cooled Chiller were obtained on January 15, 2025; however, measurements of the Packaged Air Cooled Chiller/Condenser could not be obtained. Manufacturers data from Trane has been requested, but has not been received as of the date of this report.

Nonetheless, the dominant source resulting in predicted excesses is noise from the idling refrigeration truck. Noise mitigation of idling refrigeration trucks is difficult and costly. In this case, it would require the construction of full enclosures and the installation of additional rooftop cooling systems to allow for trailer refrigeration systems to be shut off (thus creating another noise source potentially requiring mitigation). As a result, such mitigation measures are not considered technically or economically feasible.

4.6.2 Class 4 Designation & Warning Clauses Recommendations

As the source-based noise mitigation measures to meet the Class 1 Area limits are not feasible, a Class 4 Area designation is appropriate for the Project site.

Under MECP Publication NPC-300 noise guidelines, noise sensitive receptors are defined using area classifications. The receptor areas are classified as either:

- Class 1 – Urban areas
- Class 2 – Suburban / semi-rural areas
- Class 3 – Rural areas
- Class 4 – Infill areas

Depending on the receptor area classification, different guideline limits apply. The Class 4 designation is a new designation, intended to allow for infill and redevelopment, whilst still protecting residences from undue noise.

In NPC-300, a Class 4 area is defined as:

> "'Class 4 area'
>
> means 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."

The proposed development meets these requirements. The local planning authority in this case is the City of Waterloo and/or the Regional Municipality of Waterloo. The Class 4 Area designation provides elevated noise guideline limits (+10 dBA for window facades, and +5 dBA for outdoor points of reception) and allows for the use of additional receptor-based noise mitigation measures.

In this case, if the proposed development were classified as a Class 4 Area, the Class 4 noise guideline would be met at all locations, and additional physical mitigation measures would not be required to address stationary noise sources.

Central air conditioning and both Type E and Type F noise warning clauses would be needed for all residential units within the proposed development.

Part 2: Impacts of the Development on Itself

5.0 Stationary Source Noise from the Development on Itself

5.1 Residential and Mixed Uses

At the time of this assessment, mechanical systems for the proposed development have not been sufficiently designed to complete a detailed assessment of stationary source noise from the development on itself.

For common mechanical systems that will be implemented as part of the proposed development, sound levels from all noise-generating equipment should comply with the guideline limits in MECP Publication NPC-300. The potential noise from mechanical equipment in the proposed development (such as from make-up air units, cooling towers, parking garage exhaust fans, emergency generators, etc.) should be assessed later in the planning process (e.g., at building permit). The applicable criteria can be met at all on-site receptors through appropriate selection of mechanical equipment, by locating equipment with sufficient setback from noise sensitive locations, and by incorporating control measures (e.g., silencers) into the design. This can be confirmed later in the planning process (e.g., at building permit).

It is recommended that the mechanical systems be reviewed by an acoustical consultant prior to final equipment selection.

5.2 Proposed Flex Commercial and Industrial Building Uses

As the proposed development includes high density residential developments (podiums/towers) within the Project site adjacent to proposed flex commercial uses to the north and industrial buildings further to the north, there is the potential for noise impacts from these facilities. These facilities within the Project site, including both flex commercial and industrial uses, will need to comply with the sound level limits in Publication NPC-300.

Only typical 'Light Industrial' uses (i.e., Class I light industries in accordance with MECP D-series of guidelines) should be permitted for Building K and Building L. In general, Class I light industrial noise impacts are not anticipated to be a concern for the residential portions of the proposed development, and can be addressed through appropriate/strategic building design,

equipment layout, equipment selection and inclusion of noise controls (if needed) later in the planning process (e.g., at building permit) for those facilities.

Similarly, sound levels from the flex commercial buildings (Flex Commercial I1, Flex Commercial I2 and Flex Commercial J) can be sufficiently controlled with appropriate/strategic building design, equipment layout, equipment selection and inclusion of noise controls (if needed).

Considerations that could be incorporated in the design process to minimize potential noise impacts from these facilities at the residential portions of the proposed development include the following:

- Locating truck delivery and loading/unloading areas on the north sides of the buildings, facing away from the noise-sensitive residences (note: this is already shown in the designs for Building K and Building L).
- Selecting appropriate HVAC systems and mechanical equipment, and having these selections reviewed by a qualified acoustic practitioner prior to final design and construction.
- Implementing no idling policies for delivery trucks.
- Directing exhaust stacks/openings associated with mechanical systems or emergency generators away from the noise-sensitive land uses (i.e., to the north)
- Implementing physical noise control measures such as silencers or noise barriers, if necessary.

These mitigation measures are feasible. Any future use with significant emissions will also require Environmental Compliance Approvals (ECAs) or Environmental Activity and Sector Registry (EASR) registrations with the MECP. Part of that approval is proving that the noise guideline can be met.

With consideration of the design recommendations above, it is expected that future facilities associated with the Project site can be operated in compliance with applicable MECP and City of Waterloo/RMOW guidelines.

Part 3: Impacts of the Development on the Surrounding Area

6.0 Stationary Source Noise from the Development on the Surroundings

6.1 Residential and Mixed Uses

With respect to the acoustic environment of the area (i.e., Class 1), it is expected that the proposed development will have a negligible effect on neighbouring noise-sensitive properties.

Traffic related to the proposed development will be small relative to the existing traffic volumes within the area and is not of concern with respect to potential transportation noise.

Other sources associated within the proposed development with the potential to generate noise are mechanical equipment (e.g., air conditioning units, make up air units, cooling units, and parking garage exhaust fans). Sound levels due to operation of these sources should meet MECP Publication NPC-300 noise guidelines at all off-site noise sensitive receptors.

Off-site sound levels are not expected to be of concern and impacts are not anticipated because systems will be designed to ensure that the applicable noise guidelines are met at on-site receptors.

Regardless, off-site sound levels from mechanical equipment should be assessed later in the planning process (e.g., at building permit).

The applicable criteria can be met at all surrounding receptors though the use of routine mitigation measures, including the appropriate selection of mechanical equipment, by locating equipment with sufficient setback from noise sensitive locations, and by incorporating control measures (e.g., silencers, barriers) into the designs.

It is recommended that the mechanical systems be reviewed by an acoustical consultant prior to final selection of equipment.

6.2 Proposed Flex Commercial and Industrial Building Uses

The flex commercial and industrial building facilities within the Project site will also need to comply with the sound level limits in NPC-300 at other off-site points of reception (e.g., residential dwellings west of Weber Road North).

The flex commercial buildings (Flex Commercial I1, Flex Commercial I2 and Flex Commercial J) and Building K, and Building L should be designed to meet applicable guideline limits at the nearest and more exposed points of reception at the residential portions of the proposed development, as noted in Section 5.2, through appropriate/strategic building design, equipment layout, equipment selection and inclusion of noise controls (if needed).

In doing so, applicable guideline sound level limits will be met at other off-site points of reception that are less exposed to these facilities.

7.0 Conclusions and Recommendations

The potential for noise impacts on and from the proposed development have been assessed. Impacts of the environment on the development, the development on itself, and the development on the surrounding area have been considered. Based on the results of this assessment, the following conclusions have been reached:

Transportation Noise

- An assessment of transportation noise impacts from surrounding roadways, the Waterloo Central Railway Guelph Spur and Grand River Transit ION LRT has been completed.
- Based on predicted transportation façade sound levels, upgraded glazing is required for some locations within the proposed development. Refer to Section 2.5.1.
- Predicted façade sound levels are sufficiently high such that specific ventilation requirements are applicable for all building in the proposed development. The provision for installing central air conditioning at a later date/MECP Type C warning clauses and central air conditioning/ MECP Type D warning clauses should be included in agreements registered on Title for the residential units and included in agreements of purchase and sale, outlined in Section 2.5.1.
- Sound levels at the common outdoor amenity area are predicted to be within acceptable levels without the need for mitigation measures. An MECP Type A warning clause us

recommended for some building within the proposed development, as noted in Section 2.5.2.

- All transportation noise warning clause requirements are summarized in Appendix E.

Environmental Vibration

- The proposed development is located within 75 m of the Waterloo Central Railway Guelph Spur and the Grand River Transit ION LRT.
- Rail vibration measurements of freight rail and ION LRT train movements were performed by SLR between January 26, 2024 and February 1, 2024.
- Vertical vibration levels due to rail traffic are below applicable criteria, and no mitigation is required, as outlined in Section 3.0.
- No significant industrial vibration sources were identified in the vicinity of the proposed development that require assessment.

Stationary Source Noise

- Stationary source noise impacts onto the proposed development from the surrounding commercial facilities were assessed, as outlined in Section 4.0.
- Sound levels from the surrounding stationary sources are predicted to meet applicable guideline limits at all building façade and at outdoor point of reception locations without the need for noise control measures for the majority of facilities. However, potential excesses of the Class 1 Area noise guideline limits are predicted due to operation of Heffner Cabinetry & Woodworking (145 Northfield Drive West) and Sobeys (640 Parkside Drive).
- Source-based noise mitigation measures at Heffner Cabinetry and Sobey's have been investigated and are technically or administratively feasible. Therefore, it is appropriate for a Class 4 Area designation to be provided by the City/Region for the proposed development. With the inclusion of a Class 4 Area designation, the applicable NPC-300 noise guidelines are met, and additional source-based or receptor-based noise mitigation measures are not required.
- Assessment of building design, equipment layout, equipment selection and inclusion of noise controls (if needed) should be completed later in the planning process (e.g., at building permit) for Flex Commercial buildings I and J, and Industrial buildings K and L.
    - Stationary source sound levels at the proposed development from these facilities can be sufficiently controlled with appropriate building design, equipment layout, equipment selection and inclusion of noise controls (if needed). These uses will be subject to the MECP ECA/EASR approvals/ registration process, which will confirm that the applicable noise guidelines are met.
- Air conditioning is required for all residential units, and MECP Type E and Type F warning clauses are recommended for all residential units in the proposed development.

Overall Assessment

- Noise from the environment on the proposed development can be adequately controlled with the inclusion of upgraded glazing, ventilation and warning clause recommendations as detailed in Part 1 of this report.

- Noise from the proposed development on itself is not expected to be of concern and can be adequately controlled by following the design guidance outlined in Part 2 of this report.
- Noise from the proposed development on the surroundings is expected to meet the applicable guideline limits, and can be adequately controlled by following the design guidance outlined in Part 3 of this report.
- As the mechanical systems for the proposed development have not been designed in detail, the acoustical design should be reviewed by an acoustical consultant later in the planning process (e.g., at building permit).

8.0 Closure

Should you have any queries, please contact the undersigned.

Regards,

SLR Consulting (Canada) Ltd.





Keni Mallinen, M.A.Sc., P.Eng.
Senior Acoustics Engineer
kmallinen@slrconsulting.com

Dylan Diebolt
Acoustics Consultant
ddiebolt@slrconsulting.com



R. L. Scott Penton, P.Eng.
Principal Acoustics Engineer
spenton@slrconsulting.com

9.0 References

AECOM. Acoustic Assessment Report, Waterloo Light Rail Transit – Operations, Maintenance and Storage Facility, August 2014.

City of Waterloo, Noise Bylaw, Bylaw Number: 2010-073, last passed by council May 17, 2010.

City of Waterloo, Terms of Reference: Noise Study, dated June 30, 2023.

International Organization for Standardization, ISO 9613-2: Acoustics – Attenuation of Sound During Propagation Outdoors Part 2: General Method of Calculation, Geneva, Switzerland, 1996.

Ontario Ministry of the Environment, Conservation and Parks, 1989, Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT).

Ontario Ministry of the Environment, Conservation and Parks, Publication NPC-300: Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, 2013.

Ontario Ministry of the Environment, Conservation and Park, STAMSON v5.04: Road, Rail and Rapid Transit Noise Prediction, 1996.

Ontario Ministry of the Environment and Energy, Publication NPC-216: Residential Air Conditioning Devices, 1993.

Regional Municipality of Waterloo, Noise Policy Implementation Guideline, updated October 2019.

The Federation of Canadian Municipalities and the Railway Association of Canada, Guidelines for New Development in Proximity to Railway Operations, May 2013.

U.S. Department of Transportation, Federal Transit Administration (FTA, 2018), Transit Noise and Vibration Impact Assessment Manual, September 2018.