

DIXIE MALL REDEVELOPMENT

MISSISSAUGA, ONTARIO

NOISE AND VIBRATION IMPACT STUDY

RWDI #2100834

December 6, 2022

SUBMITTED TO

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VERSION HISTORY

Index	Date	Description	Prepared by	Reviewed by
1	November 30, 2022	Draft	KD	GER
2	December 6, 2022	Final	KD	GER



EXECUTIVE SUMMARY

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed Dixie Mall Redevelopment located in Mississauga, Ontario. The proposed development will consist of 4 blocks. Block 1 is a public park. Block 2 consists of a 6-storey building. Block 3 consists of an 18-storey and 25-storey building. Block 4 consists of a 9-storey and 12-storey building. This assessment was completed to support the Official Plan Amendment (OPA) and Re-Zoning Application (RZA) submission as required by the City of Mississauga.

The following noise control measures are recommended for the proposed development:

1. Installation of central air-conditioning so that all suites' windows can remain closed.
2. The inclusion of noise warning clauses related to transportation sound levels at the building façade and in the outdoor amenity areas.
3. Minimum sound isolation performance:
 - a. Suite bedroom window glazing with minimum sound isolation performance of STC-38.
 - b. Suite exterior balcony door with minimum sound isolation performance of STC-35.
4. Construction of perimeter noise barriers along the outdoor amenity areas if feasible, with the applicable warning clause.

Rail is located further than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.

Existing industrial or commercial facilities are distant and are not anticipated to affect sound levels at the development. Thus, stationary sources were not assessed.

At this stage in design the noise levels produced by the development on itself and its surroundings could not be quantitatively assessed. However, the effect on both the building itself and its surroundings is expected to be feasible to meet the applicable criteria. We recommend that the building design is evaluated prior to building permit to ensure that the acoustical design is adequately implemented in order to meet the applicable criteria.

Based on the results of the analysis including implementation of the recommendations included with this assessment, the proposed development is feasible to meet the applicable sound and vibration criteria.



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1 INTRODUCTION

Slate Asset Management retained RWDI to prepare a Noise and Vibration Impact Study for the proposed Dixie Mall Redevelopment located in Mississauga, Ontario. The proposed development will consist of 4 blocks. Block 1 is a public park. Block 2 consists of a 6-storey building. Block 3 consists of an 18-storey and 25-storey building. Block 4 consists of a 9-storey and 12-storey building. The context site plan is shown in **Figure 1**.

The site is exposed to noise from road traffic from: the North Service Road, South Service Road and the QEW to the north and Dixie Road to the east.

Rail is located further than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.

Existing industrial or commercial facilities are distant and are not anticipated to affect sound levels at the development. Thus, stationary sources were not assessed.

This assessment was completed to support the Official Plan Amendment (OPA) and Re-Zoning Application (RZA), and draft plan of subdivision submissions as required by the City of Mississauga. This assessment was based on design drawings dated November 22, 2022. A copy of the drawings are included in **Appendix A**.

2 APPLICABLE CRITERIA

Applicable criteria for transportation noise sources (road) are adopted from the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline (MOE, 2013), with a summary of the applicable criteria included with **Appendix B**.

3 THE EFFECTS OF THE ENVIRONMENT ON THE PROPOSED DEVELOPMENT

3.1 Transportation Source Assessment

3.1.1 Road Traffic Volume Data

The North Service Road, South Service Road, Queen Elizabeth Way (QEW) and Dixie Road traffic volumes were obtained from The City of Mississauga. The other smaller roads in the area are minor, or distant and are not expected to significantly affect the development.

The NPC-300 guidelines require that assessments be completed for a 10-year horizon. However, the Region of Peel General Guidelines for the Preparation of Acoustical Reports required the Ultimate Annual Daily Traffic (UADT) numbers based on the number of lanes of traffic to be used. These UADT values were used for the North Service Road, South Service Road and Dixie Road. Traffic data for the provincial highway QEW was forecasted for the horizon year 2032. A 90%/10% daytime/nighttime split was applied for North Service Road and South Service Road.



Truck percentages were obtained from the Turning Movement Counts (TMCs) at the intersections of North Service Road and Cawthra Road, and South Service Road and Cawthra Road. In the absence of specific data for Dixie Road, truck percentages at Cawthra Road were applied to Dixie Road.

The most recent road traffic data for the QEW was obtained from the Ontario Ministry of Transportation in 2020. The data included Average Annual Daily Traffic (AADT) volumes from 2010 to 2016. The AADT for 2032 was linearly extrapolated from the given list of AADTs. The truck percentages were based on recommended values from the Ontario Road Noise Analysis Method for Environment and Transportation, Technical Publication (MECP, 1989). An 85%/15% daytime/nighttime freeway split was applied for the QEW and Dixie Road. The day-night split was drawn from data of similarly sized major highways within the Greater Toronto Area.

A summary of the traffic data used is included in **Table 1** below with more detailed information included in **Appendix C**.

Table 1: Road Traffic Volumes

Roadway	2032 Future Traffic (AADT or UADT)	% Day/Night	Speed Limit (km/hr)	% Trucks
North Service Road	16,200	90% / 10%	60	1.9%
South Service Road	16,200	90% / 10%	60	2.1%
QEW	225,713	85% / 15%	100	15%
Dixie Road	8,100	85% / 15%	60	3.8%

3.1.2 Representative Receptors

The selection of receptors affected by transportation noise sources was based on the drawings reviewed for this assessment. Using the “building evaluation” feature of Cadna/A, each façade of the residential buildings was assessed.

Outdoor Living Areas (OLAs) would include outdoor areas intended and designed for the quiet enjoyment of the outdoor environment and which are readily accessible from the building. OLAs may include any common outdoor amenity spaces associated with a multi-unit residential development (e.g. courtyards, roof-top terraces), and/or private backyards and terraces with a minimum depth of 4m provided they are the only outdoor living area for the occupant. In absence of detailed drawings, the locations and number of OLAs are estimated based off the drawings. Daytime sound levels were assessed at the following identified OLAs:

- OLA_01: Block 4, 3-Storey Outdoor Amenity Area
- OLA_02: Block 2, 3-Storey Outdoor Amenity Area
- OLA_03: Block 3, 6-Storey Outdoor Amenity Area
- OLA_04: Block 4, At-Grade Outdoor Amenity Area
- OLA_05: Block 2, At-Grade Outdoor Amenity Area
- OLA_06: Block 3, At-Grade Outdoor Amenity Area

The OLAs are indicated in **Figure 2**.

3.1.3 Analysis and Results

Sound levels due to the adjacent transportation (road) sources were predicted using the RLS-90 standard (RLS,1990) as implemented in the Cadna/A software package.

To assess the effect of transportation noise on suites, the maximum sound level on each façade was determined with the results summarized in **Table 2**.

Table 2: Predicted Ground Transportation Source Sound Levels – Plane of Window

Building	Façade	Road		Notes
		Day L _{EQ} , 16hr	Night L _{EQ} , 8hr	
Block 4: Podium	West Façade	68	64	1
Block 4: 9-Storey Building	West Façade	67	62	1
Block 4: 12-Storey Building	North Façade	73	68	1
Block 2: Podium	North Façade	78	73	1
Block 2: 4-Storey Building	North Façade	77	73	1
Block 2: 22-Storey Building	North Façade	78	73	1
Block 3: Podium	North Façade	77	73	1
Block 3: 6-Storey Building	North Façade	77	73	1
Block 3: 18-Storey Building	North Façade	77	73	1
Block 3: 25-Storey Building	North Façade	77	72	1

Note(s):

1. The acoustical performance of building components must be specified to meet the indoor sound level criteria. Installation of air conditioning to allow for windows and doors to remain closed, warning clause "Type D". Refer to **Appendix D** for guidance regarding air-conditioning as a noise mitigation measure.

To assess the effect of transportation noise on the qualifying OLAs for the development, predicted sound level results are summarized in **Table 3**.



Table 3: Transportation Sound Levels in Outdoor Living Areas (OLAs)

Receptor	Description	Daytime L _{EQ} , 16hr	Notes
OLA_01	Block 4, Podium Outdoor Amenity Area	60 dBA	2
OLA_02	Block 2, Podium Outdoor Amenity Area	68 dBA	1
OLA_03	Block 3, Podium Outdoor Amenity Area	67 dBA	1
OLA_04	Block 4, At-Grade Outdoor Amenity Area	56 dBA	2
OLA_05	Block 2, At-Grade Outdoor Amenity Area	75 dBA	1
OLA_06	Block 3, At-Grade Outdoor Amenity Area	70 dBA	1

Note(s):

- Noise mitigation is recommended to meet the ≤55 dBA OLA sound level criterion. If noise controls are not feasible to meet the 55 dBA criterion for technical, economic or administrative reasons, an exceedance of 5 dB may be acceptable (to a maximum sound level of 60 dBA). In this case, a warning clause "Type B" is recommended.
- For OLA sound levels >55 dBA and ≤60 dBA, noise controls may be applied to meet the 55 dBA criterion. If noise control measures are not provided, a warning clause "Type A" is recommended.

3.2 Recommendations

Based on the noise and vibration assessment results, the following recommendations were determined for the project. Recommendations are provided for both transportation sources and stationary sources.

3.2.1 Transportation Sources

The following recommendations are provided to address transportation sources.

3.2.1.1 Building Façade Components

Due to the elevated transportation sound levels in the area, acoustical design of the façade components including spandrel, window glazing, and exterior doors, are recommended to be specified for the proposed development.

To assess the development's feasibility, preliminary window glazing, and exterior balcony door sound isolation requirements were determined. These were based on following assumptions:

- Typical residential living room:
 - Glazing 60% of façade, Door: 20% of façade
 - 55% Façade to floor area Ratio
- Typical residential bedroom:
 - Glazing 80% of façade, Door: N/A
 - 81% Façade to floor area Ratio
- Acoustical character of rooms: High absorption finishes/furniture for bedrooms and intermediate absorption finishes/furniture for living rooms.



Based on the predicted plane of window sound levels and the assumptions listed above, recommendations for the minimum sound insulation ratings for the building components were determined using the National Research Council of Canada “BPN-56 method” (NRCC, 1985). The reported results are in terms of Sound Transmission Class (STC) ratings as summarized in **Table 4**.

Table 4: Recommended Façade Component Minimum Sound Insulation Rating

Portion of Development	Façade	Window Glazing	Exterior Door	Façade Wall
Block 4: Podium	West Façade	STC-28	OBC	OBC
Block 4: 9-Storey Building	West Façade	STC-27	OBC	OBC
Block 4: 12-Storey Building	North Façade	STC-32	STC-31	OBC
Block 2: Podium	North Façade	STC-38	STC-35	OBC
Block 2: 4-Storey Building	North Façade	STC-38	STC-32	OBC
Block 2: 22-Storey Building	North Façade	STC-38	STC-35	OBC
Block 3: Podium	North Façade	STC-38	STC-32	OBC
Block 3: 6-Storey Building	North Façade	STC-38	STC-32	OBC
Block 3: 18-Storey Building	North Façade	STC-38	STC-32	OBC
Block 3: 25-Storey Building	North Façade	STC-38	STC-32	OBC

Note(s):

1. “OBC” denotes that the noise insulation design is not required to be specified. Building envelope assemblies meeting the minimum Ontario Building Code (OBC) requirements will also exhibit sufficient noise reduction to meet the interior sound level criteria.

The maximum requirement for the window glazing was determined to be STC-38, and STC-35 for the exterior door, which is considered feasible as this can be achieved by various double-glazed configurations of insulated glazing units.

Taking into account the assumptions used as a basis to determine the glazing requirements, the applicable indoor transportation source sound level criteria are predicted to be achieved.

We recommend that the façade construction is reviewed during detailed design to ensure that the indoor sound level limits will be met, and that the window/door supplier is requested to provide STC laboratory test reports as part of shop drawing submittal to confirm that the glazing/door components will meet the minimum STC requirements.

3.2.1.2 Ventilation Recommendations

Due to the transportation sound levels at the plane of the façade, central air conditioning is recommended for the proposed development to allow for windows and doors to remain closed as a noise mitigation measure. Further, prospective purchasers or tenants should be informed by a warning clause “Type D”.

3.2.1.3 Outdoor Living Areas

Due to exposure to transportation sources along the nearby QEW sound levels in OLAs are predicted to be elevated. The road daytime average sound levels for the OLAs included in the assessment are in the range of 56-75 dBA. To reduce the transportation sound levels in OLAs to meet the applicable criteria, noise barriers are recommended.

The recommended geometry of the noise barriers are included with **Figure 3a** (to meet 55 dBA) and **Figure 3b** (to meet 60 dBA). Although the barriers are not shown in the current design plans, they will be included in the drawings for Site Plan Approval (SPA) application. The barrier heights are summarized in **Table 5**. General guidance with respect to noise barrier design is included with **Appendix D**.

Table 5: Barrier Height Recommendations for OLAs

Receptor	Description	Predicted OLA Sound Level	Barrier Height (m) to Meet Sound Level Criterion	
		Daytime L_{EQ} , 16hr	≤ 55 dBA ¹	≤ 60 dBA ²
OLA_01	Block 4, Podium Outdoor Amenity Area	60 dBA	4.0 m ^[3]	-
OLA_02	Block 2, Podium Outdoor Amenity Area	68 dBA	> 5.0 m ^[4]	3.0 m
OLA_03	Block 3, Podium Outdoor Amenity Area	67 dBA	4.6 m	2.1 m
OLA_04	Block 4, At-Grade Outdoor Amenity Area	56 dBA	2.75 m ^[3]	-
OLA_05	Block 2, At-Grade Outdoor Amenity Area	75 dBA	> 5.0 m ^[4]	> 5.0 m ^[5]
OLA_06	Block 3, At-Grade Outdoor Amenity Area	70 dBA	> 5.0 m ^[4]	4.5 m

Note(s):

1. Refer to Figure 3a for barrier geometry to meet 55 dBA.
2. Refer to Figure 3b for barrier geometry to meet 60 dBA. A warning clause "Type B" is recommended in cases where the OLA sound level is >55 dBA (to a maximum of 60 dBA).
3. If noise control measures are not provided, a warning clause "Type A" is recommended.
4. 55 dBA criterion cannot be met with a 5.0 m barrier, therefore achieving 55 dBA criterion is not feasible.

The 55 dBA criterion cannot be met with a 5.0 m barrier for OLA_02, or OLA_06. In this case, achieving 55 dBA criterion would not be feasible and a warning clause "Type B" is recommended. The feasibility of barriers above 4.0 m for OLA_01 and OLA_03 will be investigated further at SPA. The location of OLA_05 is directly facing the QEW, making achieving even the 60 dBA limit infeasible. We would recommend relocating this barrier to a location to the south of the residential buildings as part of the SPA application. Relocation of OLA_06 may also be desirable given the required barrier height to achieve 60 dBA.

3.2.2 Warning Clauses

The following warning clauses are recommended for the proposed development:

1. NPC-300 Type A or B to address transportation sound levels in Outdoor Living Areas (OLAs)
2. NPC-300 Type D to address transportation sound levels at the plane of window

Warning clauses are recommended to be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. The wording of the recommended warning clauses is included with **Appendix E**.

4 THE EFFECTS OF THE PROPOSED DEVELOPMENT ON ITS SURROUNDINGS AND ON ITSELF

On-site stationary sources for the development are expected to consist of HVAC related equipment in the roof-top mechanical penthouse as well as various exhaust fans. Further, consideration should be given to control airborne and structure-borne noise generated within the proposed development.

Within the development itself the main sources of noise that are likely to affect the uses of the building are the mechanical systems. The potential noise effect of the commercial component of the development is recommended to be reviewed during detailed design, to ensure the applicable criteria will be met.

Provided that best practices for the acoustical design of the building are followed, noise from building services equipment associated with the development are expected to be feasible to meet the applicable sound level criteria due to the nature (residential) of the proposed development.

We recommend that the potential noise effect of the proposed development is reviewed during detailed design to ensure the applicable sound level criteria will be achieved.

5 CONCLUSIONS

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed mixed-use development located in Mississauga, Ontario.

The following noise control measures are recommended for the proposed development:

1. Installation of central air-conditioning so that all suites' windows can remain closed.
2. The inclusion of noise warning clauses related to transportation sound levels at the building façade and in the outdoor amenity areas
3. Minimum sound isolation performance:
 - a. Suite bedroom window glazing with minimum sound isolation performance of STC-38.
 - b. Suite exterior balcony door with minimum sound isolation performance of STC-35.
4. Construction of perimeter noise barriers along the outdoor amenity areas if feasible, with the applicable warning clause.

Rail is located further than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.



Existing industrial or commercial facilities are distant and are not anticipated to affect sound levels at the development. Thus, stationary sources were not assessed.

At this stage in design the noise levels produced by the development on itself and its surroundings could not be quantitatively assessed. However, the effect on both the building itself and its surroundings is expected to be feasible to meet the applicable criteria. We recommend that the building design is evaluated prior to building permit to ensure that the acoustical design is adequately implemented in order to meet the applicable criteria.

Based on the results of the analysis including implementation of the recommendations included with this assessment, the proposed development is feasible to meet the applicable sound and vibration criteria.

6 REFERENCES

1. Ontario Ministry of the Environment (MOE), August 2013, Publication NPC-300, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning (MOE, 2013).
2. Richtlinien für den Lärmschutz an Strassen (RLS). BM für Verkehr, Bonn, 1990 (RLS, 1990).
3. Controlling Sound Transmission into Buildings (BPN-56), National Research Council Canada (NRCC, 1985).
4. City of Mississauga, Noise Control By-Law 360-79 ([Link](#), accessed 2022-11-28).

7 STATEMENT OF LIMITATIONS

This report entitled Dixie Mall Redevelopment was prepared by Rowan Williams Davies & Irwin Inc. (“RWDI”) for Slate Asset Management (“Client”). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein (“Project”). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

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FIGURES



Site Boundary

Site Plan - Overview

Drawn by: KD

Figure: 1

Project #:

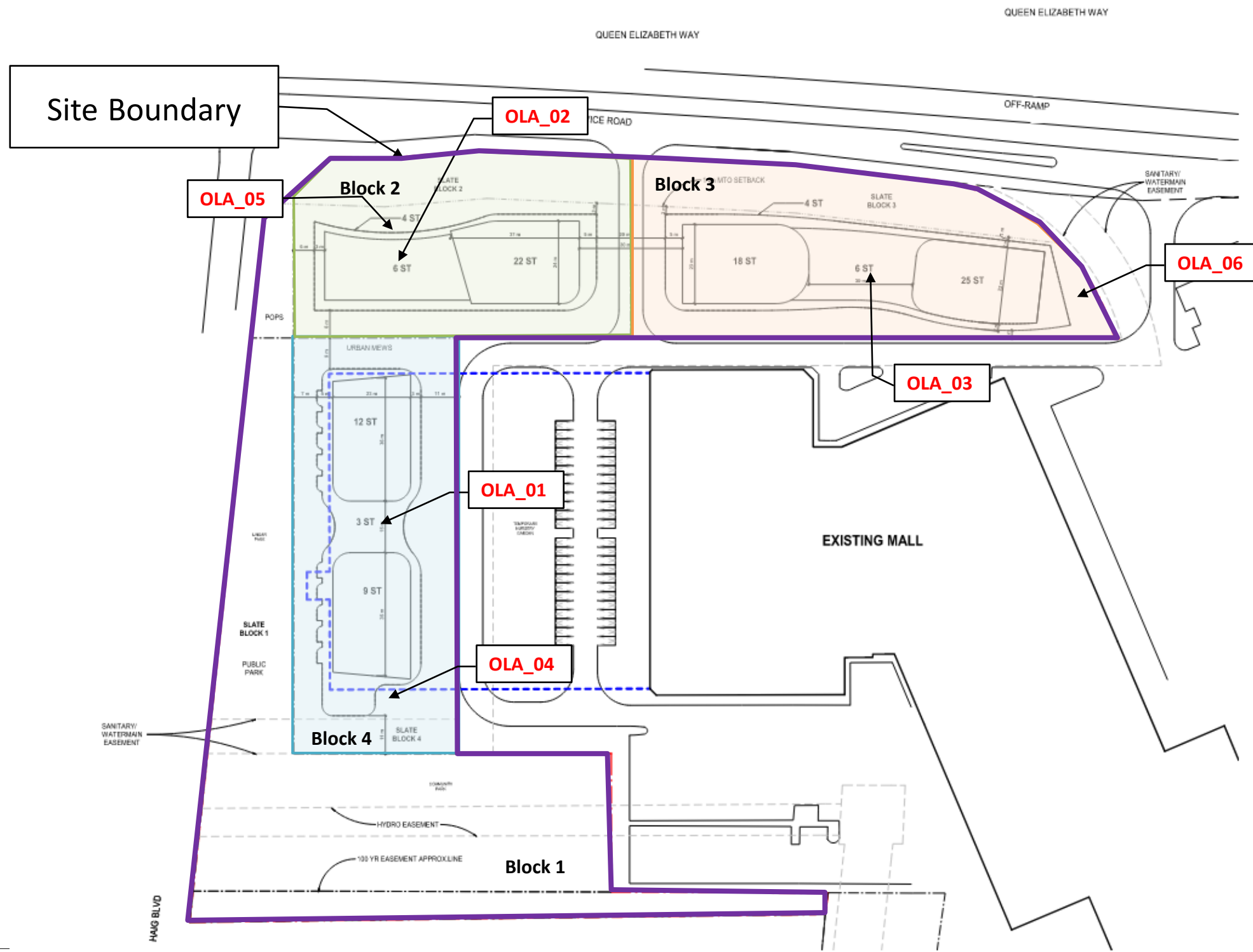
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Dixie Mall Redevelopment – Phase 1 – Mississauga, Ontario

Date:

2022-12-06





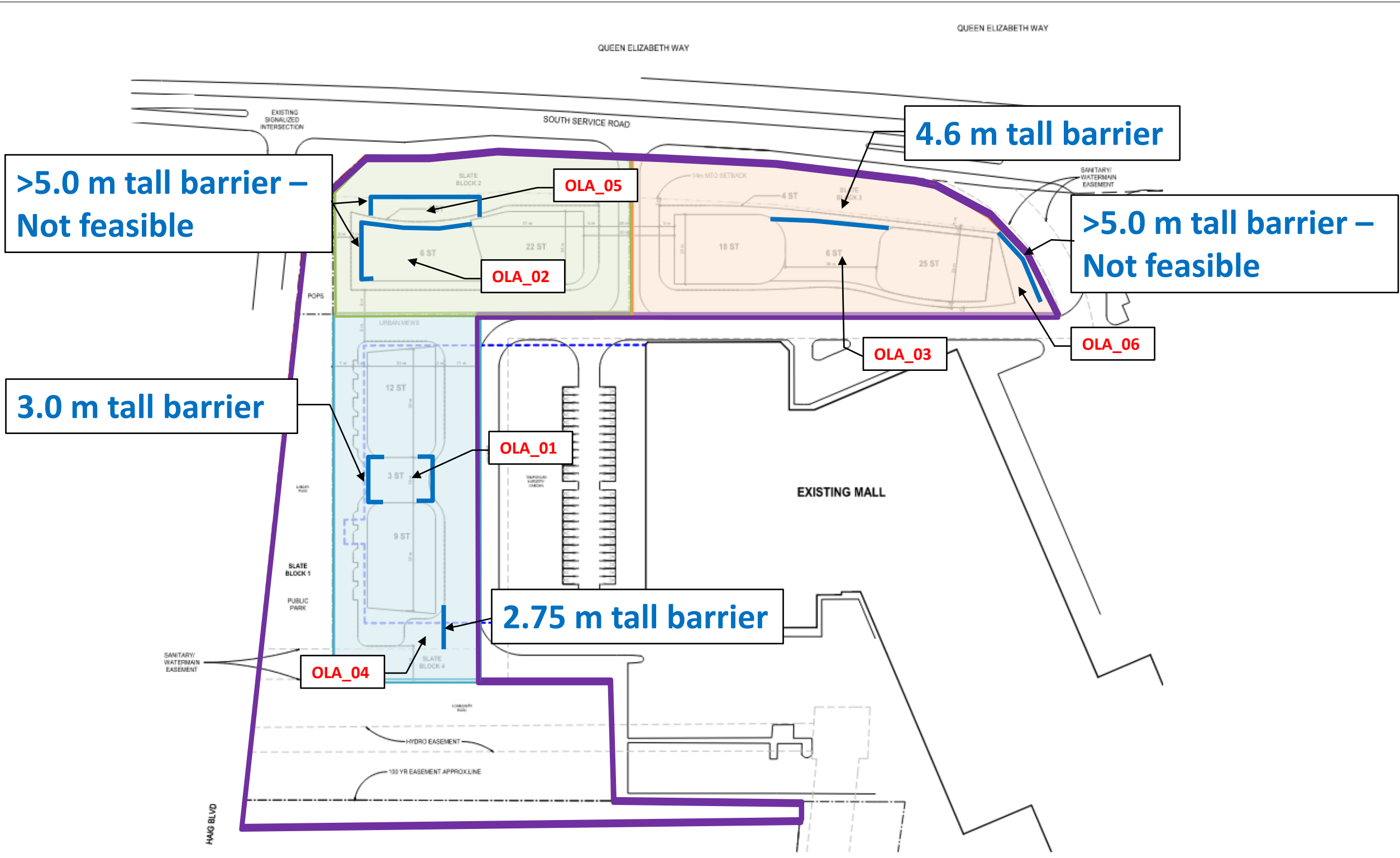
Outdoor Living Areas (OLAs) Locations

Location of Common Outdoor Amenity Areas

Dixie Mall Redevelopment – Phase 1 – Mississauga, Ontario

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Project #: 2100834	
Date: 2022-12-06	

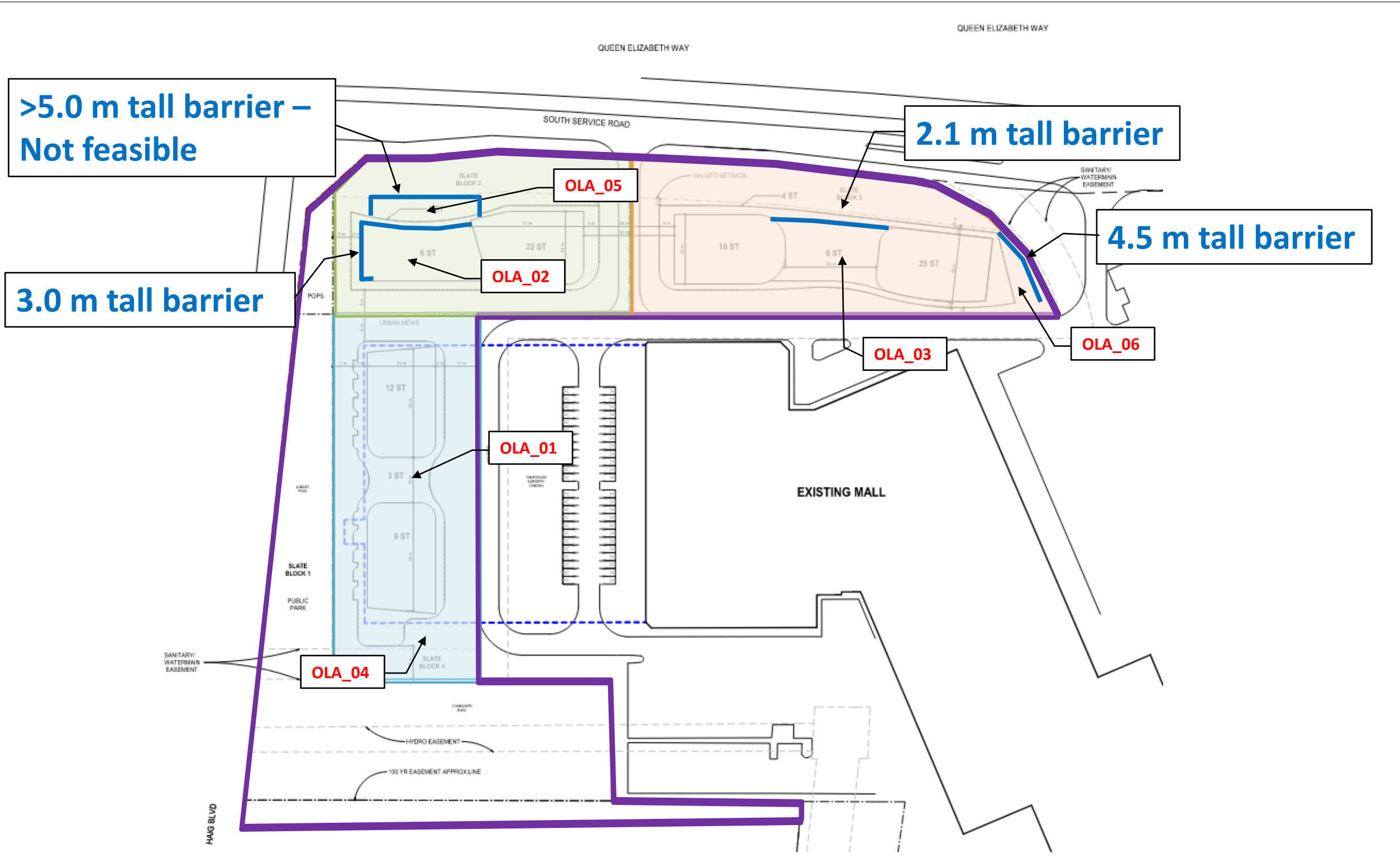




Outdoor Living Areas (OLAs) Mitigation to 55 dBA
 Recommended Barrier Geometry and Height to meet 55 dBA
 Dixie Mall Redevelopment – Phase 1 – Mississauga, Ontario

Drawn by: KD	Figure: 3a
Project #: 2100834	
Date: 2022-12-06	





Outdoor Living Areas (OLAs) Mitigation to 60 dBA

Recommended Barrier Geometry and Height to meet 60 dBA

Dixie Mall Redevelopment – Phase 1 – Mississauga, Ontario

Drawn by: KD	Figure: 3b
Project #: 2100834	
Date: 2022-12-06	

