74 Berkeley Street, Toronto, ON M5A 2W7
Tel: 647-795-8153 | www.pecg.ca

Hydrogeological Assessment

49 South Service Road, Mississauga, Ontario

Palmer Project #
2204701

Prepared For
Edenshaw SSR Developments Limited

October 13, 2022

74 Berkeley Street, Toronto, ON M5A 2W7
Tel: 647-795-8153 | www.pecg.ca

October 13, 2022

Roman Tsap
Edenshaw SSR Developments Limited
201-129 Lakeshore Rd E
Mississauga, ON L5G 1E5

Dear Roman:

Re: Hydrogeological Assessment – 49 South Service Road, Mississauga, Ontario
Project #: 2204701

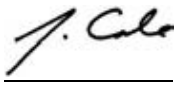
Palmer is pleased to submit the attached report describing the results of our Hydrogeological Assessment for the proposed redevelopment located at 49 South Service Road, Mississauga, Ontario ("the site"). Palmer understands that our Hydrogeological Assessment is required for a development approval application with the City of Mississauga. It is understood that the proposed residential redevelopments consist of a 22-storey tower, 4-storey podium, and up to five (5) levels of underground parking. This report provides a characterization of the site hydrogeological conditions based on our records review, field investigations, laboratory testing and data analysis. In addition, a site-wide water balance and impact assessment was completed.

This report summarizes the results of the hydrogeological assessment including a characterization of site geology and hydrostratigraphy, groundwater levels, and estimates for construction dewatering rates based on a non-watertight foundation scenario. Under stabilized dewatering conditions, the construction dewatering rate is estimated to be 256,172 L/day. However, due to the presence of an unconfined overburden sand aquifer at the site, the removal of overburden porewater must be taken into consideration during the initial stage of dewatering (i.e., first 30 days). It is estimated that approximately 589,788 L/day for 30-days will need to be removed to deplete the groundwater held in storage. An additional 65,438 L/day should be considered for direct precipitation for a 25 mm storm event.

Therefore, the maximum dewatering for the project is estimated to be 911,398 L/day. As this value is greater than 400,000 L/day, a Category 3 Permit to Take Water (PTTW) would be required for construction phase dewatering. A Short-Term Discharge Permit with the City of Mississauga and the Region of Peel will also be required to discharge into the sewer system for the construction phase, and groundwater treatment will be required if discharge waters are directed into the storm sewer.

We trust that this report will be satisfactory for your current needs. If you have any questions or require further information, please contact our office at your convenience. This report is subject to the Statement of Limitations provided at the end of this report.

Yours truly,
Palmer



Jason Cole, M.Sc., P.Geo.
VP, Principal Hydrogeologist

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1. Introduction

Palmer was retained by Edenshaw SSR Developments Limited (the "client") to complete a Hydrogeological Assessment for the proposed redevelopment located at 49 South Service Road, Mississauga, Ontario (the "site") (**Figure 1**). We understand that the development will consist of a 22-storey tower, 4-storey podium, and up to five (5) levels of underground parking, located on a property that is approximately 0.44 ha in total area. The site is surrounded by undeveloped treed area to the west and north as well as institutional land use to the east and southeast. Highway QEW is found immediately to the northwest, and South Service Road surrounds the site along the east boundary of the property.

This Hydrogeological Assessment aims to characterize the existing hydrogeological conditions of the site, and the potential impacts to natural environmental features or groundwater users, where present. This assessment includes: the groundwater flow direction at the site, the chemistry of the groundwater on site and the hydraulic conductivity of the overburden soils. The data resulting from the field investigations, laboratory and data analyses allows an assessment of the hydrogeological and Source Water Protection constraints related to the proposed redevelopment, Low Impact Development (LID) considerations, the need for groundwater control (dewatering) measures during construction and to control long-term seepage, hydrogeological foundation design considerations, and groundwater monitoring and mitigation measure recommendations.

In addition to the hydrogeological field investigations and site reconnaissance conducted by Palmer, information from the following sources was reviewed as part of the study:

- Available geology, hydrogeology, and physiography mapping (e.g., Ontario Geological Survey (OGS) Surficial and Palaeozoic Geology);
- Source Water Protection mapping; and,
- Ministry of the Environment, Conservation and Parks (MECP) water well records;
- Oak Ridges Moraine Groundwater Program (ORMGP) database.

1.1 Scope of Work

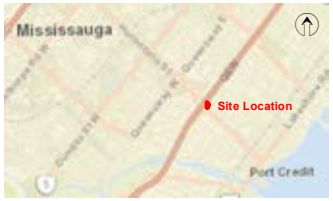
The scope of work for this Hydrogeological Investigation included:

- Complete a background review of hydrogeological data including watershed plans, MECP water well records, surficial and bedrock geology mapping, Source Water Protection mapping, and ORMCP database;
- Develop the four (4) monitoring wells drilled as part of Palmer's Geotechnical Investigation (Palmer, 2022);
- Conduct single well response testing (SWRT) (i.e., rising and/or falling head tests) in four (4) monitoring wells to determine the hydraulic conductivity of the overburden soils, fractured and competent bedrock found on site;
- Complete a short-duration pumping test in BH22-4 to more accurately estimate the hydraulic conductivity of the fractured bedrock found on site;
- Collect two (2) groundwater chemistry samples from BH22-4, with the analysis results compared against the Region of Peel Sanitary Sewer By-law and the City of Mississauga Storm Sewer By-law;

LEGEND

- Monitoring Well, Geotechnical (Palmer, 2022)
- Monitoring Well, EDD (Palmer, 2022)
- Monitoring Well, EDD (GHD, 2020)
- Subject Site

Key Map



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CLIENT
Edenshaw SSR Developments Limited

PROJECT
49 South Service Road

TITLE
Site Location

Palmer

REF. NO. 2204701-MR-301-1

Figure 1

Document Path: G:\Shared drives\Projects 2022\22047 - Edenshaw Developments\2204701 - Edenshaw - 49 S. Service Rd\GIS\1_Workspace\Task 3 - HydroG Figures\2204701-MR-301-1 (Fig 1 - Site Location Map).mxd

- Complete groundwater monitoring on two (2) occasions, separated by one (1) month, to assess the groundwater table elevation and determine the groundwater flow direction at the site;
- Estimate percolation rates using an empirical relationship and the hydraulic conductivity values obtained from single well response testing;
- Assessment of the need for dewatering for the project and if required, an estimation of the dewatering rate and permitting requirements; and
- Completion of a Hydrogeological Assessment report to support design and permitting, and to demonstrate compliance with Source Water Protection and municipal policies.

2. Hydrogeological Conditions

2.1 Regional Conditions

2.1.1 Physiography and Geology

The site is located within the Iroquois Plain physiographic region (Chapman & Putnam, 1984), about 2.2 km from the shores of Lake Ontario in Mississauga. This area is characterized by fine to coarse grained glaciolacustrine sediments overlying till deposits or bedrock. Gravel beaches and nearshore sand deposits can be found along the shore of former Glacial Lake Iroquois, which grade to silts and clays in the calmer offshore areas.

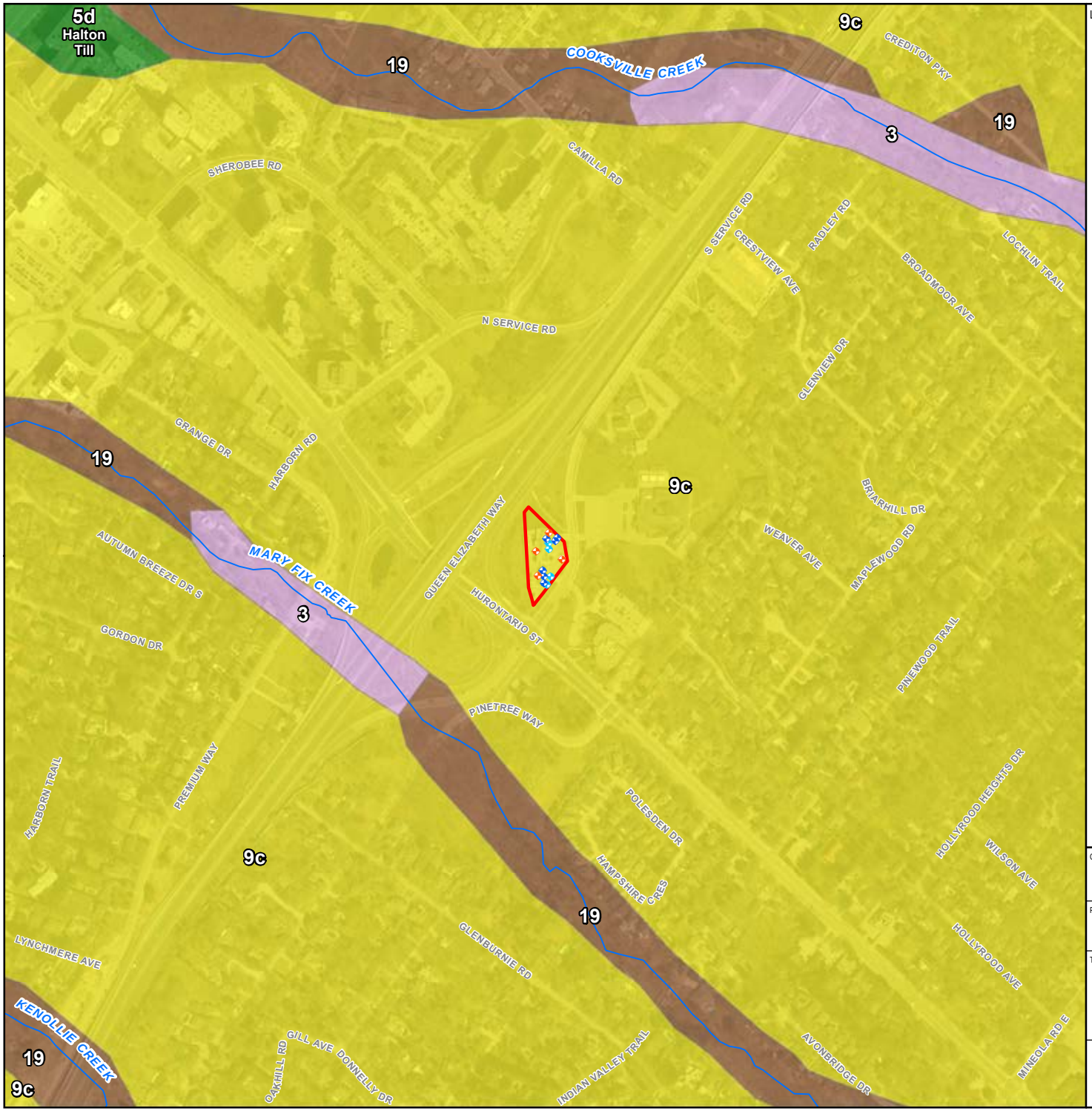
Available surficial and quaternary geology mapping by the Ontario Geological Survey (OGS) indicates that the native surficial geology is composed of coarse-textured glaciolacustrine deposits containing primarily sand and gravel with minor silt and clay (**Figure 2**). The bedrock found underlying the site is composed of the shales and limestones of the Georgian Bay Formation (**Figure 3**). Data from the Oak Ridges Moraine Groundwater Program (ORMGP) suggests that the bedrock can be found at a depth of 6 m at the site.

2.1.2 Drainage

The site is located within the Mary Fix Creek catchment of Subwatershed 9 (Norval to Port Credit) of Credit River watershed. The Mary Fix Creek originates in the mid of Mississauga and runs approximately 7.0 km from north to south before joining Credit River. The Credit River, which is about 1.5 km south of the site, discharges into Lake Ontario approximately 2.7 km southeast of the site. Mary Fix Creek is located approximately 210 m southwest of the site and Cooksville Creek approximately 590 m north of the site.

2.1.3 Hydrogeology

Hydrostratigraphic units can be subdivided into two distinct groups based on their ability to allow groundwater movement: an aquifer and an aquitard. An aquifer is defined as a layer of soil that is permeable enough to permit a usable supply of water to be extracted. An aquitard is a layer of soil that inhibits groundwater movement due to its low permeability. The major regional hydrostratigraphic units that control groundwater at the site are described below:



LEGEND

- Monitoring Well, Geotechnical (Palmer, 2022)
- Monitoring Well, EDD (Palmer, 2022)
- Monitoring Well, EDD (GHD, 2020)
- Watercourse[1]
- Subject Site

Surficial Geology[2]

Phanerozoic / Cenozoic / Quaternary / Recent

- 19: Modern alluvial deposits *(clay, silt, sand, gravel, may contain organic remains)*

Phanerozoic / Cenozoic / Quaternary / Pleistocene

- 9c: Coarse-textured glaciolacustrine deposits *(Foreshore and basinal deposits)*
- 5d: Till *(Clay to silt-textured till [derived from glaciolacustrine deposits or shale])*

Phanerozoic / Paleozoic

- 3: Paleozoic bedrock

1. LIO/MNRF
2. Ontario Geological Survey 2010 (Mapped at 1:50,000). Surficial geology of southern Ontario; Ontario Geological Survey. Miscellaneous Release- Data 128 - Revised

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PROJECT
49 South Service Road

TITLE
Surficial Geology

Palmer

REF. NO. 2204701-MR-302-1

Figure 2

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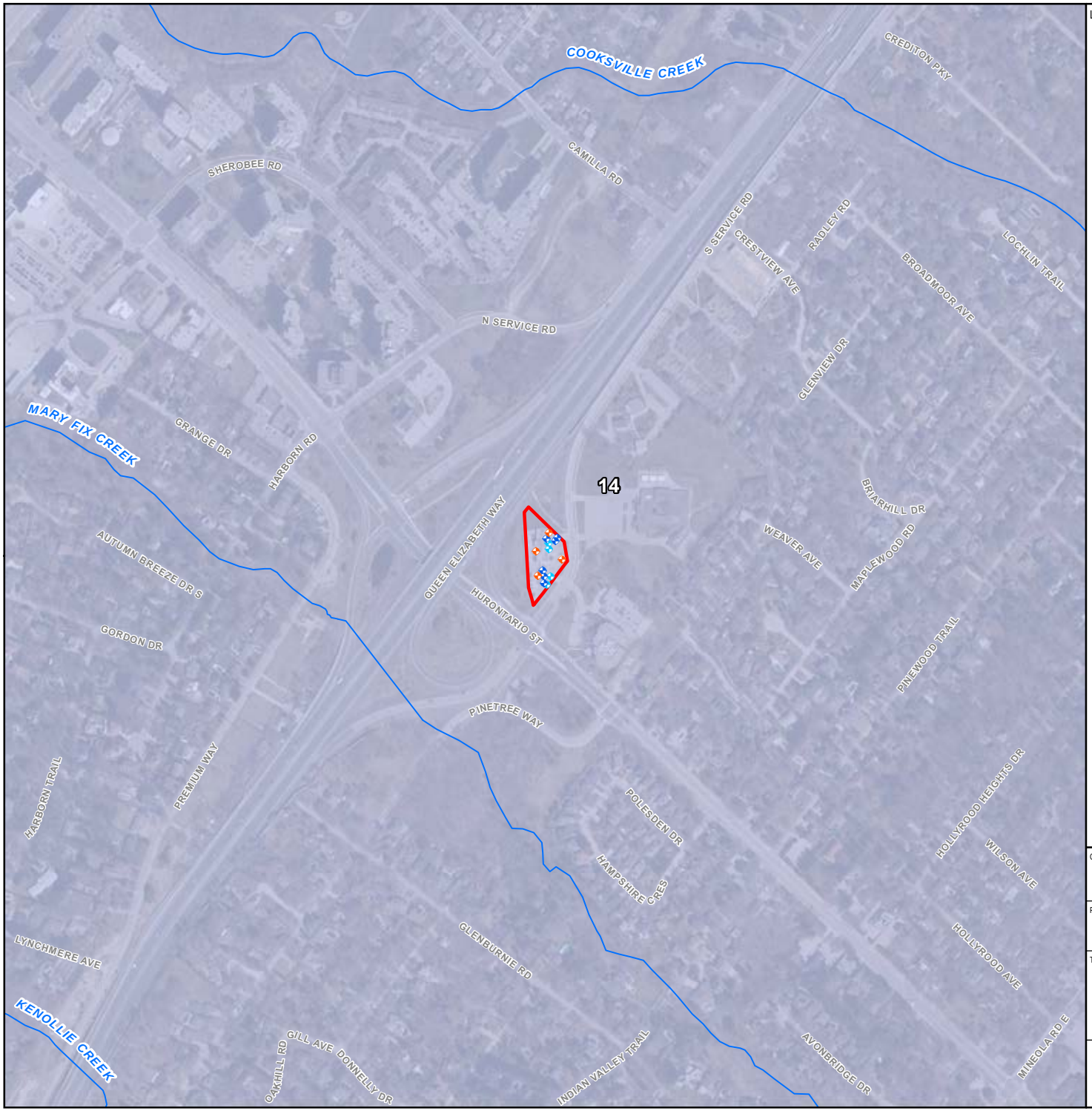

LEGEND

- Monitoring Well, Geotechnical (Palmer, 2022)
- Monitoring Well, EDD (Palmer, 2022)
- Monitoring Well, EDD (GHD, 2020)
- Watercourse[1]
- Subject Site

Paleozoic Bedrock Geology[2]

Upper Ordovician

- 14: Georgian Bay *(shale and limestone)*

1. LIO/MNRF
2. Armstrong, D.K. and Dodge, J.E.P. Paleozoic Geology Map of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 219

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PROJECT
49 South Service Road

TITLE
Bedrock Geology

Palmer

REF. NO. 2204701-MR-303-1

Figure 3

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Coarse-textured glaciolacustrine deposits: Composed of sand and gravel with minor silt and clay, these were deposited during the last retreat of glacial ice, which blocked the St. Lawrence River outlet forming Glacial Lake Iroquois (approximately 12,500 years before present). Owing to their genesis in a glaciolacustrine environment, these deposits can be vertically stratified with layers containing more or less fine-textured materials (i.e., silt and clay). At the site, they form an unconfined aquifer with hydraulic conductivities that could vary between 10^{-5} and 10^{-3} m/s.

Weathered shale (Georgian Bay Formation): Directly underlying the overburden sediments at the site is the Georgian Bay Formation. Based on Palmer's Geotechnical Investigation at the site (Palmer, 2022), approximately the upper 50 cm of the bedrock is weathered shale containing sandy silt till. This unit was formed by erosion from glacial ice, which allowed the incorporation of till soils into the upper weathered bedrock horizon. The hydraulic conductivity of this unit could vary widely, depending on the degree of weathering present (e.g., from 10^{-3} to 10^{-7} m/s), but in general would act as an unconfined aquifer in combination with the coarse-textured glaciolacustrine deposits overlying.

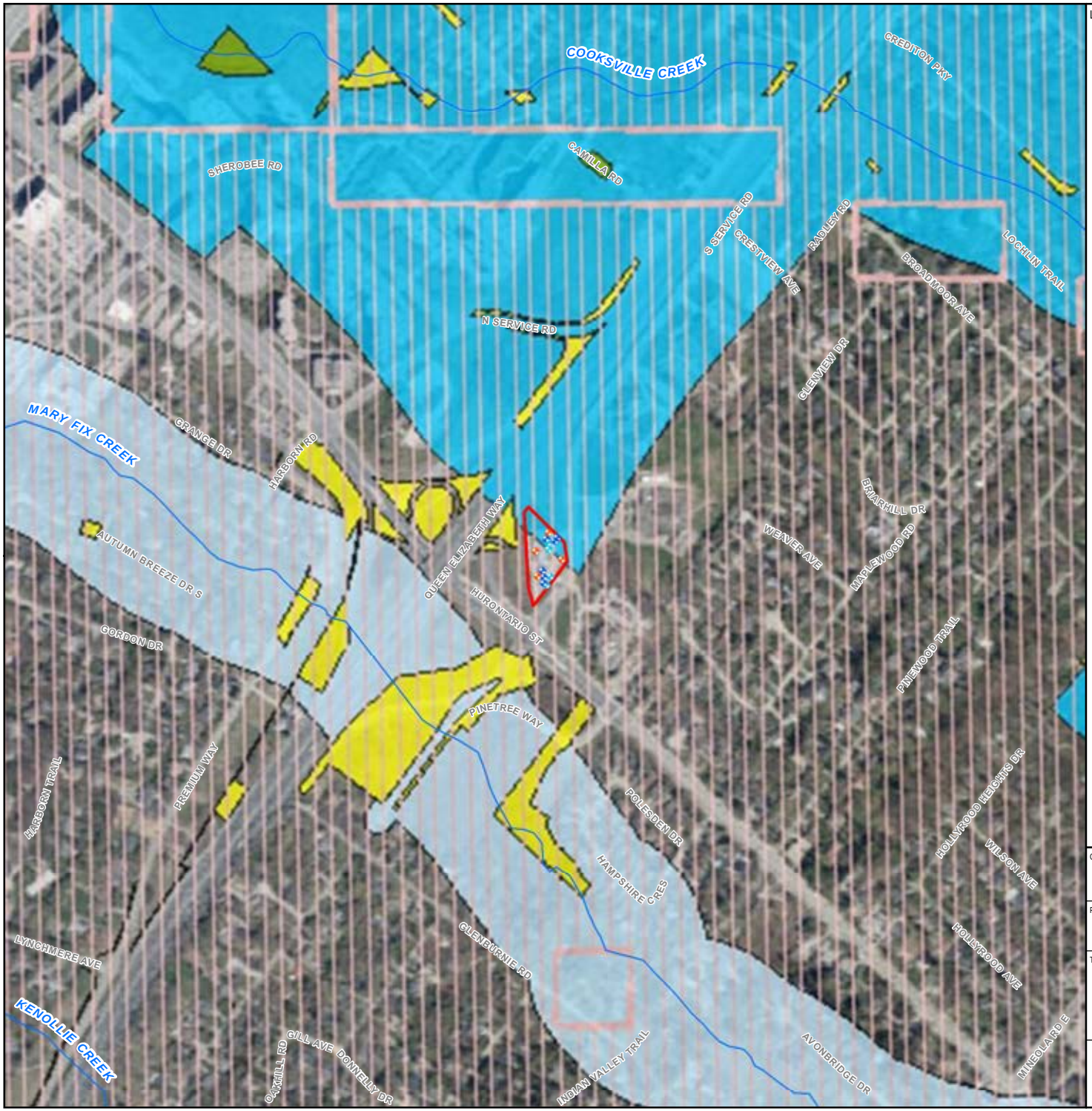
Shale and/or limestone bedrock (Georgian Bay Formation): Underlying the upper weathered zone is the shales and/or limestones of the Georgian Bay Formation. Despite not being as heavily weathered as the upper zone, the bedrock could vary in hydraulic conductivity depending on the degree of fracturing present (e.g., from 10^{-9} to 10^{-6} m/s). Owing to its sedimentary nature, horizontal or sub-horizontal bedding planes and vertical joints would be present. Fractures typically develop along bedding planes and joints.

2.1.4 Source Water Protection

The site is located within the Credit Valley Source Protection Area. The CTC Source Protection Plan (effective December 31, 2015), which encompasses the Credit Valley, Toronto and Region, and Central Lake Ontario Source Protection Areas, identifies four main regulatory factors under the *Clean Water Act (2006)* relating to local hydrogeology to consider for site development: Significant Groundwater Recharge Areas (SGRAs), Highly Vulnerable Aquifers (HVAs), and Wellhead Protection Areas (WHPAs), and Intake Protection Zones (IPZs).

A Wellhead Protection Area (WHPA) is the area around the wellhead where land use activities have the potential to affect the quality or quantity of water that flows into the well. These areas are delineated into zones of vulnerability (A, B, C, and D) based on the time of travel of water into the well, and zones around a surface water body influencing a Groundwater Under Direct Influence (GUDI) (E, F). Other zones (Q1, and Q2) are defined as the areas where new water takings or reduced recharge could impact the quantity of water available to municipal supply wells. IPZs are the area on the water and land surrounding a municipal surface water intake. HVAs are aquifers that are susceptible to contamination as a result of the soil structure/material or due its location near the ground surface. Lastly, SGRAs are areas where recharge is important to maintain the water level in a community drinking water aquifer.

Figure 4 presents the site in the context of the relevant Source Protection regulatory zones. The site is located within an HVA with score of 6 and an IPZ-2 with score of 4.5, but is not located within a WHPA or SGRA.



LEGEND

- Monitoring Well, Geotechnical (Palmer, 2022)
- Monitoring Well, EDD (Palmer, 2022)
- Monitoring Well, EDD (GHD, 2020)
- Watercourse[1]
- Subject Site

Source Water Protection[2]

- Intake Protection Zone 2
- Intake Protection Zone 3
- Highly Vulnerable Aquifer
- Significant Groundwater Recharge Area - Score 6

1. LIO/MNRF
2. *Source Protection Information Atlas*, MECP 2022 © Queen's Printer for Ontario

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PROJECT
49 South Service Road

TITLE
Source Water Protection

Palmer

REF. NO. 2204701-MR-304-1

Figure 4

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2.2 Site Specific Conditions

2.2.1 Borehole Drilling and Monitoring Well Installation

Boreholes from multiple previous field programs were used in this Hydrogeological Assessment. On December 7, 2020, ten (10) boreholes were drilled as part of a Phase Two environmental Site Assessment by GHD. The boreholes ranged from 3.1 to 4.6 m in depth, and four (4) were completed as monitoring wells (MW1-20 to MW4-20).

From May 26 to June 1, 2022 Palmer drilled four (4) boreholes at the site as part of a Geotechnical Investigation. BH22-1 and BH22-3 were drilled with solid stem augers through the overburden soils, and with a dynamic cone through the bedrock encountered. BH22-2 and BH22-4 were drilled with hollow stem augers through the overburden and rock coring through the bedrock. The boreholes ranged in depth from 8.5 to 25.0 metres. On June 22, 2022, Palmer drilled six (6) boreholes as part of a Phase Two Environmental Site Assessment. All boreholes were drilled to a depth of 5.3 m.

Monitoring wells were installed in all Palmer boreholes in accordance with Ontario Regulation 903 (Wells Regulation). Each monitoring well was completed with 51 mm (2 inch) diameter schedule 40 polyvinyl chloride (PVC) pipe, with a 3.1 m (10 ft) screened interval at bottom of the well. The monitoring wells were sealed using bentonite grout and completed with stick up casings. Additional details are provided in **Table 1**. Presented in **Figure 1** are the monitoring well locations; the borehole logs can be found in **Appendix B**.

Table 1. Borehole and Monitoring Well Installation Details

Borehole ID	Consultant	Surface Elevation (masl)	Depth (mbgs)	Screened Interval (mbgs)	Screened Unit
BH22-1	Palmer, 2022	99.90	8.5	3.0 - 6.1	Silty sand
BH22-2		99.70	25.0	21.3 - 24.4	Bedrock
BH22-3		99.60	8.8	3.0 - 6.1	Silty sand
BH22-4		99.60	25.0	12.0 - 15.1	Weathered Bedrock
BH22-5		99.66	5.3	3.8 - 5.3	Silty sand
BH22-6		99.56	5.3	3.8 - 5.3	Silty sand
BH22-7		99.55	5.3	3.8 - 5.3	Sandy silt
BH22-10		99.72	5.3	3.8 - 5.3	Silty sand
MW1-20	GHD, 2020	99.58	4.6	1.5 - 4.6	Sand
MW2-20		99.44	4.6	1.5 - 4.6	Sand
MW3-20		99.67	4.6	1.5 - 4.6	Sand
MW4-20		99.69	3.1	1.5 - 4.6	Sand
BH5-20		-	3.1	-	-
BH6-20		-	3.1	-	-
BH7-20		-	3.1	-	-
BH8-20		-	3.1	-	-
BH9-20		-	4.6	-	-
BH10-20		-	4.6	-	-

*Units are metres below ground surface (mbgs) and metres above seal level (masl)

2.2.2 Geology and Soil Profile

The stratigraphy of the site area encountered during both borehole drilling program is summarized below, and are generally consistent with the regional mapping presented in **Figure 2**. The specific stratigraphic descriptions below are based on the soils encountered by BH22-1 to BH22-4 during Palmer's Geotechnical Investigation, but they are also consistent with the soils encountered during the environmental drilling programs conducted by GHD (2020) and Palmer (2022).

Topsoil / Asphalt: In BH22-1, 100 mm of topsoil was encountered. In BH22-2 to BH22-4, 100 mm of asphalt was encountered.

Reworked or Disturbed Native Soils (Fill): The layer of fill encountered at the site ranged in thickness from 1.4 to 4.4 m. In BH22-1 to BH22-3, this layer had texture of silty sand with trace clay and trace gravel. In BH22-4, the fill layer alternated in texture. Underlying the asphalt, 1.4 m of sand and gravel with trace clay and trace silt was encountered, followed by 0.7 m of silt with trace clay, and lastly 0.8 m of silty sand with trace clay.

Coarse-textured glaciolacustrine deposits: In BH22-1 and BH22-3, silty sand with trace clay was encountered, and in BH22-2 and BH22-4, sand with some silt and trace clay. Underlying the silty sand in BH22-4 was a 1.2 m-thick layer of sand and gravel with trace silt. Owing to the similarity of these soil descriptions, they can be considered the same hydrostratigraphic unit. These soils represent the coarse-textured glaciolacustrine deposits identified by OGS mapping. These deposits, which includes the sand, silty sand and sand and gravel layers, ranged in thickness from 2.2 to 5.7 m.

Newmarket Till: In BH22-2 and BH22-4 a thin (0.5 to 1.2 m thick) layer of till was encountered. In BH22-2, 50 cm of sandy silt till and weathered shale was encountered from 7.2 to 7.7 mbgs. In BH22-4, sand and gravel with trace silt and boulder fragments was encountered from 7.2 to 8.4 mbgs

Weathered Bedrock: In BH22-2, the weathered bedrock layer was mixed with Newmarket Till, as described above. In BH22-4, weathered shale was encountered from 8.4 to 8.9 mbgs.

Grey Shale and Limestone: The unweathered Georgian Bay Formation bedrock was encountered in all boreholes at depths ranging from 6.7 to 8.9 m and extending to at least 25.0 mbgs, according to BH22-2 and BH22-4. The bedrock up to 25.0 mbgs at the site consisted of interbedded shale and limestone, with a higher proportion of shale (68-97%) vs. limestone (3-32%).

2.2.3 Groundwater Levels and Flow

On July 11, 2022 Palmer personnel developed the monitoring wells BH22-1, BH22-2, BH22-3 and BH22-4 using a hydrolift pump, Waterra tubing and a foot valve. All wells went dry during development after approximately 12 L, 40 L, 13 L and 35 L was purged from each well, respectively.

On July 18, July 20 and August 15, 2022, the static water level in all monitoring wells was measured. Water levels were measured manually using a water level tape and recorded to the nearest centimetre. **Table** 2 **2** provides a summary of the measured water level depths. With the exception of BH22-2, the water levels

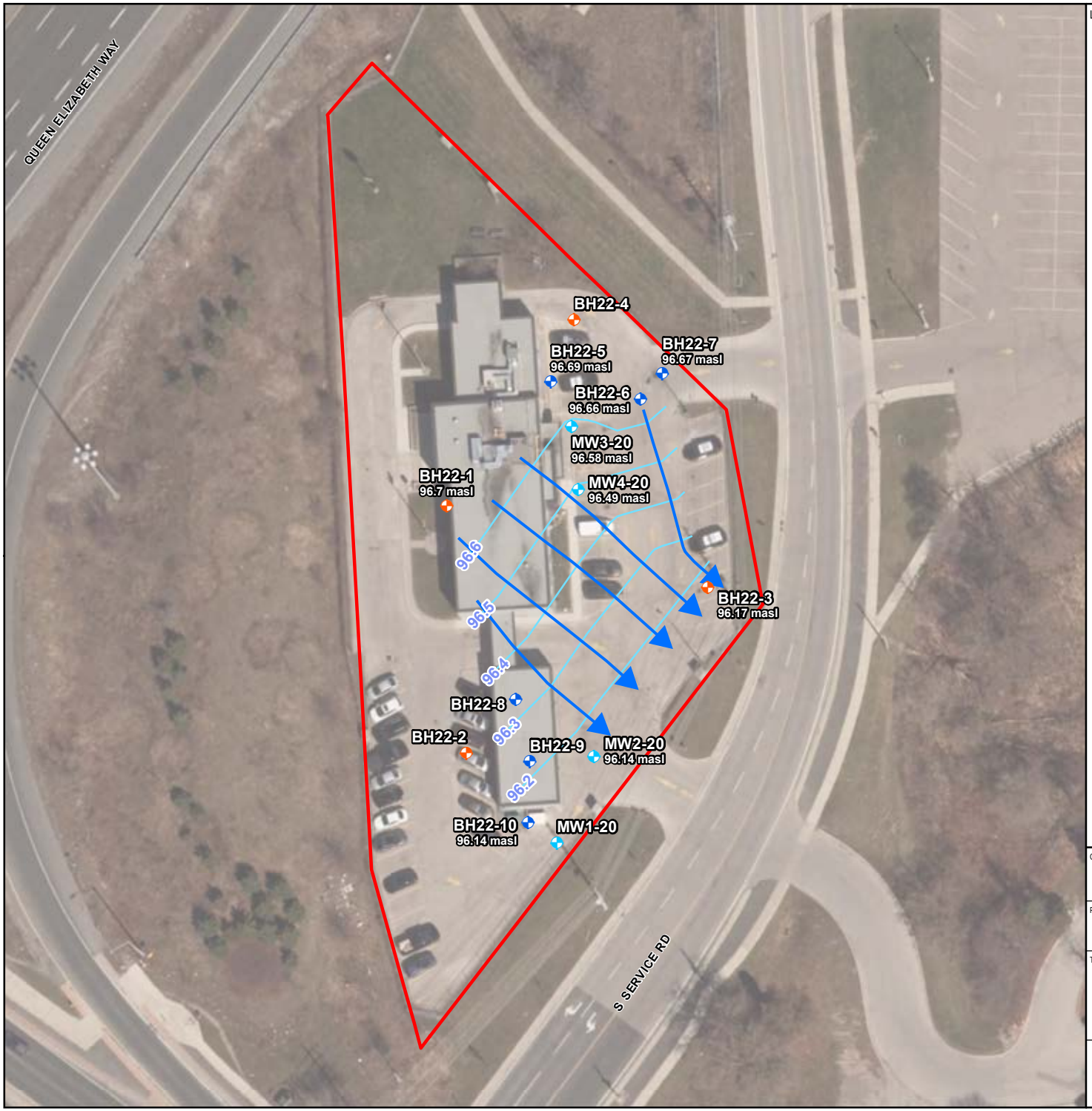
across the site varied from a minimum of 94.97 masl to a maximum of 96.70 masl. BH22-2 had water levels ranging from 77.70 masl to 80.75 masl, approximately 15 m to 20 m lower than the rest of the wells on site. BH22-2 is screened over a non-fractured interval in the shale bedrock. Its lack of direct hydraulic connection with productive fracture zones explains the low water level in BH22-2 compared to the other wells. The depths of groundwater levels increase with well depths, indicating the vertical gradient of groundwater flow is downward at the site. Based on the groundwater levels measured on July 18, 2022, the groundwater in the coarse-textured glaciolacustrine deposits flows from northwest to southeast (**Figure 5**).

Table 2. Groundwater Levels

Well Information			Water Levels					
			July 18, 2022		July 20, 2022		August 15, 2022	
Well ID	Elevation (masl)	Stick-up (m)	mbgs	masl	mbgs	masl	mbgs	masl
BH22-1	99.90	0.00	3.20	96.70	3.20	96.70	3.33	96.57
BH22-2	99.70	0.00	21.93	77.77	22.00	77.70	18.95	80.75
BH22-3	99.60	0.00	3.43	96.17	3.43	96.17	3.60	96.00
BH22-4	99.60	0.00	4.52	95.08	4.51	95.09	4.63	94.97
BH22-5	99.66	0.00	2.97	96.69	3.00	96.66	3.18	96.48
BH22-6	99.56	0.00	2.90	96.66	2.94	96.62	3.12	96.44
BH22-7	99.55	0.00	2.88	96.67	2.87	96.68	3.05	96.50
BH22-10	99.72	0.00	3.58	96.14	3.58	96.14	3.67	96.05
MW1-20	99.58	0.00	No longer exists					
MW2-20	99.44	0.00	3.30	96.14	3.30	96.14	3.41	96.03
MW3-20	99.67	0.00	3.09	96.58	3.12	96.55	3.28	96.39
MW4-20	99.69	0.00	3.20	96.49	3.23	96.46	3.37	96.32

2.2.4 MECP Water Well Records

Figure 6 shows the MECP Well Records within a 500 m radius of the site. In total, there are 25 well records within this radius. Of these 25 records, 3 are test holes, 3 test holes that are used for monitoring, 4 more are used for monitoring, 1 is not used, 11 are of unknown use, 1 is a domestic well, and the remaining 2 are dewatering wells. For the wells with depth value on record, they range in depth from 3.8 to 15.2 m. Only the domestic well (Well ID 4902195) has a static water level on record (4.6 mbgs). The depth to bedrock recorded at this same well was 4 m. None of the wells in a 500 m radius of the site are expected to be actively used for potable water, considering that there is full municipal water servicing in Mississauga, and most are dewatering wells.



LEGEND

- Monitoring Well, Geotechnical (Palmer, 2022)
- Monitoring Well, EDD (Palmer, 2022)
- Monitoring Well, EDD (GHD, 2020)
- Groundwater Elevation Contour
- Groundwater Flow Direction
- Subject Site

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PROJECT
49 South Service Road

TITLE
Groundwater Flow Direction

Palmer

REF. NO. 2204701-MR-305-1

Figure 5

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LEGEND

- Water Well Record within 500m[1]
- Monitoring Well, Geotechnical (Palmer, 2022)
- Monitoring Well, EDD (Palmer, 2022)
- Monitoring Well, EDD (GHD, 2020)
- Watercourse[2]
- Radius of Influence for Construction Dewatering
- 500m Site Buffer
- Subject Site

1. MECP
2. LIO/MNRF

0 25 50 100 150 200 250
METRE SCALE

North American Datum 1983
Universal Transverse Mercator Projection Zone 17

Scale: 1:5,800
Page Size: Letter (8.5 x 11 inches)

Drawn: CV
Checked: WC
Date: Aug 25, 2022

NORTH

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CLIENT
Edenshaw SSR Developments Limited

PROJECT
49 South Service Road

TITLE
MECP Well Records within a 500 m Radius

Palmer

REF. NO. 2204701-MR-306-1

Figure 6

Document Path: G:\Shared drives\Projects 2022\22047 - Edenshaw Developments\2204701 - Edenshaw - 49 S. Service Rd\GIS\1_Workspace\Task 3 - HydroG Figures\2204701-MR-306-1 (Fig 6 - MECP Well Records).mxd

2.2.5 Hydraulic Conductivity

2.2.5.1 Single Well Response Tests

On July 18, 2022 Palmer personnel conducted single well response tests (SWRTs) in BH22-1, BH22-2, BH22-3 and BH22-4. Bail tests (i.e., rising-head tests) were conducted in BH22-1, BH22-2 and BH22- by removing a bailer of water (<1 L) from the well to create a change in hydraulic head. A slug test (i.e., one falling-head and one rising-head test) was conducted in BH22-4. Hydraulic conductivity values were estimated by measuring the rate of change in recovery of the water level after the water column was displaced by either the removal of a bailer or the insertion or removal of the slug. Water levels in each well were recorded using a datalogger set to record every second. Manual water level measurements were used to gauge recovery to equilibrium. Tests were terminated after the 80% recovery was achieved or 30 minutes had passed.

Hydraulic conductivity (K) values were then calculated using the displacement-time data. The data collected from BH22-1, BH22-2 and BH22-3 were analyzed with the Bouwer-Rice (1976) method for unconfined aquifers and the data from BH22-4 with the Hvorslev (1951) method for confined aquifers, all modelled using Aqtesolv™ software. The analysis results are presented in **Appendix C**, and the calculated hydraulic conductivity values are summarized in **Table 4**.

The hydraulic conductivity of the coarse-textured glaciolacustrine deposits ranged from $3.7x10^{-6}$ m/s to $1.4x10^{-5}$ m/s, with a geometric mean of $7.2x10^{-6}$ m/s and a 90th percentile of $1.3x10^{-5}$ m/s. Based on a falling and rising-head test, the hydraulic conductivity of the fractured shale and limestone that BH22-4 is screened in has a hydraulic conductivity between $1.2x10^{-6}$ m/s and $1.3x10^{-6}$ m/s. The hydraulic conductivity of the competent bedrock in BH22-2 had a measured hydraulic conductivity of $5.4x10^{-8}$ m/s.

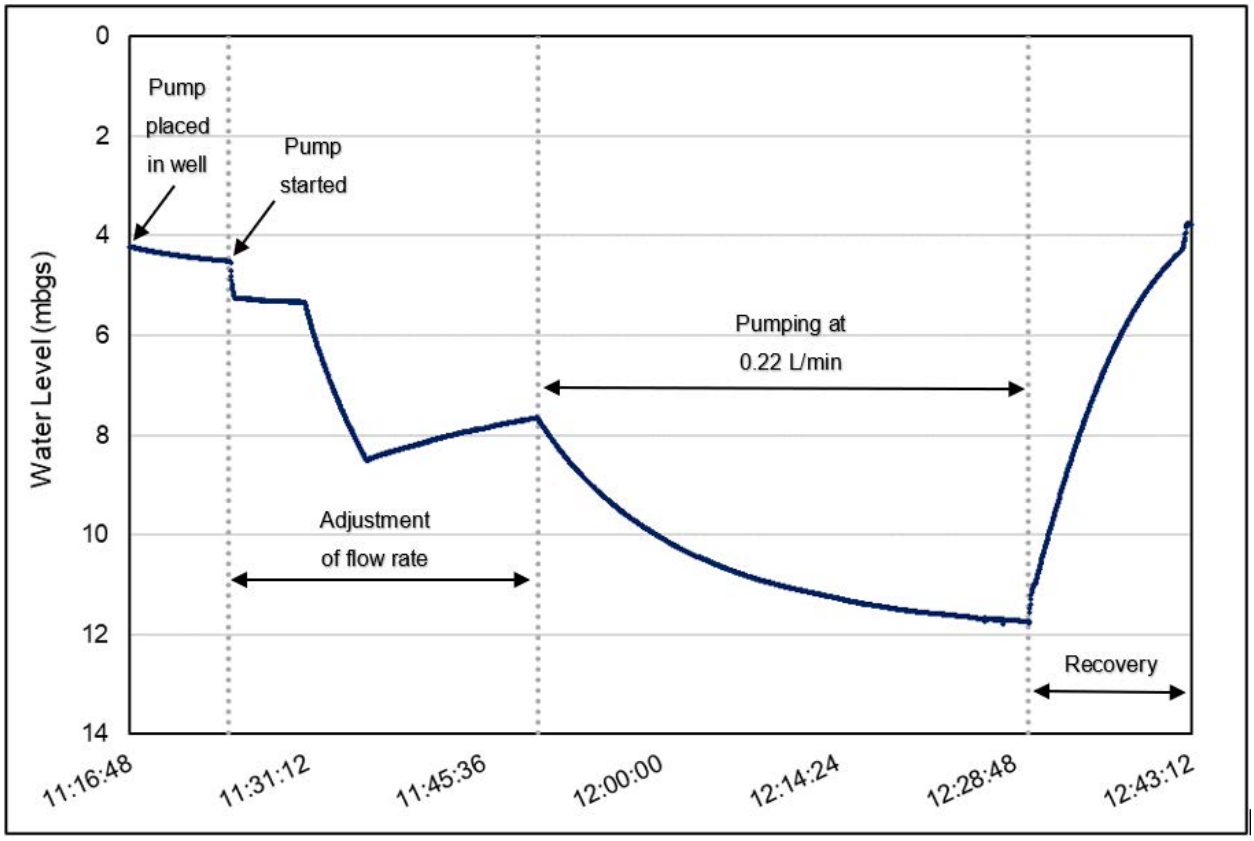
Table 3. Single Well Response Tests

Well ID	Screened Geology	Test Method	Analysis Method	Hydraulic Conductivity, K (m/s)	Geometric Mean K (m/s)	90th Percentile K (m/s)
BH22-1	Silty sand	Rising Head	Unconfined Bouwer-Rice	$4.4x10^{-6}$	$7.2x10^{-6}$	$1.3x10^{-5}$
				$4.1x10^{-6}$		
				$3.7x10^{-6}$		
BH22-3				$1.4x10^{-5}$		
				$1.2x10^{-5}$		
				$1.3x10^{-5}$		
BH22-2	Competent shale and limestone	Rising Head	Unconfined Bouwer-Rice	$5.4x10^{-8}$		
BH22-4	Fractured shale and limestone	Falling Head	Confined Hvorslev	$1.3x10^{-6}$		
		Rising Head		$1.2x10^{-6}$		

2.2.5.2 Short-Duration Pumping Test

On July 20, 2022, Palmer personnel conducted a short-duration pumping and recover test in BH22-4. Since this well is screened in the fractured bedrock from 12.0 to 15.1 mbgs, this test permitted an estimation of the hydraulic properties for the Georgian Bay Formation at the site. BH22-4 was pumped for a total of 65 mins before it was left to recover. It took 25 mins to calibrate a reasonable flow rate to test the well with. From 25 to 65 mins, BH22-4 was pumped at a flow rate of 0.22 L/min.

Figure 7. Short-Duration Pumping Test in BH22-4



The transmissivity (T) and storativity (S) were estimated using the drawdown data from 25 to 65 mins at 0.22 L/min, in addition to the recovery curve beginning at 12:30 pm. Aqtesolv™ software was used to analyze the drawdown and recovery data. For the drawdown data, the Cooper-Jacob (1946) method for confined aquifers was used. To analyze the recovery curve, the Hvorslev (1951) method for confined aquifers was used. **Table 4** summarizes the results of the pumping test analysis, and the analyzed curves can be found in **Appendix D**.

Based on the drawdown data, the transmissivity and storativity of the fractured aquifer screened by BH22-4 are 2.1×10^{-7} m^2/s and 0.086, respectively. Considering a saturated thickness of 6.2 m (measured from the bottom of the well screen to the top of bedrock), this corresponds to a hydraulic conductivity of 3.4×10^{-8} m/s. Based on the recovery data, a hydraulic conductivity of 1.7×10^{-6} m/s was estimated for the fractured bedrock. Considering the discretely fractured nature of the aquifer screened by BH22-4, the

Table 4. Short-Duration Pumping Test Results

Well ID	Geology	Curve Analyzed	Pumping Rate (L/min)	Analysis Method	Transmissivity (m^2/s)	Saturated Thickness (m)	Hydraulic Conductivity (m/s)	Storativity (-)
BH22-4	Fractured shale and limestone	Drawdown	0.22	Cooper-Jacob	$2.1x10^{-7}$	6.2	$3.4x10^{-8}$	0.086
		Recovery	0.00	Hvorslev	-		$1.7x10^{-6}$	-

recovery curve is interpreted to better estimate the hydraulic conductivity of the aquifer. The drawdown data would have captured the combined hydraulic properties of the fractured and competent bedrock screened by BH22-4; a lower hydraulic conductivity ($3.4x10^{-8}$ m/s), similar to the value estimated via the SWRT in BH22-2 ($5.4x10^{-8}$ m/s) is therefore expected.

2.2.5.3 Grain Size Analyses

The hydraulic conductivity of the soils at the site were estimated using empirical relationships derived by Sauerbrei (1932) which utilize grain size distribution curves of soil samples. During drilling, a soil sample was collected from 7.6 to 8.2 mbgs in BH22-2, from 9.1 to 9.7 mbgs in BH22-4 and from 6.1 to 6.7 mbgs in BH22-5. The grain size distribution curves are provided in **Appendix E**, and the results of the empirical analyses are provided in **Table 5.**

$$K\ (Sauerbrei, 1932) = \frac{\rho g}{\mu}[(3.75 \times 10^{-5}) \times \tau]\left[\frac{n^3}{(1-n)^2}\right] d_{17}^2\ \frac{cm}{s}$$

Where:

K = hydraulic conductivity (cm/s)
ρ = $3.1x10^{-8}T^3 - 7.0x10^{-6}T^2 + 4.19x10^{-5}T + 0.99985$
g = 980 cms^{-2}
μ = $-7.0x10^{-8}T^3 + 1.002x10^{-5}T^2 – 5.7x10^{-4}T + 0.0178$
τ = $1.093x10^{-4}T^2 + 2.102x10^{-2}T + 0.5889$
n = porosity as a fraction of aquifer volume
T = water temperature (°C)

Table 5. Empirical Grain Size Analyses

Borehole ID	Sample	Geology	Method of Analysis	Hydraulic Conductivity, K (m/s)	Geometric Mean K (m/s)	90th Percentile K (m/s)
BH22-1	SS6	Silty sand	Saurbrei	$1.6x10^{-6}$	$1.5x10^{-6}$	$4.7x10^{-6}$
BH22-2	SS7			$2.7x10^{-6}$		
BH22-3	SS5			$6.1x10^{-6}$		
BH22-3	SS7	Sand and silt		$9.1x10^{-7}$		
BH22-4	SS6	Sandy silt		$3.4x10^{-7}$		

The computed hydraulic conductivities ranged from $3.4x10^{-7}$ m/s (sandy silt in BH22-4, SS6) to $6.1x10^{-6}$ m/s (silty sand in BH22-3, SS5). The geometric mean and 90th percentile hydraulic conductivities are $1.5x10^{-6}$ and $4.7x10^{-6}$ m/s, respectively. The hydraulic conductivities calculated are consistent with those calculated from SWRTs conducted in BH22-1 and BH22-3, wells that are screened in the coarse-textured glaciolacustrine deposits.

2.2.6 Estimated Percolation Rates

An estimate of the infiltration rate for the study area was made based on an accepted formula from the Ontario Ministry of Municipal Affairs and Housing (OMMAH) Supplementary Guidelines to the Ontario Building Code 1997, and provided in the Low Impact Development Stormwater Management Planning and Design Guide (TRCA/CVC, 2010).

$$K = (6 \times 10^{-11}) I^{3.7363}$$

Where:

K = hydraulic conductivity (cm/s)
I = infiltration rate (mm/hr)

Rearranging for infiltration rate, we obtain the following relationship:

$$I = \left[\frac{K}{6 \times 10^{-11}}\right]^{\frac{1}{3.7363}}$$

Using the hydraulic conductivity values from **Tables 4** and **5**, on-site infiltration rates were estimated. Assuming a 2.5x factor of safety, the values in the coarse-textured glaciolacustrine deposits ranged from 13.9 to 37.3 mm/hr. The same infiltration rates estimated for the bedrock ranged from 8.5 to 19.6 mm/hr. The average estimated infiltration rate in the coarse-textured glaciolacustrine deposits, including the factor of safety, is 27.1 mm/hr.

Table 6. Estimated Percolation Rates

Borehole ID	Test Method	Geology	Hydraulic Conductivity, K (m/s)	Infiltration Rate (mm/hr)	Infiltration Rate with 2.5x Factor of Safety (mm/hr)
BH22-1	SWRT	Coarse-textured glaciolacustrine deposits	$4.4x10^{-6}$	68.6	27.4
			$4.1x10^{-6}$	67.5	27.0
			$3.7x10^{-6}$	65.7	26.3
BH22-3			$1.4x10^{-5}$	93.2	37.3
			$1.2x10^{-5}$	90.0	36.0
			$1.3x10^{-5}$	91.8	36.7
BH22-2	SWRT	Competent shale and limestone	$5.4x10^{-8}$	21.2	8.5
BH22-4		Fractured shale and limestone	$1.3x10^{-6}$	49.1	19.6
			$1.2x10^{-6}$	48.6	19.4

Borehole ID	Test Method	Geology	Hydraulic Conductivity, K (m/s)	Infiltration Rate (mm/hr)	Infiltration Rate with 2.5x Factor of Safety (mm/hr)
BH22-1	GSA	Coarse-textured glaciolacustrine deposits	$1.6x10^{-6}$	52.5	21.0
BH22-2			$2.7x10^{-6}$	60.4	24.1
BH22-3			$6.1x10^{-6}$	75.1	30.0
BH22-3			$9.1x10^{-7}$	45.1	18.0
BH22-4			$3.4x10^{-7}$	34.7	13.9

2.2.7 Groundwater Chemistry

On July 20, 2022 groundwater chemistry samples were collected from BH22-4 and submitted for analysis for a suite of water quality parameters, the results of which were compared to the Peel Region Storm and Sanitary Sewer By-Law criteria, in addition to the City of Mississauga Storm Sewer criteria. **Tables 7** and **8** presents a summary of the analysis results and the full analysis results can be found in **Appendix F**. The samples collected exceed the Peel Region Storm Sewer criteria for the following parameters: total suspended solids (TSS), Kjeldahl nitrogen (TKN), coliforms, manganese, zinc and phenols (4AAP). The samples exceeded the Mississauga Storm Sewer criteria for TSS, aluminum and manganese. The samples collected exceeded non of the Peel Region Sanitary Sewer criteria.

Table 7. Groundwater Chemistry Analyses (Region of Peel Storm and Sanitary)

Analyte	Guideline Limit		Lowest Detection Limit	Units	BH22-4 Water
	Peel Sanitary By-Law	Peel Storm By-Law			
Physical Tests (Matrix: Water)					
pH	5.5 -> 10	6 -> 9	0.10	pH units	7.93
solids, total suspended [TSS]	350	15	3.0	mg/L	**160**
Anions and Nutrients (Matrix: Water)					
Kjeldahl nitrogen, total [TKN]	100	1	0.050	mg/L	**5.57**
fluoride	10	-	0.020	mg/L	0.692
phosphorus, total	10	0.4	0.0020	mg/L	0.126
sulfate (as SO4)	-	-	0.30	mg/L	123
Cyanides (Matrix: Water)					
cyanide, strong acid dissociable (total)	2	0.02	0.0020	mg/L	<0.0020
Microbiological Tests (Matrix: Water)					
coliforms, Escherichia coli [E. coli]	-	200	1	CFU/100mL	<1
coliforms, thermotolerant [fecal]	-	1	1	CFU/100mL	**<2**
Total Metals (Matrix: Water)					
aluminum, total	50	-	0.0030	mg/L	1.44

Analyte	Guideline Limit		Lowest Detection Limit	Units	BH22-4 Water
	Peel Sanitary By-Law	Peel Storm By-Law			
antimony, total	5	-	0.00010	mg/L	<0.00100
arsenic, total	1	0.02	0.00010	mg/L	0.00171
cadmium, total	0.7	0.008	0.0000050	mg/L	<0.0000500
chromium, total	5	0.08	0.00050	mg/L	<0.00500
cobalt, total	5	-	0.00010	mg/L	0.00125
copper, total	3	0.05	0.00050	mg/L	0.0174
lead, total	3	0.12	0.000050	mg/L	0.000763
manganese, total	5	0.05	0.00010	mg/L	**0.271**
mercury, total	0.01	0.0004	0.0000050	mg/L	<0.0000050
molybdenum, total	5	-	0.000050	mg/L	0.00290
nickel, total	3	0.08	0.00050	mg/L	<0.00500
selenium, total	1	0.02	0.000050	mg/L	<0.000500
silver, total	5	0.12	0.000010	mg/L	<0.000100
tin, total	5	-	0.00010	mg/L	<0.00100
titanium, total	5	-	0.00030	mg/L	<0.0300
zinc, total	3	0.04	0.0030	mg/L	**0.0454**
Aggregate Organics (Matrix: Water)					
carbonaceous biochemical oxygen demand [CBOD]	300	15	2.0	mg/L	<3.0
oil & grease (gravimetric)	-	-	5.0	mg/L	<5.0
oil & grease, animal/vegetable (gravimetric)	150	-	5.0	mg/L	<5.0
oil & grease, mineral (gravimetric)	15	-	5.0	mg/L	<5.0
phenols, total (4AAP)	1	0.008	0.0010	mg/L	**0.0128**
Volatile Organic Compounds (Matrix: Water)					
benzene	10	2	0.50	µg/L	<0.50
chloroform	40	2	0.50	µg/L	<0.50
dichlorobenzene, 1,2-	50	5.6	0.50	µg/L	<0.50
dichlorobenzene, 1,4-	80	6.8	0.50	µg/L	<0.50
dichloroethylene, cis-1,2-	4000	5.6	0.50	µg/L	<0.50
dichloromethane	2000	5.2	1.0	µg/L	<1.0
dichloropropylene, trans-1,3-	140	5.6	0.30	µg/L	<0.30
ethylbenzene	160	2	0.50	µg/L	<0.50
methyl ethyl ketone [MEK]	8000	-	20	µg/L	<20

Analyte	Guideline Limit		Lowest Detection Limit	Units	BH22-4 Water
	Peel Sanitary By-Law	Peel Storm By-Law			
styrene	200	-	0.50	µg/L	<0.50
tetrachloroethane, 1,1,2,2-	1400	17	0.50	µg/L	<0.50
tetrachloroethylene	1000	4.4	0.50	µg/L	<0.50
toluene	270	2	0.50	µg/L	0.97
trichloroethylene	400	8	0.50	µg/L	<0.50
xylene, m+p-	-	-	0.40	µg/L	<0.40
xylene, o-	-	-	0.30	µg/L	<0.30
xylenes, total	1400	4.4	0.50	µg/L	<0.50
Volatile Organic Compounds Surrogates (Matrix: Water)					
bromofluorobenzene, 4-	-	-	1.0	%	82.4
difluorobenzene, 1,4-	-	-	1.0	%	103
Phthalate Esters (Matrix: Water)					
bis(2-ethylhexyl) phthalate [DEHP]	12	8.8	2.0	µg/L	<2.0
di-n-butyl phthalate	80	15	1.0	µg/L	<1.0
Semi-Volatile Organics Surrogates (Matrix: Water)					
fluorobiphenyl, 2-	-	-	1.0	%	100
terphenyl-d14, p-	-	-	1.0	%	99.6
Phenolics Surrogates (Matrix: Water)					
tribromophenol, 2,4,6-	-	-	0.20	%	126
Nonylphenols (Matrix: Water)					
nonylphenol diethoxylates [NP2EO]	-	-	0.10	µg/L	<0.10
nonylphenol ethoxylates, total	200	-	2.0	µg/L	<2.0
nonylphenol monoethoxylates [NP1EO]	-	-	2.0	µg/L	<2.0
nonylphenols [NP]	20	-	1.0	µg/L	<1.0
Polychlorinated Biphenyls (Matrix: Water)					
Aroclor 1016	-	-	0.020	µg/L	<0.020
Aroclor 1221	-	-	0.020	µg/L	<0.020
Aroclor 1232	-	-	0.020	µg/L	<0.020
Aroclor 1242	-	-	0.020	µg/L	<0.020
Aroclor 1248	-	-	0.020	µg/L	<0.020
Aroclor 1254	-	-	0.020	µg/L	<0.020
Aroclor 1260	-	-	0.020	µg/L	<0.020

Analyte	Guideline Limit		Lowest Detection Limit	Units	BH22-4 Water
	Peel Sanitary By-Law	Peel Storm By-Law			
Aroclor 1262	-	-	0.020	µg/L	<0.020
Aroclor 1268	-	-	0.020	µg/L	<0.020
polychlorinated biphenyls [PCBs], total	1	0.4	0.060	µg/L	<0.060
Polychlorinated Biphenyls Surrogates (Matrix: Water)					
decachlorobiphenyl	-	-	0.1	%	99.6
tetrachloro-m-xylene	-	-	0.1	%	94.7

Exceeds Guideline Limit

Table 8. Groundwater Chemistry Analyses (City of Mississauga Criteria)

Analyte	Guideline Limit	Lowest Detection Limit	Units	BH22-4 Water
	Mississauga Storm By-Law			
Physical Tests (Matrix: Water)				
pH	6 -> 9	0.10	pH units	7.98
solids, total suspended [TSS]	15	3.0	mg/L	**58.0**
Anions and Nutrients (Matrix: Water)				
phosphorus, total	0.4	0.0020	mg/L	0.0566
Cyanides (Matrix: Water)				
cyanide, strong acid dissociable (total)	0.02	0.0020	mg/L	<0.0020
Inorganic Parameters (Matrix: Water)				
chlorine, total	1	0.050	mg/L	<0.050
Microbiological Tests (Matrix: Water)				
coliforms, Escherichia coli [E. coli]	200	1	CFU/100mL	<1
Total Metals (Matrix: Water)				
aluminum, total	1	0.0030	mg/L	**1.57**
arsenic, total	0.02	0.00010	mg/L	0.00140
cadmium, total	0.008	0.0000050	mg/L	<0.0000500
chromium, total	0.08	0.00050	mg/L	<0.00500
copper, total	0.04	0.00050	mg/L	0.0121
lead, total	0.12	0.000050	mg/L	0.000704
manganese, total	0.05	0.00010	mg/L	**0.232**
mercury, total	0.0004	0.0000050	mg/L	<0.0000050
nickel, total	0.08	0.00050	mg/L	<0.00500

Analyte	Guideline Limit	Lowest Detection Limit	Units	BH22-4 Water
	Mississauga Storm By-Law			
selenium, total	0.02	0.000050	mg/L	<0.000500
silver, total	0.12	0.000010	mg/L	<0.000100
zinc, total	0.04	0.0030	mg/L	0.0331
Speciated Metals (Matrix: Water)				
chromium, hexavalent [Cr VI], total		0.00050	mg/L	<0.00050
Aggregate Organics (Matrix: Water)				
biochemical oxygen demand [BOD]	15	2.0	mg/L	<3.0
phenols, total (4AAP)	0.008	0.0010	mg/L	0.0068
Volatile Organic Compounds (Matrix: Water)				
benzene	2	0.50	µg/L	<0.50
dichlorobenzene, 1,2-	-	0.50	µg/L	<0.50
dichlorobenzene, 1,4-	-	0.50	µg/L	<0.50
dichloromethane	-	1.0	µg/L	<1.0
ethylbenzene	2	0.50	µg/L	<0.50
tetrachloroethane, 1,1,2,2-	-	0.50	µg/L	<0.50
tetrachloroethylene	-	0.50	µg/L	<0.50
toluene	2	0.50	µg/L	0.56
trichloroethylene	-	0.50	µg/L	<0.50
xylene, m+p-	-	0.40	µg/L	<0.40
xylene, o-	-	0.30	µg/L	<0.30
xylenes, total	4.4	0.50	µg/L	<0.50
Volatile Organic Compounds Surrogates (Matrix: Water)				
bromofluorobenzene, 4-	-	1.0	%	82.1
difluorobenzene, 1,4-	-	1.0	%	104
Polycyclic Aromatic Hydrocarbons (Matrix: Water)				
acenaphthene	-	0.010	µg/L	<0.010
acenaphthylene	-	0.010	µg/L	<0.010
anthracene	-	0.010	µg/L	<0.010
benz(a)anthracene	-	0.010	µg/L	<0.010
benzo(a)pyrene	-	0.0050	µg/L	<0.0050
benzo(b+j)fluoranthene	-	0.010	µg/L	0.021
benzo(g,h,i)perylene	-	0.010	µg/L	<0.010
benzo(k)fluoranthene	-	0.010	µg/L	<0.010

Analyte	Guideline Limit	Lowest Detection Limit	Units	BH22-4 Water
	Mississauga Storm By-Law			
chrysene	-	0.010	µg/L	<0.010
dibenz(a,h)anthracene	-	0.0050	µg/L	<0.0050
fluoranthene	-	0.010	µg/L	<0.010
fluorene	-	0.010	µg/L	<0.010
indeno(1,2,3-c,d)pyrene	-	0.010	µg/L	<0.010
methylnaphthalene, 1-	-	0.010	µg/L	<0.010
methylnaphthalene, 2-	-	0.010	µg/L	<0.010
naphthalene	-	0.050	µg/L	<0.050
phenanthrene	-	0.020	µg/L	<0.020
pyrene	-	0.010	µg/L	<0.010
PAHs, total (CCME Sewer 18)	2	0.070	µg/L	<0.070
Polycyclic Aromatic Hydrocarbons Surrogates (Matrix: Water)				
chrysene-d12	-	0.1	%	106
naphthalene-d8	-	0.1	%	110
phenanthrene-d10	-	0.1	%	107
Polychlorinated Biphenyls (Matrix: Water)				
Aroclor 1016	-	0.020	µg/L	<0.020
Aroclor 1221	-	0.020	µg/L	<0.020
Aroclor 1232	-	0.020	µg/L	<0.020
Aroclor 1242	-	0.020	µg/L	<0.020
Aroclor 1248	-	0.020	µg/L	<0.020
Aroclor 1254	-	0.020	µg/L	<0.020
Aroclor 1260	-	0.020	µg/L	<0.020
Aroclor 1262	-	0.020	µg/L	<0.020
Aroclor 1268	-	0.020	µg/L	<0.020
polychlorinated biphenyls [PCBs], total	-	0.060	µg/L	<0.060
Polychlorinated Biphenyls Surrogates (Matrix: Water)				
decachlorobiphenyl	-	0.1	%	86.4
tetrachloro-m-xylene	-	0.1	%	91.2

Exceeds Guideline Limit

3. Hydrogeological Conceptual Model

The site is immediately underlain by coarse-textured glaciolacustrine deposits. These deposits form an unconfined aquifer that is approximately 5 to 7 m thick. Based on single well response testing in BH22-1 and BH22-3, these deposits have a hydraulic conductivity ranging from $3.7x10^{-6}$ m/s to $1.4x10^{-5}$ m/s, with a geometric mean of $7.2x10^{-6}$ m/s and a 90^{th} percentile of $1.3x10^{-5}$ m/s. These deposits are directly underlain by a thin layer of Newmarket Till (approximately 0.5 to 1.2 m thick) that is sometimes mixed with weathered bedrock.

The bedrock was encountered at the site at depths ranging from 8.4 to 8.9 mbgs, and the upper 50 cm was weathered. The bedrock at the site is composed of the interbedded shales and limestones of the Georgian Bay Formation. In general, it contains a larger portion of shale (68-97%) than limestone (3-32%). Single well response testing in BH22-2 and BH22-4, as well as a short-duration pumping test in BH22-4 indicate that the hydraulic conductivity of the bedrock ranges from $3.4x10^{-8}$ to $1.7x10^{-6}$ m/s. The data from the recovery portion of the pumping test as well as single well response testing in BH22-4 suggest that fractured zone underlying the site, which constitute the main conduits for bedrock groundwater flow, have a hydraulic conductivity ranging from $1.2x10^{-6}$ to $1.7x10^{-6}$ m/s. The competent, less fractured zones of the bedrock have a hydraulic conductivity ranging from $3.4x10^{-8}$ to $5.4x10^{-8}$ m/s based on the drawdown portion of the pumping test and single well response testing in BH22-2.

Whether or not the bedrock aquifer underlying the site acts as an unconfined or a confined aquifer depends on the connectivity of fracture zones to the surface. Considering that the Georgian Bay Formation consists of relatively flat-lying stratified sedimentary beds, the fractured zones are most commonly found as horizontal features. Vertical fractures extending through multiple metres of interbedded shale and limestone are less common. The bedrock aquifer therefore likely acts primarily as a confined aquifer.

Groundwater levels across the site vary little for those wells screened in the coarse-textured glaciolacustrine deposits (56 to 57 cm during a given monitoring event). Groundwater flow in the unconfined granular aquifer formed by these deposits is expected to flow from northwest to southeast with a gradient of approximately 0.015. The water level in BH22-4 (screened in fractured bedrock from 12.0 to 15.1 mbgs) was approximately 1.0 to 1.7 m lower than the wells screened in the overburden, and BH22-2 (screened in competent bedrock from 21.3 to 24.4 mbgs) had a water level that was approximately 15 to 19 m lower in elevation than BH22-4. This difference in water level elevations suggests a downward hydraulic head gradient of approximately 0.85 to 1.05 at the site.

Considering the downward hydraulic head gradient present at the site and the coarse-textured glaciolacustrine deposits at the surface, the site would act as a groundwater recharge zone wherever the site is currently not covered by impermeable surfaces.

4. Preliminary Dewatering Assessment

4.1 Short-Term Dewatering Estimate

It is understood that the proposed redevelopment will consist of a 22-storey building and a 4-storety podium with up to five (5) levels of underground parking, which would extend to approximately 17.5 mbgs, considering 3.5 m per underground level.

For the proposed redevelopment, both the coarse-textured glaciolacustrine sediments and the fractured Georgian Bay Formation will contribute to the total rate of groundwater inflow. Based on single well response testing, the 90th percentile hydraulic conductivity of the overburden sediments is 1.3x10^{-5} m/s. From the recovery curve of the short-duration pumping test, the fractured bedrock has a hydraulic conductivity of 1.7x10^{-6} m/s. The competent bedrock, interpreted to be found below approximately 13 m (where RQD values >90) has a hydraulic conductivity of 5.4x10^{-8} m/s.

Based on the concept plan drawings from the client, the floor area of underground parking is 2,526 m^2. The excavation footprint will be irregular. The excavation length was measured from the concept plan to be 60 m, and the excavation width was estimated to be 42 m. After one (1) meter allowance for structure and safety space is added, the excavation length and width will be 62 m and 44 m respectively.

For preliminary considerations, the dewatering rate (Q) or the steady-state groundwater inflow in m^3/s into an individual section described above can be calculated using Jacob's modified non-equilibrium equation for an unconfined aquifer (Powers *et al.*, 2007):

$$Q = \frac{\pi K(H^2 - h^2)}{\ln\left(\frac{R_O}{r_e}\right)} \quad m^3/s$$

Where:

K	=	hydraulic conductivity (m/s)
H	=	saturated thickness (m)
h	=	saturated thickness after dewatering (m)
r_e	=	equivalent radius of influence estimated by: $r_e = \sqrt{\frac{a*x}{\pi}}$ (m)
R_O	=	radius of influence estimated by: $3000(H-h)\sqrt{K} + r_e$ (m) *Where* a = width (m) – 44, x = length (m)

See **Tables 9**, **10**, and **11**, below for the detailed calculations for the expected groundwater dewatering rates, including porewater storage depletion in the zone of influence of the overburden soils and direct precipition, based on the three hydrostratigraphic unit identified for this project (overburden sand, fractured bedrock and competent bedrock).

Table 9. Estimated Short-Term Dewatering Rate for Overburden

Overburden	Symbol	Unit	Value
Excavation Length	x	m	62
Excavation Width	a	m	44
Overburden Depth	-	m	8.6
Hydraulic conductivity	K	m/s	$1.3x10^{-5}$
Saturated thickness	H	m	5.4
Dewatered saturated thickness	h	m	0.00
Radius of influence (from edge of excavation)	R_o	m	58*
Equivalent Well Radius	r_e	m	29.5
Dewatering Rate	Q_{DW}	L/day	150,390
Total Dewatering Rate with 1.5x Factor of Safety	$1.5Q_{DW}$	L/day	225,585
Depletion of Storage (over the first 30 days of dewatering)	Q_{DS}	L/day	589,788
Nominal two-year storm (25 mm in 24 hours)	Q_{STORM}	L/day	65,438

**measured from excavation boundary*

Table 10. Estimated Short-Term Dewatering Rate for High RQD Rock

Bedrock (RQD<75%)	Symbol	Unit	Value
Excavation Length	x	m	62
Excavation Width	a	m	44
Maximum Excavation Depth	-	m	13.0
Hydraulic conductivity	K	m/s	$1.3x10^{-6}$
Saturated thickness	H	m	4.4
Dewatered saturated thickness	h	m	0.00
Radius of influence (from edge of excavation)	R_o	m	15*
Equivalent Well Radius	r_e	m	29.5
Dewatering Rate	Q_{DW}	L/day	16,557
Total Dewatering Rate with 1.5x Factor of Safety	$1.5Q_{DW}$	L/day	24,835
Depletion of Storage	Q_{DS}	L/day	N/A

**measured from excavation boundary*

Table 11. Estimated Short-Term Dewatering Rate for Low RQD Rock

Bedrock (RQD>75%)	Symbol	Unit	Value
Excavation Length	x	m	62
Excavation Width	a	m	44
Maximum Excavation Depth	-	m	17.5
Hydraulic conductivity	K	m/s	$5.4x10^{-8}$
Saturated thickness	H	m	5.8

Bedrock (RQD>75%)	Symbol	Unit	Value
Dewatered saturated thickness	h	m	0.00
Radius of influence (from edge of excavation)	R_o	m	4*
Equivalent Well Radius	r_e	m	29.5
Dewatering Rate	Q_{DW}	L/day	3,834
Total Dewatering Rate with 1.5x Factor of Safety	$1.5Q_{DW}$	L/day	5,752
Depletion of Storage	Q_{DS}	L/day	N/A

**measured from excavation boundary*

Table 12. Total Dewatering Rate

Total Dewatering Rate	Symbol	Unit	Value
Maximum Excavation Depth	-	m	17.5
saturated thickness	h	m	15.63
Radius of influence (from edge of excavation)	R_o	m	58*
Dewatering Rate	Q_{DW}	L/day	170,781
Total Dewatering Rate with 1.5x Factor of Safety	$1.5Q_{DW}$	L/day	256,172
Depletion of Storage	Q_{DS}	L/day	589,788
Nominal two-year storm (25 mm in 24 hours)	Q_{STORM}	L/day	65,438
Total Dewatering Rate	Q_{TOTAL}	L/day	911,398

**measured from excavation boundary*

Table 9 summarizes results of the short-term construction dewatering rate estimate. Based on the assumptions above, the dewatering rate for stabilized groundwater is estimated to be 170,781 L/day. Adding a factor of safety of 1.5, this rate becomes 256,172 L/day. Adding pumping rate of storage depletion over the first 30 days of dewatering (589,788 L/day) and the volume of a nominal two-year storm (25 mm in 24 hrs; 65,438 L/day) the total expected maximum dewatering rate for the project is estimated at 911,398 L/day. Dewatering rates are expected to be the highest at the start of dewatering and should decrease over time to the stabilized groundwater dewatering rate of 256,172 L/day as equilibrium is reached and aquifer storage is depleted.

4.2 Construction Dewatering Permitting

Under the Environmental Activity and Sector Registry (EASR) system, water takings that are greater than 50,000 L/day and less than 400,000 L/day do not require a Permit to Take Water (PTTW) from the MECP; however, the project must be registered on the EASR system, and meet a series of environmental protection criteria. Above 400,000 L/day, a Category 3 PTTW from the MECP is required.

It is estimated that approximately 911,398 L/day of dewatering could be required for the project based on our assumptions of the proposed construction methods and dewatering rate calculations. As this is above 400,000 L/day, a Category 3 PTTW will be required from the MECP.

4.3 Hydrogeological Design Considerations

Based on a high water table of 1.87 mbgs at the site, any construction below this elevation will require significant groundwater control (i.e., dewatering) or construction methods to cut-off groundwater seepage. Based upon the hydrogeological conditions, the following options could be considered for construction of the proposed building with five (5) levels of underground parking having a foundation depth of 17.5 mbgs:

Active Dewatering – A perimeter dewatering array of well points or deep wells could be considered around the outside of the excavation to lower the groundwater table to 1 m below the invert of the foundation floor. This hydrogeological assessment is meant to support water taking permit application. A dewatering contractor should be retained to design and execute construction dewatering for this project. Confirmation with the Region of Peel (for sanitary sewer) and the City of Mississauga (for storm sewer) will also be required to confirm the sewer capacity to accept the dewatering discharge. The groundwater chemistry samples taken from BH22-4 passed all Peel Region Sanitary Sewer criteria, but exceeded multiple Peel and Mississauga Storm Sewer criteria. Palmer recommends that groundwater from construction dewatering be directed (i.e., discharge) into the sanitary sewer, or go through appropriate treatment to bring the exceedances below the limits before discharging into storm sewer.

Watertight Shoring – To cut off the groundwater, watertight shoring (e.g., interlocking caisson walls) could be considered through the full depth of the overburden sediments and into the Georgian Bay Formation. Additional geotechnical and hydrogeological drilling might be required to confirm the depth and properties of the lower confining units up to the discretion of contractors. Groundwater will still need to be removed from the storage inside of the watertight shoring.

Long-Term Foundation Drainage – Without watertight shoring, full water proofing of the underground basement levels, the long-term groundwater seepage rate into the foundation drainage system around building foundation is estimated to be approximately 175,000 L/day. This may exceed what would be allowable from the City of Mississauga, and therefore, design alternatives to reduce groundwater seepage should be explored. In addition, long-term seepage greater than 50,000 L/day, would require a long-term Category 3 PTTW from the MECP and would also be subject to CVC water balance policies, adding significant cost to the development.

Ground Settlement – Dewatering will reduce pore pressure and increase effective stress of soil within influence zone (estimated at 58 m), and potentially lead to ground settlement. It is recommended that a settlement monitoring program is implemented for major building features and underground facilities within the influence zone of dewatering. The settlement monitoring program is meant to manage risk and eliminate potential litigation burden for the client. Settlement monitoring is usually implemented as part of geotechnical monitoring program which is designed and executed jointly by hydrogeological and geotechnical professionals.

As shown on **Figure 6**, major structures within the influence zone include Highway QEW, Hurontario Street, bridge and sewer pipes. Both deep and shallow settlement points should be considered.

4.4 LID Design Considerations

Based on satellite imagery, the site is currently covered by approximately 84% impermeable surfaces. From the preliminary architectural drawings (**Appendix A**), the proposed re-development's building and pavement will cover a combined area of approximately 71%. Given the coarse texture of the overburden sediments, infiltration galleries could be a useful LID design technique. In addition, the proportion of groundwater recharge could be increased through the use of green rooves and roof leaders that discharge to the infiltration galleries. Based on a preliminary estimate of the on-site percolation rates, stormwater could be infiltrated into the overburden soils at a rate of 27 mm/hr. In-situ percolation testing at potential future infiltration gallery locations would be required to support LID design.

5. Source Water Protection

The site is not located within any WHPA, and therefore it will not be required to maintain the pre- to post-development water balance at the site. The site is located within an HVA with a score of 6 and an IPZ-2 with a score of 4.5. Based on vulnerability cores, the nature of operation of the proposed development and the provincial Drinking Water Threats Table, the proposed development should not impose a significant water quality threat to the HVA and IPZ.

6. Impact Assessment

6.1 Assessment of Impacts

7.1.1 Aquifers and Natural Environmental Features

Within a 500 m radius, there are no groundwater supported natural features, and the site is not located within any WHPA or SGRA. Neither the surficial unconfined aquifer nor the fractured Georgian Bay Formation is used in the area as a source of drinking water. Adverse impacts on aquifers and the natural environment are therefore expected to be null.

7.1.2 Groundwater Recharge and Runoff

Based on the available architectural drawings (**Appendix A**), the proposed redevelopment will increase the area of permeable surfaces by approximately 13%. The proposed redevelopment could therefore increase the quantity of on-site groundwater recharge and decrease the quantity of runoff if infiltration based LID design measures are implemented.

7.1.3 Private Water Wells

There is one (1) domestic well in the MECP Well Records within 500 m of the site, and there are only two (2) test holes within the estimated radius of influence from construction dewatering. In addition, the City of Mississauga has full municipal water servicing. The single domestic well is not expected to be active and the impacts on private groundwater wells is expected to be null.

7.1.4 Groundwater Treatment and Discharge

Palmer recommends that temporary construction discharge be directed to nearby storm or sanitary sewer. The groundwater samples collected from BH22-4 passed all Peel Region Sanitary Sewer criteria but

exceeded multiple Peel Region and Mississauga Storm Sewer criteria. If groundwater from construction dewatering will be directed into the storm sewer, groundwater treatment will be required. Approval from the City of Mississauga or the Region of Peel will be required prior to discharging water to municipal storm or sanitary sewers.

7. Conclusions and Recommendations

Based on the results of this Hydrogeological Assessment, the following conclusions and recommendations are presented:

- As part of Palmer's Geotechnical Investigation (2022) and Phase Two ESA (2022) and GHD's Phase Two ESA (2020), fourteen (14) boreholes were drilled at the site, ranging in depth from 4.6 to 25.0 m. Monitoring wells were installed in all boreholes. MW1-20, drilled by GHD, no longer exists;

- The site is underlain by coarse-textured glaciolacustrine deposits which is approximately 5 to 7 m thick. Based on single well response testing, this stratigraphic unit has a 90th percentile hydraulic conductivity of 1.3x10^{-5} m/s. There exists a thin (0.5 to 1.2 m) layer of Newmarket Till underlying these deposits, which is sometimes mixed with weathered bedrock. Competent bedrock can be found at the site from approximately 13 mbgs. Single well response tests and a short-duration pumping test indicate that the hydraulic conductivity of the fractured bedrock ranges from 1.2x10^{-6} to 1.7x10^{-6} m/s at the site;

- Groundwater levels collected on July 18, July 20 and August 15, 2022 indicate that shallow groundwater flows from northwest to southeast with hydraulic gradient of 0.015. Groundwater levels in the coarse-textured glaciolacustrine deposits ranged from 96.00 to 96.70 masl and from 2.87 to 3.67 mbgs. Groundwater levels in BH22-4 (screened in fractured bedrock from 12.0 to 15.1 mbgs) ranged from 94.97 to 95.09 masl or 4.51 to 4.63 mbgs, and those in BH22-2 (screened in competent bedrock from 21.3 to 24.4 mbgs) ranged from 77.70 to 80.75 masl or 18.95 to 22.00 mbgs. A downward hydraulic gradient of approximately 0.85 to 1.05 is present at the site;

- The hydraulic conductivity of the coarse-textured glaciolacustrine deposits were estimated using empirical formula and grain size analysis results on five (5) soil samples. The estimated hydraulic conductivities (3.4x10^{-7} m/s to 6.1x10^{-6} m/s) are consistent with those estimated via single well response testing, considering that grain size analysis typically underestimates the hydraulic conductivity;

- One (1) groundwater chemistry sample was taken from BH22-4. The groundwater from this sample passed all Peel Region Sanitary Sewer criteria, but exceeded the Peel Region Storm Sewer criteria for TSS, TKN, coliforms, manganese, zinc and phenols (4AAP), and exceeded the City of Mississauga Storm Sewer criteria for TSS, aluminum and manganese;

- Palmer understands that the proposed redevelopment will consist of a 22-storey building and 4-storey podium with up to five (5) levels of underground parking. Considering an estimated high water level of 1.87 mbgs and a foundation depth of 17.5 mbgs, Palmer estimates that up to approximately 911,398 L/day could be required for short-term construction dewatering when taking

into consideration groundwater seepage, aquifer storage, and direct precipitation. At this dewatering rate, a Category 3 PTTW would be required from the MECP;

- Watertight shoring could be considered to cut off groundwater flow. Groundwater will still need to be removed from the inside of the watertight shoring. The required construction dewatering rate is still expected to exceed 400,000 L/day, and therefore a PTTW is still required;

- Without watertight shoring or full water proofing of the underground basement level, the proposed redevelopment will require permanent foundation drainage into the Region of Peel and City of Mississauga sewer system. A long-term discharge agreement with the Region of Peel or the City of Mississauga will be required, depending on whether groundwater is discharged to the sanitary or storm sewer. Groundwater treatment would likely not be required for discharge to the storm sewer; and

- No groundwater supported natural features or active groundwater users are present within the predicted radius of influence for dewatering. It is recommended that LID measures are put in place to increase groundwater recharge and minimize runoff.

8. Signatures

This report was prepared and reviewed by the undersigned:

Prepared By:

Wesley Campbell, M.A.Sc., G.I.T.
Environmental Scientist

Reviewed By:

Frank Liu, P.Eng., P.Geo.
Senior Hydrogeologist

Approved By:

Jason Cole, M.Sc., P.Geo.
VP, Principal Hydrogeologist

9. Limitations of Report

The extent of this study was limited to the specific scope of work for which we were retained and that is described in this report. Palmer has assumed that the information provided by the client or any secondary sources of information are factual and accurate. Palmer accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or negligent acts from relied upon data. Judgment has been used by Palmer in the interpretation of the information provided but subsurface physical and chemical characteristics may differ from regional scale geology mapping and vary between or beyond well/borehole locations given the inherent variability in geological conditions.

Palmer is not a guarantor of the geological or groundwater conditions at the subject site, but warrants only that its work was undertaken and its report prepared in a manner consistent with the level of skill and diligence normally exercised by competent geoscience professionals practicing in the Province of Ontario. Our findings, conclusions and recommendations should be evaluated in light of the limited scope of our work.

The information and opinions expressed in the Report are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT PALMER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS PALMER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belongs to Palmer. Any use which a third party makes of the Report is the sole responsibility of such third party. Palmer accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Palmer's express written permission. Should the project design change following issuance of the Report, Palmer must be provided the opportunity to review and revise the Report in light of such alteration or variation.

10. References

Armstrong D.K. and Dodge J.E.P. 2007:
Paleozoic geology of southern Ontario; Ontario Geological Survey, Miscellaneous Release-Data 219.

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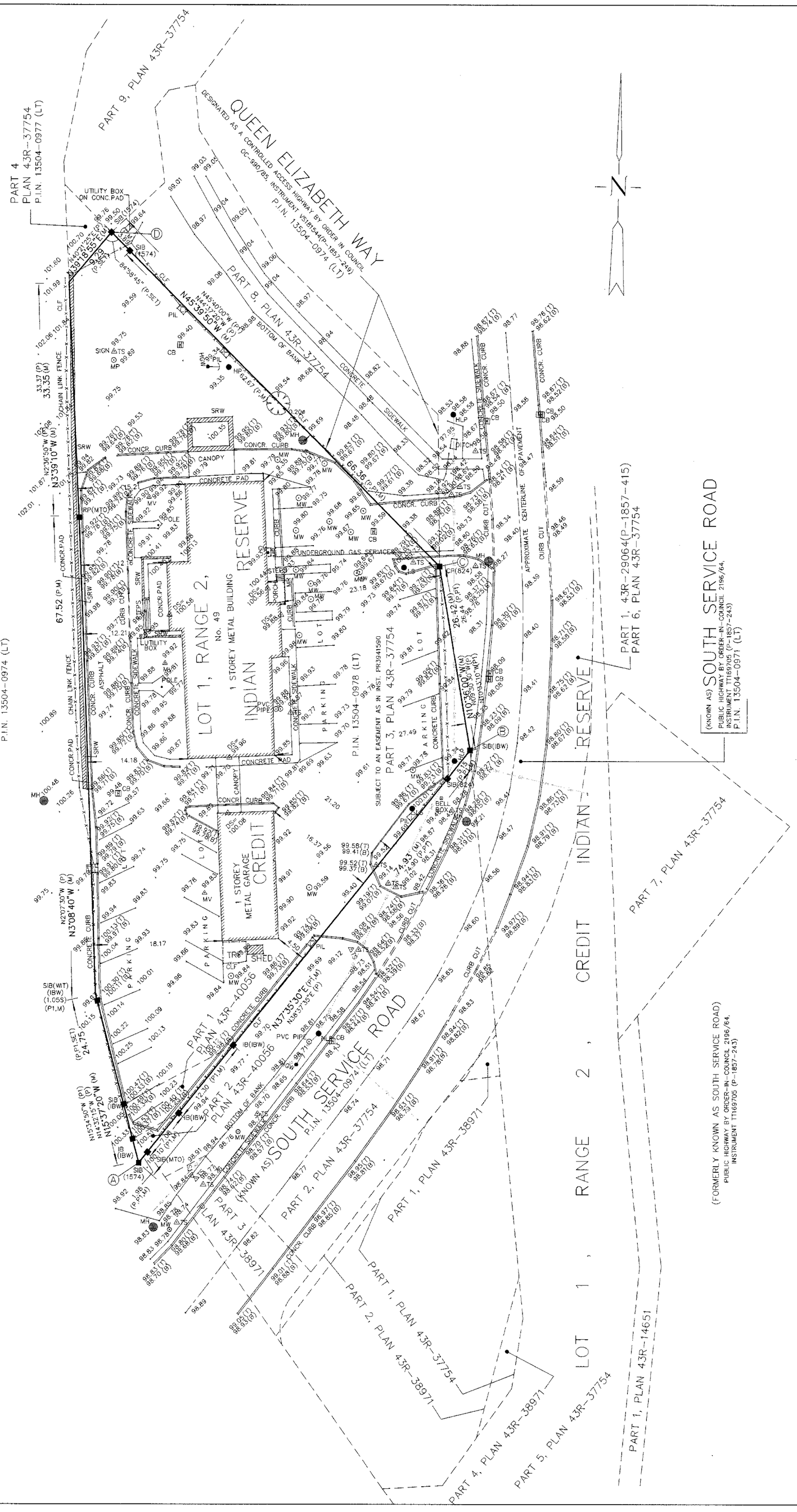
Surficial geology of Southern Ontario.

Appendix A

Architectural and Survey Drawings

Kirkor Architects and Planners, 2022
and R. Avis Surveying Inc.



PLAN OF SURVEY OF

PART OF LOT 1, RANGE 2 CREDIT INDIAN RESERVE

GEOGRAPHIC TOWNSHIP OF TORONTO

CITY OF MISSISSAUGA

REGIONAL MUNICIPALITY OF PEEL

SCALE 1 : 400

10m 5 0 10 20 30m

R. AVIS SURVEYING INC.

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

NOTES AND LEGEND

BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE DERIVED FROM OBSERVED REFERENCE POINTS A AND B HAVING A BEARING OF N37°35'55"E BY REAL TIME NETWORK(RTN) OBSERVATION , UTM ZONE 17, CENTRAL MERIDIAN 81° 00' WEST LONGITUDE.
(3° MODIFIED TRANSVERSE MERCATOR PROJECTION, NAD 83 (CSRS-2010)

6° UTM ZONE 17 COORDINATES
NAD83(CSRS-2010) (CENTRAL MERIDIAN 81° 00' WEST LONGITUDE)

	NORTHING	EASTING
A	4824807.213	613183.946
B	4824866.583	613229.664
C	4824892.548	613224.805
D	4824938.928	613177.338

(1) THE UTM COORDINATES LISTED ABOVE COMPLY WITH SUBSECTION 14(2) OF ONTARIO REGULATION 216/10 FILED UNDER THE SURVEYORS ACT

(2) THE UTM COORDINATES LISTED ABOVE ARE TO BE USED FOR GEOGRAPHIC INFORMATION SYSTEM INTEGRATION ONLY AND CANNOT BE USED TO RE-ESTABLISH THE PROPERTY CORNERS OR BOUNDARIES SHOWN HEREON

DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.99972.

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA BENCH MARK No. BM300, HAVING AN ELEVATION = 97.563 metres.

■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT PLANTED
SIB	DENOTES STANDARD IRON BAR
CP	DENOTES CONCRETE PIN
IB	DENOTES IRON BAR
RP	DENOTES ROCK PIN
WIT	DENOTES WITNESS
MEAS/M	DENOTES MEASURED
N,S,E,W	DENOTES NORTH, SOUTH, EAST, WEST
MTO	DENOTES MINISTRY OF TRANSPORTATION, ONTARIO
824	DENOTES A. T. McLAREN LTD., O.L.S.
1574	DENOTES DELPH & JENKINS NORTH LTD.
IBW	DENOTES IBW SURVEYORS
P	DENOTES PLAN 43R-37754
P1	DENOTES PLAN 43R-40056
(B)	DENOTES BOTTOM OF CURB
CB	DENOTES CATCH BASIN
CLF	DENOTES CHAIN LINK FENCE
CONCR.	DENOTES CONCRETE
HLP	DENOTES HYDRO LIGHT POLE
HGW	DENOTES HYDRO GUY WIRE
HP	DENOTES HYDRO POLE
LS	DENOTES LIGHT STANDARD
MH	DENOTES MANHOLE
MR	DENOTES METAL RAIL
MP	DENOTES METAL PIPE
MW	DENOTES MONITORING WELL
PIL	DENOTES STONE PILLER
SRW	DENOTES STONE RETAINING WALL
(T)	DENOTES TOP OF CURB
TRF	DENOTES TRANSFORMER
TS	DENOTES TRAFFIC SIGN

0.10ø DENOTES DECIDUOUS TREE WITH TRUNK DIAMETER 0.10 metres

000.00 DENOTES SPOT ELEVATION

AREA = 4377.4 sq. m.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.

2. THE SURVEY WAS COMPLETED ON THE 6TH DAY OF JULY, 2022.

JULY 13, 2022
DATE

PIRATHEEPAN RAMACHANDRAN
Ontario Land Surveyor

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2193609

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29(3).

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DRAWN BY : FM/AM	DRAWING No. : 3592-0PS.DWG

49 SOUTH SERVICE RD.

Proposed Residential Development

DRAWING LIST

Sheet Number	Sheet Name	Issue#1 (Add Date)	Issue#2 (Add Date)	Issue#3 (Add Date)	Issue#4 (Add Date)	Issue#5 (Add Date)
12 SITE PLAN APPROVAL						
A0						
dA0.00	Cover Sheet	■				
A1						
dA1.01	Survey & Site Statistics	■				
dA1.02	Context Plan	■				
dA1.03	Site Plan	■				
A2						
dA2.01	Parking Level Floor Plan P3	■				
dA2.02	Parking Level Floor Plan P2	■				
dA2.03	Parking Level Floor Plan P1	■				
dA2.04	Floor Plans LEVEL 1	■				
dA2.05	Floor Plans LEVEL 2,4	■				
dA2.06	Floor Plans LEVEL 3	■				
dA2.07	Floor Plans LEVEL 5	■				
dA2.08	Floor Plans LEVEL 6-26 (Even Levels)	■				
dA2.09	Floor Plans LEVEL 7-25 (Odd Levels)	■				
dA2.10	Floor Plans LEVEL MPH	■				
dA2.11	Roof Plan	■				
dA2.12	Waste Management Plan	■				
A3						
dA3.01	North & East Elevations	■				
dA3.02	South & West Elevations	■				
A4						
dA4.01	Sections	■				
A5						
dA5.01	Pespectives	■				
A6						
dA6.01	Sun Shadow Study June	■				
dA6.02	Sun Shadow Study June	■				
dA6.03	Sun Shadow Study Sep/Mar	■				
dA6.04	Sun Shadow Study Sep/Mar	■				
dA6.05	Sun Shadow Study December	■				

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JE COULTER

T: 416 502 8598
SAM KULENDRAN

WIND CONSULTANT

RWDI

T: 519 823 1311
STEFAN GOPAUL

GEOTECHNICAL CONSULTANT

PALMER

T: 416 617 2019
SARAH SIPAK

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Do not scale the drawings.

This Drawing Is Not To Be Used For Construction Until Signed ByThe Architect.

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Cover Sheet

Scale:

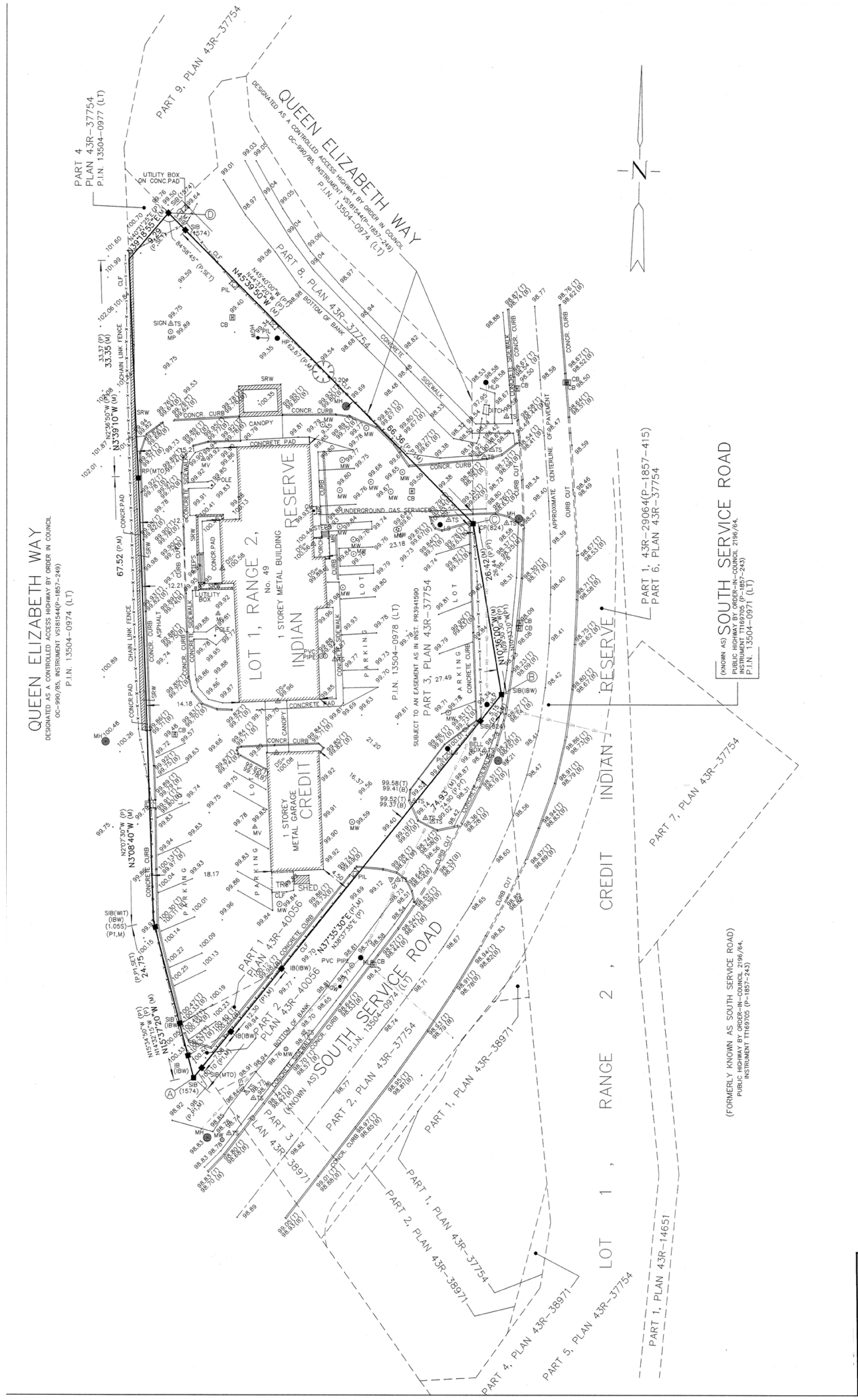
Drawn by:
A.P.

Checked by:
R.P.

Project No.:
22-073

Date:
10/05/22

Drawing No.:
dA0.00



PLAN OF SURVEY OF

PART OF LOT 1, RANGE 2
CREDIT INDIAN RESERVE

GEOGRAPHIC TOWNSHIP OF TORONTO

CITY OF MISSISSAUGA

REGIONAL MUNICIPALITY OF PEEL

SCALE 1 : 400

10m 5 0 10 20 30m

R. AVIS SURVEYING INC.

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

NOTES AND LEGEND

BEARINGS SHOWN HEREON ARE GRID BEARINGS AND ARE DERIVED FROM OBSERVED REFERENCE POINTS A AND B HAVING A BEARING OF N37°35'55"E BY REAL TIME NETWORK(RTN) OBSERVATION , UTM ZONE 17, CENTRAL MERIDIAN 81° 00' WEST LONGITUDE. (3° MODIFIED TRANSVERSE MERCATOR PROJECTION, NAD 83 (CSRS-2010)

6° UTM ZONE 17 COORDINATES
NAD83(CSRS-2010) (CENTRAL MERIDIAN 81° 00' WEST LONGITUDE)

	NORTHING	EASTING
A	4824807.213	613183.946
B	4824866.583	613229.664
C	4824892.548	613224.805
D	4824938.928	613177.338

(1) THE UTM COORDINATES LISTED ABOVE COMPLY WITH SUBSECTION 14(2) OF ONTARIO REGULATION 216/10 FILED UNDER THE SURVEYORS ACT

(2) THE UTM COORDINATES LISTED ABOVE ARE TO BE USED FOR GEOGRAPHIC INFORMATION SYSTEM INTEGRATION ONLY AND CANNOT BE USED TO RE-ESTABLISH THE PROPERTY CORNERS OR BOUNDARIES SHOWN HEREON

DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.99972.

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO CITY OF MISSISSAUGA BENCH MARK No. BM300, HAVING AN ELEVATION = 97.563 metres.

■	DENOTES SURVEY MONUMENT FOUND
□	DENOTES SURVEY MONUMENT PLANTED
SIB	DENOTES STANDARD IRON BAR
CP	DENOTES CONCRETE PIN
IB	DENOTES IRON BAR
RP	DENOTES ROCK PIN
WIT	DENOTES WITNESS
MEAS/M	DENOTES MEASURED
N,S,E,W	DENOTES NORTH, SOUTH, EAST, WEST
MTO	DENOTES MINISTRY OF TRANSPORTATION, ONTARIO
824	DENOTES A. T. McLAREN LTD., O.L.S.
1574	DENOTES DELPH & JENKINS NORTH LTD.
IBW	DENOTES IBW SURVEYORS
P	DENOTES PLAN 43R-37754
P1	DENOTES PLAN 43R-40056
(B)	DENOTES BOTTOM OF CURB
CB	DENOTES CATCH BASIN
CLF	DENOTES CHAIN LINK FENCE
CONCR.	DENOTES CONCRETE
HLP	DENOTES HYDRO LIGHT POLE
HGW	DENOTES HYDRO GUY WIRE
HP	DENOTES HYDRO POLE
LS	DENOTES LIGHT STANDARD
MH	DENOTES MANHOLE
MR	DENOTES METAL RAIL
MP	DENOTES METAL PIPE
MW	DENOTES MONITORING WELL
PIL	DENOTES STONE PILLER
SRW	DENOTES STONE RETAINING WALL
(T)	DENOTES TOP OF CURB
TRF	DENOTES TRANSFORMER
TS	DENOTES TRAFFIC SIGN
0.10ø	DENOTES DECIDUOUS TREE WITH TRUNK DIAMETER 0.10 metres
000.00	DENOTES SPOT ELEVATION

AREA = 4377.4 sq. m.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.

2. THE SURVEY WAS COMPLETED ON THE 6TH DAY OF JULY, 2022.

JULY 13, 2022
DATE

PIRATHEEPAN RAMACHANDRAN
Ontario Land Surveyor

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2193609
THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29(3).

R. AVIS SURVEYING INC.
SUITE 203
235 YORKLAND BOULEVARD
TORONTO, ONTARIO
M2J 4Y8
TEL.: (416) 490-8352 FAX: (416) 491-6206
EMAIL : office@ravissurveying.com

CHECKED BY : J.B., O.L.S.	
CALCULATED BY : FM	PROJECT No. : 3592-0
DRAWN BY : FM/AM	DRAWING No. : 3592-OPS.DWG

Survey 3
NTS dA1.01

General Note:

i. I hereby certify that this drawing confirms in all respects to the site development plans Architect or Engineer's Signature (if applicable) and Professional seal
ii. The City of Mississauga requires that all working drawings submitted to the Building Division as part of an application for the issuance of a building permit shall be certified by the architect or engineer as being in conformity with the site development plan as approved by the City of Mississauga.
iii. All exterior lighting will be directed onto the site and will not infringe upon the adjacent properties.
iv. All rooftop mechanical units shall be screened from view by the applicant.
v. Parking spaces reserved for people with disabilities must be identified by a sign, installed at the applicant's expense, in accordance with the By-law Requirements and Building Code Requirements.
vi. The applicant will be responsible for ensuring that all plans confirm to Transport Canada's restrictions.
vii. Grades will be met with a 33% maximum slope at the property lines and within the site.
viii. All damaged areas are to be reinstated with topsoil and sod prior to the release of securities.
ix. Signage shown on the site development plans is for information purposes only. All signs
will be subject to the provisions of Sign by-law 0054-2002, as amended, and a separate sign application will be required through the Building Division.
x. Any fencing adjacent to municipal lands is to be located 15 cm (6.0 in.) inside the property line.
xi. Only "shielded" lighting fixtures are permitted for all development, except for detached and semi-detached dwellings within 60 m (196.8 ft.) of a residentially zoned property and must confirm to the Engineer Certified Lighting Plan.
xii. The Engineer Certified Lighting Plan must be signed by the consulting Engineer.
xiii. The Owner covenants and agrees to construct and install "shielded" lighting fixtures on
the subject lands, in conformity with the Site Plan and Engineer Certified Lighting Plan to the satisfaction of the City of Mississauga.
xiv. The applicant will be responsible for ensuring that all plans confirm to Transport Canada's restrictions.
xv. Where planting is to be located in landscaped areas on top of an underground parking
structure, it is the responsibility of the applicant to arrange the coordination of the design of the underground parking structure with the Landscape Architect and the Consulting Engineering. Underground parking structures with landscaping area to be capable of supporting the following loads:
- 15 cm of drainage gravel plus 40 cm topsoil for sod
- 15 cm of drainage gravel plus 60 cm topsoil for shrubs
- 15 cm of drainage gravel plus 90 cm for trees
Or
- Prefabricated sheet drain system* with a compressive strength of 1003 Kpa plus 40 cm topsoil for sod
- Prefabricated sheet drain system* with a compressive strength of 1003 Kpa plus 60 cm topsoil for shrubs
- Prefabricated sheet drain system* with a compressive strength of 1003 Kpa plus 90 cm topsoil for trees
* Terradrain 900 or approved equal
xvi. The structural design of any retaining wall over 0.6 m in height or any retaining wall located on a property line is to be shown on the Site Grading plan for this project and is to be approved by the Consulting Engineer for the project.
xvii. Continuous 15 cm high barrier type poured concrete curbing will be provided between all asphalt and landscaped areas throughout the site.
xviii. All utility companies will be notified for locates prior to the installation of the hoarding that lies within the site and within the limited of the City boulevard area.

General Notes 2
NTS dA1.01

49 South Service Rd
Residential DEVELOPMENT
Mississauga, ON

Project Statistics
October 5, 2022 — Project No. 22-073

1.0 Site Information

1.1 Total Lot Area

	hectare	acres	sq.m	sq.ft
Lot Area	0.44	1.08	4,377.40	47,118
Total Lot Area	**0.44**	**1.08**	**4,377.40**	**47,118**

2.0 Proposed TFA (Total Floor Area)

means the area of a building, structure or part thereof measured from the exterior of outside walls, or from the midpoint of common walls (0225-2007)

2.1 Underground TFA

	floors	sq.m.	sq.m.	sq.ft.
Level P3	1 x	2,393	2,393	25,758
Level P2	1 x	2,393	2,393	25,758
Level P1	1 x	2,393	2,393	25,758
Proposed Underground TFA			**7,179**	**77,274**

2.2 Above Ground TFA

	floors	sq.m.	sq.m.	sq.ft.
Level 1	1 x	1,086	1,086	11,690
Levels 2 to 4	3 x	1,087	3,262	35,113
Level 5	1 x	886	886	9,535
Levels 6 to 26	21 x	886	18,602	200,233
Level MPH	1 x	445	445	4,790
Proposed Above Ground TFA			**24,281**	**261,361**

2.3 Total Proposed TFA

	sq.m.	sq.ft.
Underground TFA	*7,179*	*77,274*
Above Ground TFA	*24,281*	*261,361*
Total Proposed TFA	**31,460**	**338,635**

3.0 Proposed GFA (Gross Floor Area)

means the sum of the areas of each storey of a building above or below established grade, measured from the exterior of outside walls of the building including floor area occupied by interior walls but excluding any part of the building used for mechanical floor area,stairwells, elevators, motor vehicle parking, bicycle parking, storage lockers, below-grade storage, any enclosed area used for the collection or storage of disposable or recyclable waste generated within the building, common facilities for the use of the residents of the building, a day care and amenity area. (0174-2017)

3.1 Residential GFA

	floors	sq.m.	sq.m.	sq.ft.
Level P3	1 x	50	50	538
Level P2	1 x	50	50	538
Level P1	1 x	50	50	538
Level 1	1 x	570	570	6,135
Levels 2 to 4	3 x	1,019	3,057	32,905
Level 5	1 x	393	393	4,230
Levels 6 to 26	21 x	818	17,178	184,902
Proposed Residential GFA			**21,348**	**229,786**

3.2 Total Proposed GFA

	sq.m.	sq.ft.
Total Proposed GFA	**21,348**	**229,786**

4.0 Proposed Floor Space Index

"Floor Space Index" the gross floor area of all buildings on a lot divided by the lot area.

	FSI
	4.88

5.0 Amenity GFA

The greater of 5.6 m² per dwelling unit or 10% of the site area

5.1 Required Amenity GFA

		sq.m.	sq.ft.
Indoor & Outdoor Amenity	*5.6 sqm / unit*	**1,971**	21,218
Total Required Amenity GFA		**1,971**	**21,218**

5.2 Proposed Amenity GFA — sq.m. — sq.ft.

5.3 Indoor Amenity

	sq.m.	sq.ft.
Level 1	13	140
Level 5	326	3,509
Total Indoor Amenity	**339**	**3,509**

5.4 Outdoor Amenity

	sq.m.	sq.ft.
Level 1	902	9,709
Total Outdoor Amenity	**902**	**9,709**

5.5 Total Proposed Amenity GFA

		sq.m.	sq.ft.
Indoor Amenity	0.96 sq.m / Unit	339	3,509
Outoor Amenity	2.56 sq.m / Unit	902	9,709
Total Proposed Amenity GFA		**1,241**	**13,218**
Proposed Amenity Ratio		**3.53 sq.m/Unit**	

6.0 Unit Count

6.1

	floors	1 bed	1bed +	2 bed (int)	2 bed	3 bed	units / floor	Total
Level 1	1 x			2	2		4	4
Levels 2 to 4	3 x	4	3	5	4		16	48
Level 5	1 x	3			3		6	6
Levels 6 to 26	21 x	6	4		4		14	294
Total Unit Count		**141**	**93**	**17**	**101**			**352**
		40.1%	**26.4%**	**4.8%**	**28.7%**			**100%**

7.0 Parking

7.1 Proposed Parking *Ratio*

	Ratio	Number of Units	
Residential	0.29 /unit	352	102
Visitor	0.10 /unit	352	35
Accessible*			6
Total Parking Required			**137**

**Accessible Parking as per AODA Requirements*

7.2 Parking Provided

	Residents	Visitors	Accessible	
P3	48	0	2	50
P2	46	0	2	48
P1	4	33	2	39
Total Parking Provided	**102**	**35**	**6**	**137**
Parking Ratio Provided	**0.29**	**0.10**		**0.39**

7.3 Bicycle Parking Required

	Ratio*	Number of Units	
Resident- Long Term	0.60	352	211
Visitor-Short Term	0.05	352	18
Total Bicycle Parking Required			**229**

** Bicycle Parking Ratio as per " City of Mississauga Bicycle Parking Zoning By-Law Directions - Final Draft - Apr 19,2021"*

7.4 Bicycle Parking Provided

	Long Term	Short Term	
P1	171		171
L1	40	18	58
Total Bicycle Parking Provided	**211**	**18**	**229**
Bicycle Parking Ratio Provided			**0.65**

Site Statistics 1
NTS dA1.01

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Do not scale the drawings.

This Drawing Is Not To Be Used For Construction Until Signed ByThe Architect.

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Survey & Site Statistics

Scale:	1 : 550
Drawn by:	A.P.
Checked by:	R.P.
Project No.:	22-073
Date:	10/05/22
Drawing No.:	**dA1.01**

Plot Date: 2022-10-05 2:09:09 PMFile Path: C:\Revit\2021\22073P011_Edenshaw-49 South Service Rd_RVT2021_aershadMXBUQ.rvt

Context Plan
1 : 1250
2
dA1.02

3D Context
NTS
1
dA1.02

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

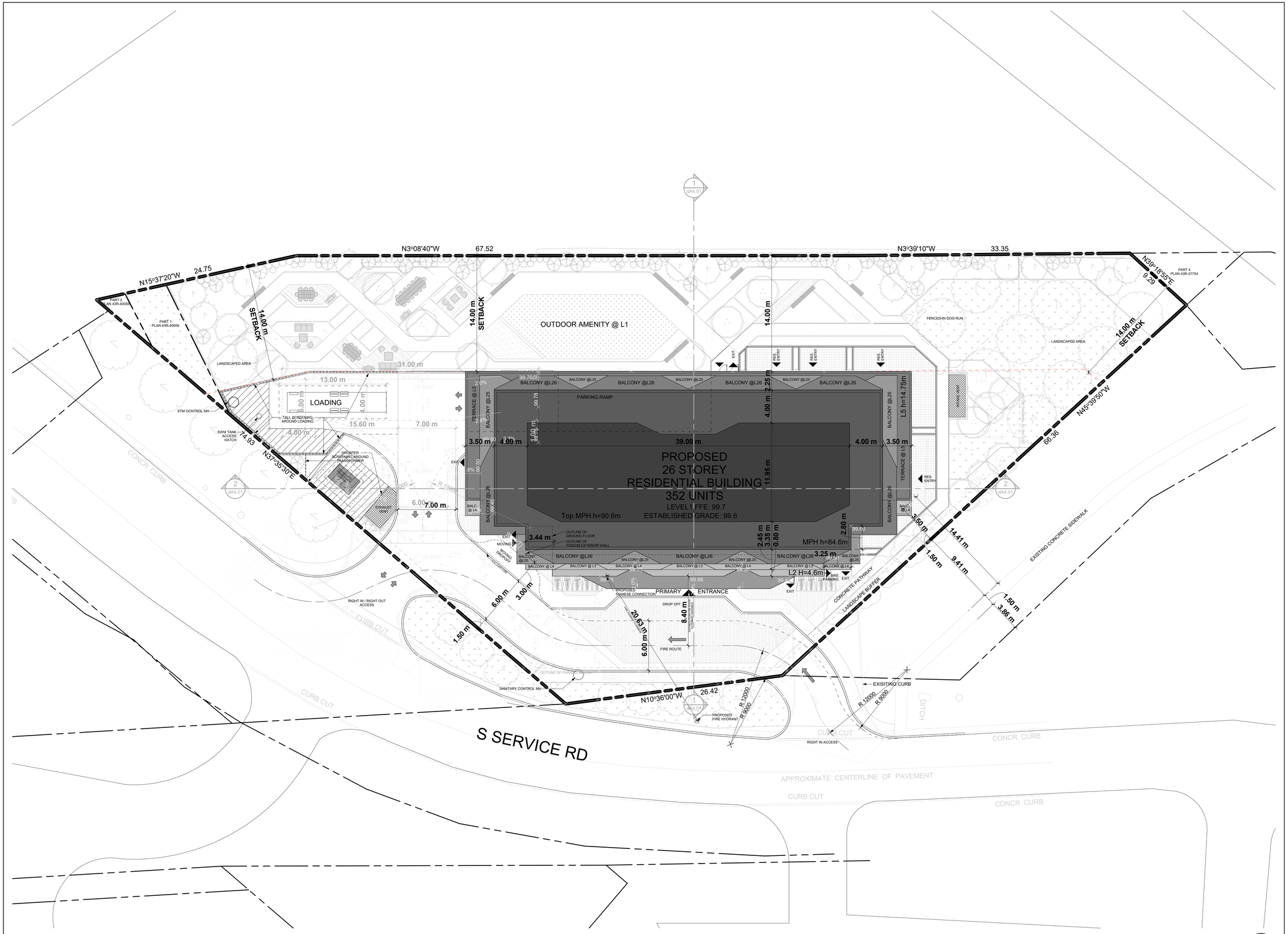
49 SOUTH SERVICE RD, MISSISSAUGA , ON
Proposed Residential Development

Drawing Title:
Context Plan

Scale: 1 : 1250
Drawn by: A.P.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

N

dA1.02



SITE PLAN 1
1 : 200
dA1.03

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Date:

ONTARIO ASSOCIATION of ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

Revisions:

No.:	Revision:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022
No.:	Issued For:	Date:

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

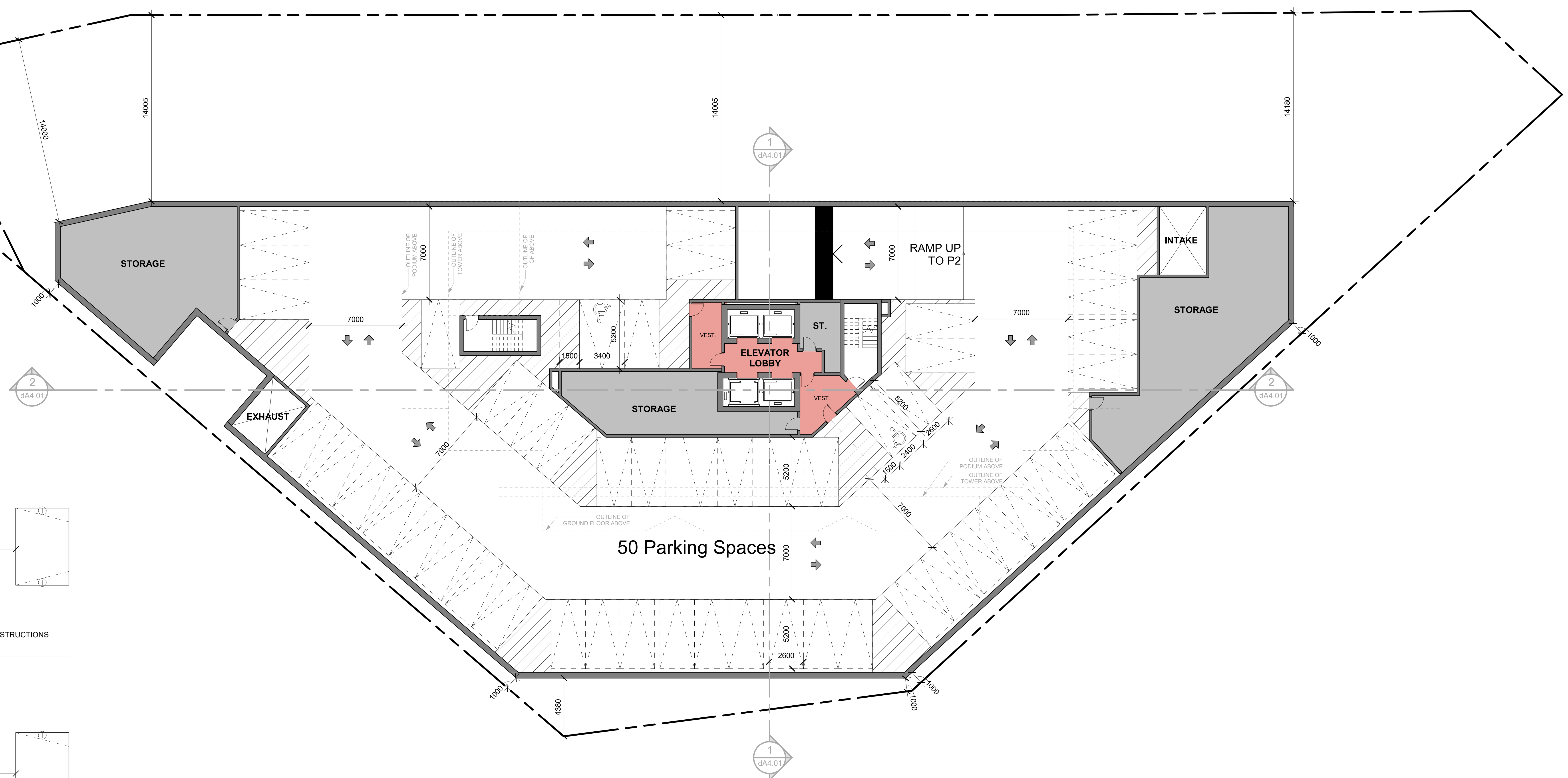
Drawing Title:
Site Plan

Scale: 1 : 200
Drawn by: A.P.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.: **dA1.03**

Plot Date: 2022-10-05 2:09:29 PM File Path: C:\Revit\2021\22073\01_Edenshaw 49 South Service Rd_R21f0321_central.rvt

Authorities Having Jurisdiction

PROGRESS DRAFT 10/05/22

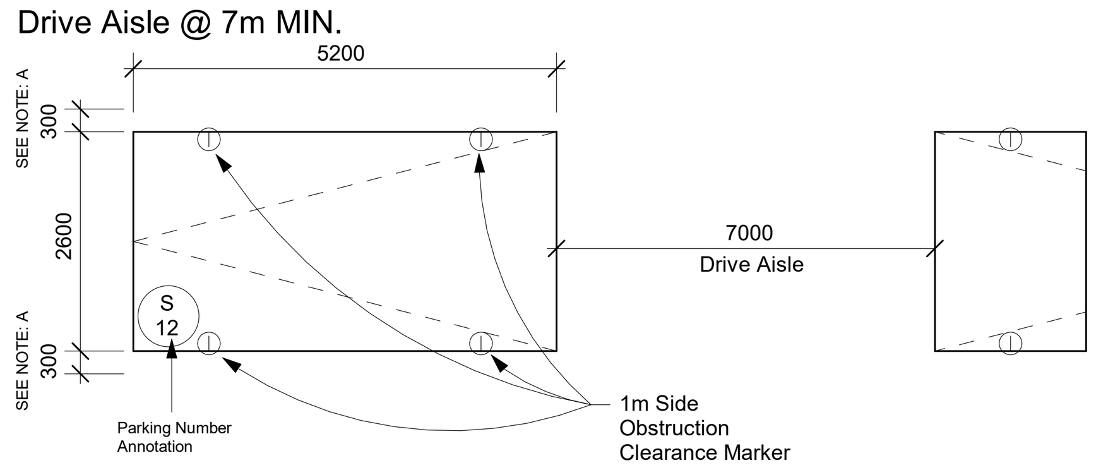


12 A2 Floor Plan - Level P3 1 dA2.01

1 : 200

TYPICAL PARKING SPACE:

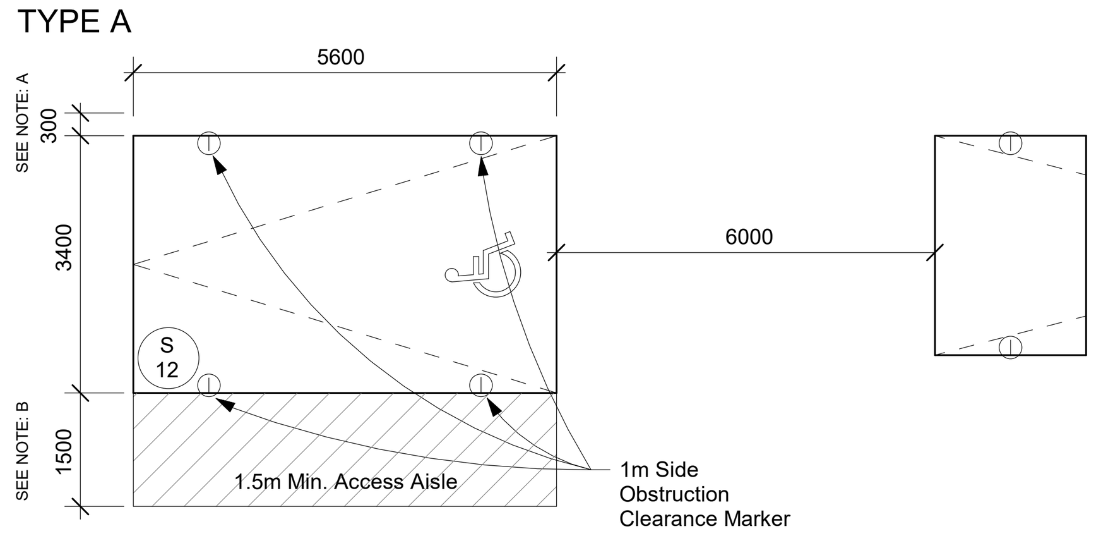
Drive Aisle @ 7m MIN.



NOTE: A - PROVIDE AN ADDITIONAL 300mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm

TYPICAL PARKING SPACE:

TYPE A



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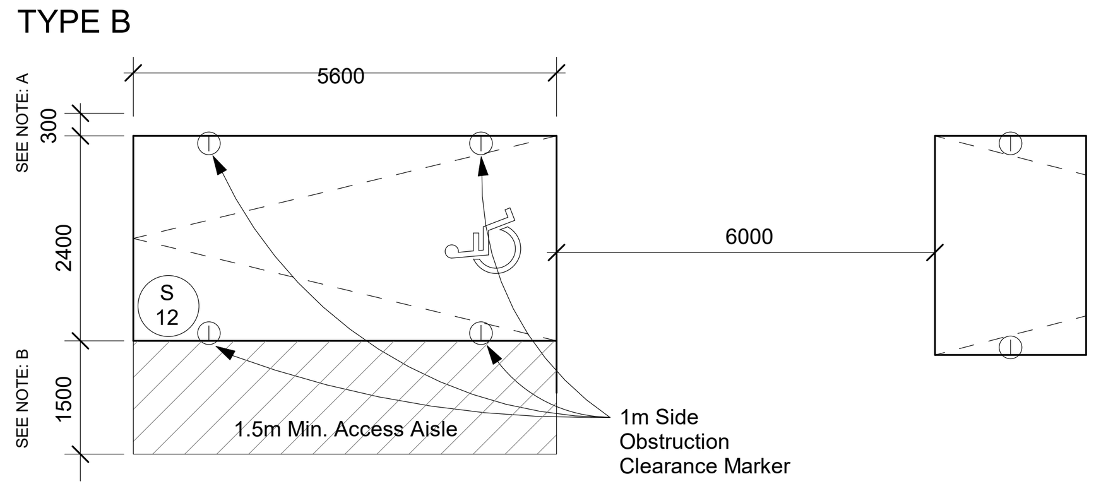

NOTES:
A - PROVIDE AN ADDITIONAL 300mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm.
B - PROVIDE A 1500mm WALKWAY ON AT LEAST ONE SIDE OF A HANDICAP PARKING STALL. THIS WALKWAY MAY BE SHARED WITH ADJOINING HANDICAP SPACE.

General Typical Floor Notes 2 dA2.01

NTS

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

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01	ZBA/OPA Submission	Oct. 14, 2022

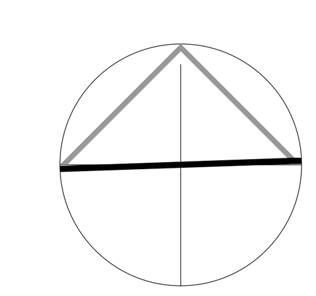
EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

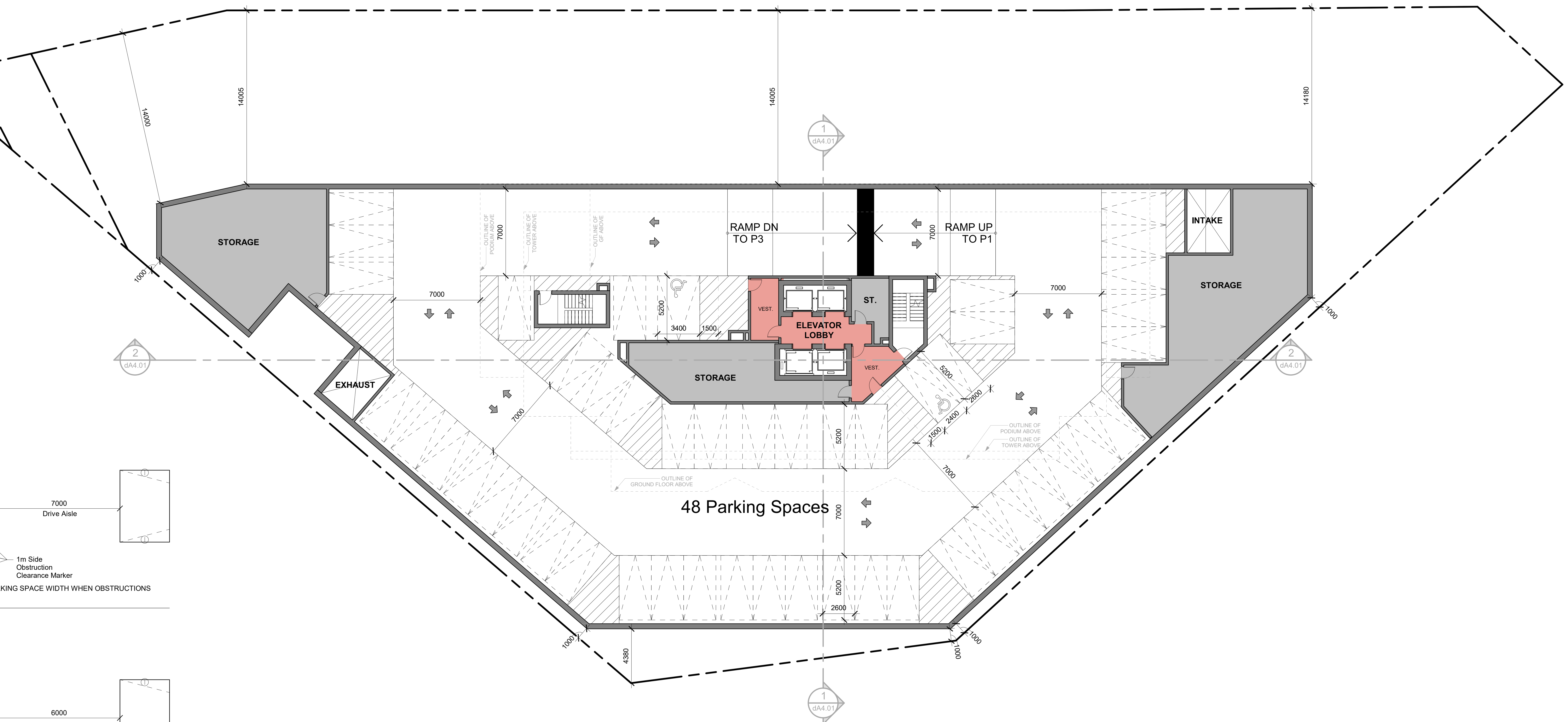
Drawing Title:
Parking Level Floor Plan P3

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:



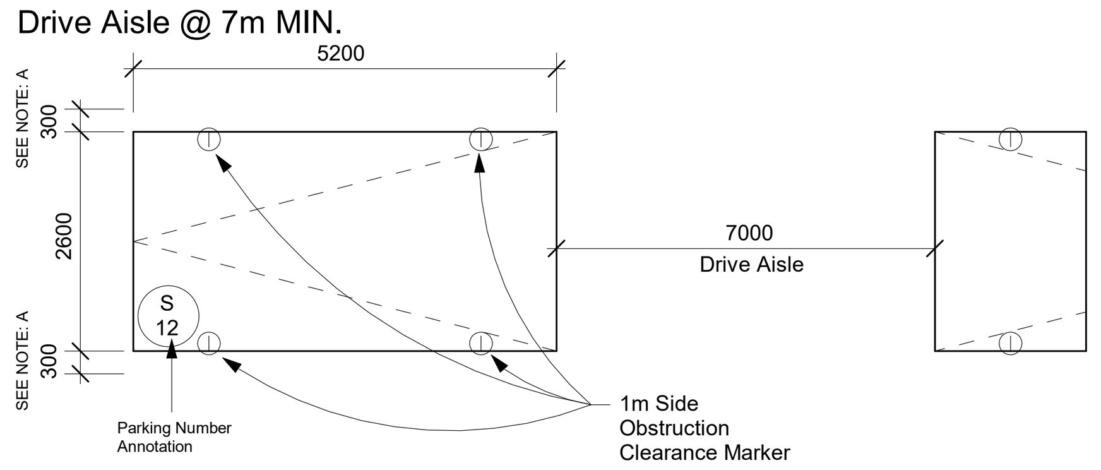
dA2.01

Authorities Having Jurisdiction



TYPICAL PARKING SPACE:

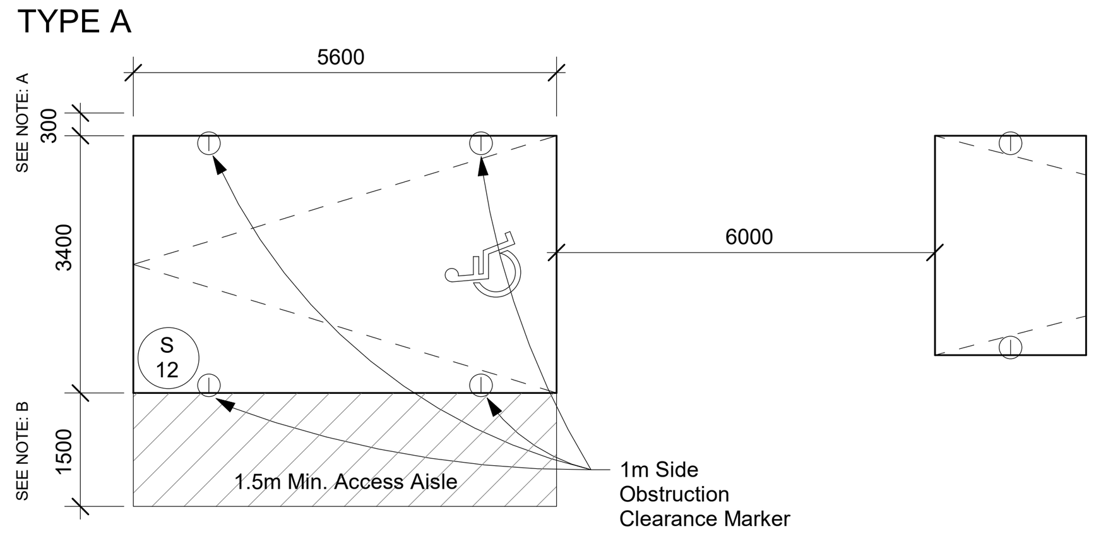
Drive Aisle @ 7m MIN.



NOTE: A - PROVIDE AN ADDITIONAL 300mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm

TYPICAL PARKING SPACE:

TYPE A



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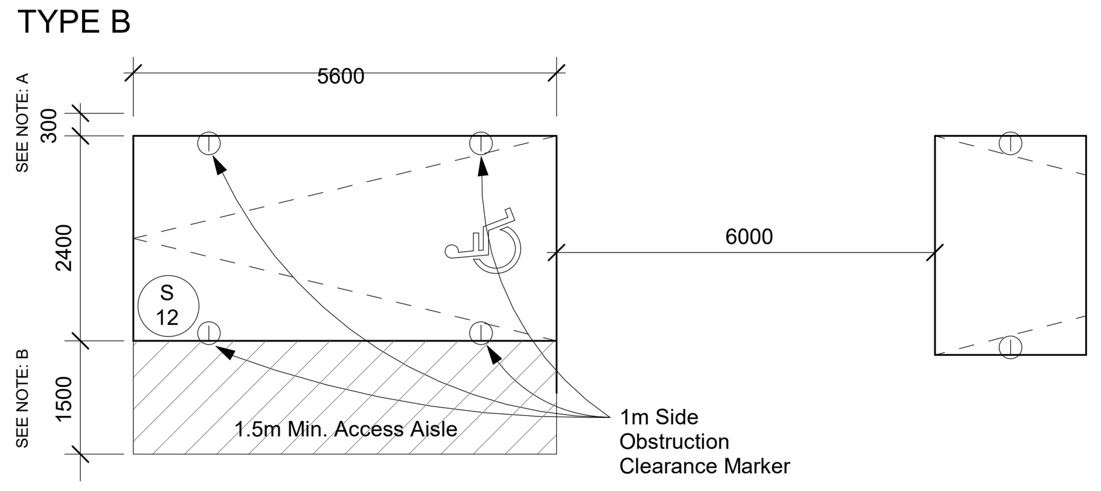

NOTES:
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B - PROVIDE A 1500mm WALKWAY ON AT LEAST ONE SIDE OF A HANDICAP PARKING STALL. THIS WALKWAY MAY BE SHARED WITH ADJOINING HANDICAP SPACE.

General Typical Floor Notes 2 dA2.02
NTS

12 A2 Floor Plan - Level P2 1 dA2.02
1 : 200

PROGRESS DRAFT
10/05/22

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
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EDENSHAW

Client:
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49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

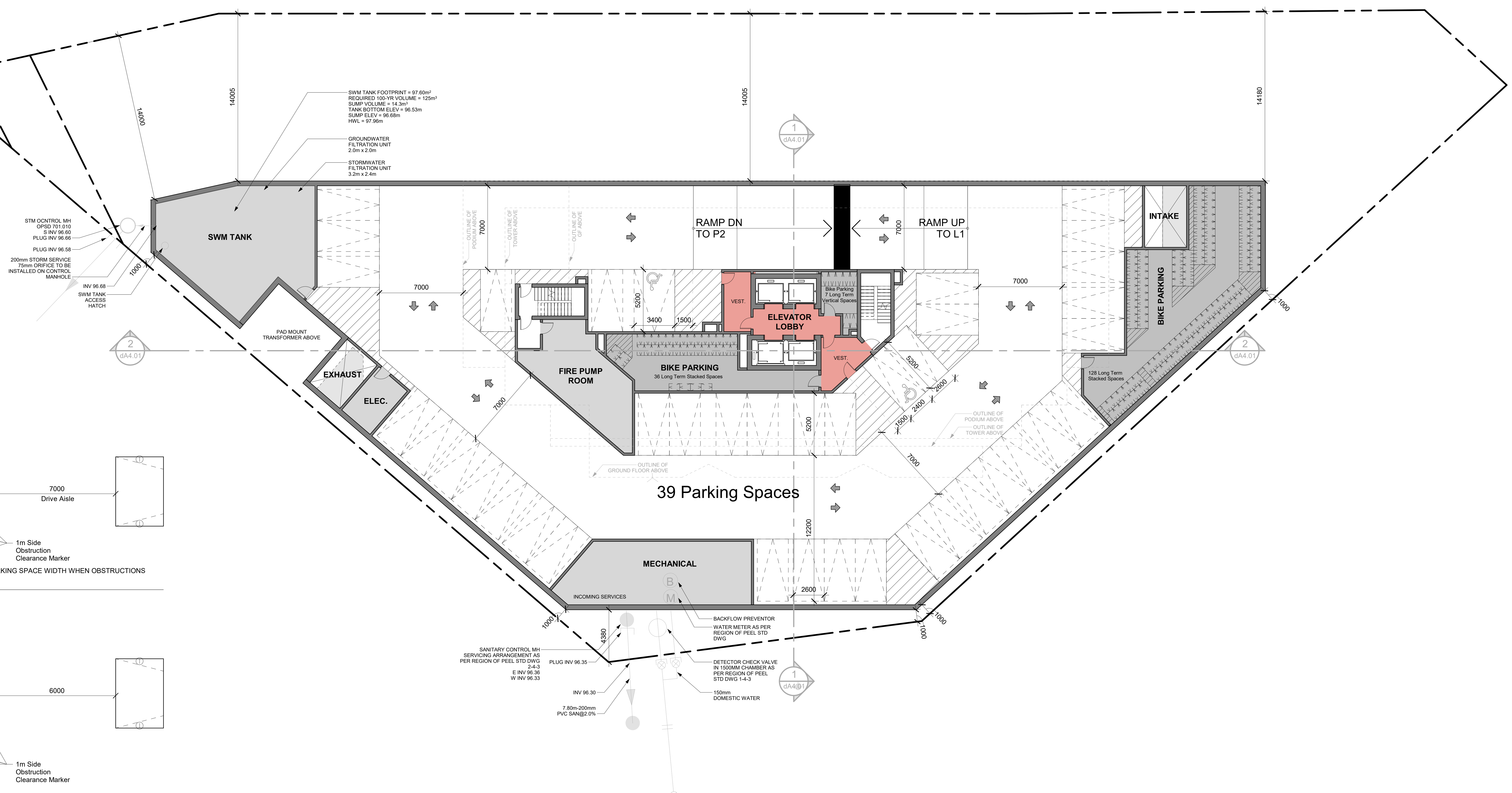
Drawing Title:
Parking Level Floor Plan P2

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

dA2.02

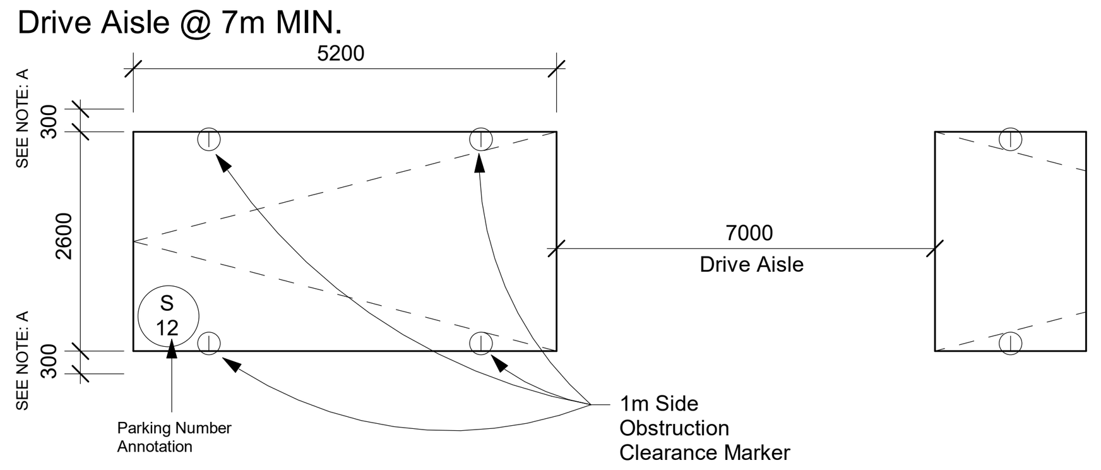
Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22



TYPICAL PARKING SPACE:

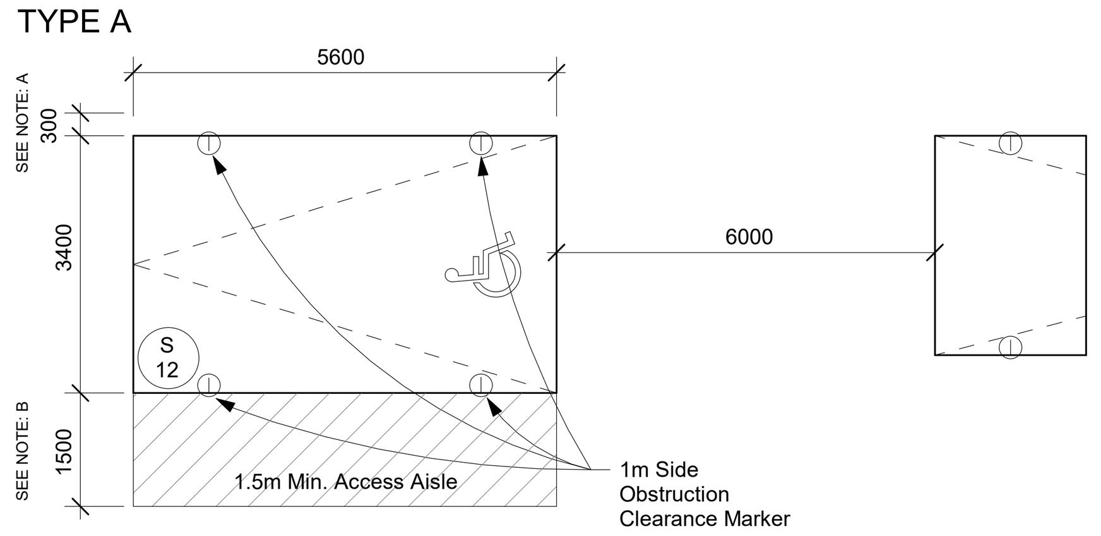
Drive Aisle @ 7m MIN.



NOTE: A - PROVIDE AN ADDITIONAL 300mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm

TYPICAL PARKING SPACE:

TYPE A



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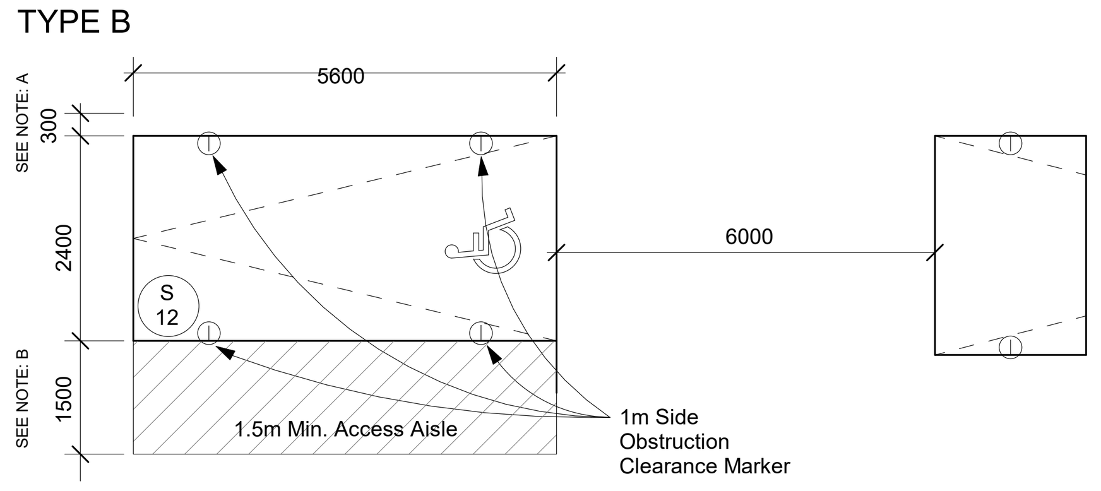

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A - PROVIDE AN ADDITIONAL 300mm FOR PARKING SPACE WIDTH WHEN OBSTRUCTIONS OCCUR BETWEEN THE FRONT AND REAR 1000mm.
B - PROVIDE A 1500mm WALKWAY ON AT LEAST ONE SIDE OF A HANDICAP PARKING STALL. THIS WALKWAY MAY BE SHARED WITH ADJOINING HANDICAP SPACE.

General Typical Floor Notes — 2 / dA2.03 — NTS

12 A2 Floor Plan - Level P1 — 1 / dA2.03 — 1 : 200

Do not scale the drawings.

This Drawing Is Not To Be Used For Construction Until Signed ByThe Architect.

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

Revisions:

No.:	Revision:	Date:

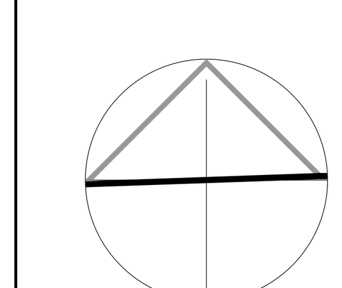
No.:	Issued For:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISSAUGA , ON
Proposed Residential Development

Drawing Title:
Parking Level Floor Plan P1



Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

dA2.03

12 A2 Floor Plan - Level 1

1 : 200

1
dA2.04

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
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20 De Boers Drive Suite 400
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01	ZBA/OPA Submission	Oct. 14, 2022

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Floor Plans LEVEL 1

Scale:	1 : 200
Drawn by:	A.E.
Checked by:	R.P.
Project No.:	22-073
Date:	10/05/22
Drawing No.:	dA2.04

12 A2 Floor Plan - Level 2,4

1 : 200

4
dA2.05

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
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20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

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Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Floor Plans LEVEL 2,4

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

dA2.05

12 A2 Floor Plan - Level 3

1 : 200

1 dA2.06

Authorities Having Jurisdiction

PROGRESS DRAFT 10/05/22

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BRENT F. WHITBY LICENCE 6723

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20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

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No.:	Issued For:	Date:
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49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Floor Plans LEVEL 3

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

dA2.06

12 A2 Floor Plan - Level 5
1 : 200
1 dA2.07

Authorities Having Jurisdiction

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01	ZBA/OPA Submission	Oct. 14, 2022

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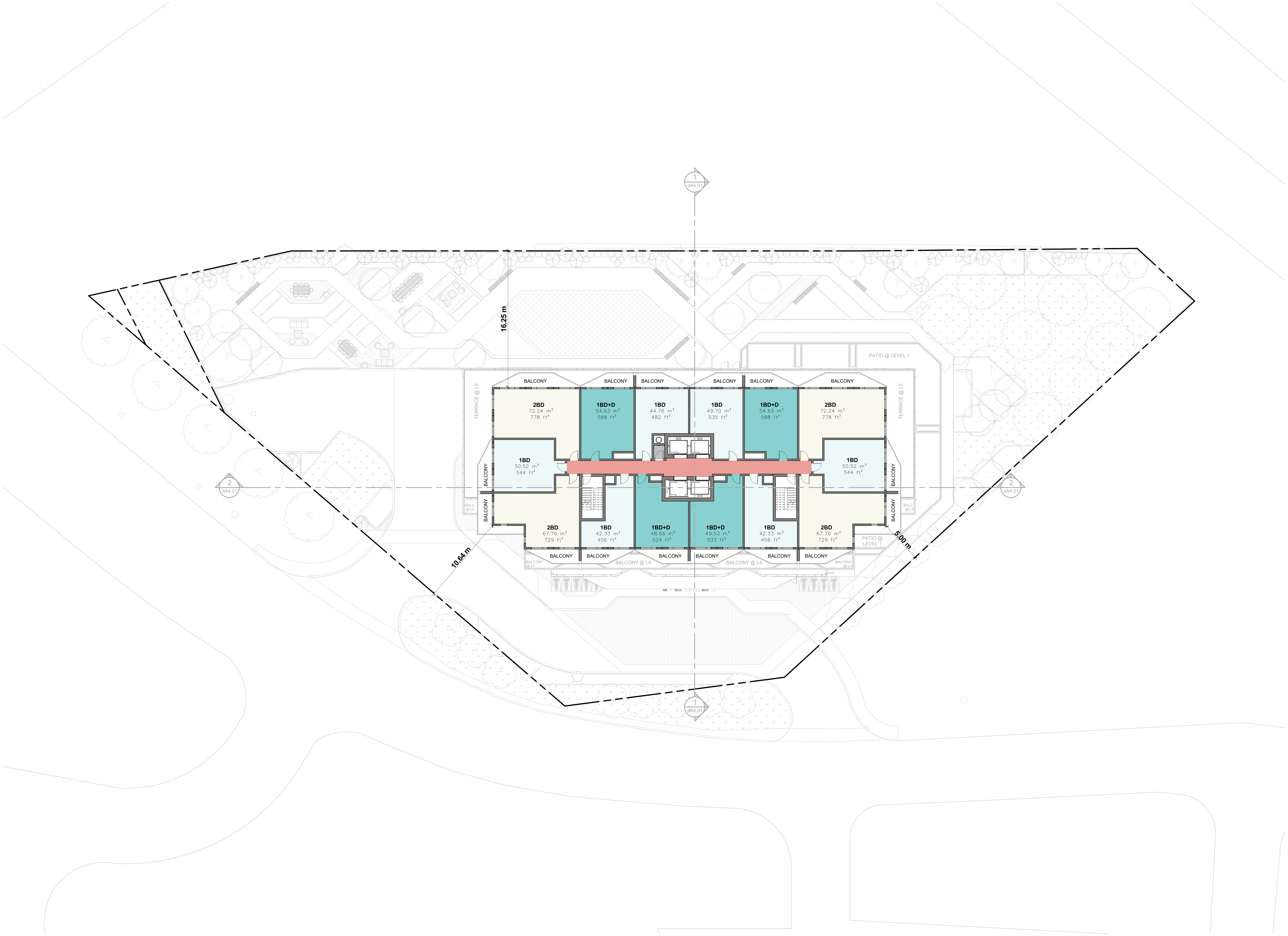
49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Floor Plans LEVEL 5

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:
dA2.07



12 A2 Floor Plan - Level 6,8,10,12,14,16,18,20,22,24,26

1 : 200

1 dA2.08

Authorities Having Jurisdiction

PROGRESS DRAFT 10/05/22

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No.:	Issued For:	Date:
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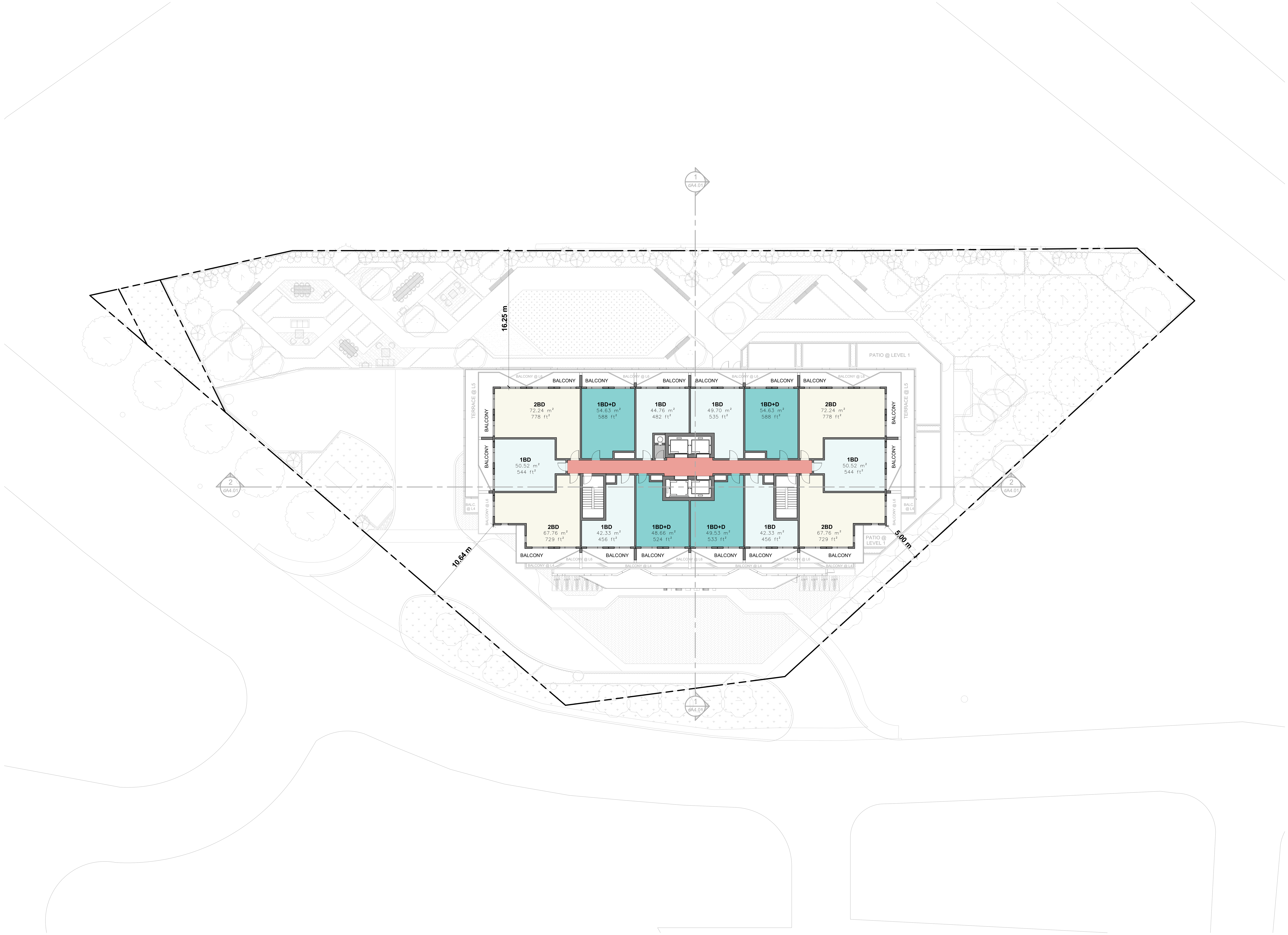
49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Floor Plans LEVEL 6-26 (Even Levels)

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

dA2.08



12 A2 Floor Plan - Level 7,9,11,13,15,17,19,21,23,25

1 : 200

1
dA2.09

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

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ONTARIO ASSOCIATION OF ARCHITECTS
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No.:	Revision:	Date:

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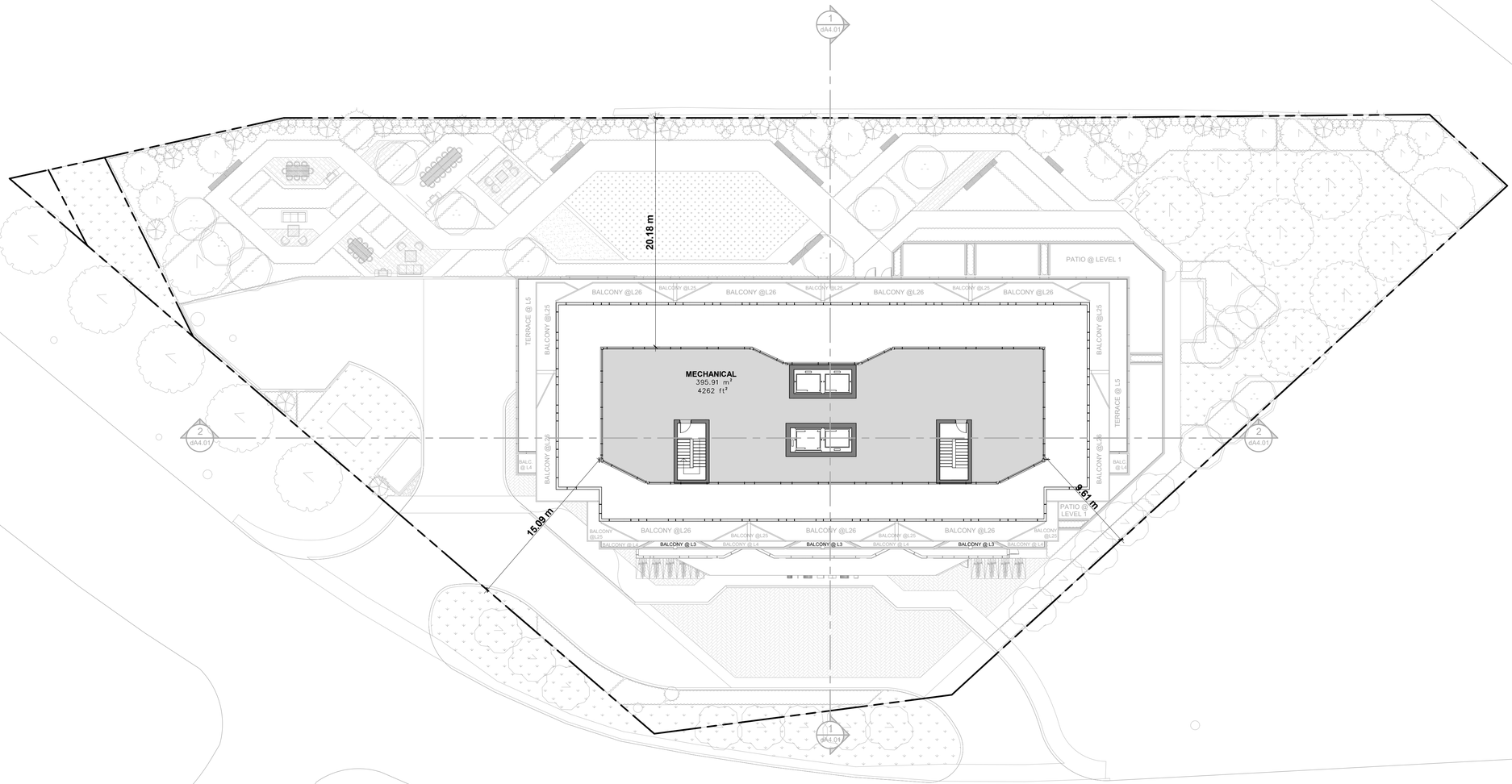
Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Floor Plans LEVEL 7-25 (Odd Levels)

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

dA2.09



12 A2 Floor Plan - Level MPH

1 : 200

1
dA2.10

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Date:

ONTARIO ASSOCIATION of ARCHITECTS
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ARCHITECTS AND PLANNERS

20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

Revisions:

No.:	Revision:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022
No.:	Issued For:	Date:

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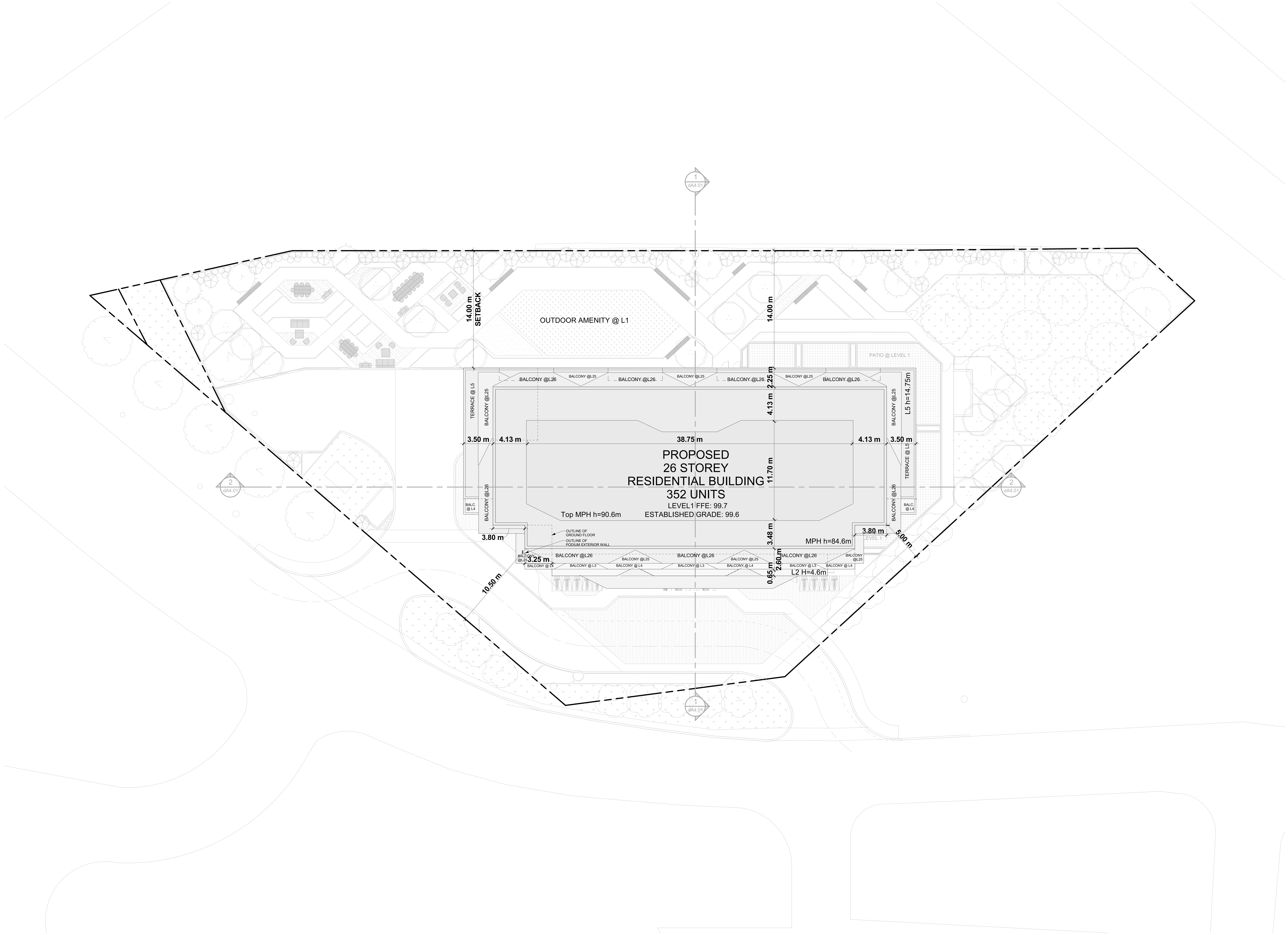
Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Floor Plans LEVEL MPH

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

dA2.10



12 A2 Floor Plan - Level Roof

1 : 200

1 dA2.11

Authorities Having Jurisdiction

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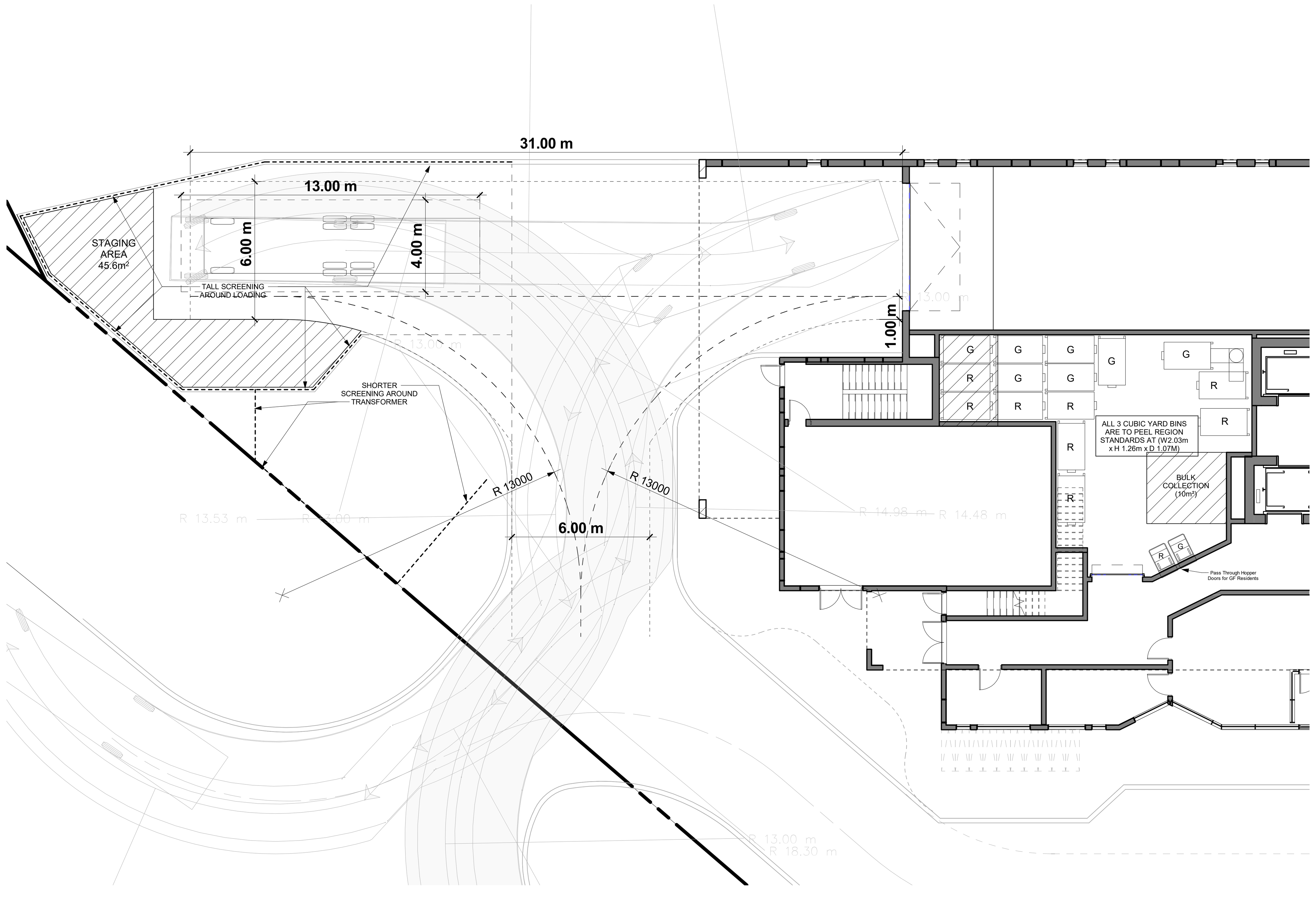
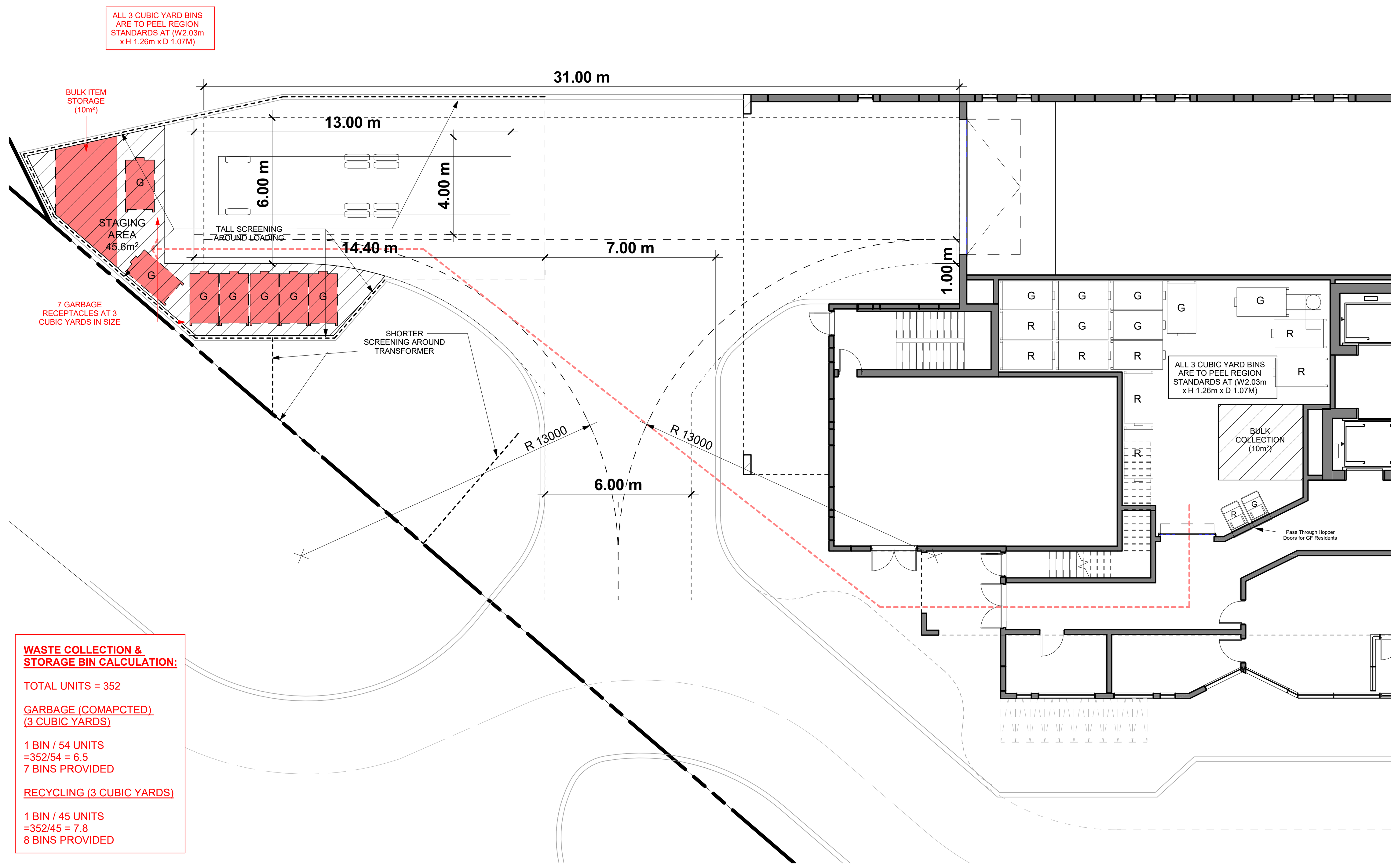
49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Roof Plan

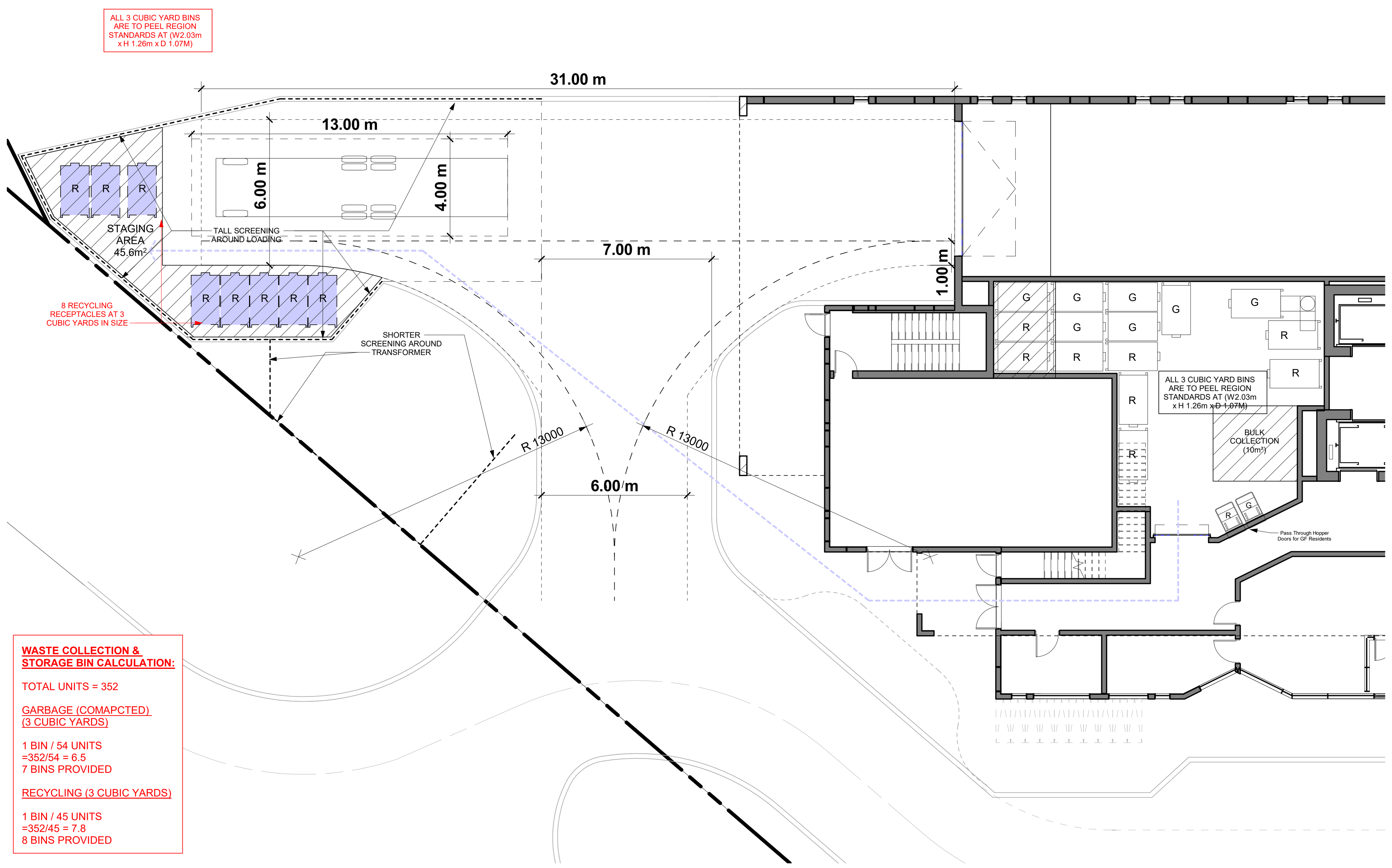
Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:
dA2.11



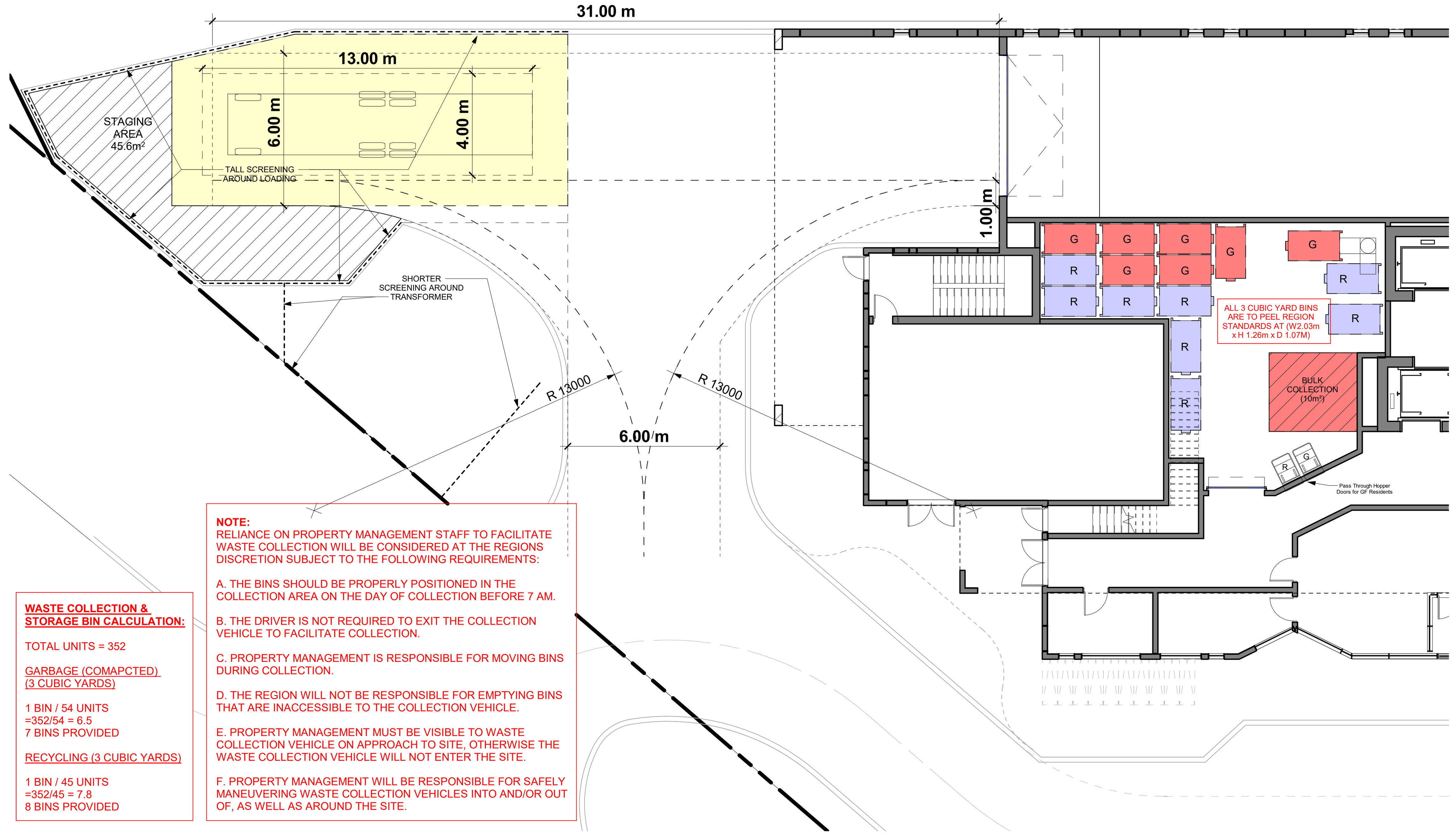
Waste Management Plan - Vehicle Maneuvering Diagram
4
dA2.12
1 : 150


ALL 3 CUBIC YARD BINS ARE TO PEEL REGION STANDARDS AT (W2.03m x H 1.26m x D 1.07M)
BULK ITEM STORAGE (10m²)
31.00 m
13.00 m
6.00 m
4.00 m
14.40 m
7.00 m
STAGING AREA 45.6m²
TALL SCREENING AROUND LOADING
7 GARBAGE RECEPTACLES AT 3 CUBIC YARDS IN SIZE
SHORTER SCREENING AROUND TRANSFORMER
R 13000
6.00 m
BULK COLLECTION (10m²)
WASTE COLLECTION & STORAGE BIN CALCULATION:
TOTAL UNITS = 352
GARBAGE (COMPACTED) (3 CUBIC YARDS)
1 BIN / 54 UNITS
=352/54 = 6.5
7 BINS PROVIDED
RECYCLING (3 CUBIC YARDS)
1 BIN / 45 UNITS
=352/45 = 7.8
8 BINS PROVIDED

Waste Management Plan - Garbage Collection
2
dA2.12
1 : 150


ALL 3 CUBIC YARD BINS ARE TO PEEL REGION STANDARDS AT (W2.03m x H 1.26m x D 1.07M)
31.00 m
13.00 m
6.00 m
4.00 m
7.00 m
STAGING AREA 45.6m²
TALL SCREENING AROUND LOADING
8 RECYCLING RECEPTACLES AT 3 CUBIC YARDS IN SIZE
SHORTER SCREENING AROUND TRANSFORMER
R 13000
6.00 m
WASTE COLLECTION & STORAGE BIN CALCULATION:
TOTAL UNITS = 352
GARBAGE (COMPACTED) (3 CUBIC YARDS)
1 BIN / 54 UNITS
=352/54 = 6.5
7 BINS PROVIDED
RECYCLING (3 CUBIC YARDS)
1 BIN / 45 UNITS
=352/45 = 7.8
8 BINS PROVIDED

Waste Management Plan - Recycling Collection
3
dA2.12
1 : 150


31.00 m
13.00 m
6.00 m
4.00 m
STAGING AREA 45.6m²
TALL SCREENING AROUND LOADING
SHORTER SCREENING AROUND TRANSFORMER
R 13000
6.00 m
ALL 3 CUBIC YARD BINS ARE TO PEEL REGION STANDARDS AT (W2.03m x H 1.26m x D 1.07M)
BULK COLLECTION (10m²)
WASTE COLLECTION & STORAGE BIN CALCULATION:
TOTAL UNITS = 352
GARBAGE (COMPACTED) (3 CUBIC YARDS)
1 BIN / 54 UNITS
=352/54 = 6.5
7 BINS PROVIDED
RECYCLING (3 CUBIC YARDS)
1 BIN / 45 UNITS
=352/45 = 7.8
8 BINS PROVIDED
NOTE:
RELIANCE ON PROPERTY MANAGEMENT STAFF TO FACILITATE WASTE COLLECTION WILL BE CONSIDERED AT THE REGIONS DISCRETION SUBJECT TO THE FOLLOWING REQUIREMENTS:
A. THE BINS SHOULD BE PROPERLY POSITIONED IN THE COLLECTION AREA ON THE DAY OF COLLECTION BEFORE 7 AM.
B. THE DRIVER IS NOT REQUIRED TO EXIT THE COLLECTION VEHICLE TO FACILITATE COLLECTION.
C. PROPERTY MANAGEMENT IS RESPONSIBLE FOR MOVING BINS DURING COLLECTION.
D. THE REGION WILL NOT BE RESPONSIBLE FOR EMPTYING BINS THAT ARE INACCESSIBLE TO THE COLLECTION VEHICLE.
E. PROPERTY MANAGEMENT MUST BE VISIBLE TO WASTE COLLECTION VEHICLE ON APPROACH TO SITE, OTHERWISE THE WASTE COLLECTION VEHICLE WILL NOT ENTER THE SITE.
F. PROPERTY MANAGEMENT WILL BE RESPONSIBLE FOR SAFELY MANEUVERING WASTE COLLECTION VEHICLES INTO AND/OR OUT OF, AS WELL AS AROUND THE SITE.

Waste Management Plan - Waste Storage and Loading Space
1
dA2.12
1 : 150

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022

EDENSHAW

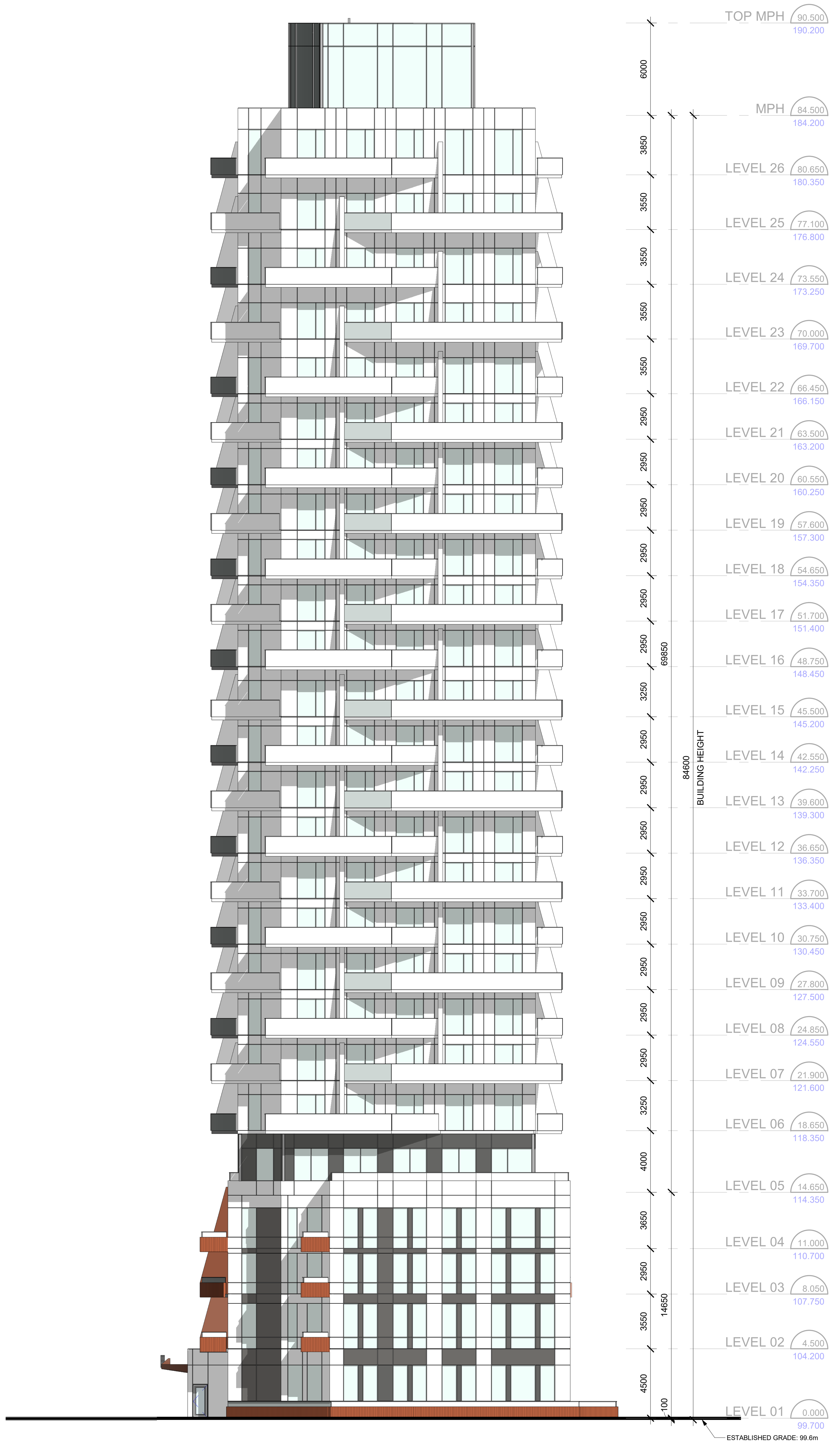
Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

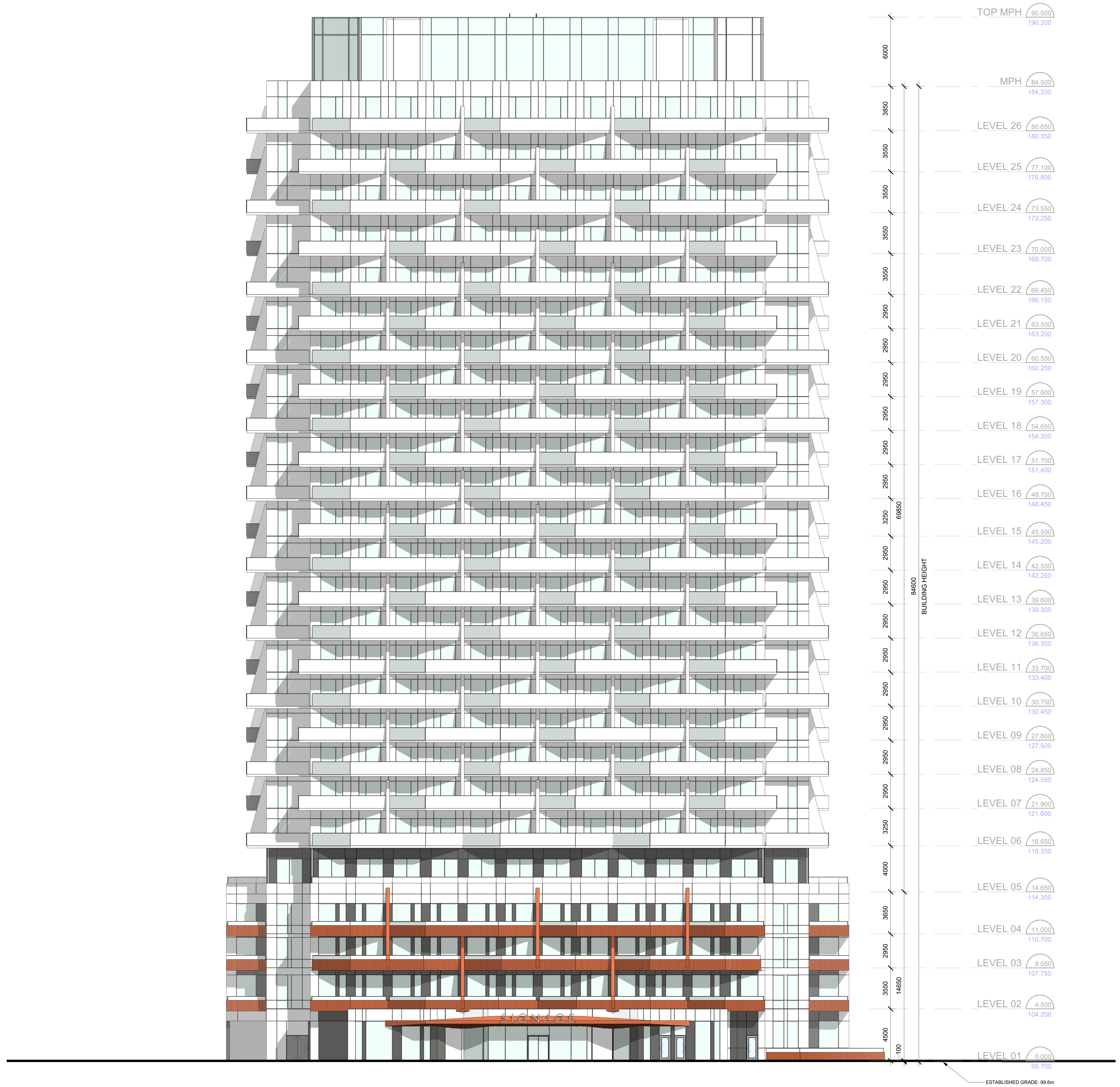
Drawing Title:
Waste Management Plan

Scale: 1 : 150
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:

dA2.12



North Elevation 2 dA3.01
1 : 200



East Elevation 1 dA3.01
1 : 200

Authorities Having Jurisdiction

PROGRESS DRAFT 10/05/22

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY LICENCE 6723

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ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

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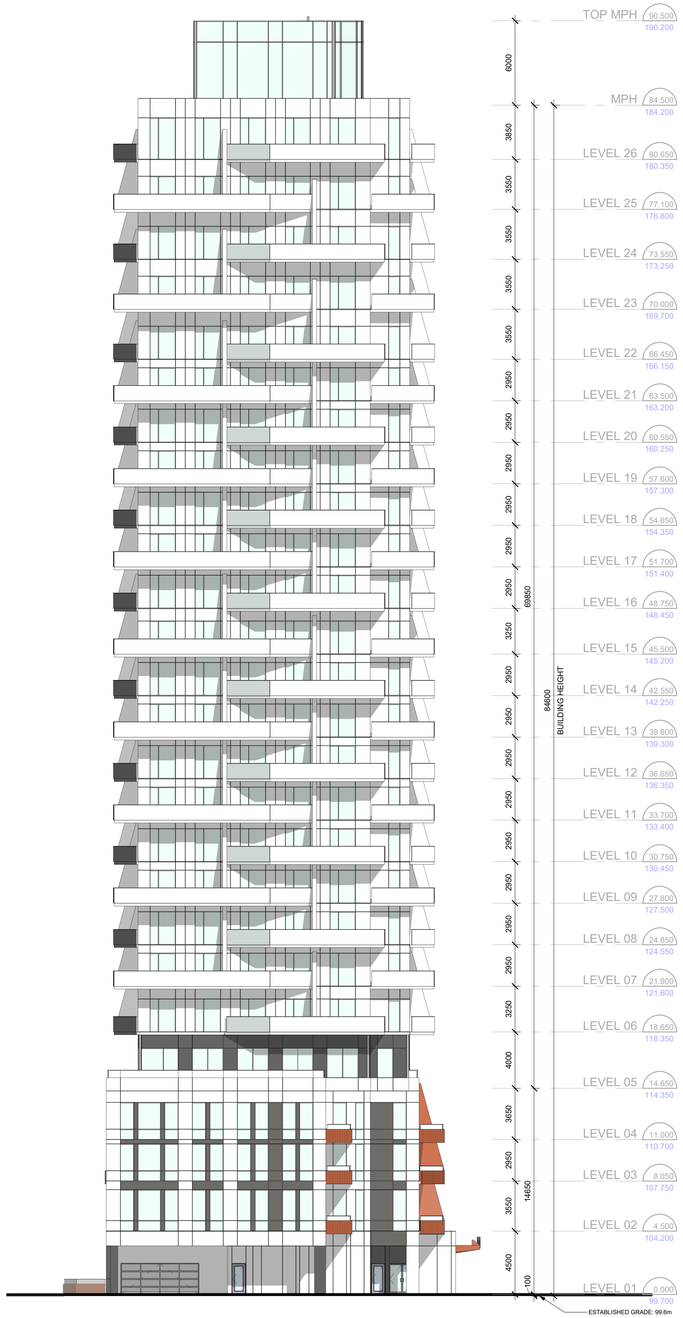
EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

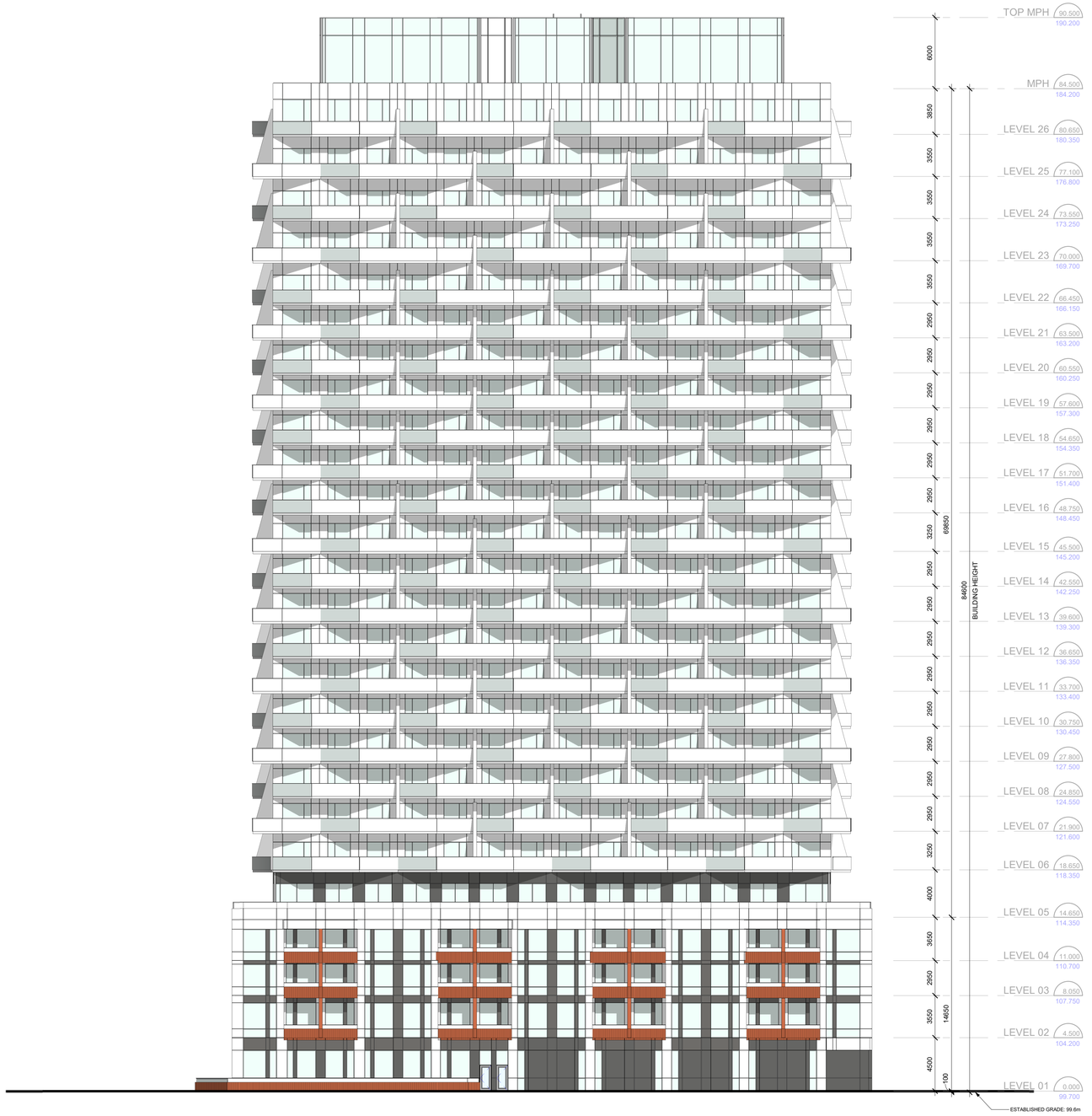
49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
North & East Elevations

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:
dA3.01



South Elevation 2
1 : 200
dA3.02



West Elevation 1
1 : 200
dA3.02

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Date:

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Toronto, ON M3J 0H1

Revisions:		
No.:	Revision:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022
No.:	Issued For:	Date:

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

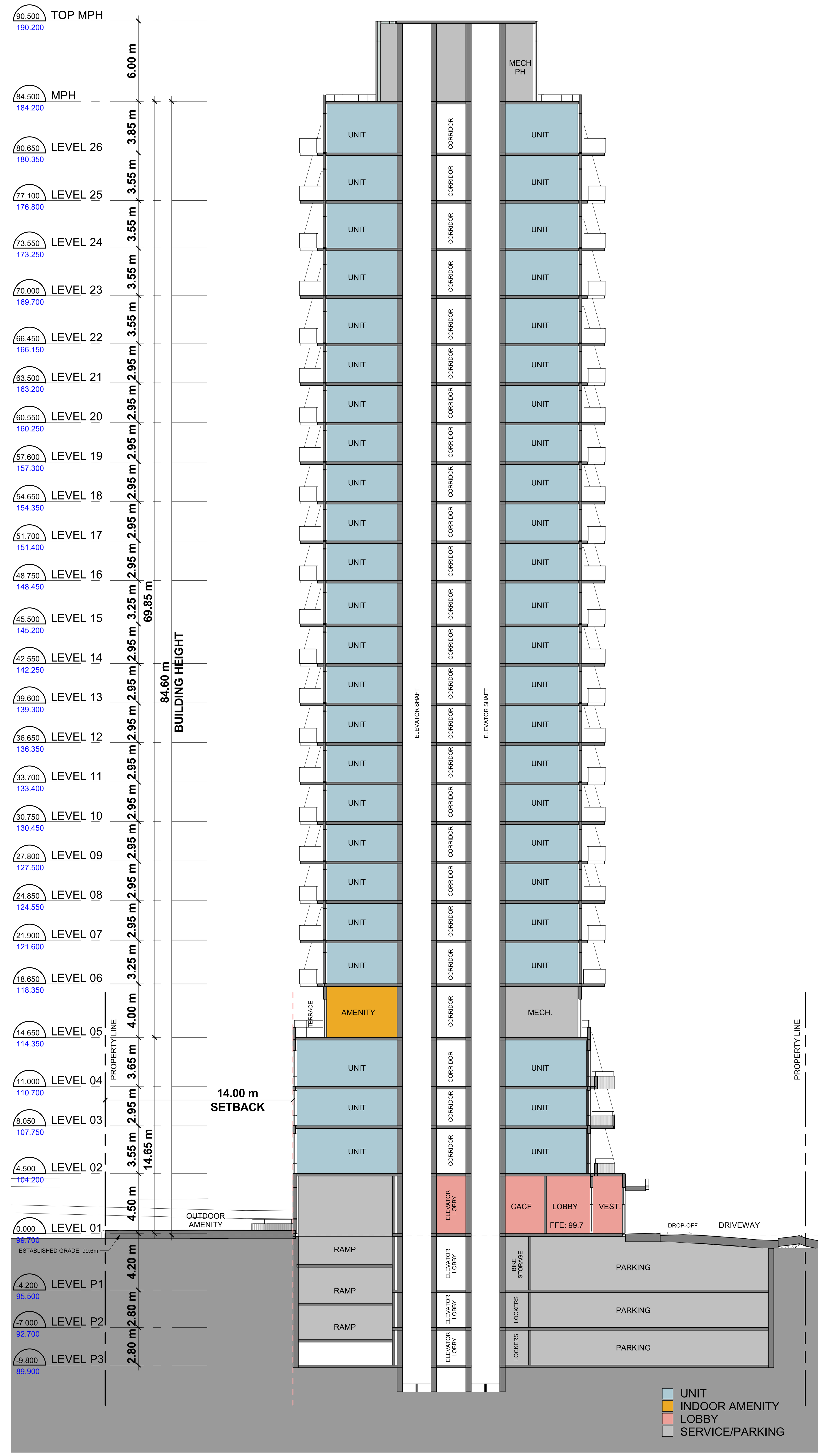
49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
South & West Elevations

Scale: 1 : 200
Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.: **dA3.02**

Plot date: 2022-10-05 2:13:13 PM File Path: C:\Revit\2021\22073\01_Edenshaw 49 South Service Rd_R21_centralM.rvt

12 A5 Section 1
1 : 200
2 dA4.01



12 A5 Section 2
1 : 200
1 dA4.01

Authorities Having Jurisdiction

PROGRESS DRAFT 10/05/22

Date:

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Toronto, ON M3J 0H1

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No.:	Issued For:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Sections

Scale: As indicated
Drawn by: A.P.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:
dA4.01

Street View from Hurontario & South Service Rd 4 dA5.01
NTS

Street View from South Service Rd 2 dA5.01
NTS

Ground Level View Looking North 3 dA5.01
NTS

East Elevation from Site Entrance 1 dA5.01
NTS

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Do not scale the drawings.

This Drawing Is Not To Be Used For Construction Until Signed ByThe Architect.

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
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Toronto, ON M3J 0H1

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01	ZBA/OPA Submission	Oct. 14, 2022

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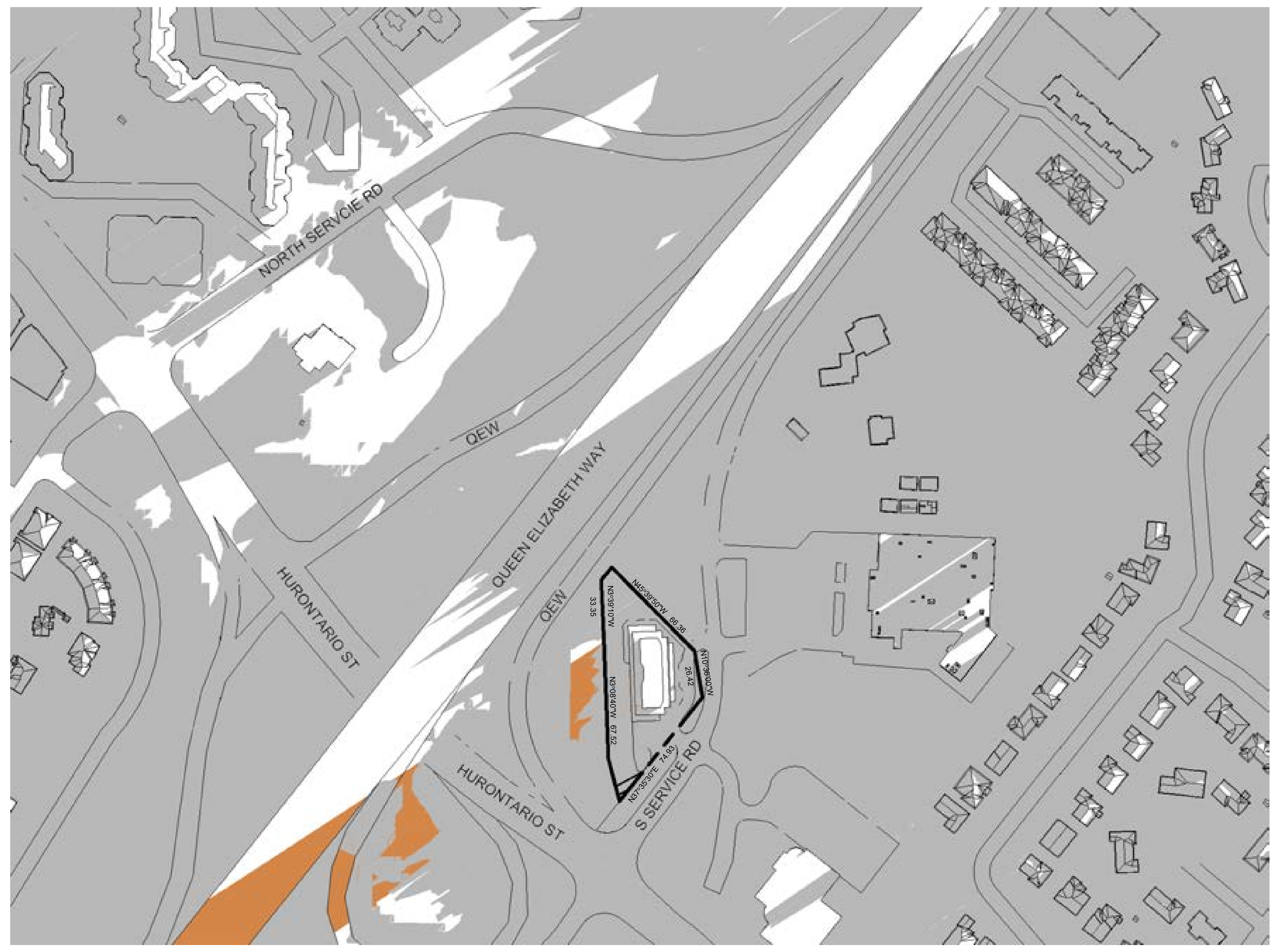
49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Pespectives

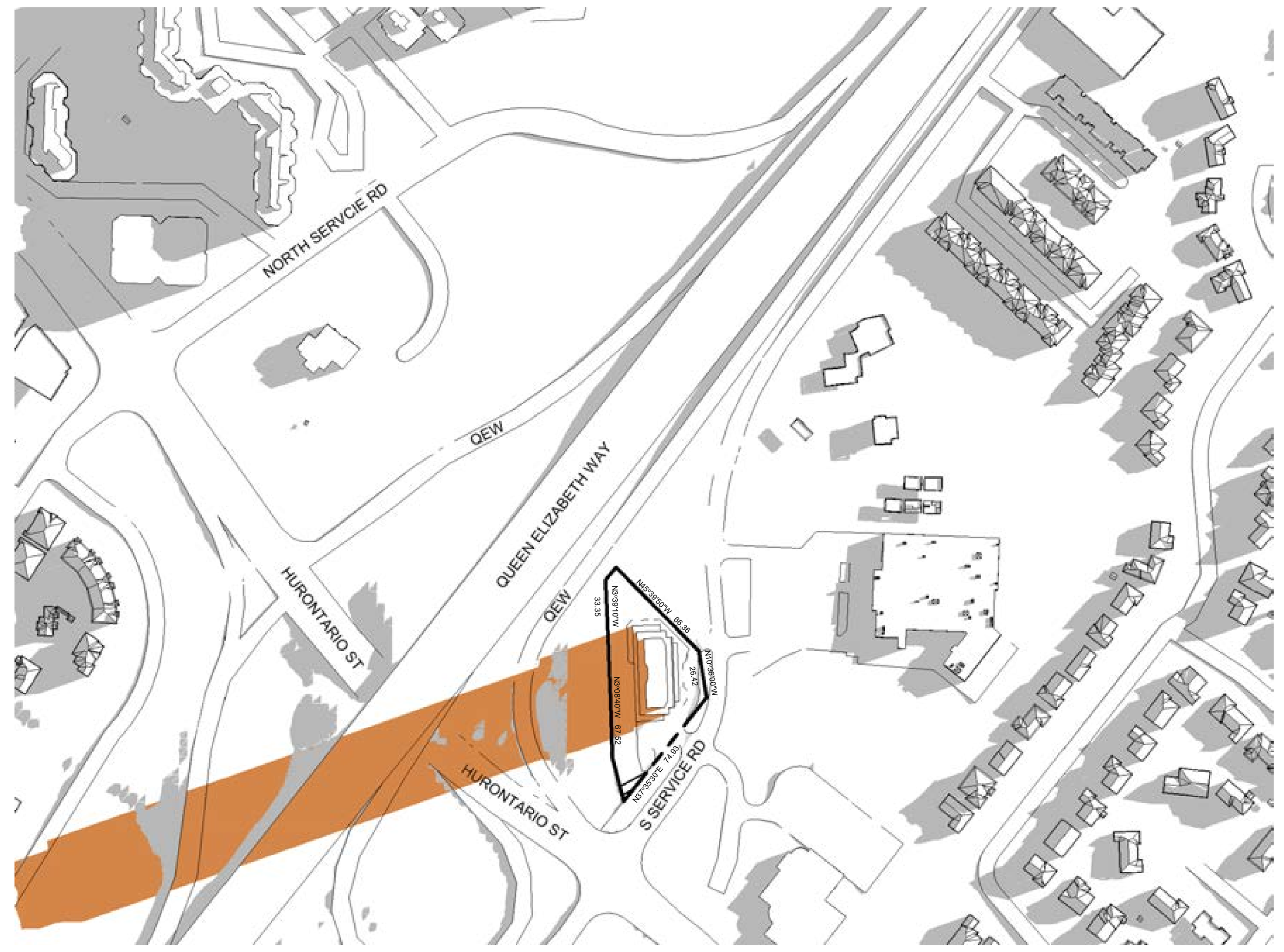
Scale:

Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.: **dA5.01**

Plot Date: 2022-10-05 2:12:32 PMFile Path: C:\Revit\2021\22073P011_Edenshaw-49 South Service Rd_RVT2021_aershadMXBUQ.rvt



June 21 @ 05:37 1
NTS dA6.01



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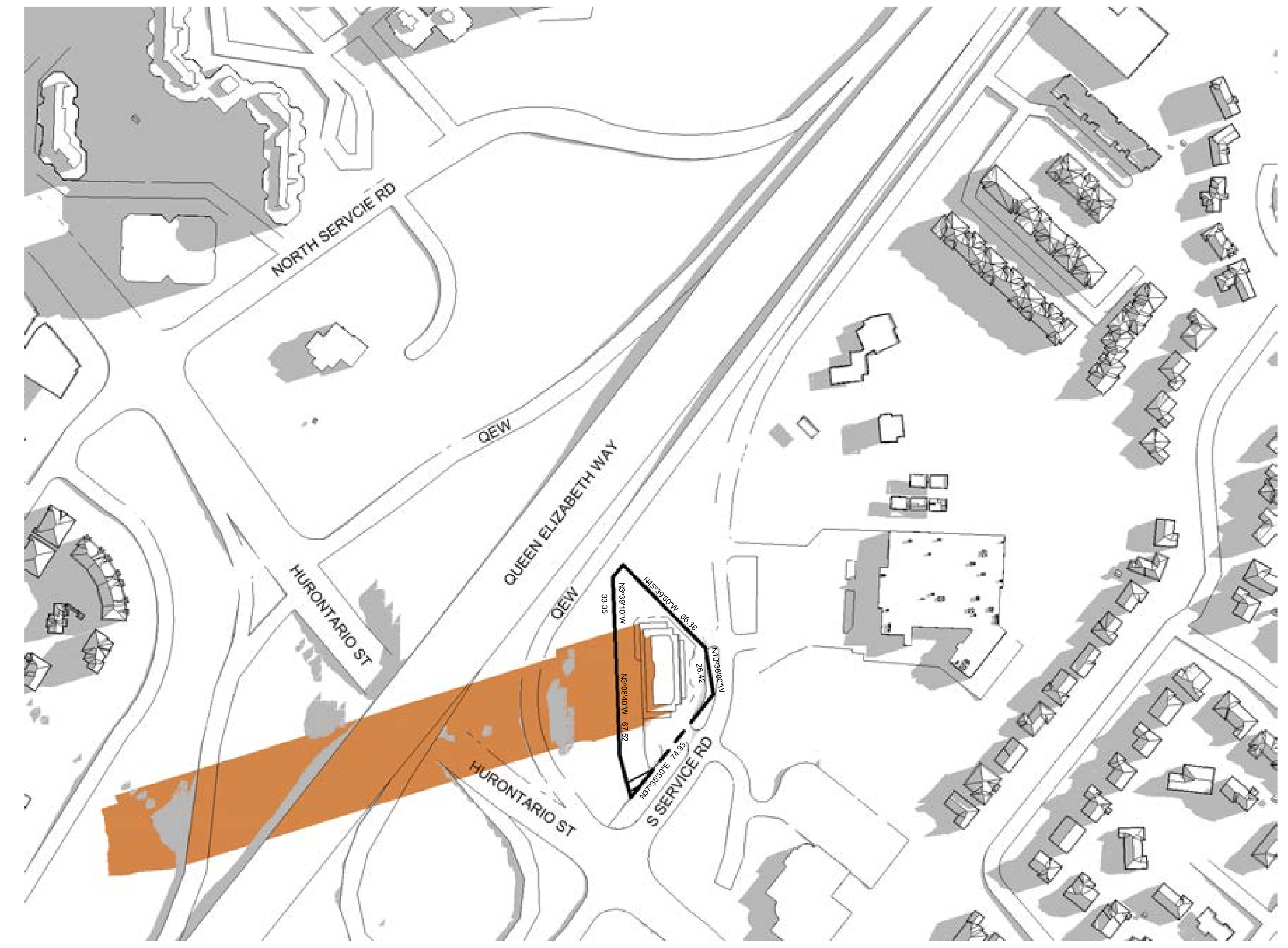
NTS dA6.01



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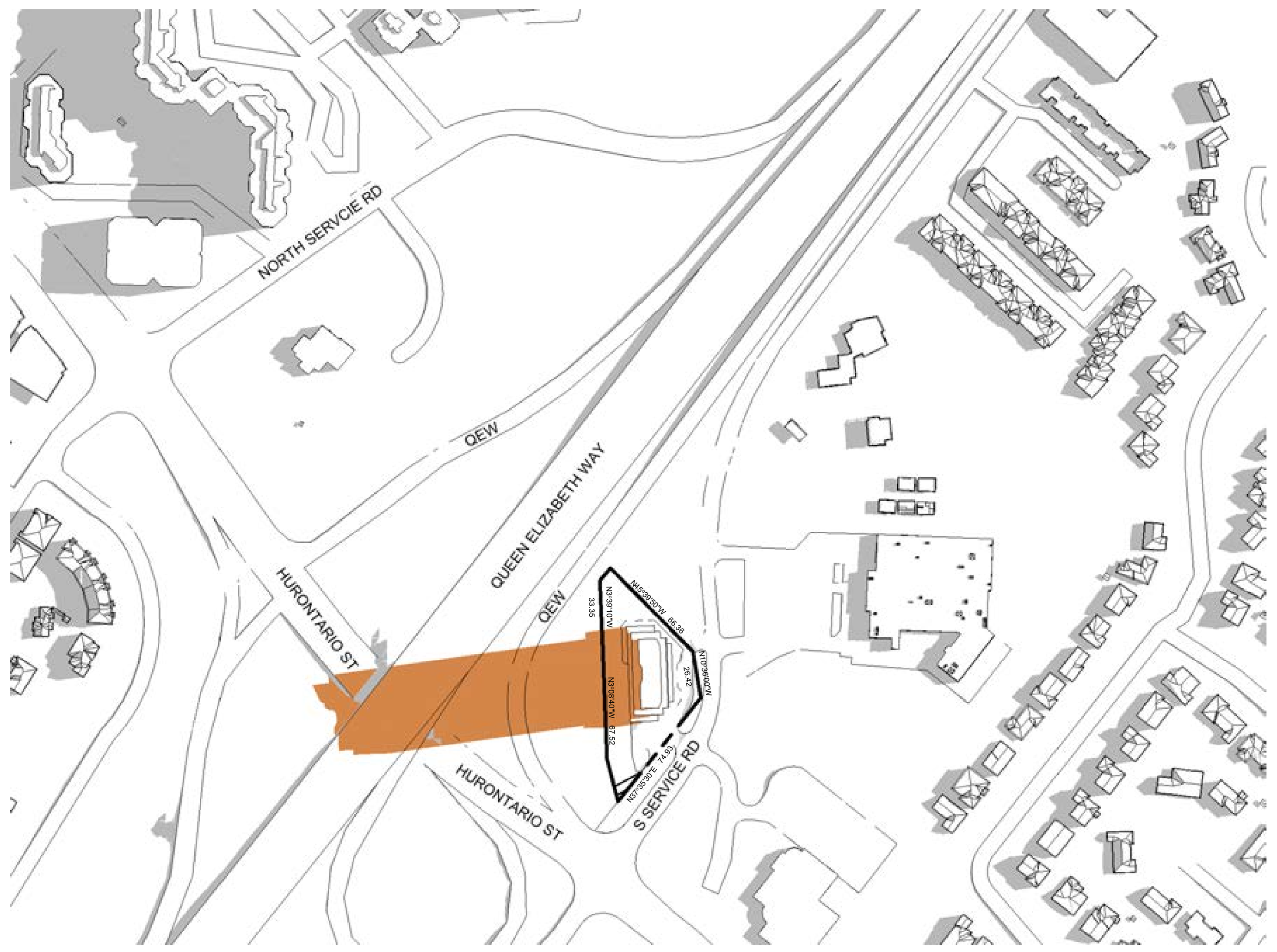

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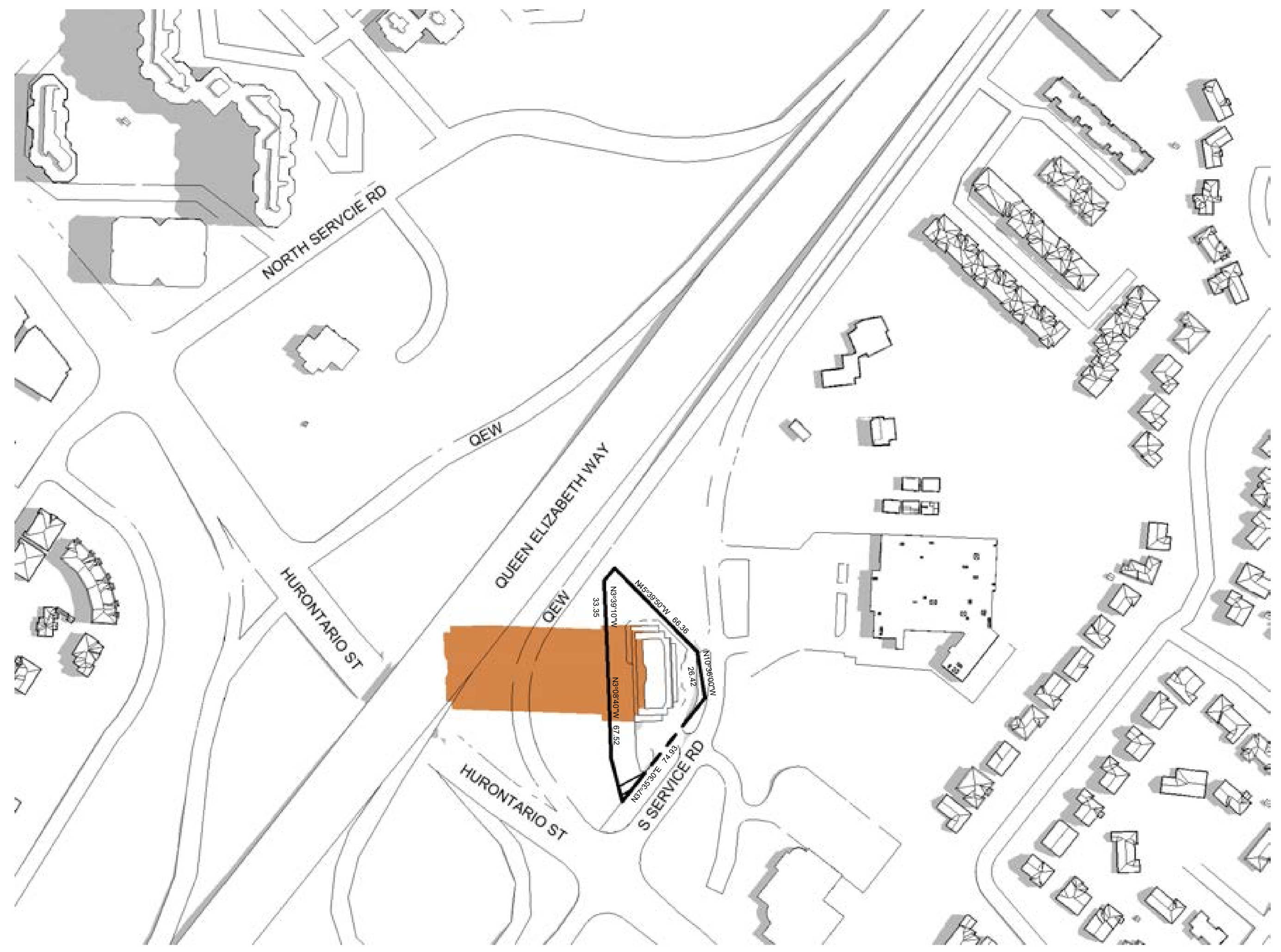
NTS dA6.01



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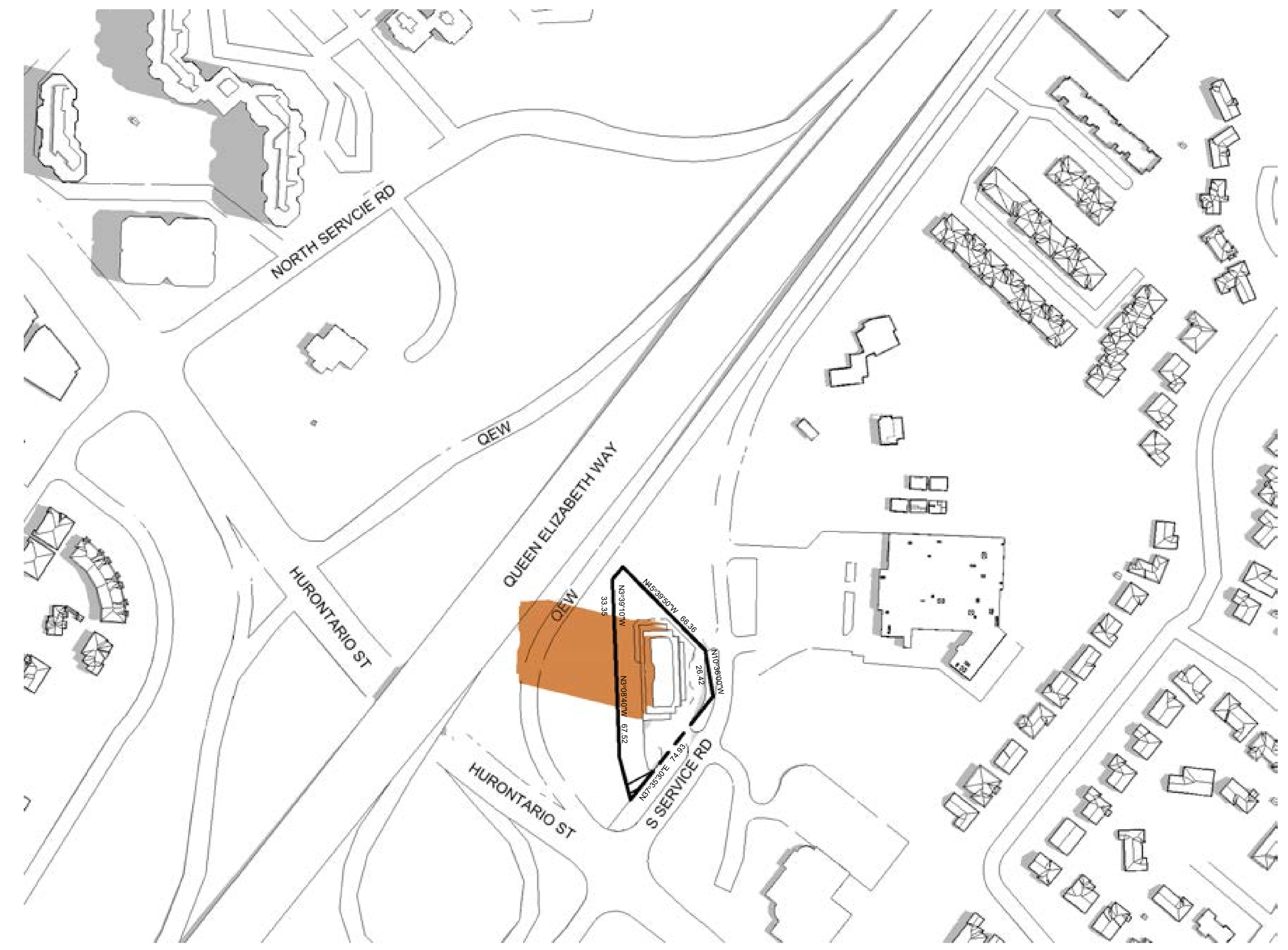

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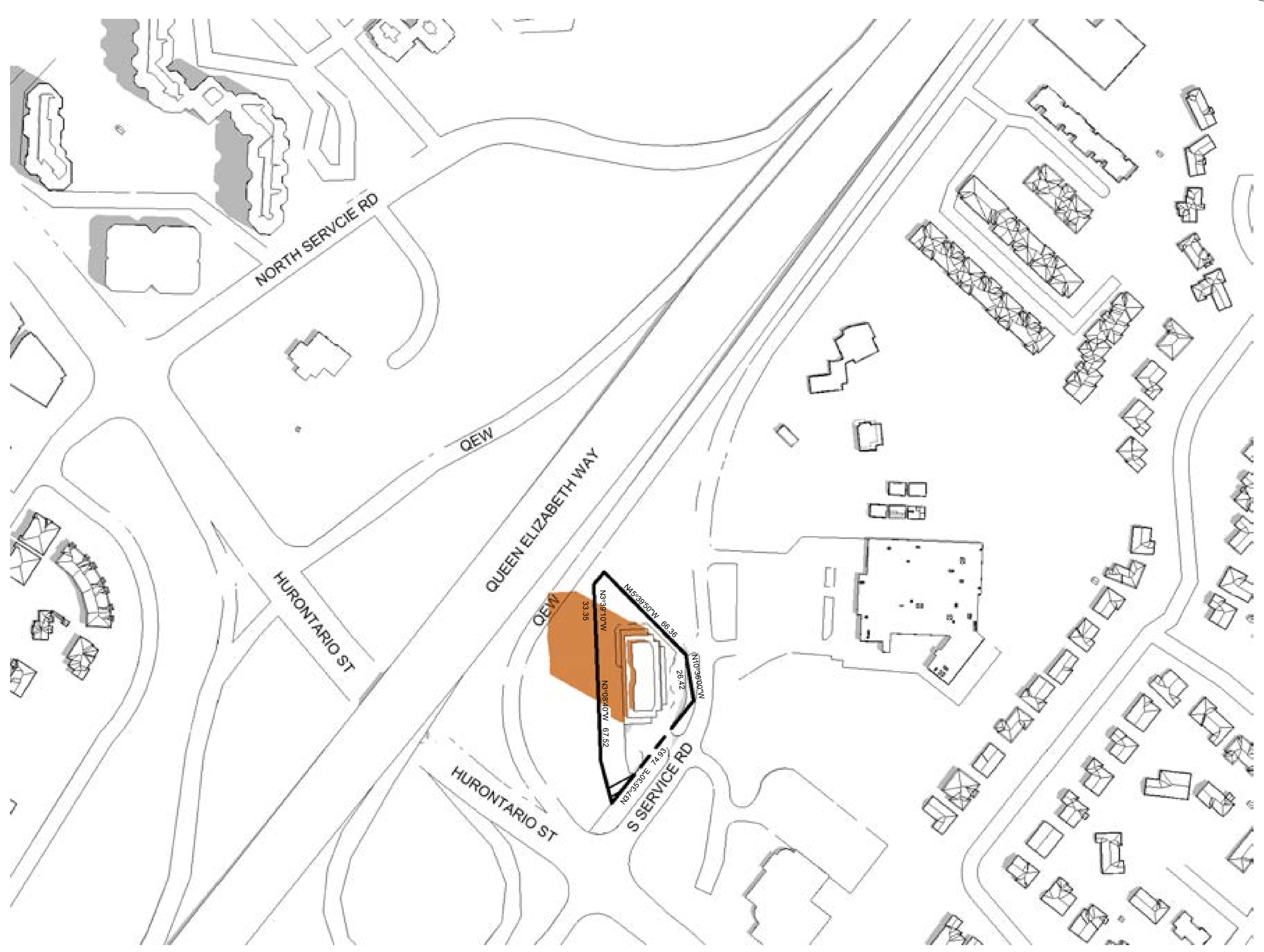

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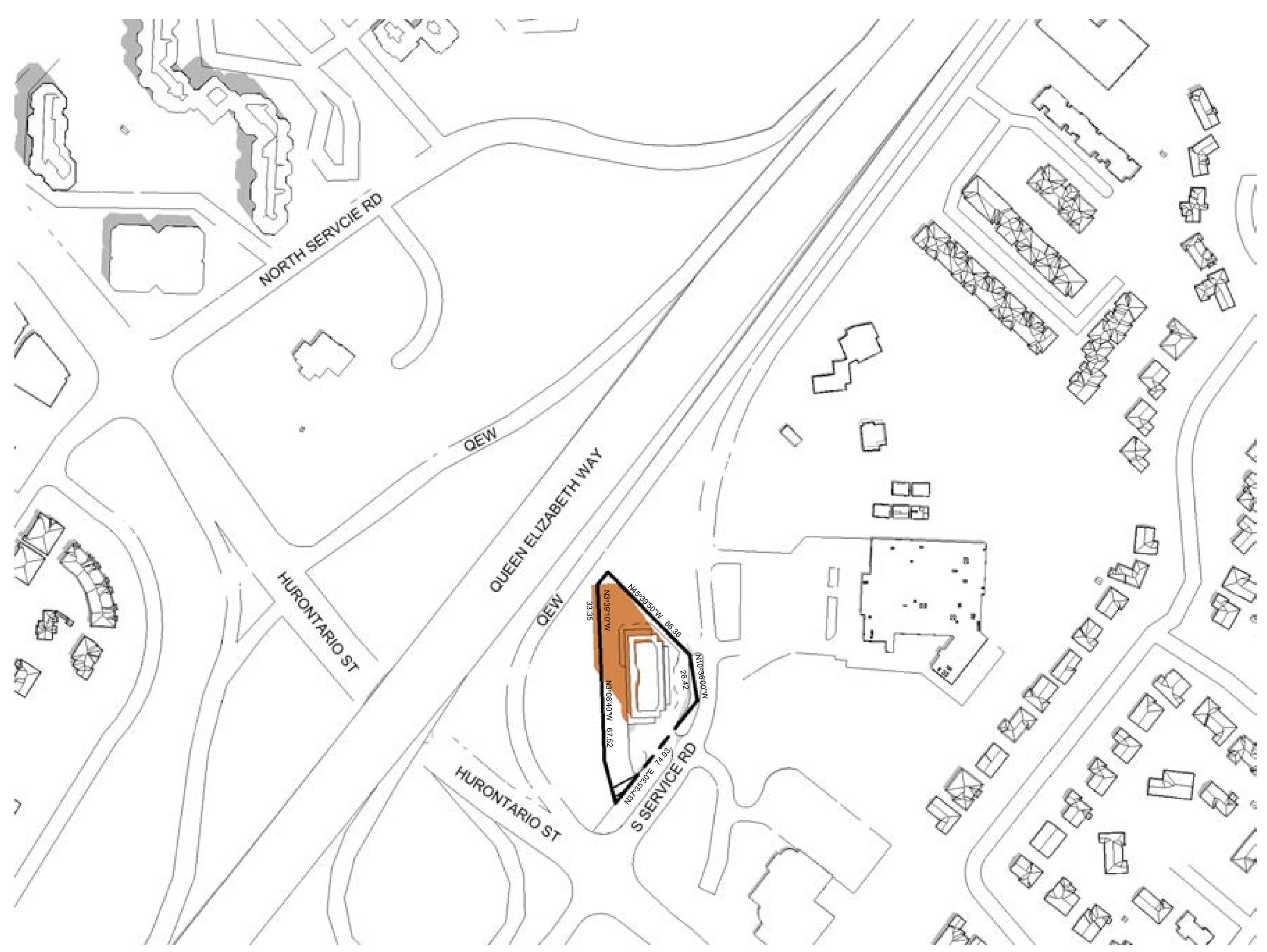

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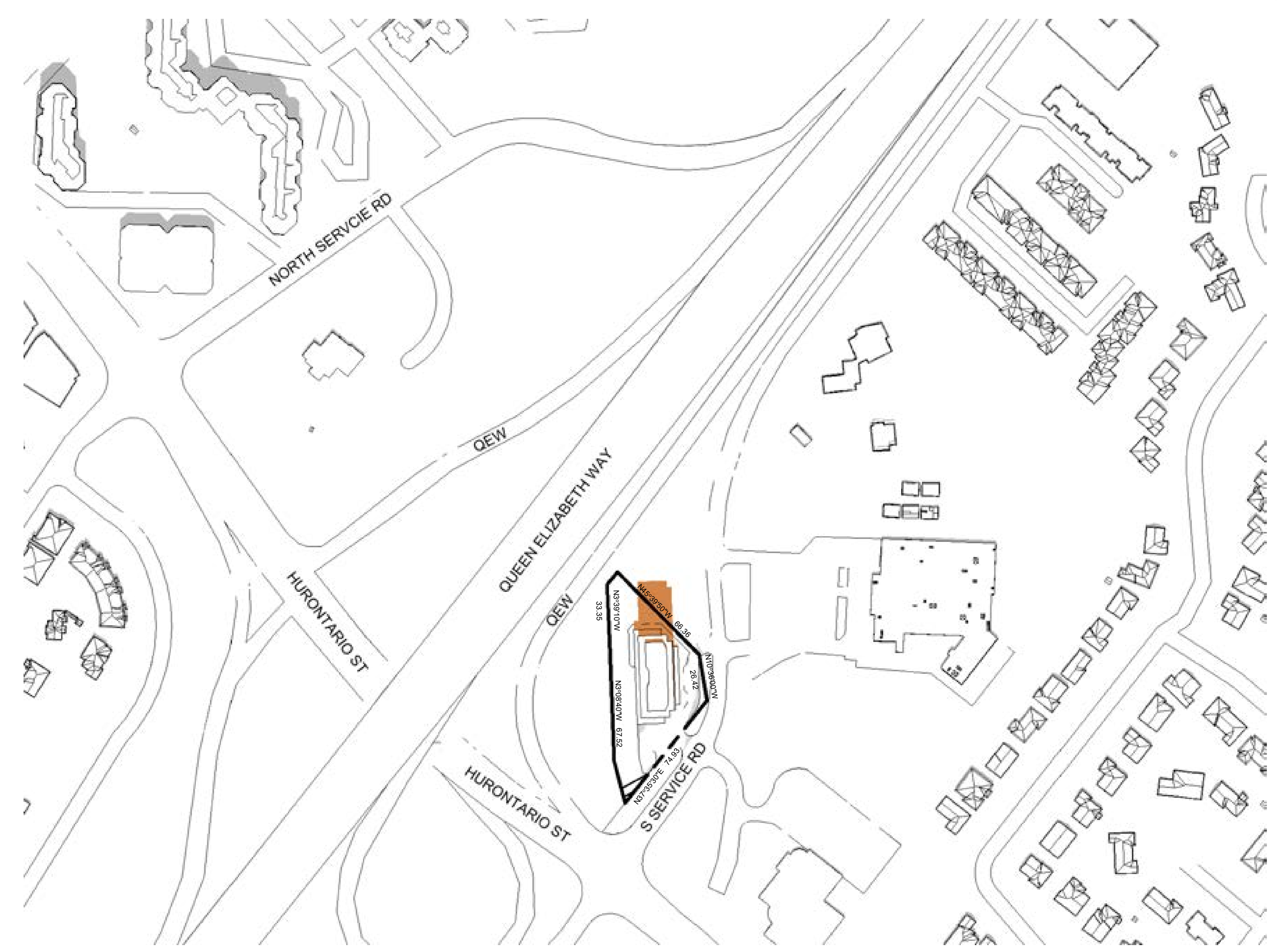

June 21 @ 13:20 9
NTS dA6.01

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

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LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
20 De Boers Drive Suite 400
Toronto, ON M3J 0H1

Revisions:

No.:	Revision:	Date:

No.:	Issued For:	Date:
01	ZBA/OPA Submission	Oct. 14, 2022

EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

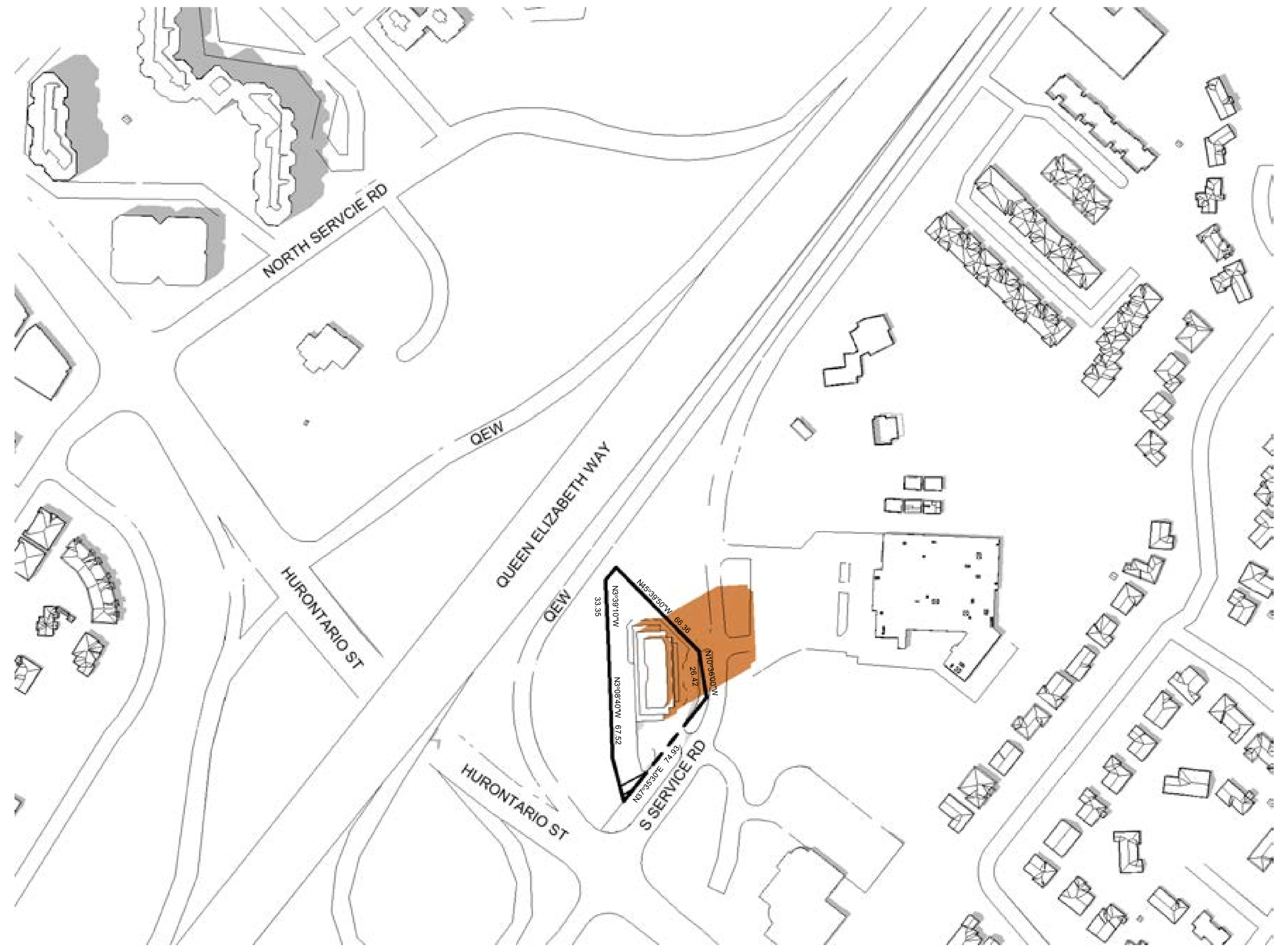
Drawing Title:
Sun Shadow Study June

Scale:
0 5 10 20 50 100 200

N

Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:
dA6.01

June 21 @14:20 1
NTS dA6.02



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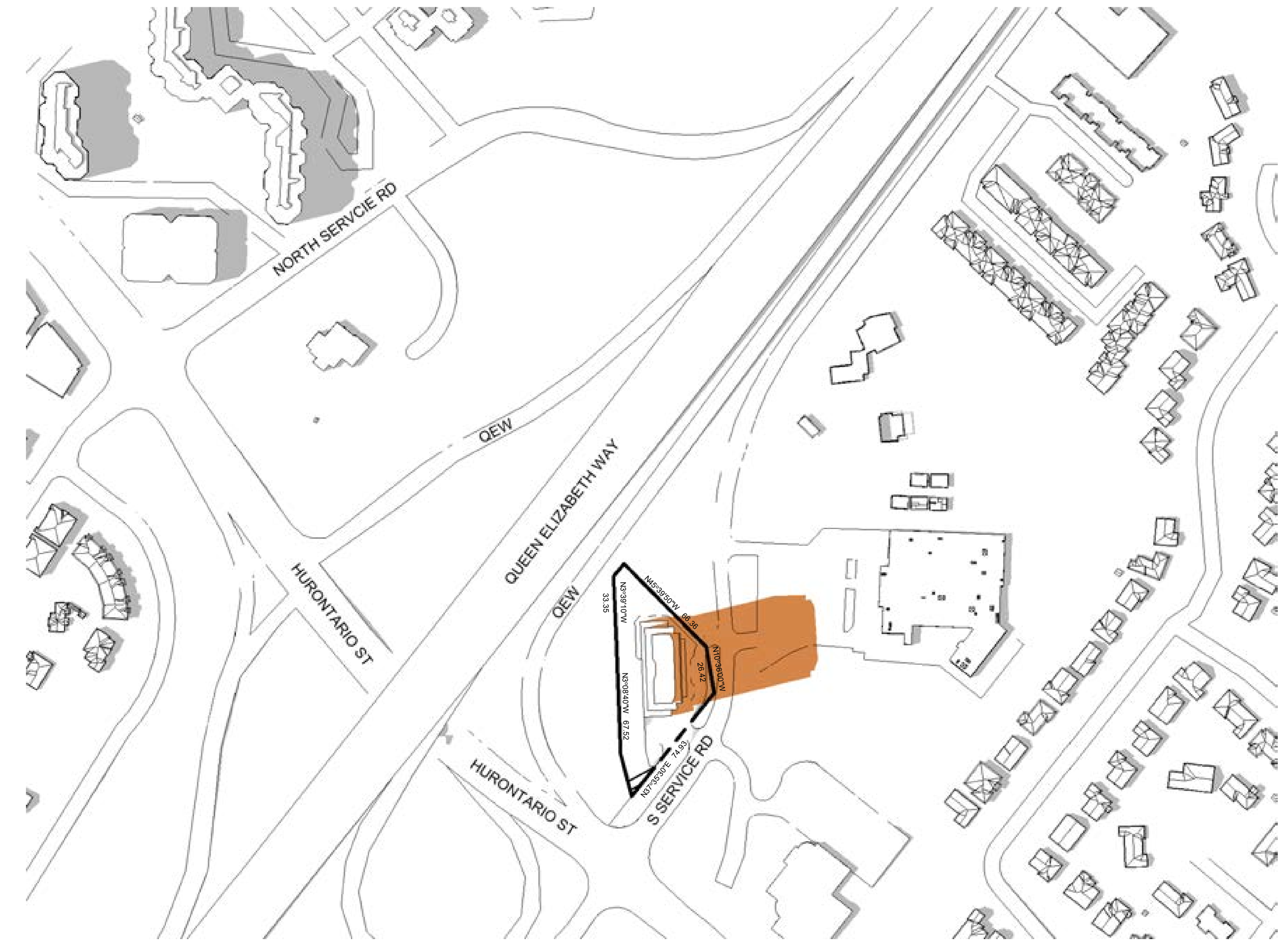
NTS dA6.02



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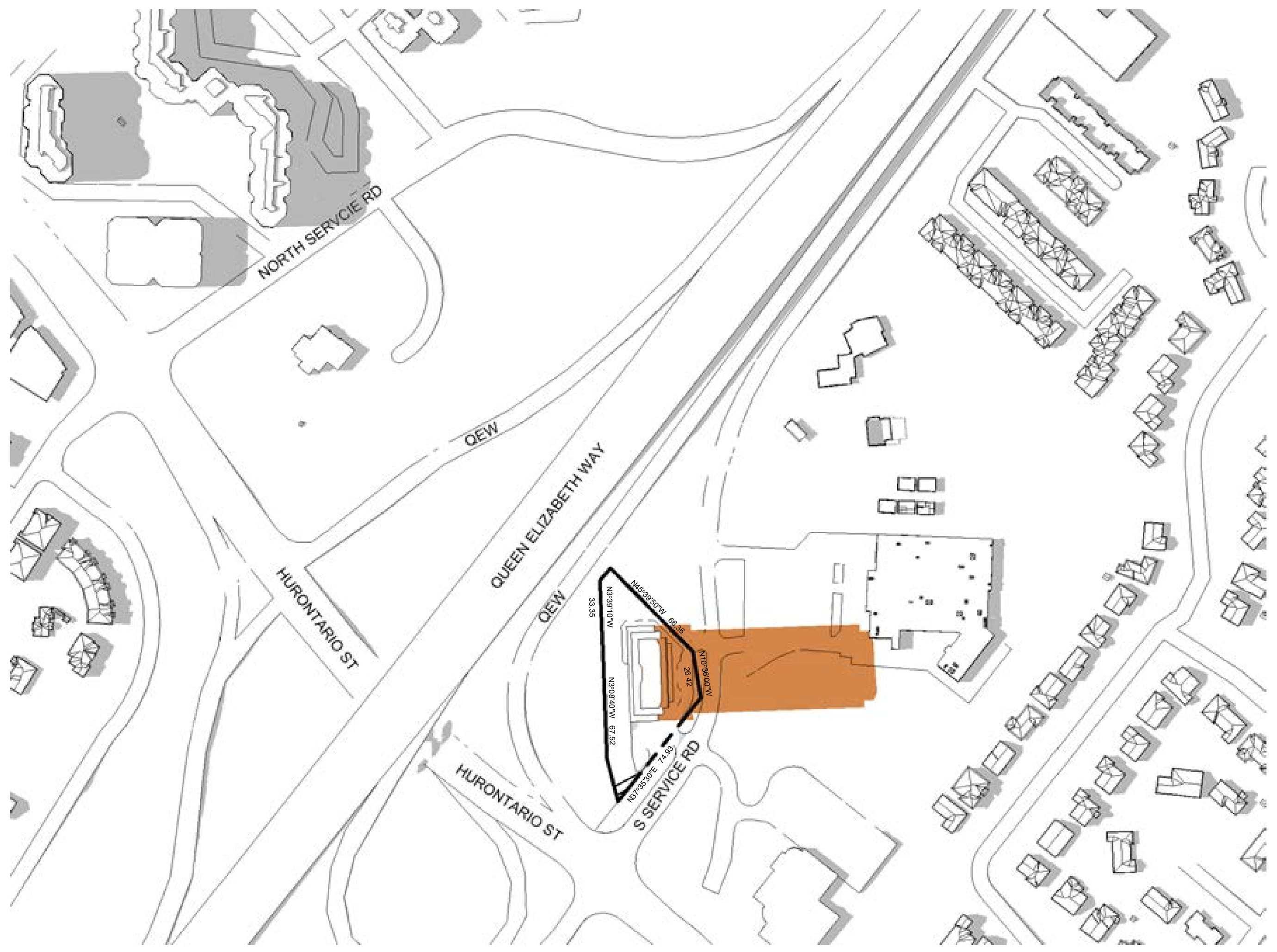

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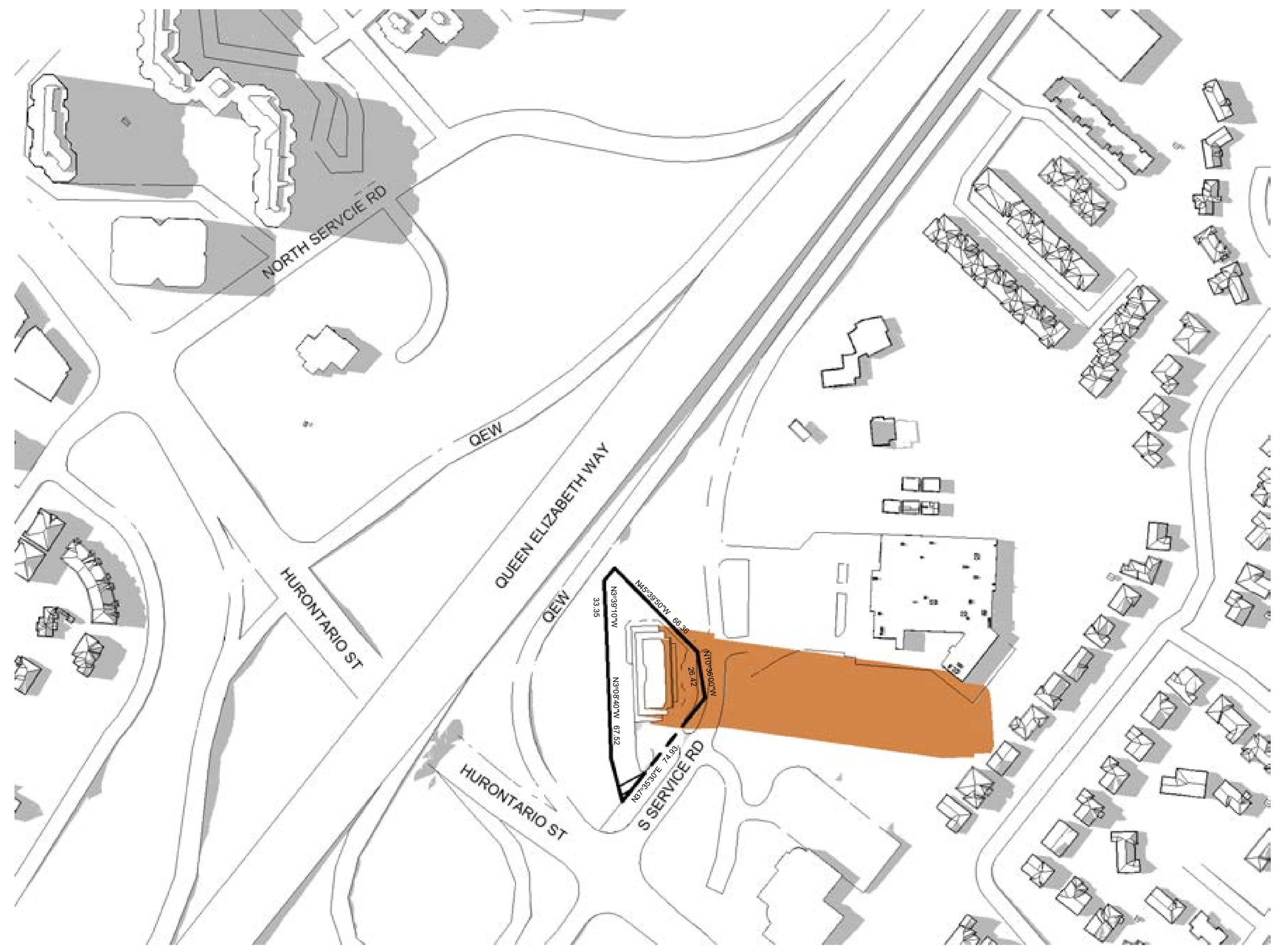
NTS dA6.02



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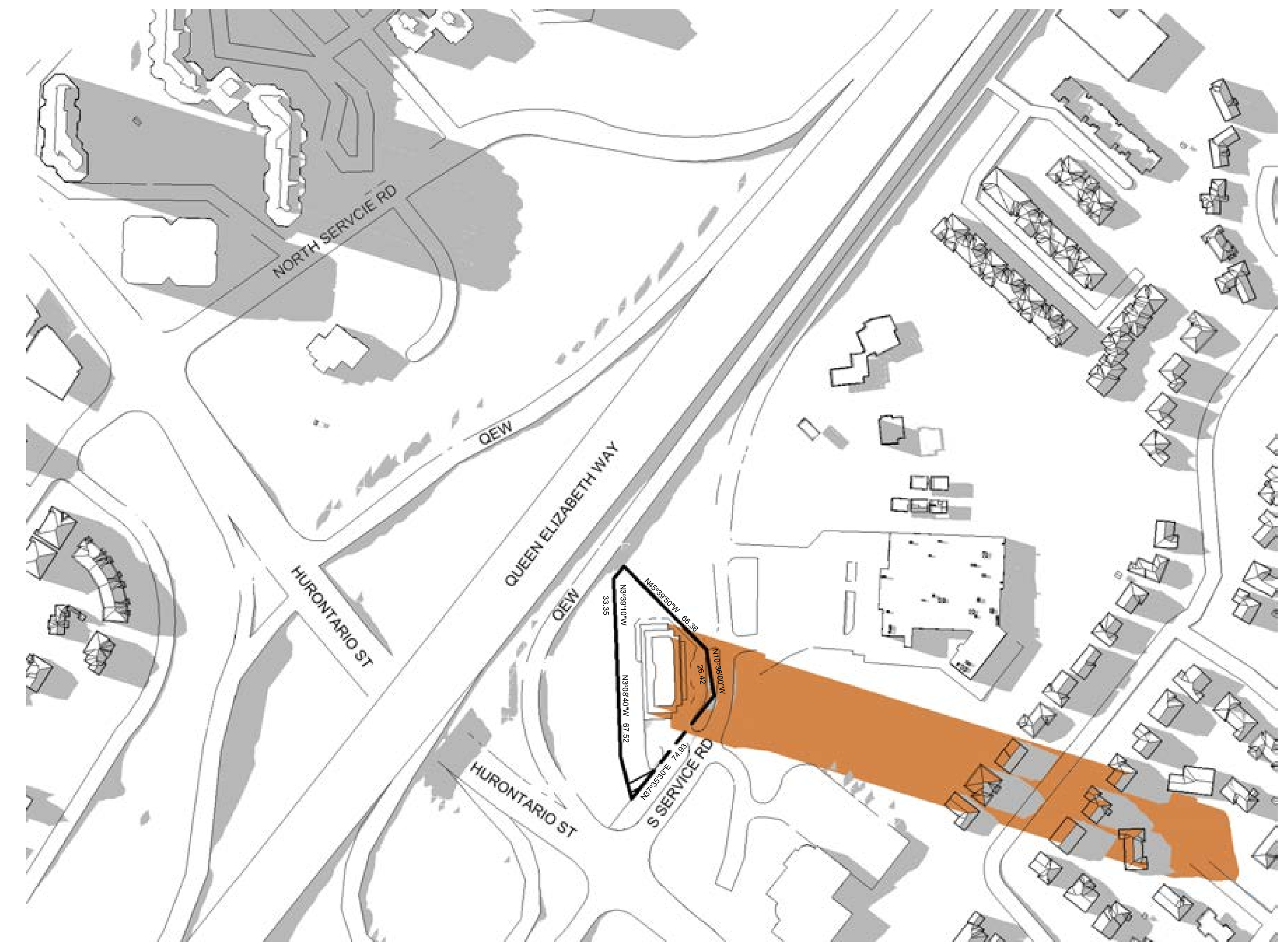

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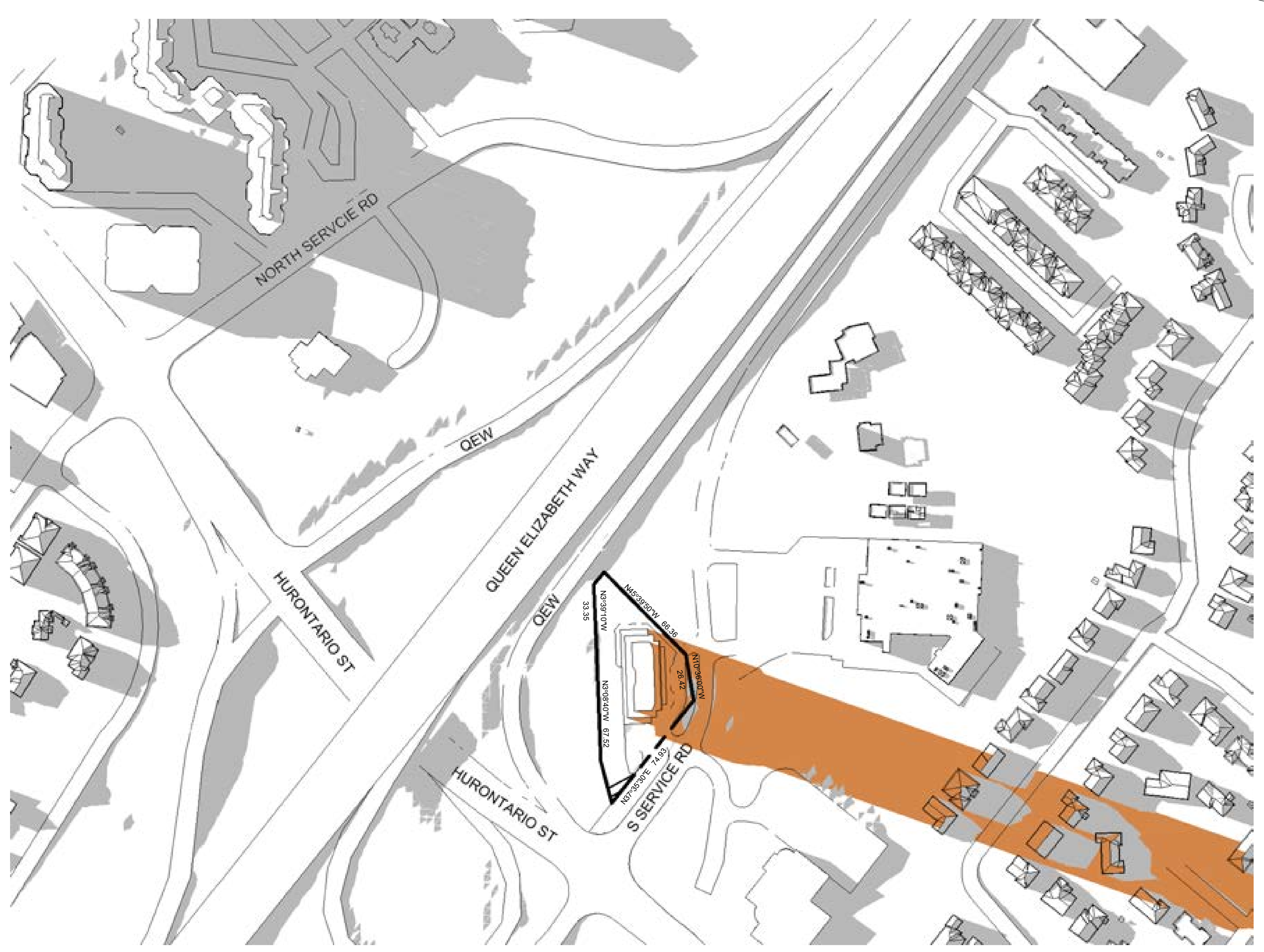

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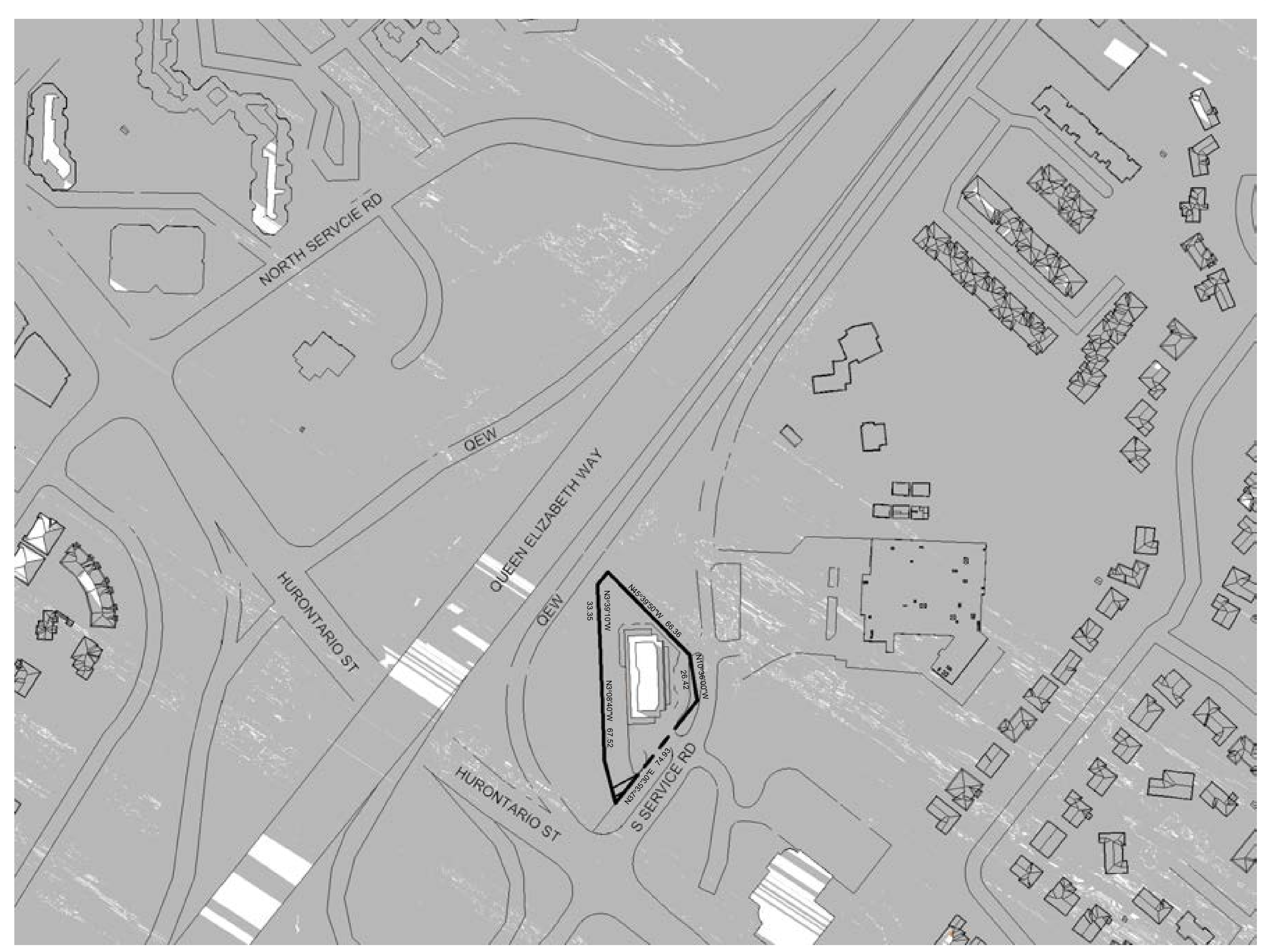

June 21 @ 21:03 8
NTS dA6.02

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
ARCHITECTS AND PLANNERS
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Proposed Residential Development

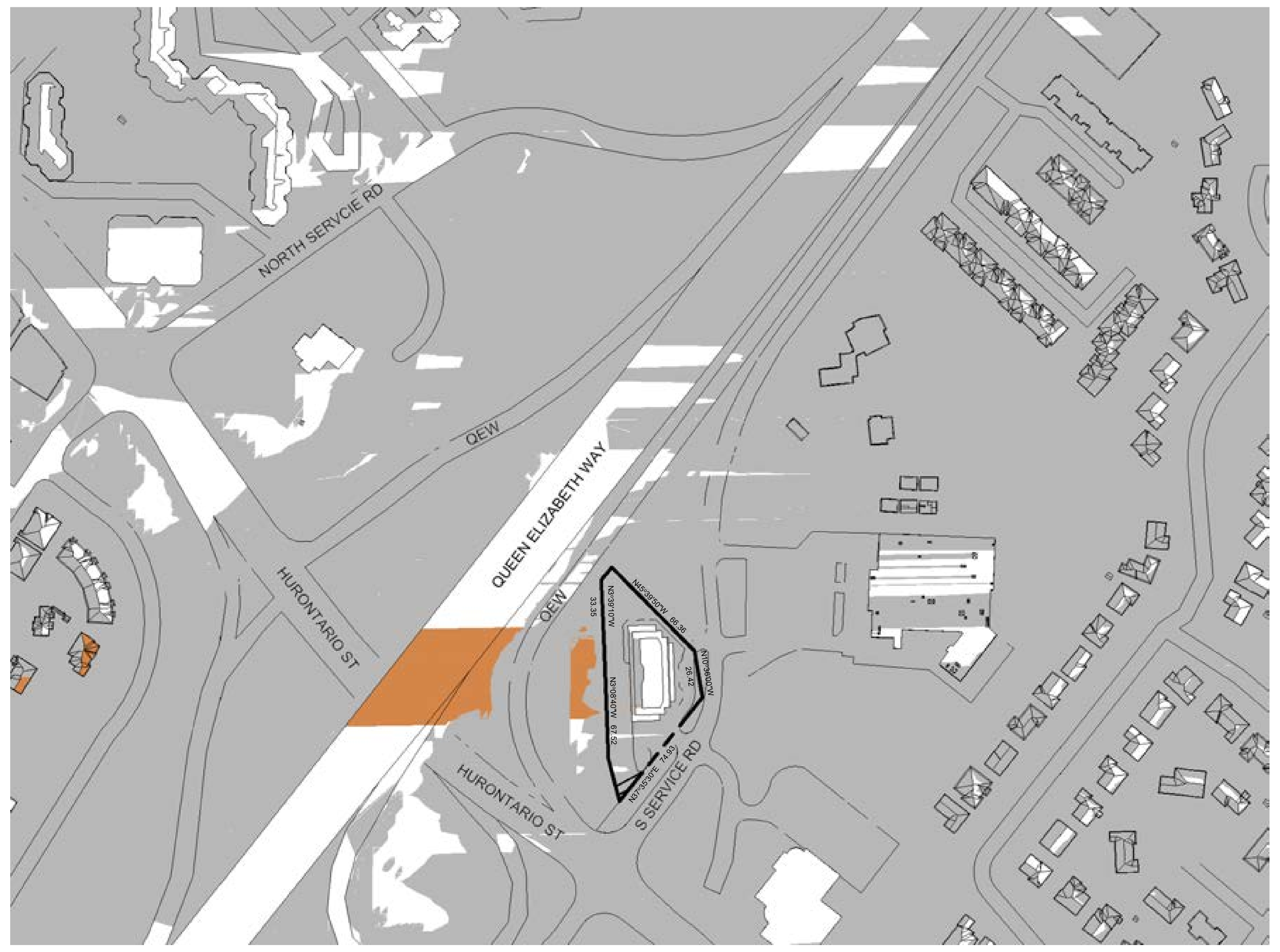
Drawing Title:
Sun Shadow Study June

Scale: 0 5 10 20 50 100 200

N

Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:
dA6.02

Plot Date: 2022-10-05 2:12:39 PMFile Path: C:\Revit\2021\22073P011_Edenshaw-49 South Service



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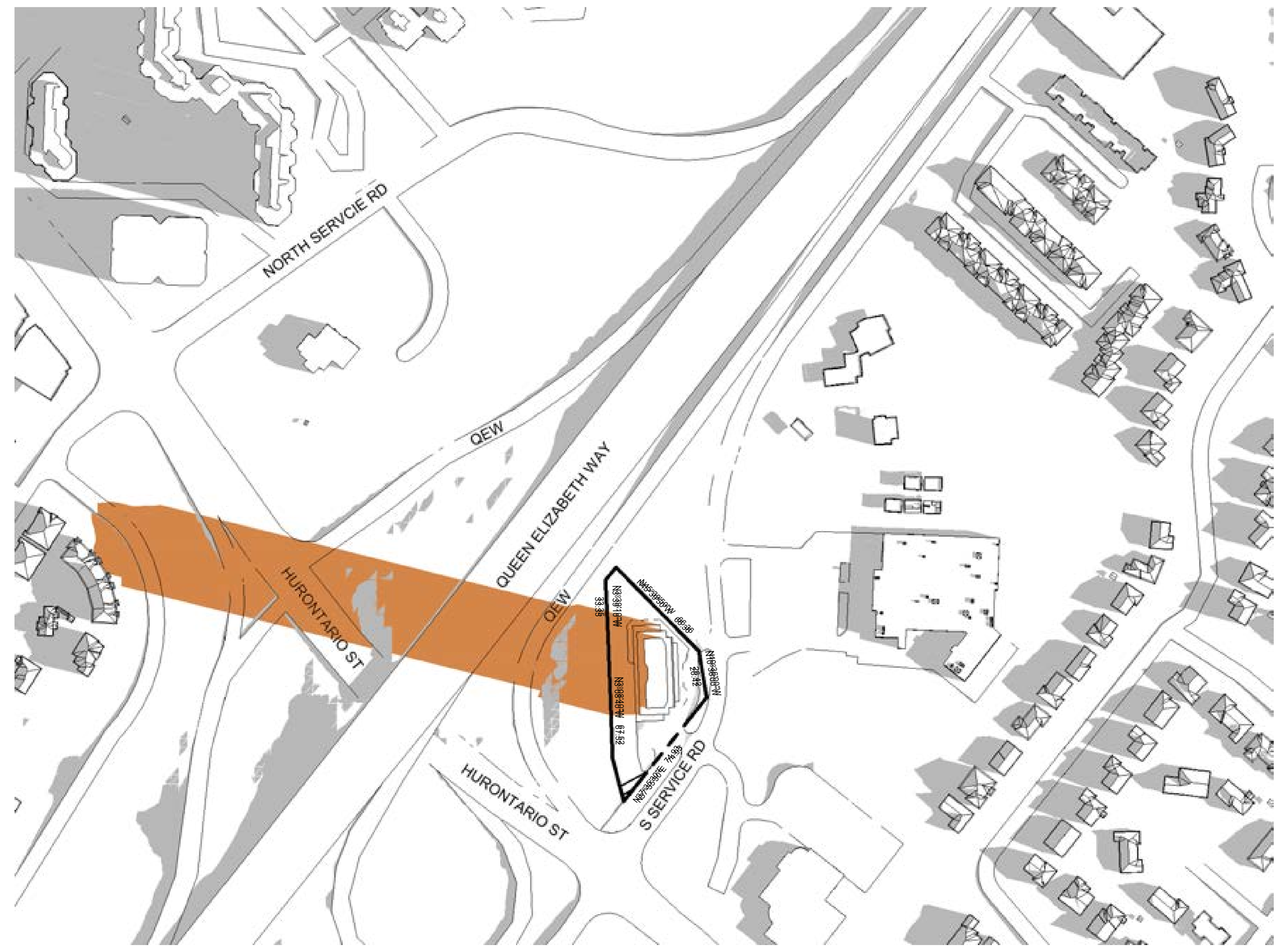

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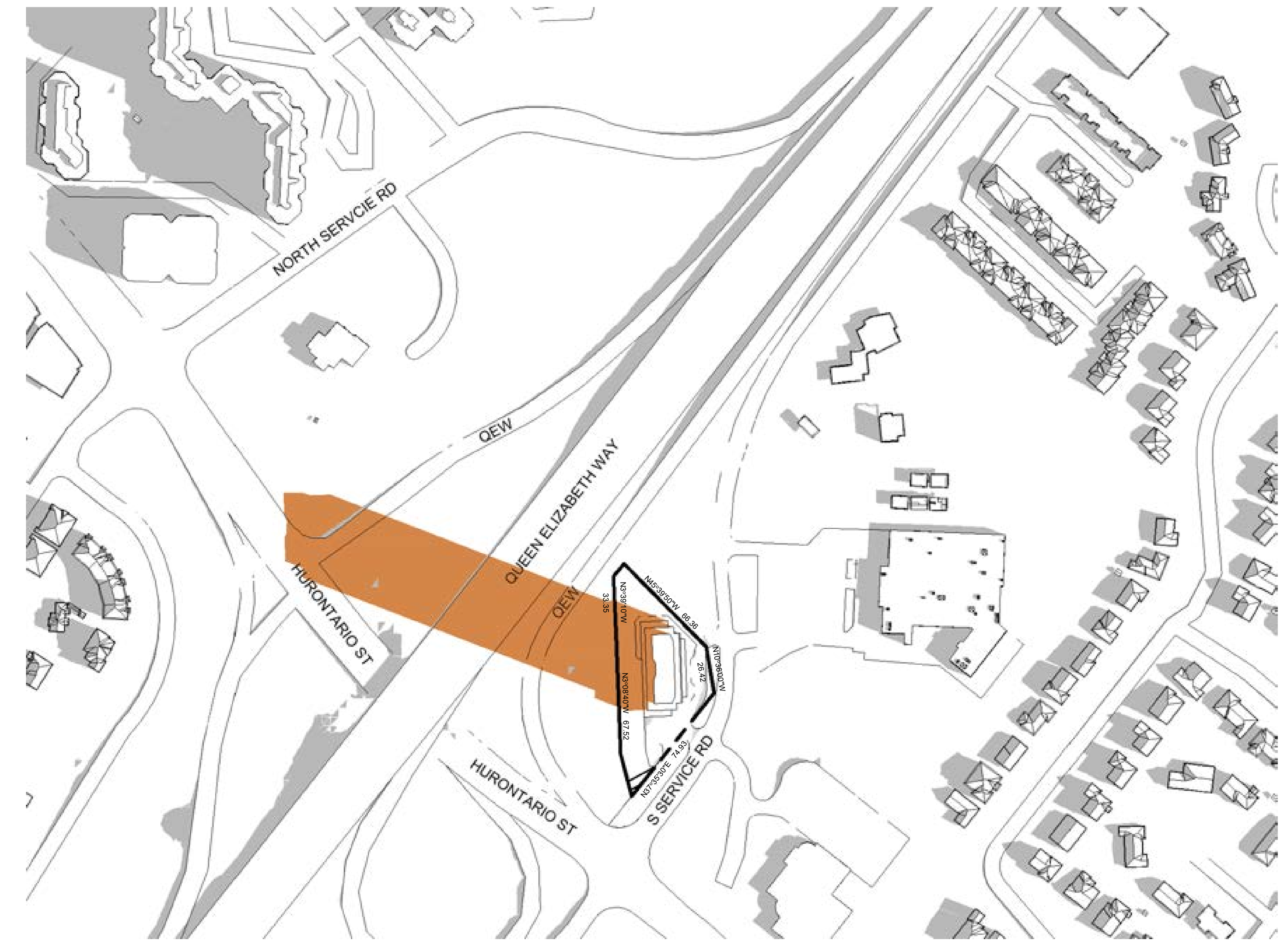

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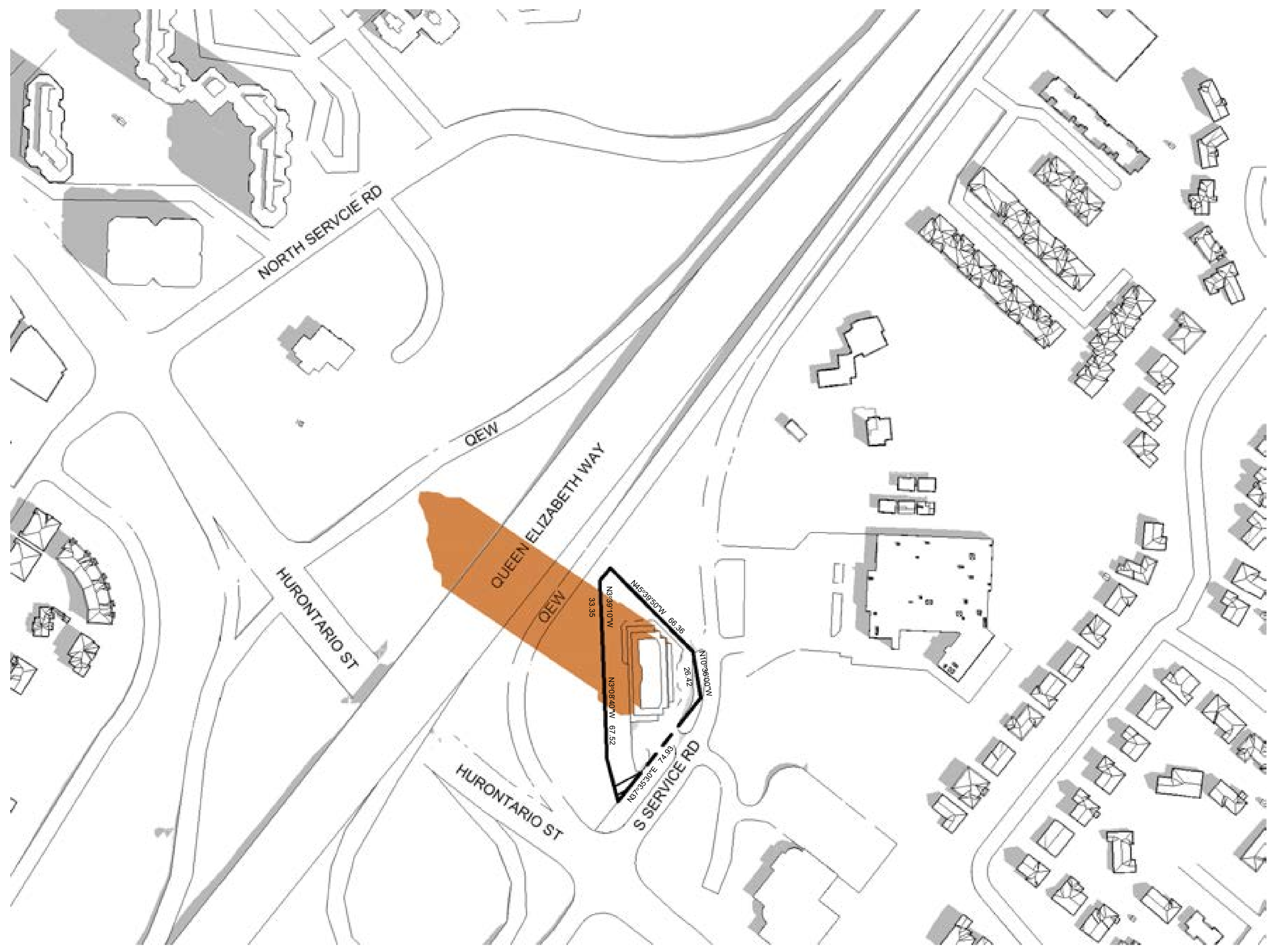

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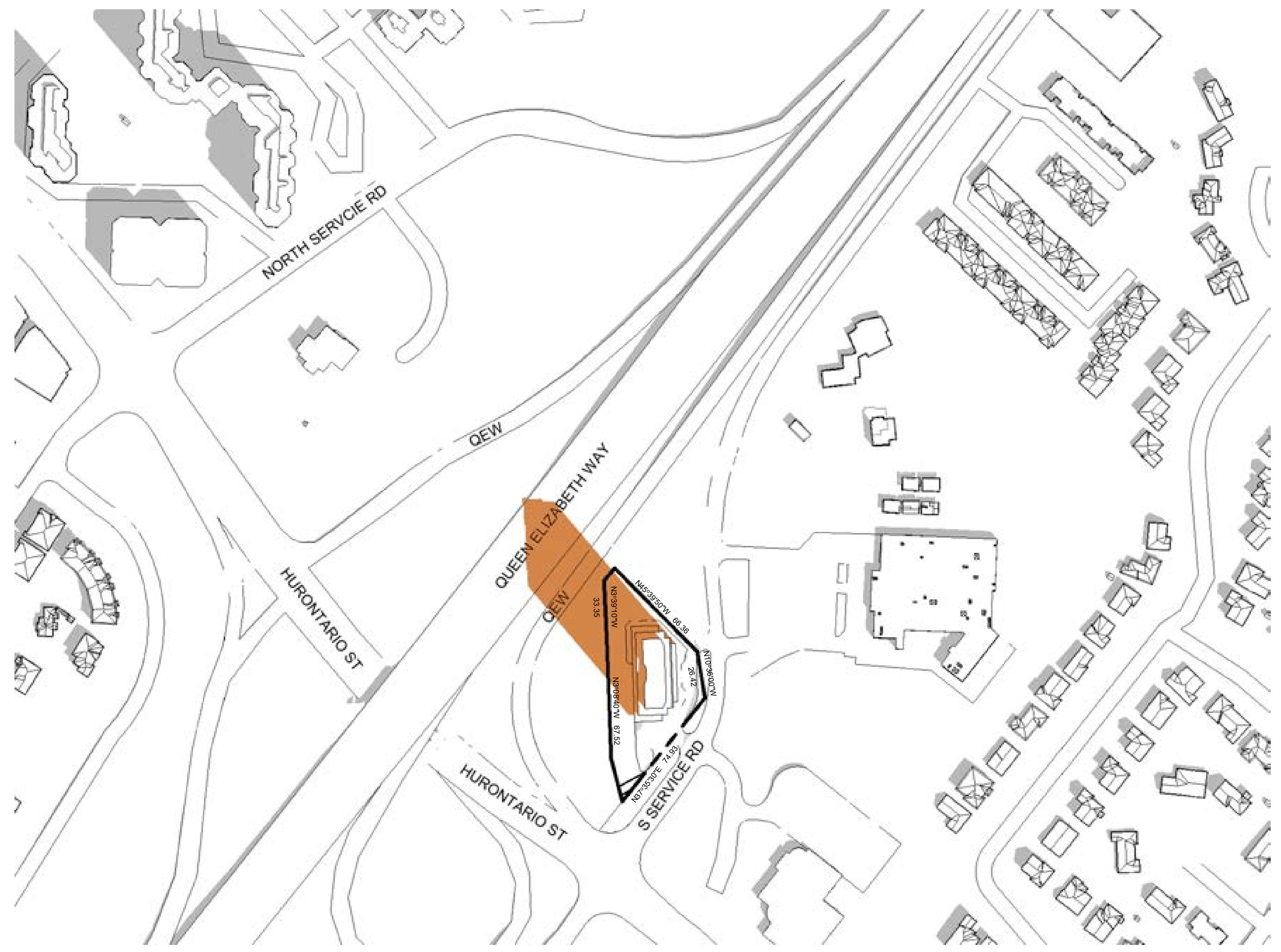

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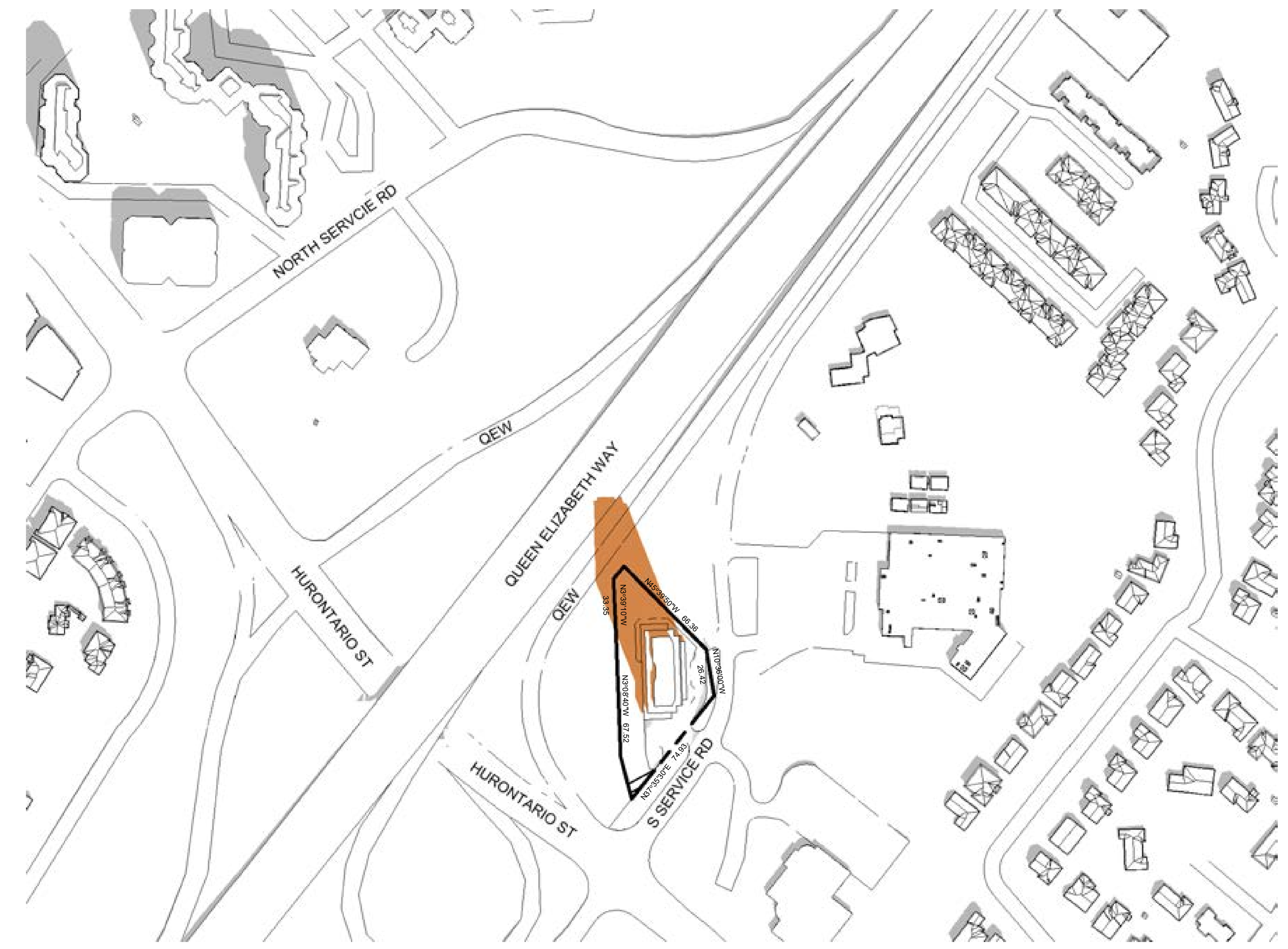

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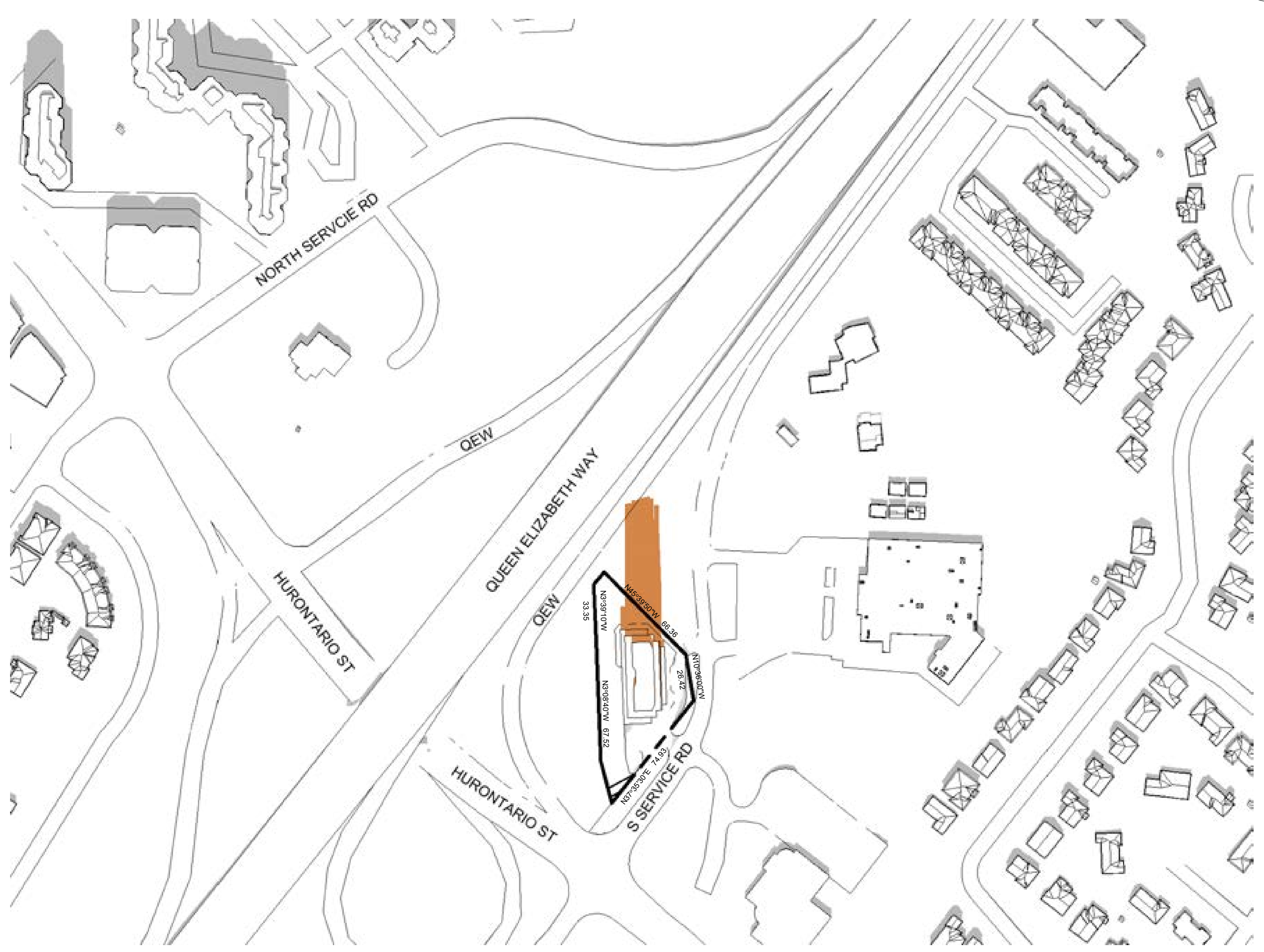

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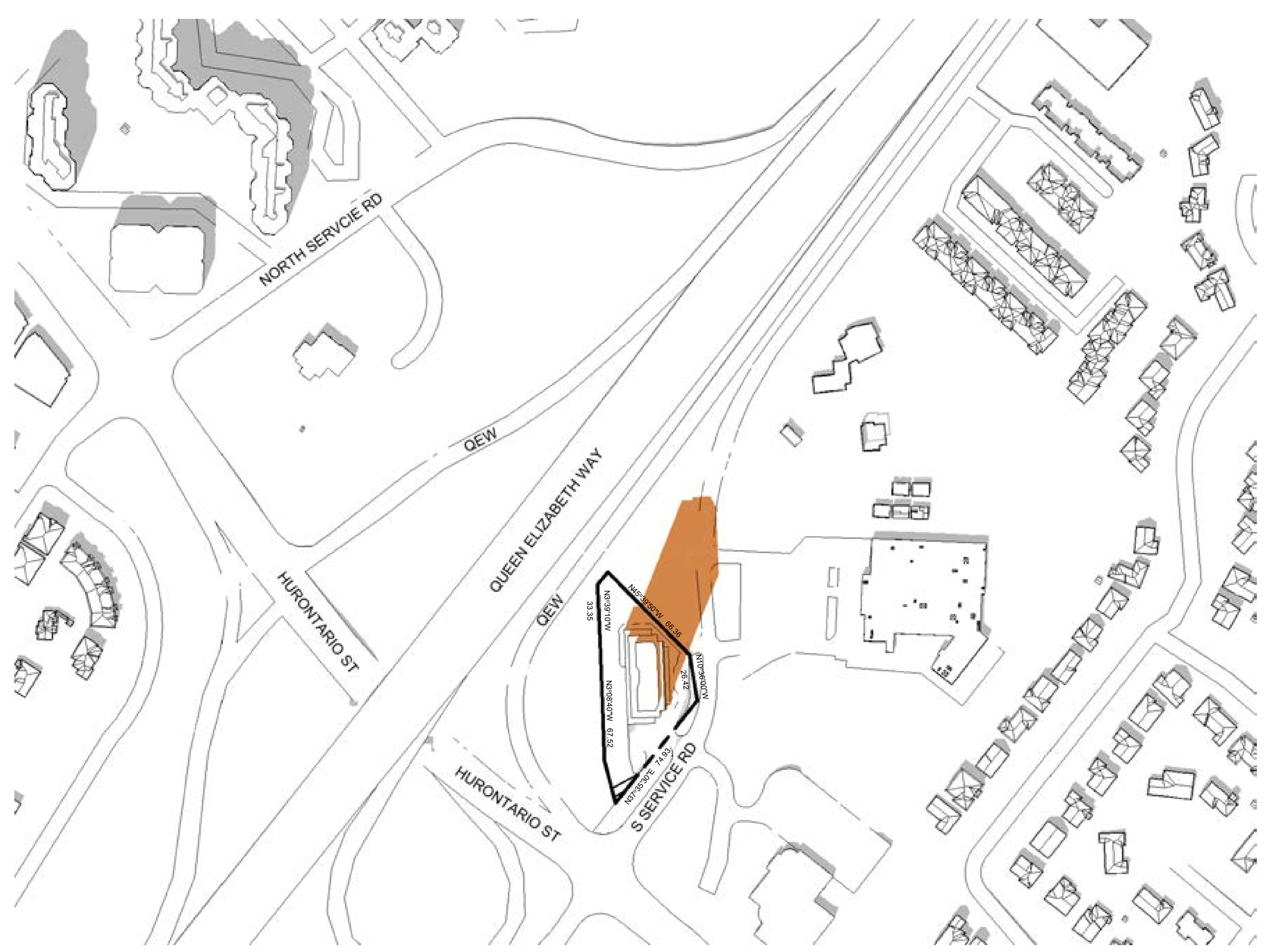

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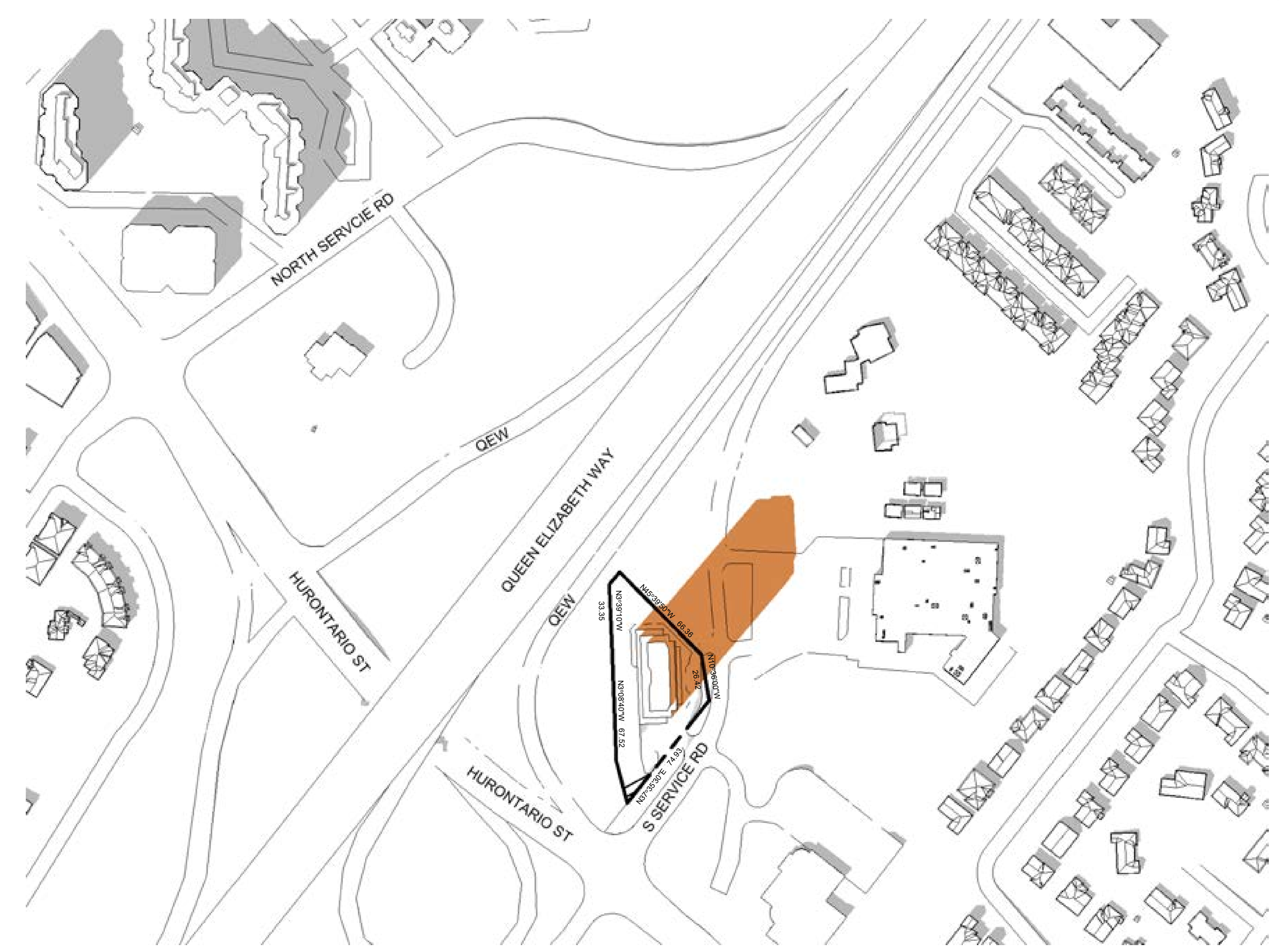

March/September 21 @ 15:12 9
NTS dA6.03

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

Do not scale the drawings.

This Drawing Is Not To Be Used For Construction Until Signed ByThe Architect.

Date:

ONTARIO ASSOCIATION OF ARCHITECTS
BRENT F. WHITBY
LICENCE
6723

KIRKOR
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EDENSHAW

Client:
EDENSHAW SSR DEVELOPMENTS LTD.

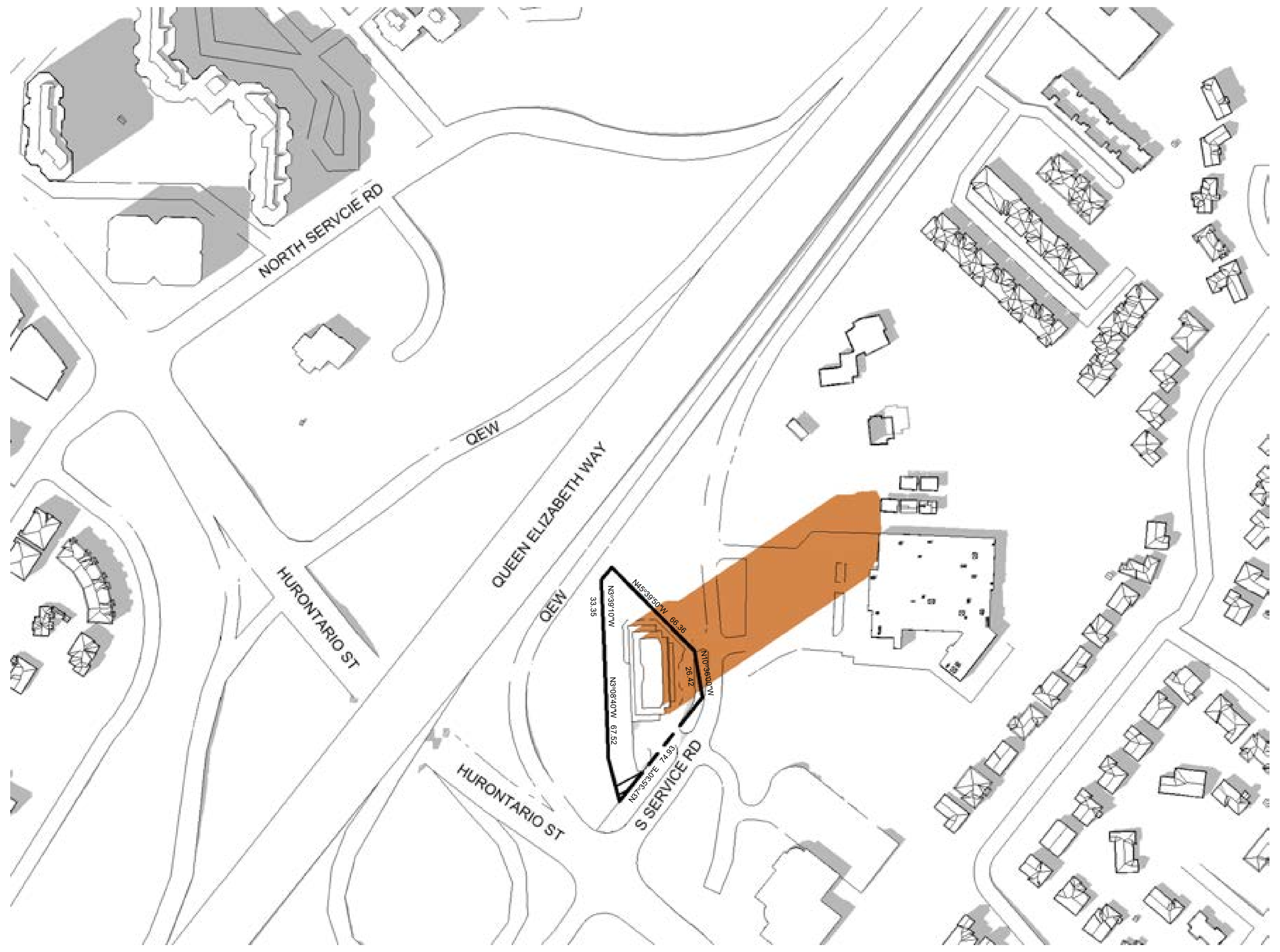
49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Sun Shadow Study Sep/Mar

Scale:
0 5 10 20 50 100 200

N

Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:
dA6.03



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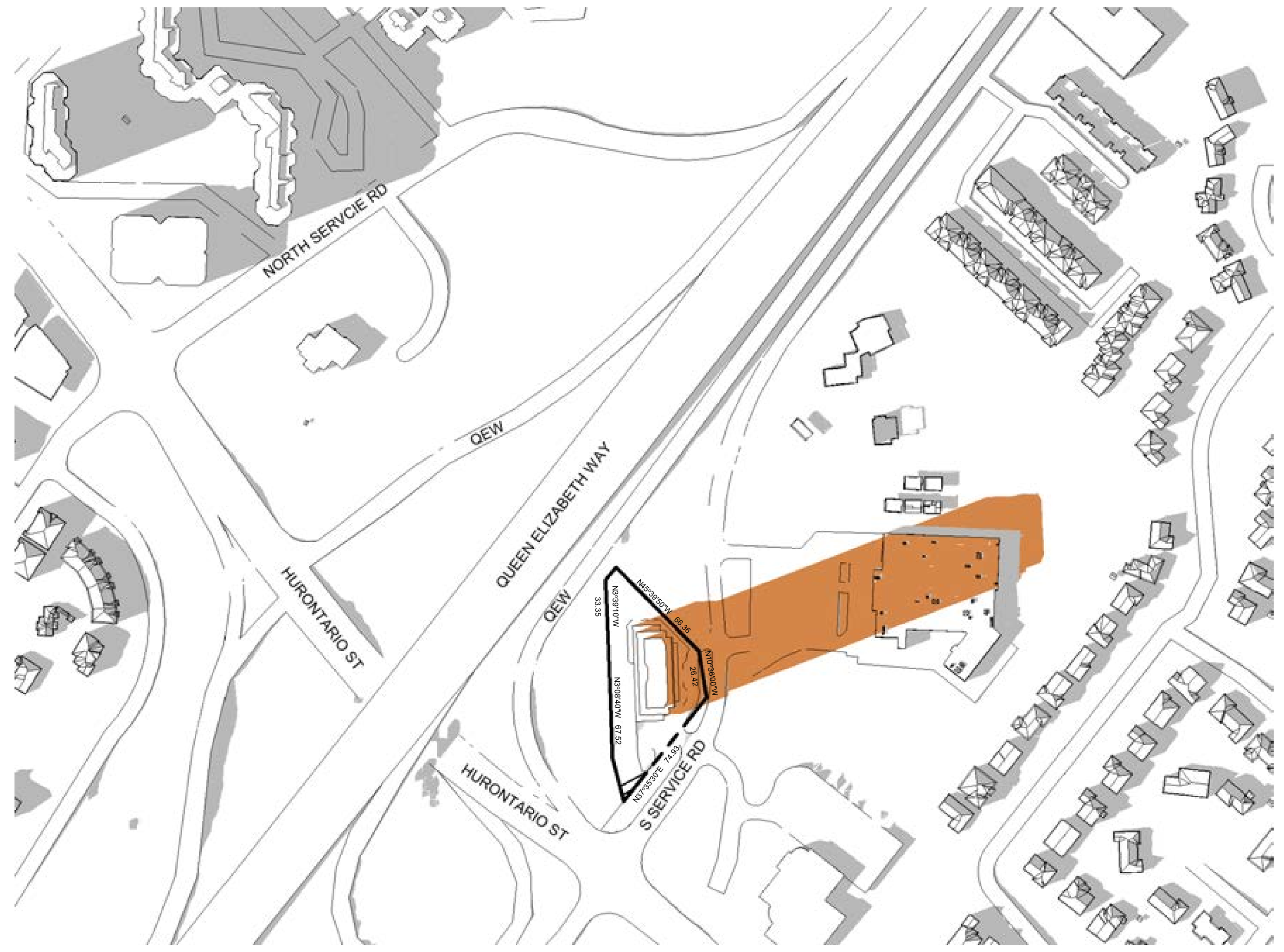
NTS dA6.04



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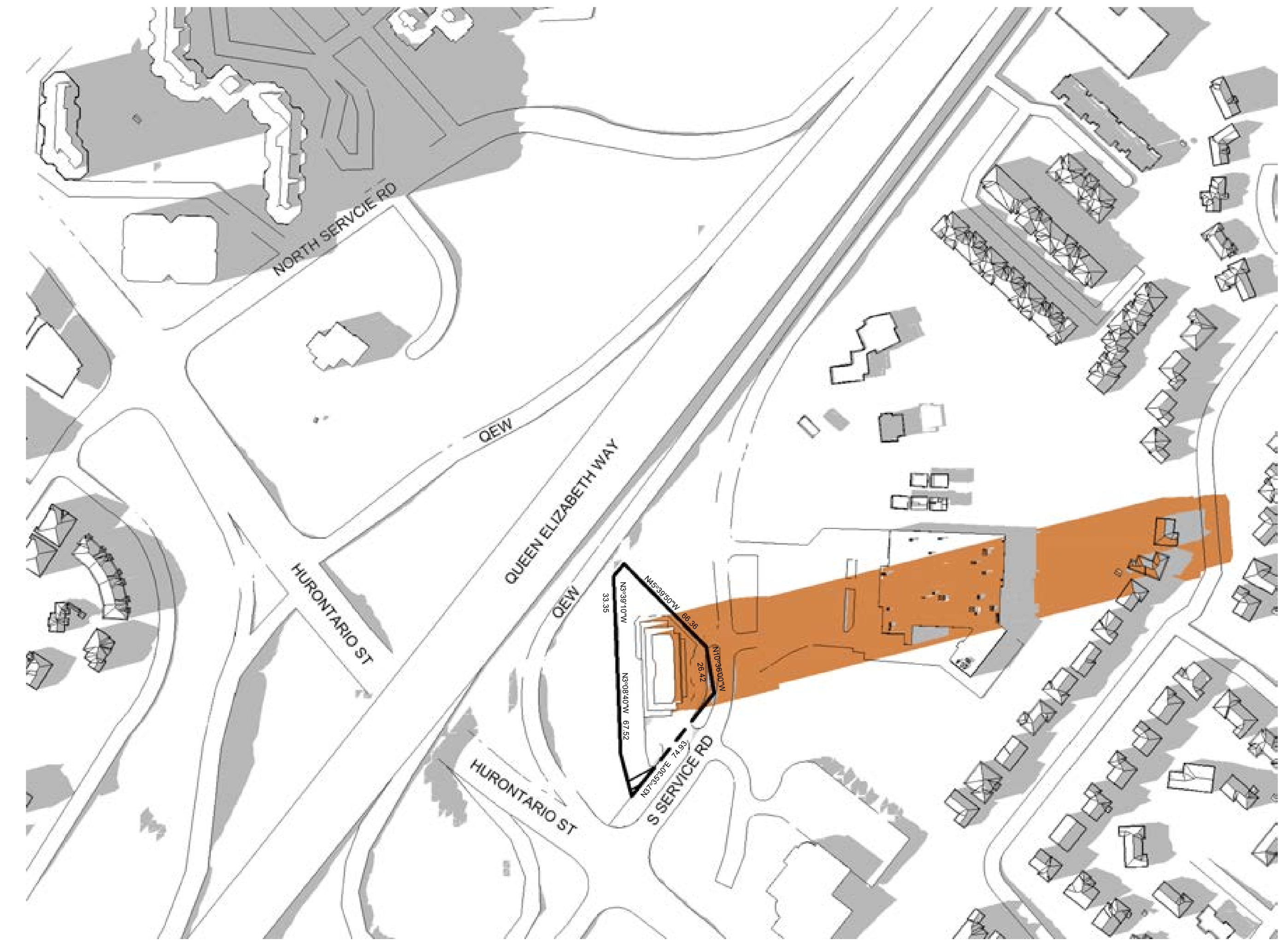

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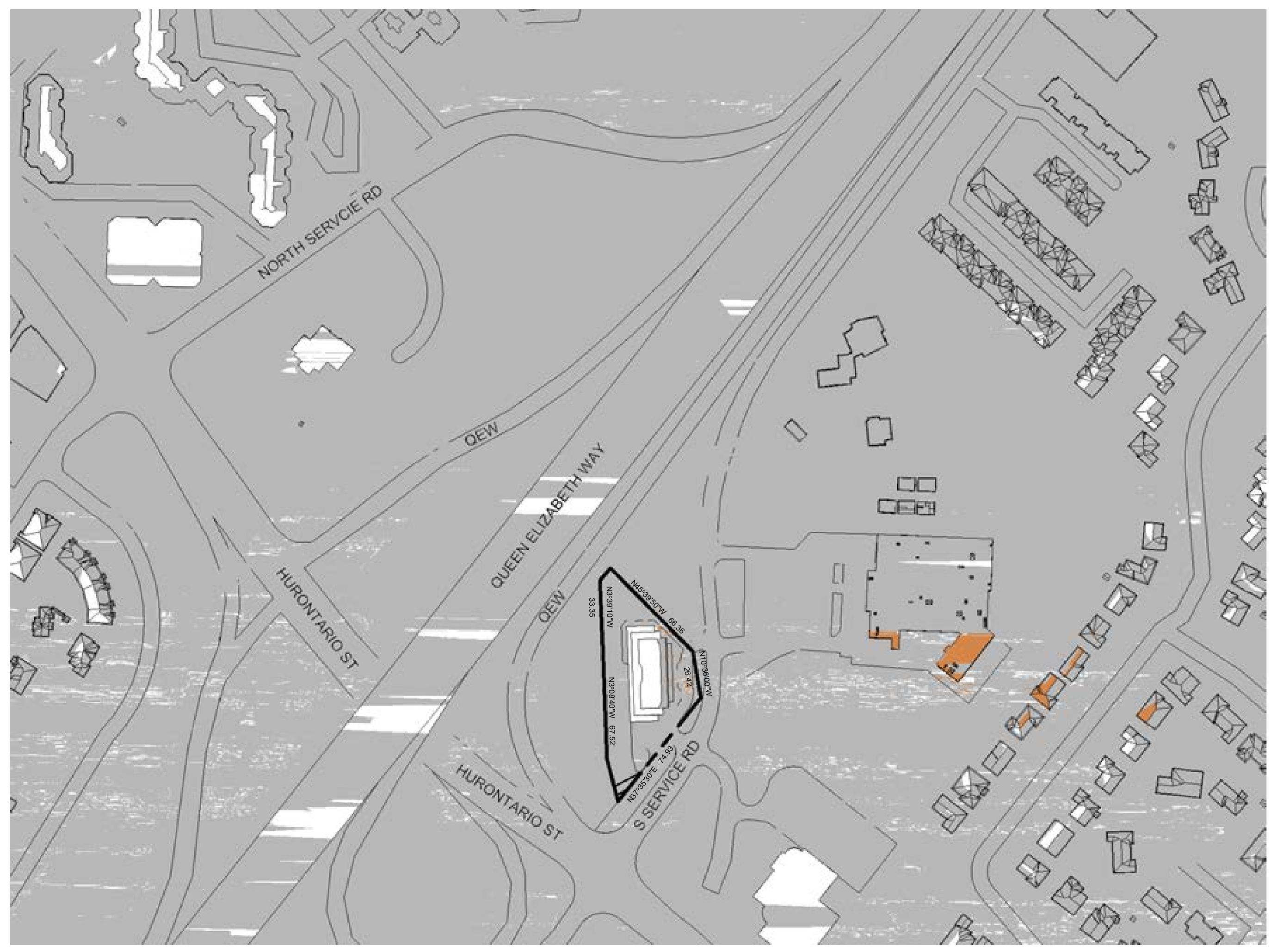

March/September 21 @ 19:18 4
NTS dA6.04

Authorities Having Jurisdiction

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Scale: 0 5 10 20 50 100 200

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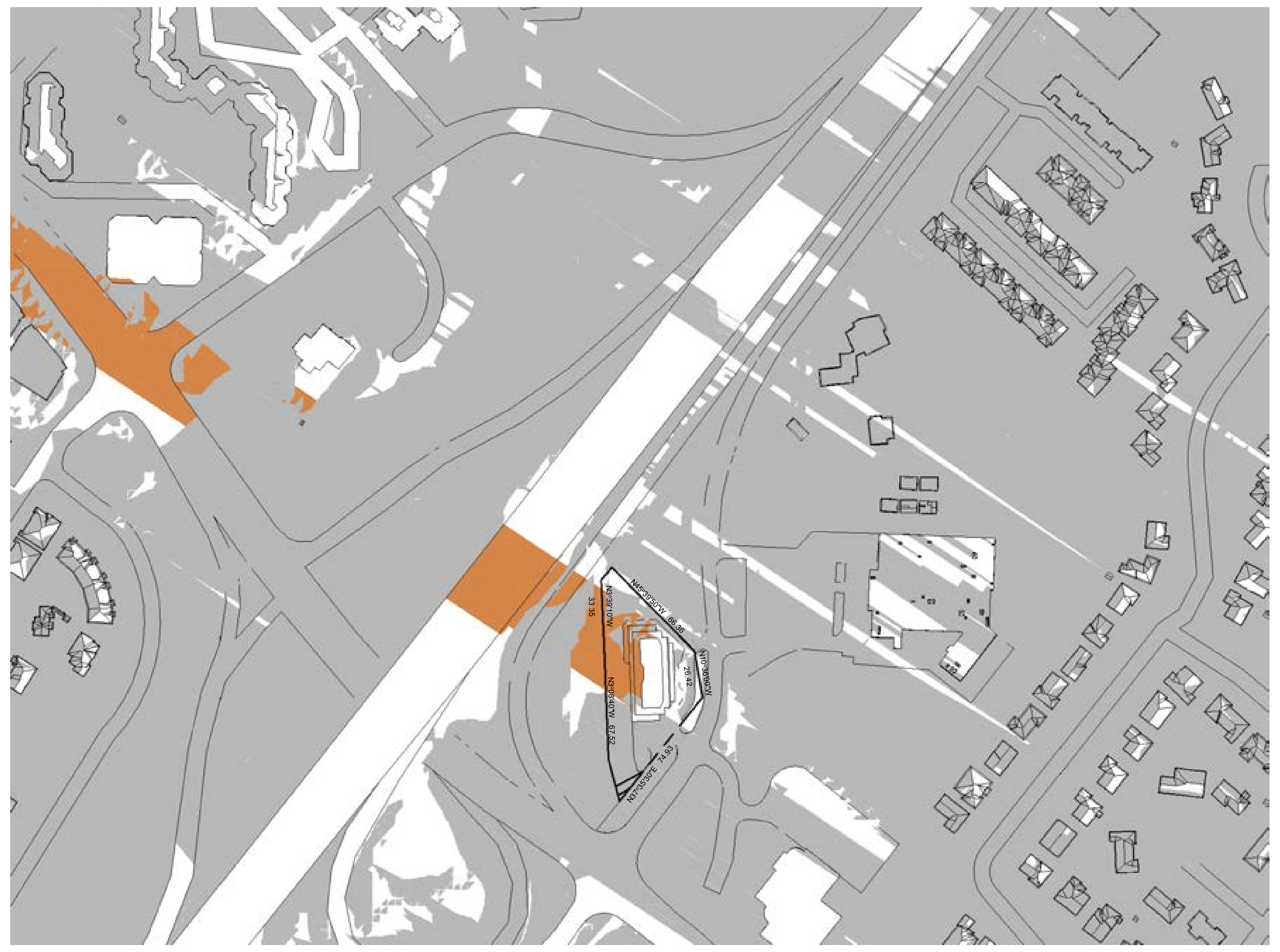
dA6.04



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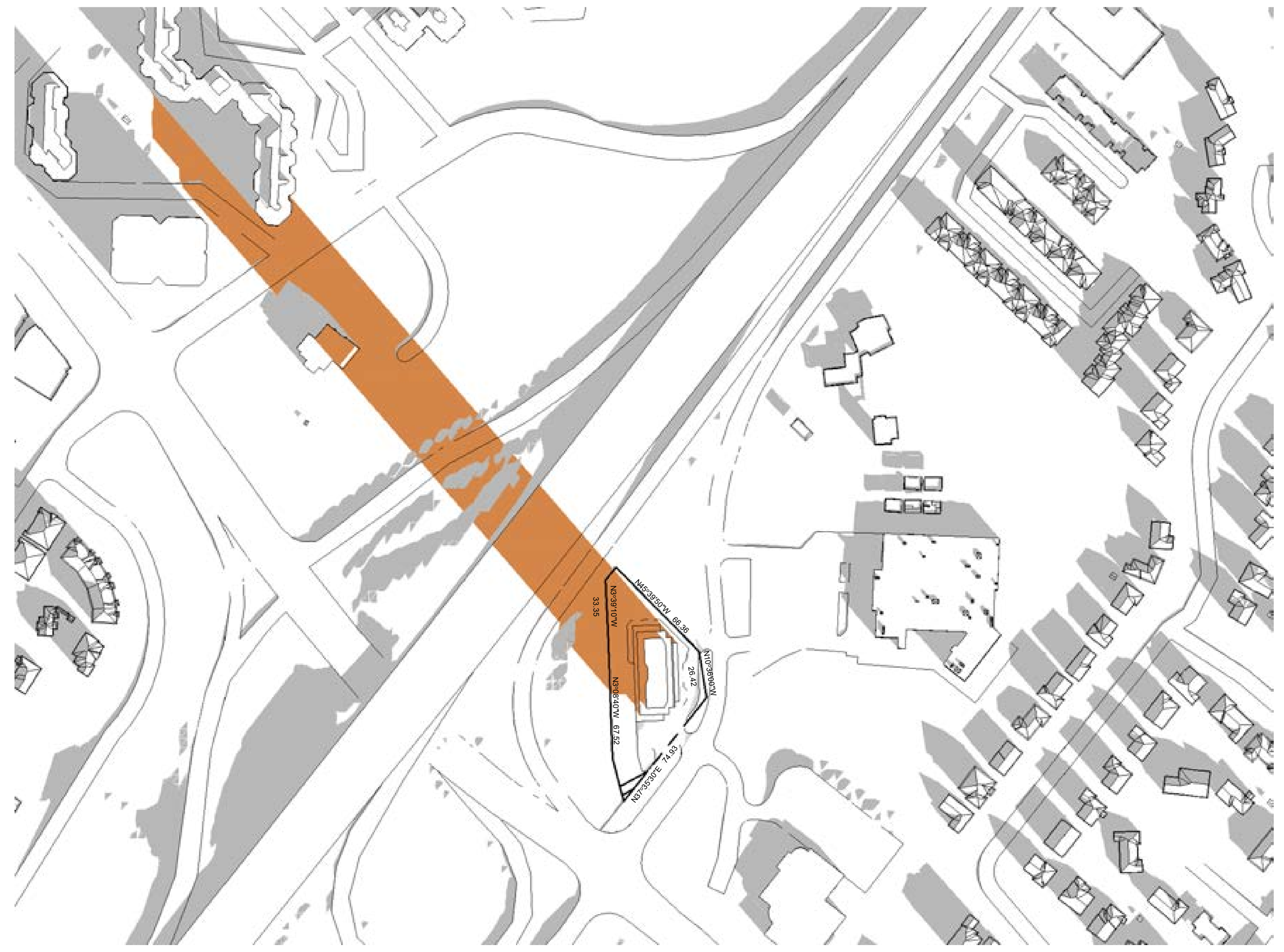

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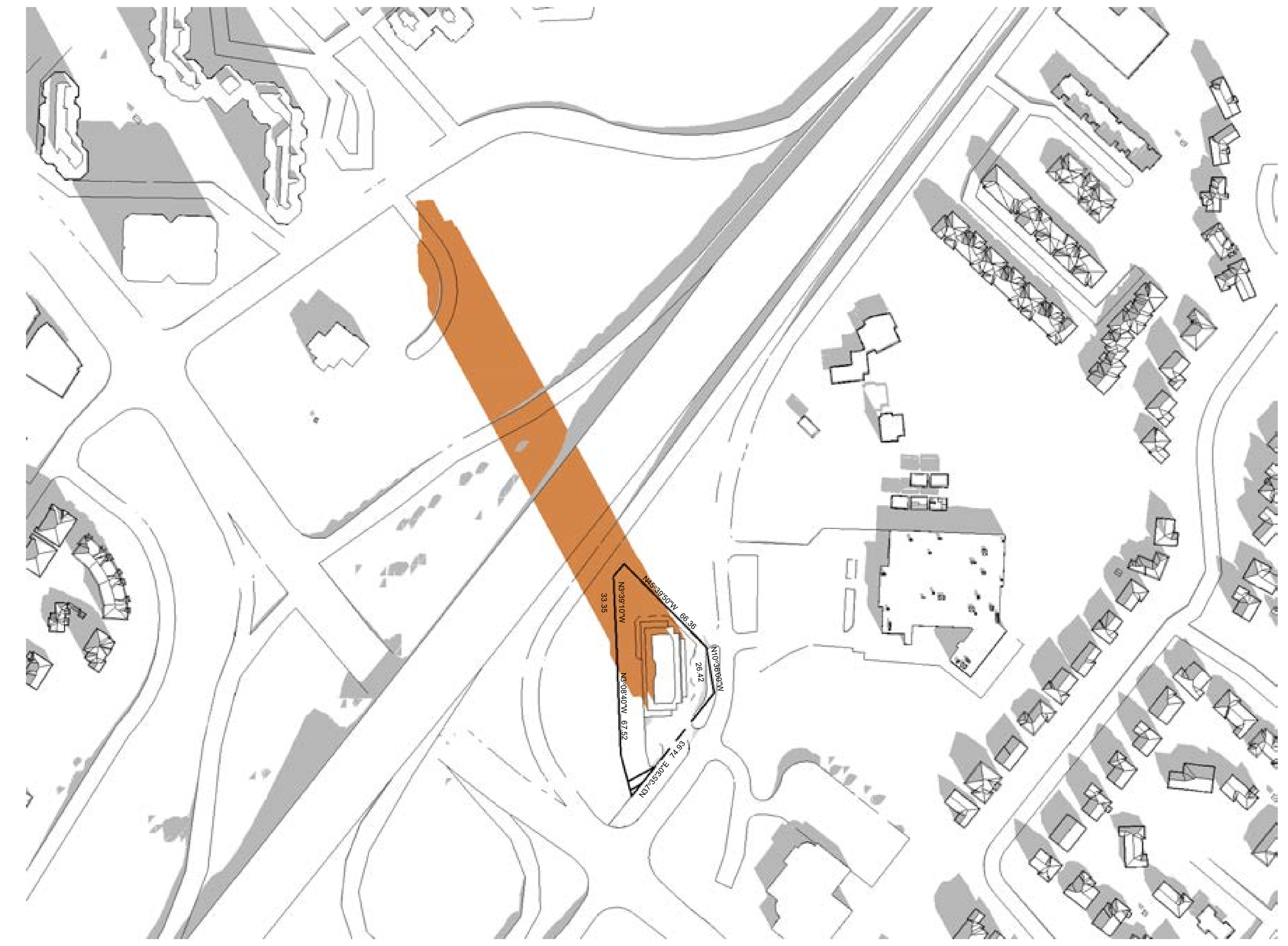

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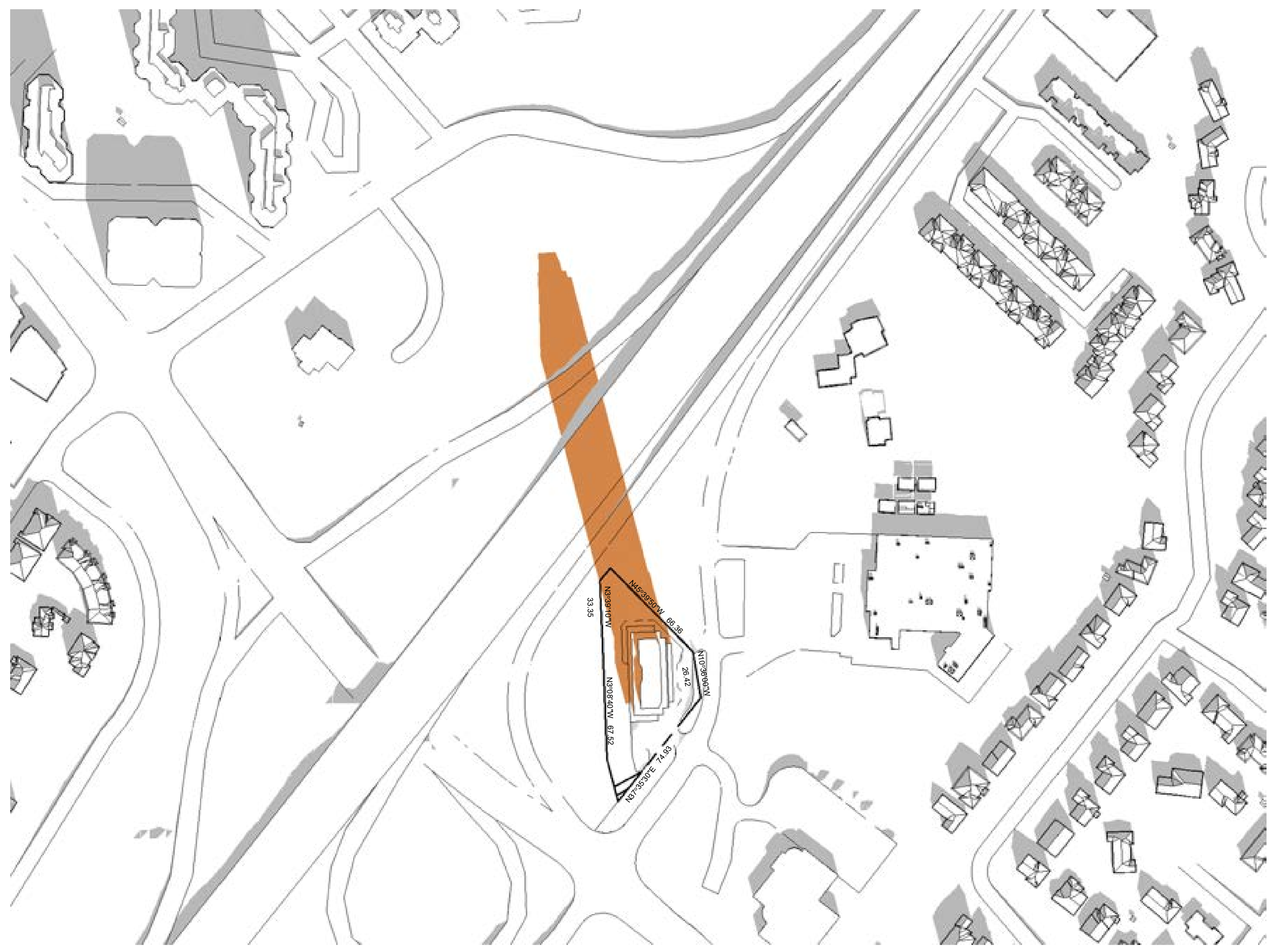

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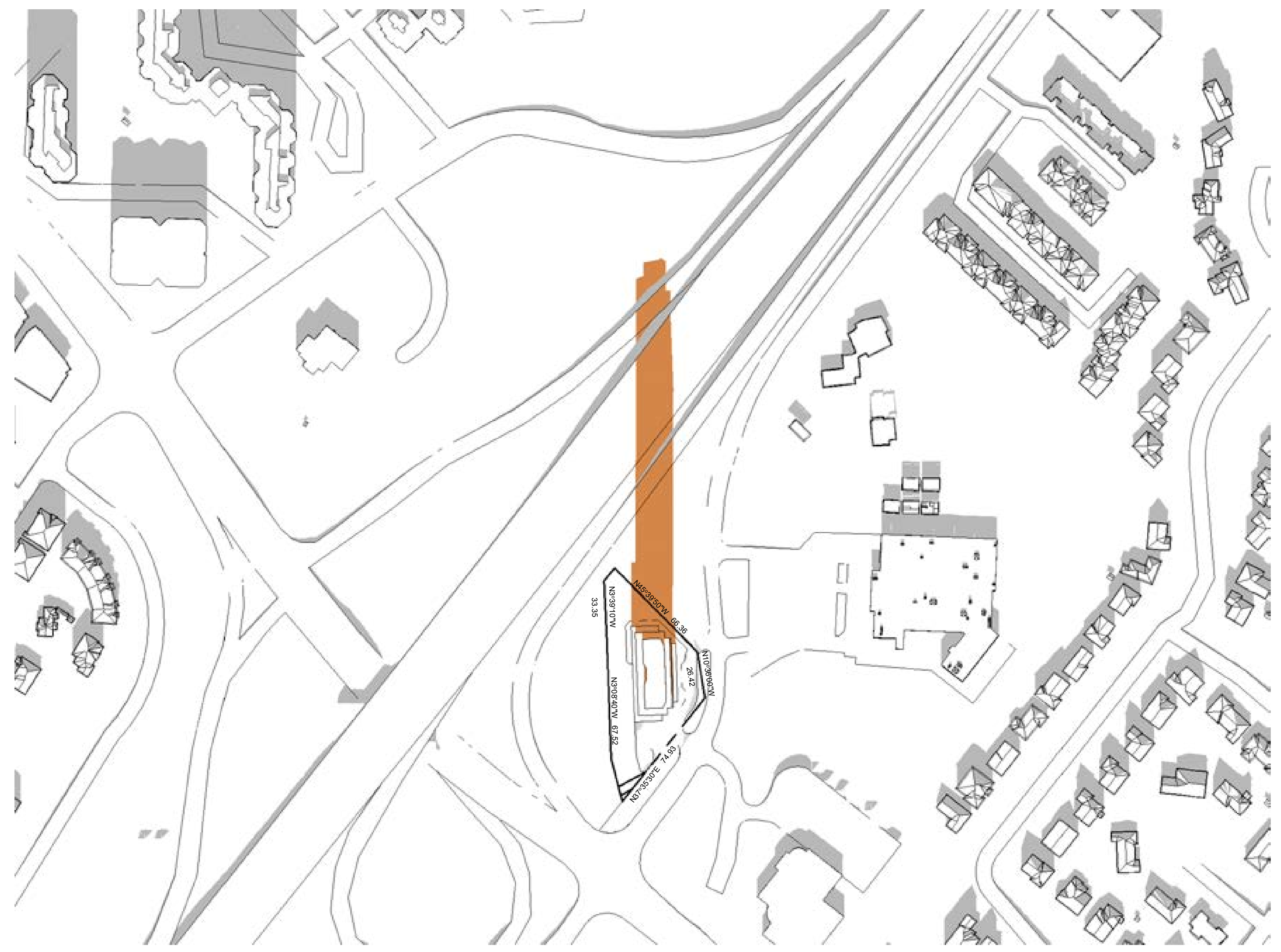
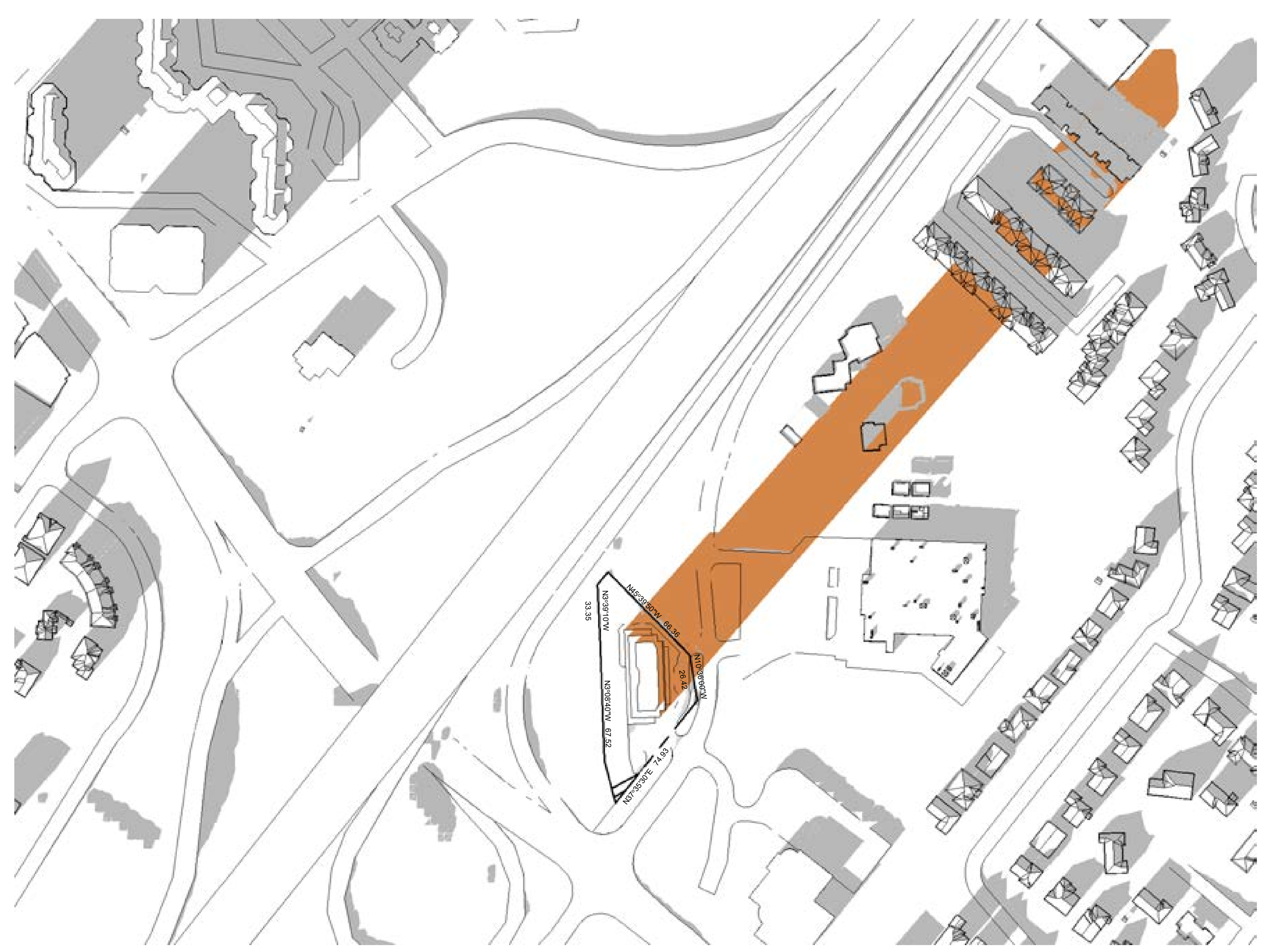


December 21 @ 12:17 5
NTS dA6.05

December 21 @ 13:17 6
NTS dA6.05

December 21 @ 14:17 7
NTS dA6.05



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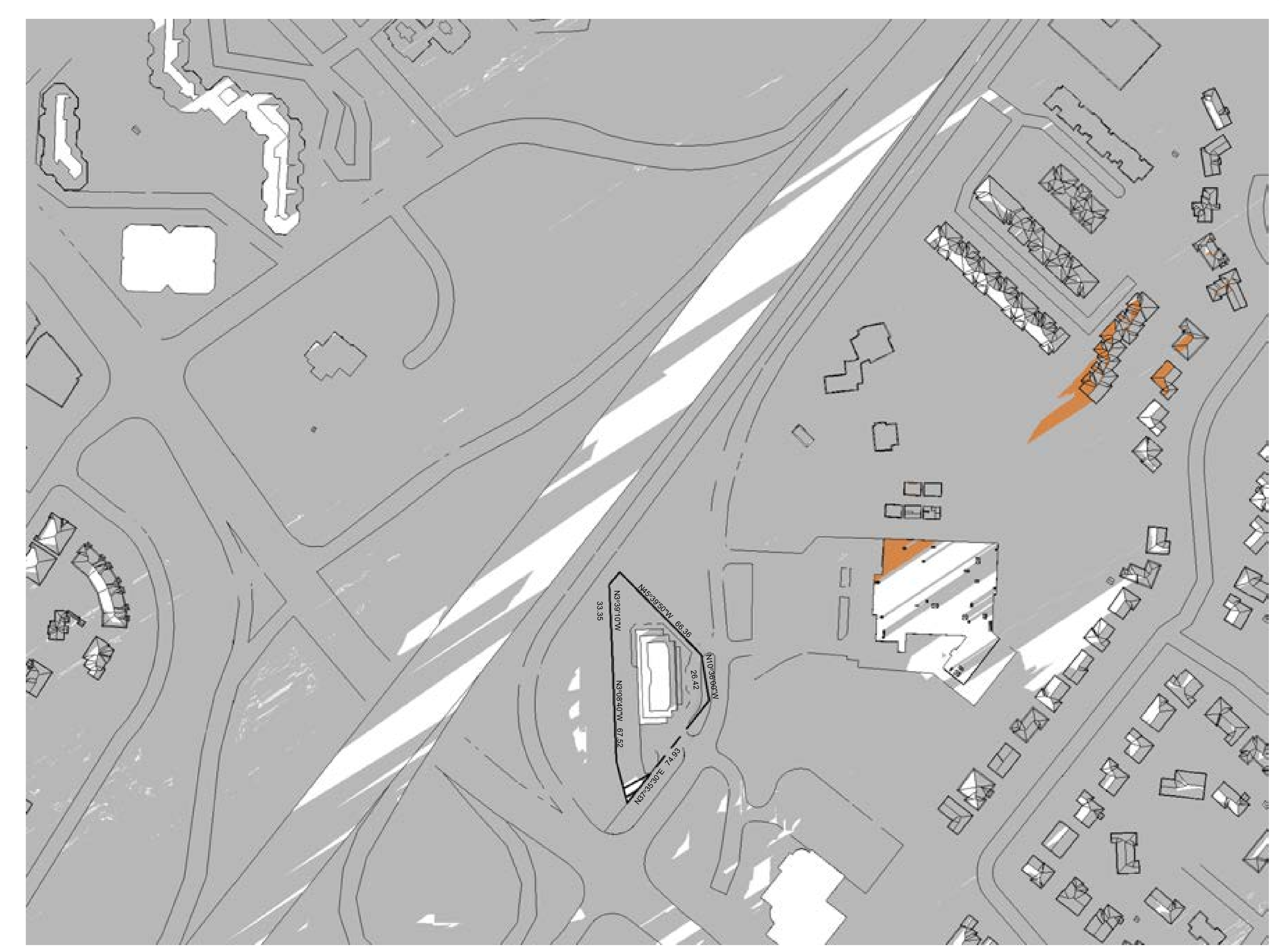

December 21 @ 16:45 9
NTS dA6.05

Authorities Having Jurisdiction

PROGRESS DRAFT
10/05/22

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49 SOUTH SERVICE RD, MISSISAUGA , ON
Proposed Residential Development

Drawing Title:
Sun Shadow Study December

Scale:
0 5 10 20 50 100 200

N

Drawn by: A.E.
Checked by: R.P.
Project No.: 22-073
Date: 10/05/22
Drawing No.:
dA6.05

Appendix B

Borehole Logs

Palmer, 2022 and GHD, 2020

Palmer

LOG OF BOREHOLE BH22-1

PROJECT: Geotechnical Investigation - 49 South Service Road

CLIENT: Edenshaw Developments

PROJECT LOCATION: City of Mississauga, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

Method: Solid Stem Augers

Diameter: 150mm

Date: Jun 1, 2022

REF. NO.: 2204701

ENCL NO.: 1

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
99.9	Ground Surface					
99.8	**TOPSOIL:** 100mm				Concrete	
0.1	**FILL:** silty sand, trace clay, trace gravel, brown, moist to wet, loose contains rootlets	1	SS	8	Sand	
		2	SS	7	99	
		3	SS	4	Bentonite 98	
97.7						
2.2	**SILTY SAND:** trace clay, grey to brown, moist to wet, compact to dense wet below 2.3m	4	SS	24		Wet spoon below
		5	SS	36	W. L. 97.0 m Jun 2, 2022	
		6	SS	31	96	0 64 32 4
		7	SS	44	Screen 95	
		8	SS	26	94	
93.2						
6.7	**UNSAMPLED:** Advanced dynamic cone penetration test				93 Bentonite	
					92	
91.3						
8.5	**END OF BOREHOLE** 1. Upon completion of drilling, one (1) 50mm diameter monitoring well was installed in the borehole. 2. Water Level Readings: Date W. L. Depth (BGS) June 2, 2022 2.89m					Dynamic cone refusal

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

LOG OF BOREHOLE BH22-2

PROJECT: Geotechnical Investigation - 49 South Service Road
CLIENT: Edenshaw Developments
PROJECT LOCATION: City of Mississauga, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring
Diameter: 205mm/96mm
Date: May 27, 2022

REF. NO.: 2204701
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
99.7	Ground Surface											
99.6	**ASPHALT:** 100 mm						Concrete					
0.1	**FILL:** silty sand, trace clay, trace gravel, brown, moist to wet, loose to compact		1	SS	12		Sand					
			2	SS	5		99					
98.3												
1.5	**SILTY SAND:** trace clay, trace gravel, brown, moist to wet, loose to compact		3	SS	4		98					
			4	SS	6		97					
	wet below 2.7m		5	SS	9	▽						Wet spoon below
							W. L. 96.1 m Jun 2, 2022					
			6	SS	15		95					
							94					
			7	SS	21		93					0 71 25 4
92.6												
7.2	**SANDY SILT TILL/SHALE COMPLEX:** trace clay, trace gravel, grey, wet, very dense											
92.1			8	SS	50/ initial 50mm		92					Spoon bouncing
7.7	**ROCK CORING STARTS, REFER TO ROCK CORE LOG**											
							91					
							90					

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

Palmer.

LOG OF BOREHOLE BH22-2

PROJECT: Geotechnical Investigation - 49 South Service Road
CLIENT: Edenshaw Developments
PROJECT LOCATION: City of Mississauga, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring
Diameter: 205mm/96mm
Date: May 27, 2022

REF. NO.: 2204701
ENCL NO.: 2

SOIL PROFILE (m) ELEV DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	"N" BLOWS/0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100; SHEAR STRENGTH (kPa) ○ UNCONFINED + FIELD VANE & Sensitivity ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P, NATURAL MOISTURE CONTENT w, LIQUID LIMIT w_L; WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m^3)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
Continued	**ROCK CORING STARTS, REFER TO ROCK CORE LOG**(Continued)					Bentonite	89					
11							88					
12							87					
13							86					
14							85					
15							84					
16							83					
17							82					
18							81					
19							80					
20												

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3, \times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

LOG OF BOREHOLE BH22-2

PROJECT: Geotechnical Investigation - 49 South Service Road

CLIENT: Edenshaw Developments

PROJECT LOCATION: City of Mississauga, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring

Diameter: 205mm/96mm

Date: May 27, 2022

REF. NO.: 2204701

ENCL NO.: 2

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued										
	ROCK CORING STARTS, REFER TO ROCK CORE LOG(Continued)						79				
21							Sand				
							78				
22											
							77				
23							Screen				
							76				
24											
							Bentonite				
25 74.7											
25.0	**END OF BOREHOLE** 1. Upon completion of drilling, one (1) 50mm diameter monitoring well was installed in the borehole. 2. Water Level Readings: Date W. L. Depth (BGS) June 2, 2022 3.67m										

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

LOG OF ROCK CORE BH22-2

PROJECT: Geotechnical Investigation - 49 South Service Road
CLIENT: Edenshaw Developments
LOCATION: City of Mississauga, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring
Diameter: 205mm/96mm
Date: May-27-2022

REF. NO.: 2204701
ENCL NO.: 2

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	Weathering Index	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm³) E (GPa)
92.2	Rock Surface															
92.0 / 7.5 / 7.7	**GEORGIAN BAY FORMATION** Highly weathered shale to complex, grey, weak		1	HQ	100	58	8	38	23, 6, 1	Soft Layer: 7.54m - 7.70m; Fragment Zone: 8.12m - 8.16m; Hard Layer: 8.16m - 8.20m Limestone	W4					
91.5 / 8.2	**GEORGIAN BAY FORMATION** Moderately weathered to slightly weathered, laminated to thinly bedded, grey and light grey, weak to medium strong **SHALE** (95~97%), thinly laminated to medium bedded with slightly weathered to fresh, grey, medium strong to very strong **LIMESTONE** (3~5%).		2	HQ	100	87	5	35	15, 7, 6, 3, 8	Soft Layer: 9.08m - 9.12m; Fragment Zone: 8.20m - 8.25m; 8.31m - 8.52m; 9.55m - 9.64m	W3-W2					
90.0 / 9.7			3	HQ	55	50	3	10	5, 6, 7, 0, 0	Lost Zone: 10.57m - 11.25m; Fragment Zone: 10.47m - 10.52m						
88.5 / 11.3	**GEORGIAN BAY FORMATION** slightly weathered, laminated to thinly bedded, grey and light grey, weak to medium strong **SHALE** (88~93%), thinly laminated to medium bedded with slightly weathered to fresh, grey, medium strong to very strong **LIMESTONE** (7~12%).		4	HQ	100	98	12	75	3, 6, 3, 3, 1	Fragment Zone: 11.25m - 11.27m						
86.9 / 12.8			5	HQ	100	99	10	92	1, 2, 2, 1, 2							
85.4 / 14.3			6	HQ	100	99	8	96	0, 5, 1, 1, 1	Soft Layer: 14.80m - 14.85m						
83.9 / 15.8			7	HQ	100	100	7	95	2, 2, 2, 1, 1							
82.4 / 17.3									2	Fracture: 17.85m - 18.18m: 90° - 75°						

Continued Next Page

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered   θ = angle to the core axis

E = Modulus of Elasticity
*: UCS [Mpa] ≈ 24 $I_{S(50)}$

LOG OF ROCK CORE BH22-2

PROJECT: Geotechnical Investigation - 49 South Service Road

CLIENT: Edenshaw Developments | Method: Hollow Stem Augers/Rock Coring | REF. NO.: 2204701

LOCATION: City of Mississauga, ON | Diameter: 205mm/96mm | ENCL NO.: 2

DATUM: Geodetic | Date: May-27-2022

BH LOCATION: See Borehole Location Plan

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	Weathering Index	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm^3) E (GPa)
	Continued															
18	**GEORGIAN BAY FORMATION** slightly weathered, laminated to thinly bedded, grey and light grey, weak to medium strong **SHALE** (88~93%), thinly laminated to medium bedded with slightly weathered to fresh, grey, medium strong to very strong **LIMESTONE** (7~12%). *(continued)*		8	HQ	100	100	8	88	2 3 0 2	Fracture: 17.85m - 18.18m: 90° - 75° *(continued)*	W2-W1					
80.8																
19 18.9									1	Soft Layer: 20.21m - 20.33m						
			9	HQ	100	100	12	91	0 1 2							
20																
79.3									12							
20.4									1	Hard Layer: 20.44m - 20.52m Limestone						
21			10	HQ	100	100	10	100	0 0 1							
77.8																
22 22.0									0							
			11	HQ	100	100	8	95	1 0 2 1						24.2	
23																
76.3																
23.5									0	Hard Layer: 24.57m - 24.64m Limestone						
24			12	HQ	100	100	8	100	1 1 1						42.1	
25 74.7																
25.0	**END OF BOREHOLE** 1. Upon completion of drilling, a 50 mm diameter monitoring well was installed in the borehole. 2. Water Level Readings: Date W. L. Depth (mBGS) June 2, 2022 3.67m															

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered θ = angle to the core axis E = Modulus of Elasticity

*: UCS [Mpa] ≈ 24 $I_{S(50)}$

Palmer

LOG OF BOREHOLE BH22-3

PROJECT: Geotechnical Investigation - 49 South Service Road

CLIENT: Edenshaw Developments

PROJECT LOCATION: City of Mississauga, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

Method: Solid Stem Augers

Diameter: 150mm

Date: Jun 1, 2022

REF. NO.: 2204701

ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
99.6	Ground Surface							
99.6	**ASPHALT:** 100mm						Concrete	
99.3	**FILL:** sand and gravel, trace silt, contains cobbles, grey, moist, loose						Sand	
0.3	**FILL:** silty sand, trace clay, trace gravel, brown to grey, moist to wet, very loose to loose		1	SS	7		99	
			2	SS	9			
							Bentonite	
			3	SS	5			
			4	SS	3		97	Wet spoon below
96.6	wet below 2.7m						Sand	
3.0	**SILTY SAND TO SAND AND SILT:** trace clay, trace gravel, grey to brown, moist to wet, compact to very dense		5	SS	16	W. L. 96.4 m Jun 2, 2022	96	1 76 20 3
			6	SS	20			
							Screen	
			7	SS	39			3 36 57 4
							94	
			8	SS	60		93	
92.9								
6.7	**UNSAMPLED:** Advanced dynamic cone penetration test						Bentonite	
							92	
90.7							91	
8.8	**END OF BOREHOLE** 1. Upon completion of drilling, one (1) 50mm diameter monitoring well was installed in the borehole. 2. Water Level Readings: Date W. L. Depth (BGS) June 2, 2022 3.21m							Dynamic cone refusal

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

LOG OF BOREHOLE BH22-4

PROJECT: Geotechnical Investigation - 49 South Service Road
CLIENT: Edenshaw Developments
PROJECT LOCATION: City of Mississauga, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring
Diameter: 205mm/96mm
Date: May 26, 2022

REF. NO.: 2204701
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
99.6	Ground Surface							
99.5	**ASPHALT:** 100 mm						Concrete	
0.1	**FILL:** sand and gravel, trace clay, trace silt, contains boulder fragments, contains brick fragments, redish brown, moist, loose to compact		1	SS	9		Sand	
			2	SS	11		99	
98.2								
1.5	**FILL:** silt, trace clay, trace sand, trace gravel, brown, moist, loose		3	SS	5		98	
97.4								
2.2	**FILL:** silty sand, trace clay, brown, saturated, compact		4	SS	11		97	Wet spoon below
96.7								
3.0	**SILTY SAND TO SANDY SILT:** trace clay, trace gravel, brown, saturated, compact to loose		5	SS	20		96	
			6	SS	26			3 30 60 7
			7	SS	25	▽	W. L. 95.1 m Jul 14, 2022	
							94	
							Bentonite	
			8	SS	9		93	
92.5								
7.2	**SAND AND GRAVEL:** trace silt, contains boulder fragments, brown, moist, very dense		9	SS	65		92	
91.3								
8.4	**WEATHERED SHALE:** grey, moist, very dense		10	SS	76/ 250mm		91	
90.7								
8.9	**ROCK CORING STARTS, REFER TO ROCK CORE LOG**						90	

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH22-4

PROJECT: Geotechnical Investigation - 49 South Service Road
CLIENT: Edenshaw Developments
PROJECT LOCATION: City of Mississauga, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring
Diameter: 205mm/96mm
Date: May 26, 2022

REF. NO.: 2204701
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION
	Continued						
11	**ROCK CORING STARTS, REFER TO ROCK CORE LOG**(Continued)						89
12							88
						Sand	
13							87
						Screen	
14							86
15							85
16							84
17							83
18							82
19							81
20							80

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH22-4

PROJECT: Geotechnical Investigation - 49 South Service Road

CLIENT: Edenshaw Developments

PROJECT LOCATION: City of Mississauga, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring

Diameter: 205mm/96mm

Date: May 26, 2022

REF. NO.: 2204701

ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" BLOWS / 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa): ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE & Sensitivity, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L; WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued										
	ROCK CORING STARTS, REFER TO ROCK CORE LOG(Continued)						Bentonite				
21							79				
22							78				
23							77				
24							76				
74.6							75				
25.0	**END OF BOREHOLE** 1. Upon completion of drilling, one (1) 50mm diameter monitoring well was installed in the borehole. 2. Water Level Readings: Date W. L. Depth (BGS) July 14, 2022 4.57m										

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: + 3, × 3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

Palmer.

LOG OF ROCK CORE BH22-4

PROJECT: Geotechnical Investigation - 49 South Service Road

CLIENT: Edenshaw Developments

LOCATION: City of Mississauga, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring

Diameter: 205mm/96mm

Date: May-26-2022

REF. NO.: 2204701

ENCL NO.: 4

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	Weathering Index	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm^3) E (GPa)
90.7	Rock Surface															
90.7 / 9.0	**GEORGIAN BAY FORMATION** Highly weathered shale to complex, grey, weak **SHALE** (27%), thinly laminated to medium bedded with highly weathered, grey **SOFT LAYER** (73%).		1	HQ	100	31	4	13	>25, 15, 17	Soft Layer: 8.94m - 9.29m; 9.46m - 9.72m; Hard Layer: 9.72m - 9.75m Limestone	W4-W3					
89.9 / 9.8	**GEORGIAN BAY FORMATION** slightly weathered, laminated to thinly bedded, grey and light grey, weak to medium strong **SHALE** (68~94%), thinly laminated to medium bedded with slightly weathered to fresh, grey, medium strong to very strong **LIMESTONE** (6~32%).		2	HQ	100	97	3	37	5, 4, 6, 6, 1	Fragment Zone: 9.86m - 9.91m; Fracture: 10.47m - 10.95m: 90°	W2-W1					
88.4 / 11.3			3	HQ	100	86	32	43	1, 8, 2, 4, 3	Hard Layer: 11.68m - 11.76m; 11.91m - 12.00m; 12.18m - 12.24m; 12.33m - 12.45m						
86.8 / 12.8			4	HQ	100	100	8	91	4, 3, 0, 4, 0	Hard Layer: 13.05m - 13.09m; 13.30m - 13.34m						
85.3 / 14.3			5	HQ	100	98	11	95	2, 2, 1, 1, 0	Fracture: 14.45m - 14.51m: 90°; Hard Layer: 14.45m - 14.51m; 14.63m - 14.69m; 15.08m - 15.13m						
83.8 / 15.9			6	HQ	100	98	15	98	0, 1, 1, 1, 1	Hard Layer: 16.18m - 16.32m; 17.00m - 17.10m						
82.3 / 17.4			7	HQ	100	100	10	93	1, 0, 1, 1, 0	Hard Layer: 18.75m - 18.80m						
80.7																

Continued Next Page

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered

θ = angle to the core axis

E = Modulus of Elasticity

*: UCS [Mpa] ≈ 24 $I_{S(50)}$

Palmer

PROJECT: Geotechnical Investigation - 49 South Service Road
CLIENT: Edenshaw Developments
LOCATION: City of Mississauga, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan

Method: Hollow Stem Augers/Rock Coring
Diameter: 205mm/96mm
Date: May-26-2022

REF. NO.: 2204701
ENCL NO.: 4

(m) ELEV / DEPTH	ROCK DESCRIPTION (Continued)	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	Weathering Index	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm^3) E (GPa)
18.9	**GEORGIAN BAY FORMATION** slightly weathered, laminated to thinly bedded, grey and light grey, weak to medium strong **SHALE** (68~94%), thinly laminated to medium bedded with slightly weathered to fresh, grey, medium strong to very strong **LIMESTONE** (6~32%). *(continued)*		8	HQ	100	92	22	45	3, 3, 2, 3, 1	Fracture: 18.92m - 19.02m: 75° Fragment Zone/Soft Layer: 19.94m - 19.99m 20.06m - 20.11m Hard Layer: 18.92m - 19.02m 19.44m - 19.58m 19.82m - 19.90m *(continued)*					40.4	
79.2 / 20.5			9	HQ	100	100	14	100	1, 0, 1, 1, 0	Fracture joint: 20.52m - 20.60m Hard layer: 20.52m - 20.60m						
77.7 / 22.0			10	HQ	100	100	8	92	0, 0, 0, 1, 2						25	
76.1 / 23.5			11	HQ	100	100	6	100	1, 0, 1, 1, 0							
74.6 / 25.0	**END OF BOREHOLE** 1. Upon completion of drilling, a 50 mm diameter monitoring well was installed in the borehole. 2. Water Level Readings: Date W. L. Depth (mBGS) July 14, 2022 4.57m															

0_SOIL-ROCK-APRIP 5-2022_PM_ROCK_HYDROG FORM_NEW LOGO.GLB
PALMER ROCK 1 DECI 2018 2204701 49 S SERVICE RD BH LOG 20220812.GPJ 22-8-12

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered

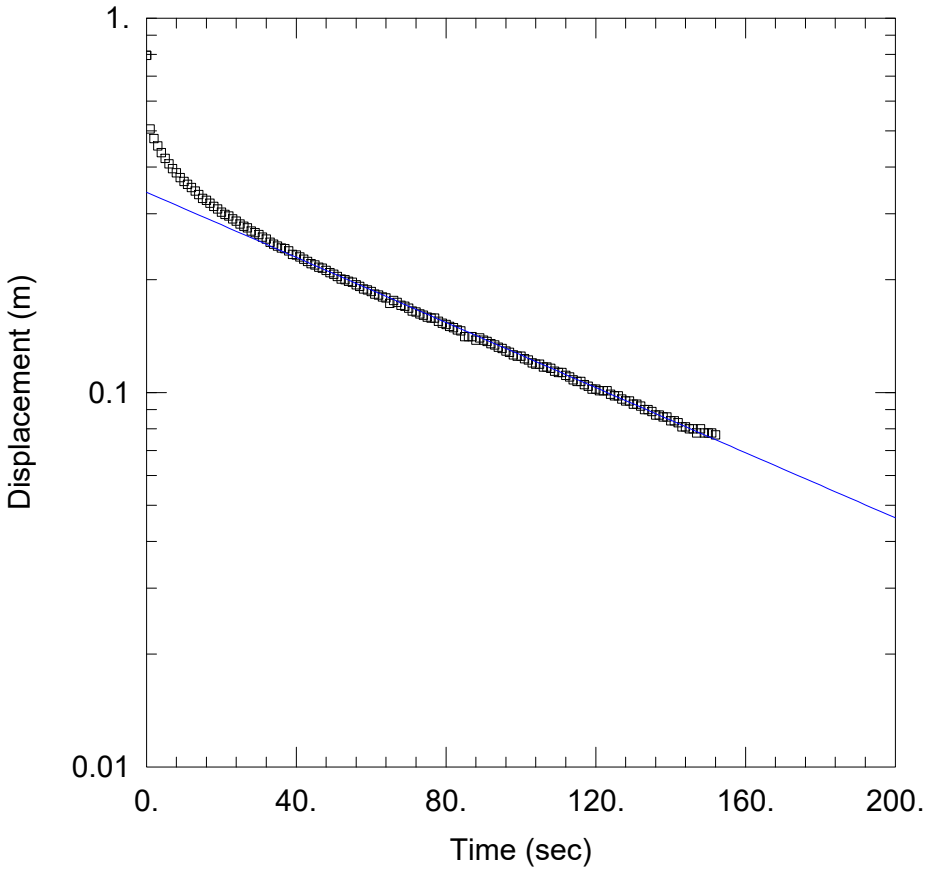
θ = angle to the core axis

E = Modulus of Elasticity
*: UCS [Mpa] ≈ 24 $I_{S(50)}$

Appendix C

Single Well Response Tests

Palmer, 2022



RISING HEAD TEST #1

Data Set: G:\...\BH22-1_RH1.aqt
Date: 08/15/22 Time: 18:12:51

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-1
Test Date: July 18, 2022

AQUIFER DATA

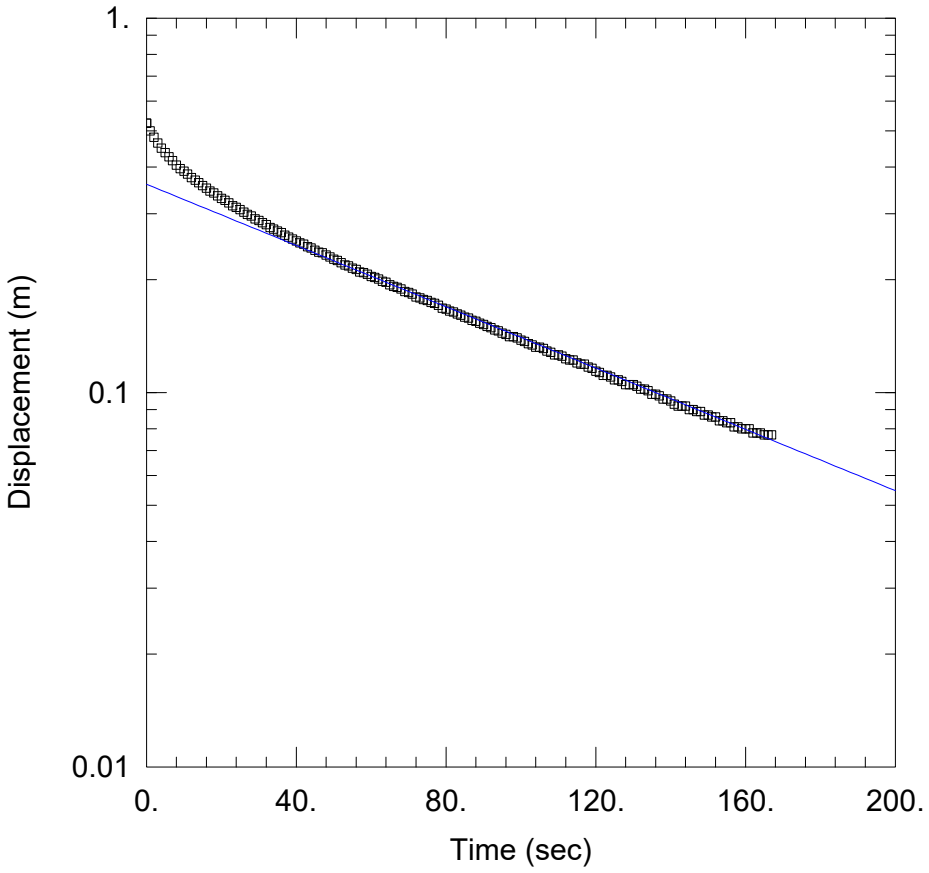
Saturated Thickness: 6.7 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-1)

Initial Displacement: 0.795 m Static Water Column Height: 3.5 m
Total Well Penetration Depth: 3.1 m Screen Length: 3.1 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 4.357E-6 m/sec y0 = 0.3427 m



RISING HEAD TEST #2

Data Set: G:\...\BH22-1_RH2.aqt
Date: 08/15/22 Time: 18:21:52

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-1
Test Date: July 18, 2022

AQUIFER DATA

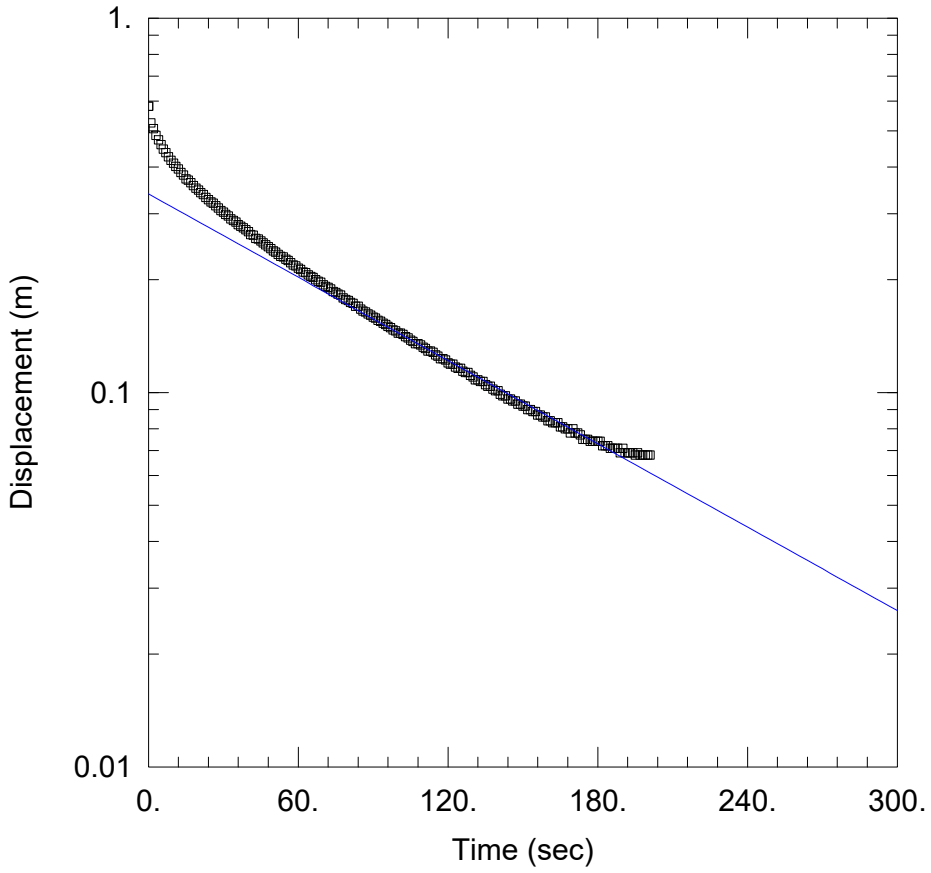
Saturated Thickness: 6.7 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-1)

Initial Displacement: 0.524 m Static Water Column Height: 3.5 m
Total Well Penetration Depth: 3.1 m Screen Length: 3.1 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 4.1E-6 m/sec y0 = 0.36 m



RISING HEAD TEST #3

Data Set: G:\...\BH22-1_RH3.aqt
Date: 08/15/22 Time: 18:24:34

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-1
Test Date: July 18, 2022

AQUIFER DATA

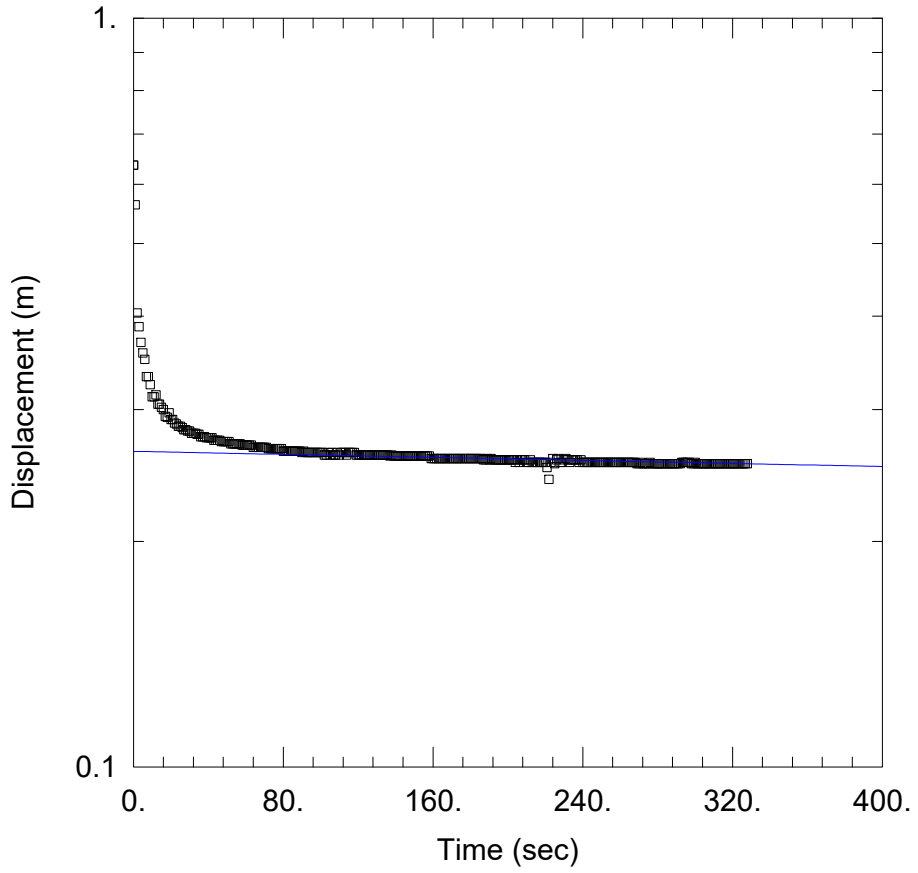
Saturated Thickness: 6.7 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-1)

Initial Displacement: 0.581 m Static Water Column Height: 3.5 m
Total Well Penetration Depth: 3.1 m Screen Length: 3.1 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 3.715E-6 m/sec y0 = 0.339 m



RISING HEAD TEST #1

Data Set: G:\...\BH22-2_RH1.aqt
Date: 08/17/22 Time: 11:34:58

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-2
Test Date: July 18, 2022

AQUIFER DATA

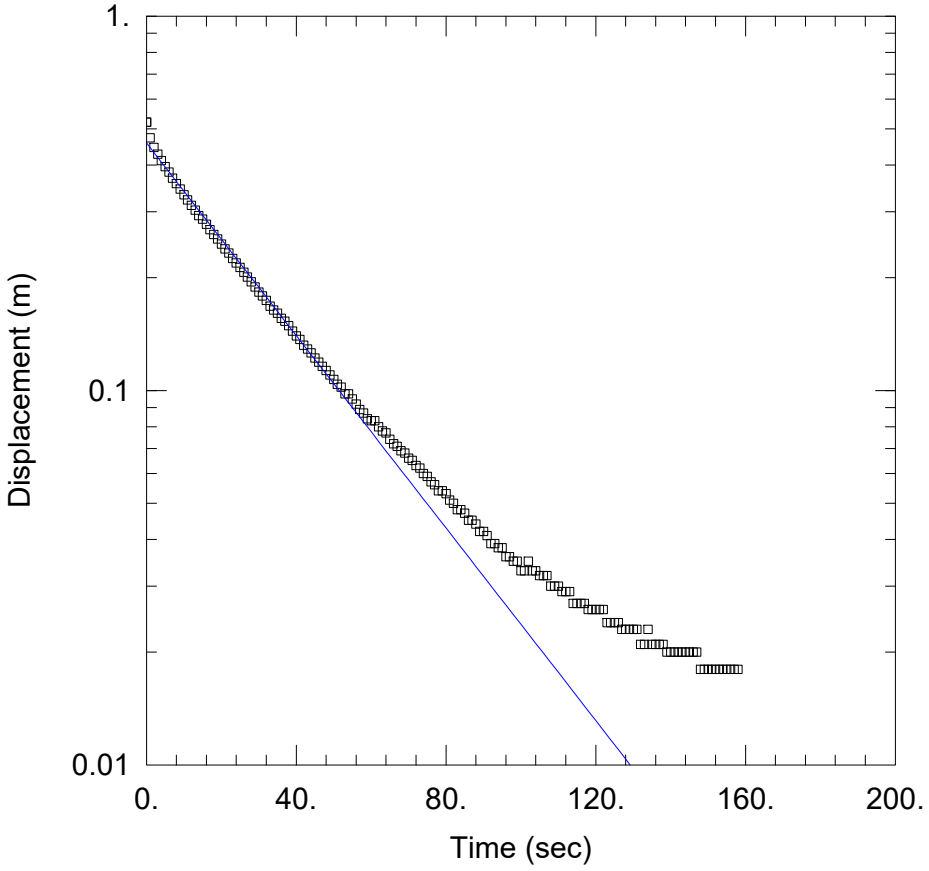
Saturated Thickness: 2.47 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-2)

Initial Displacement: 0.636 m Static Water Column Height: 2.47 m
Total Well Penetration Depth: 3.1 m Screen Length: 3.1 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 5.405E-8 m/sec y0 = 0.2639 m



RISING HEAD TEST #1

Data Set: G:\...\BH22-3_RH1.aqt
Date: 08/17/22 Time: 11:49:07

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-3
Test Date: July 18, 2022

AQUIFER DATA

Saturated Thickness: 3.27 m Anisotropy Ratio (Kz/Kr): 0.1

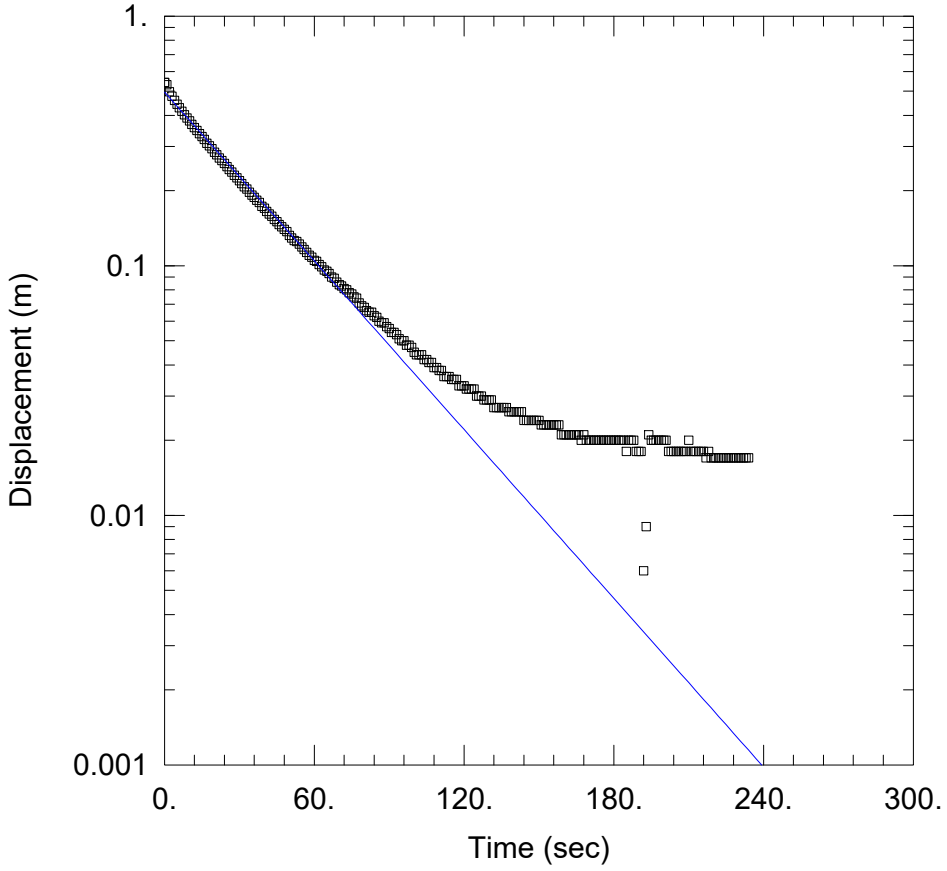
WELL DATA (BH22-3)

Initial Displacement: 0.521 m Static Water Column Height: 3.27 m
Total Well Penetration Depth: 3.1 m Screen Length: 3.1 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.368E-5 m/sec y0 = 0.4581 m



RISING HEAD TEST #2

Data Set: G:\...\BH22-3_RH2.aqt
Date: 08/17/22 Time: 11:51:52

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-3
Test Date: July 18, 2022

AQUIFER DATA

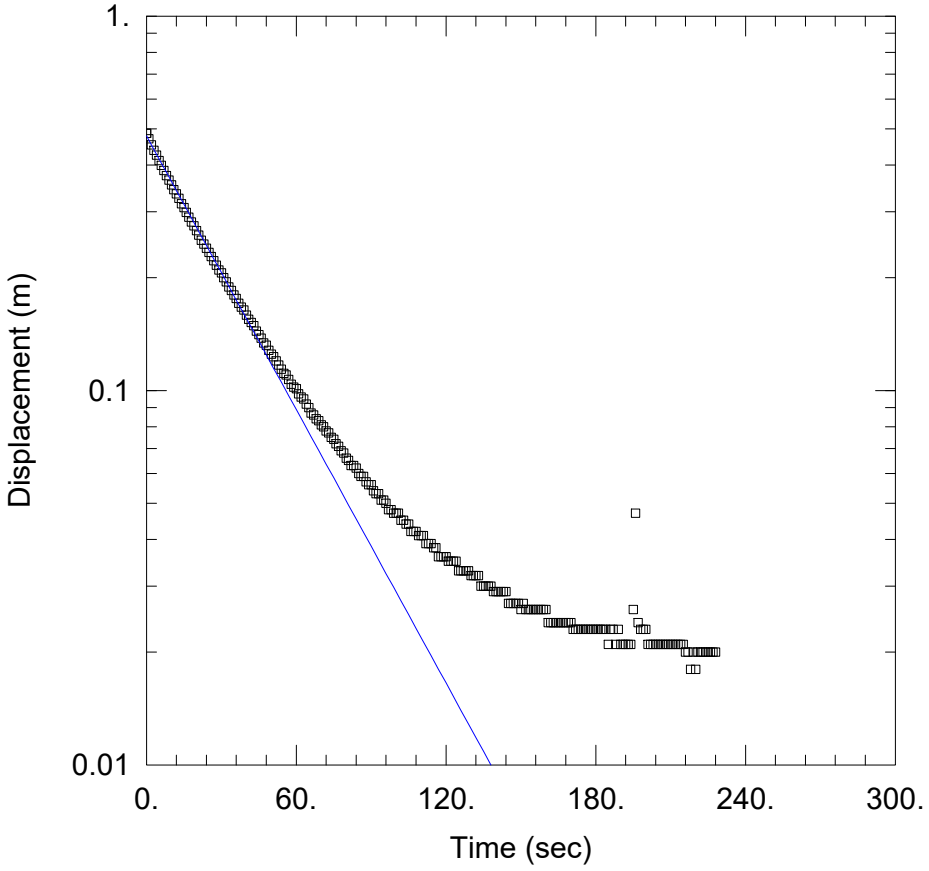
Saturated Thickness: 3.27 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-3)

Initial Displacement: 0.542 m
Total Well Penetration Depth: 3.1 m
Casing Radius: 0.025 m
Static Water Column Height: 3.27 m
Screen Length: 3.1 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.2E-5 m/sec
y0 = 0.4962 m



RISING HEAD TEST #3

Data Set: G:\...\BH22-3_RH3.aqt
Date: 08/17/22 Time: 13:12:49

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-3
Test Date: July 18, 2022

AQUIFER DATA

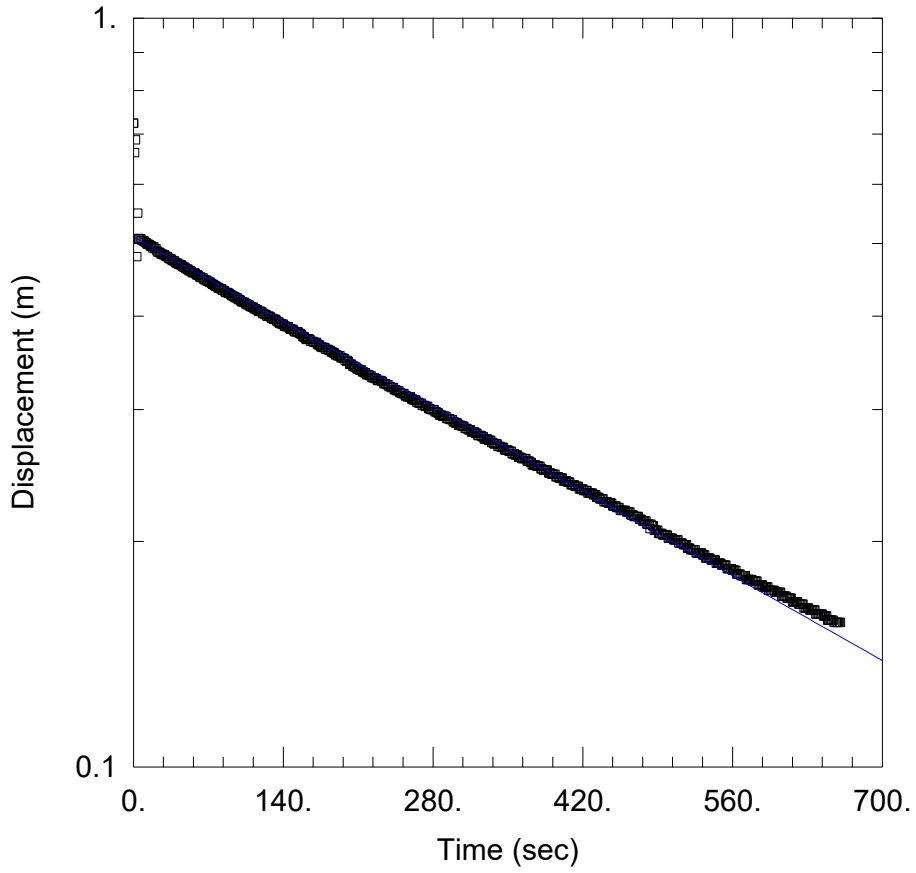
Saturated Thickness: 3.27 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-3)

Initial Displacement: 0.486 m Static Water Column Height: 3.27 m
Total Well Penetration Depth: 3.1 m Screen Length: 3.1 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 1.296E-5 m/sec y0 = 0.4786 m



FALLING HEAD TEST #1

Data Set: G:\...\BH22-4_FH11.aqt
Date: 08/17/22 Time: 13:30:32

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-4
Test Date: July 18, 2022

AQUIFER DATA

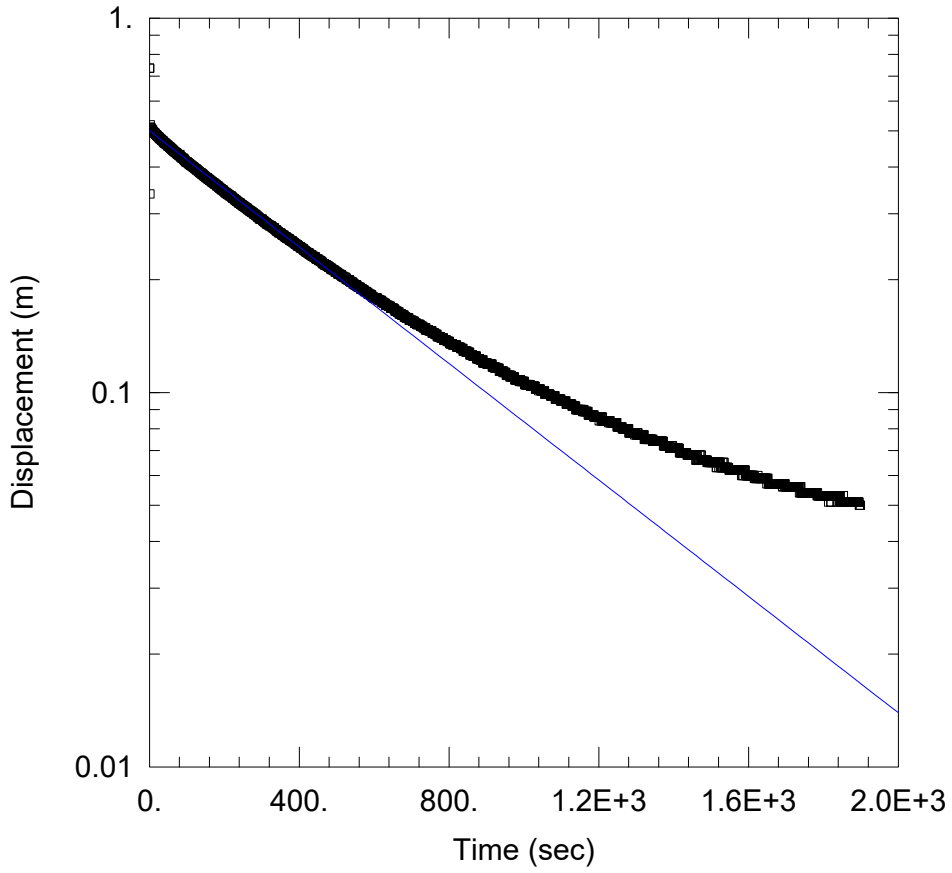
Saturated Thickness: 6.1 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-4)

Initial Displacement: 0.724 m Static Water Column Height: 10.48 m
Total Well Penetration Depth: 6.1 m Screen Length: 3.1 m
Casing Radius: 0.025 m Well Radius: 0.025 m

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 1.251E-6 m/sec y0 = 0.5105 m



RISING HEAD TEST #1

Data Set: G:\...\BH22-4_RH11.aqt
Date: 08/17/22 Time: 13:32:00

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-4
Test Date: July 18, 2022

AQUIFER DATA

Saturated Thickness: 6.1 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-4)

Initial Displacement: 0.735 m Static Water Column Height: 10.48 m
Total Well Penetration Depth: 6.1 m Screen Length: 3.1 m
Casing Radius: 0.025 m Well Radius: 0.025 m

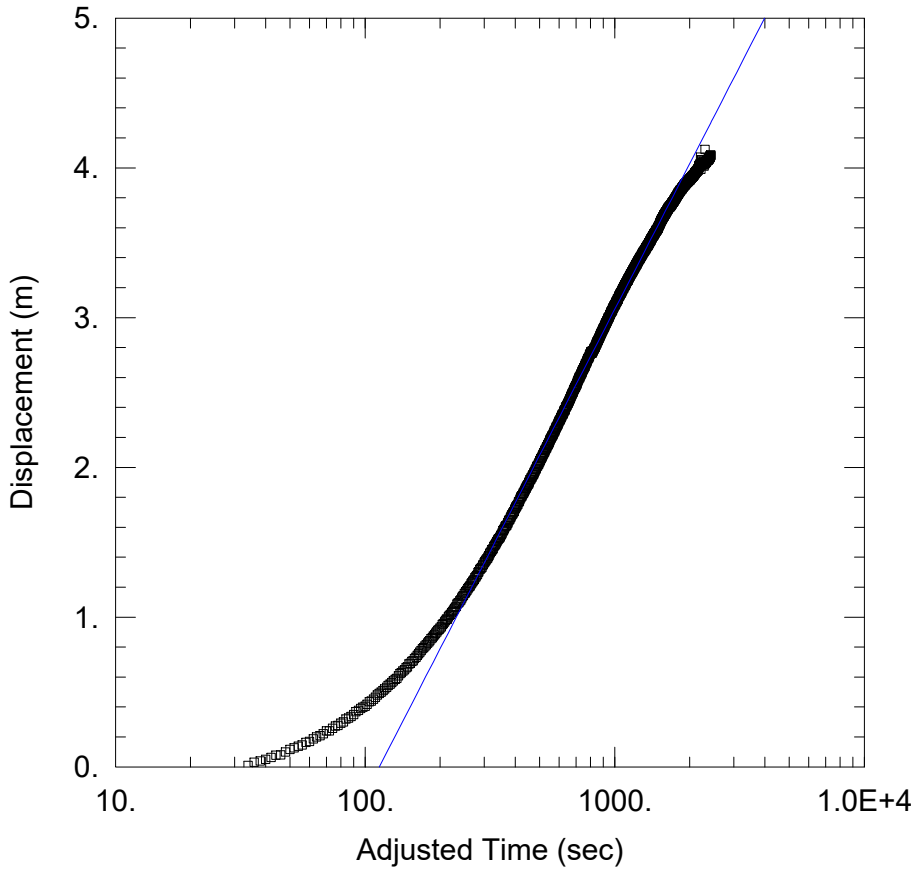
SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 1.203E-6 m/sec y0 = 0.5003 m

Appendix D

Pumping Test Analyses

Palmer, 2022



SHORT-DURATION PUMPING TEST #1

Data Set: G:\...\Pumping Test Drawdown.aqt
Date: 08/21/22 Time: 13:45:43

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-4
Test Date: July 20, 2022

AQUIFER DATA

Saturated Thickness: 6.2 m Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BH22-4	0	0

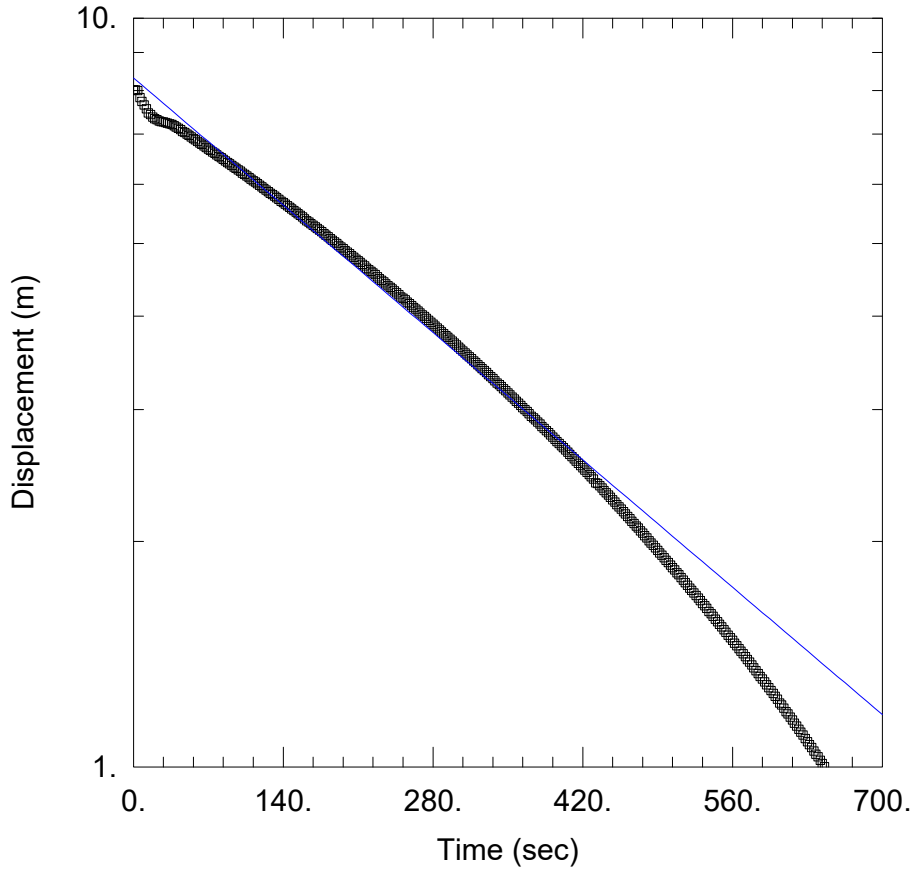
Observation Wells

Well Name	X (m)	Y (m)
▫ BH22-4	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Jacob

T = 2.103E-7 m^2/sec S = 0.08619



SHORT-DURATION PUMPING TEST - RECOVERY

Data Set: G:\...\Pumping Test Recovery.aqt
Date: 08/21/22 Time: 13:49:45

PROJECT INFORMATION

Company: Palmer
Client: Edenshaw SSR Developments Ltd.
Project: 2204701
Location: 49 S. Service Rd.
Test Well: BH22-4
Test Date: July 20, 2022

AQUIFER DATA

Saturated Thickness: 10.6 m
Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH22-4)

Initial Displacement: 8.02 m
Static Water Column Height: 10.6 m
Total Well Penetration Depth: 6.2 m
Screen Length: 3.1 m
Casing Radius: 0.025 m
Well Radius: 0.025 m

SOLUTION

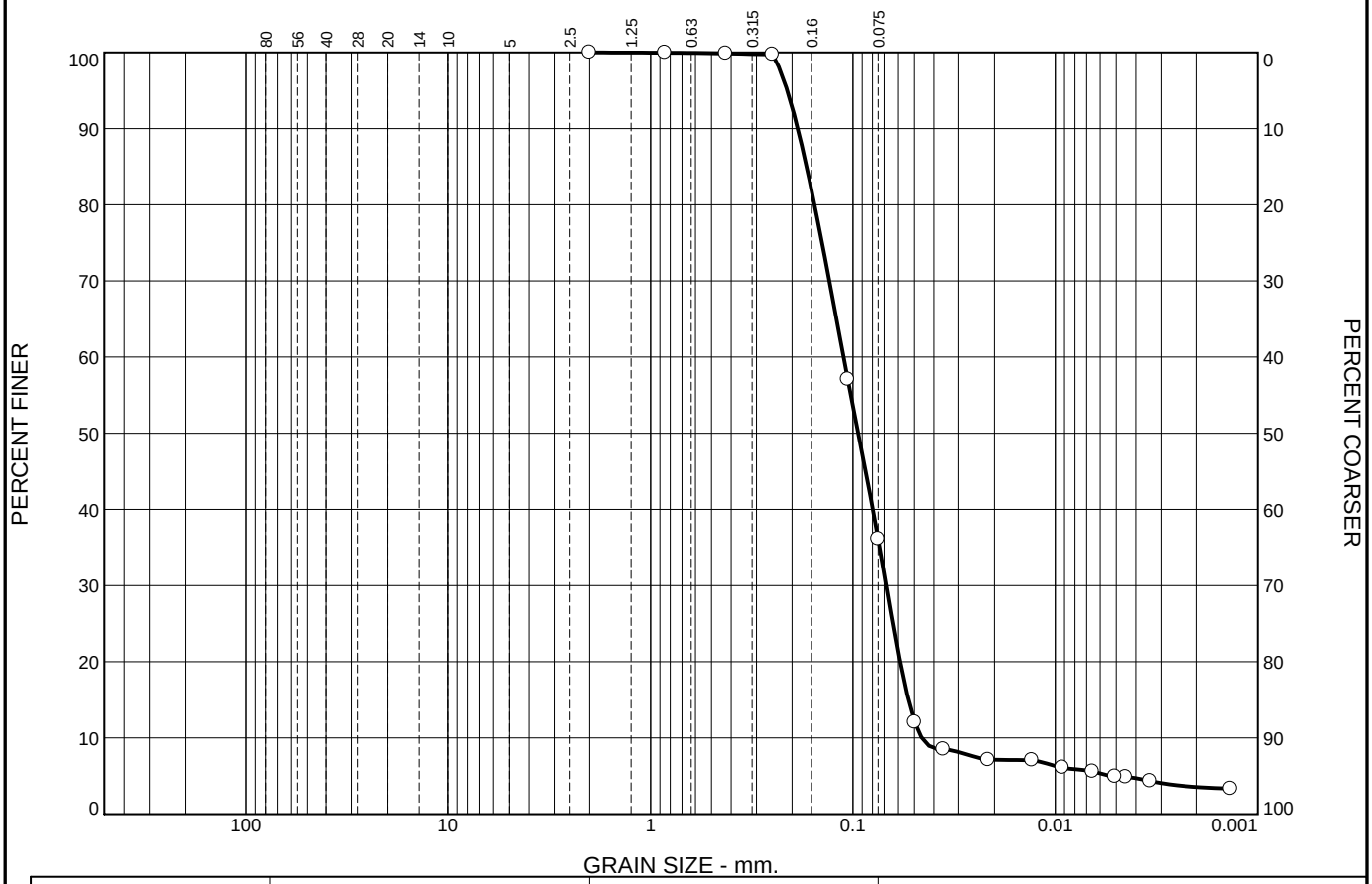
Aquifer Model: Confined
Solution Method: Hvorslev
K = 1.683E-6 m/sec
y0 = 8.319 m

Appendix E

Grain Size Distributions

Terrapex, 2022

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	0	0	64	32	4

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1696	0.1113	0.0941	0.0685	0.0535	0.0459	0.92	2.42

Material Description	USCS	AASHTO
○ SILTY SAND trace clay		

Project No. CA19009 **Client:** Palmer Environmental Consulting Group Inc. (PECG)

Project: PECG PRJ #2204701

○ **Sample Number:** BH 22-1, SS 6

Terrapex

Toronto, Ontario

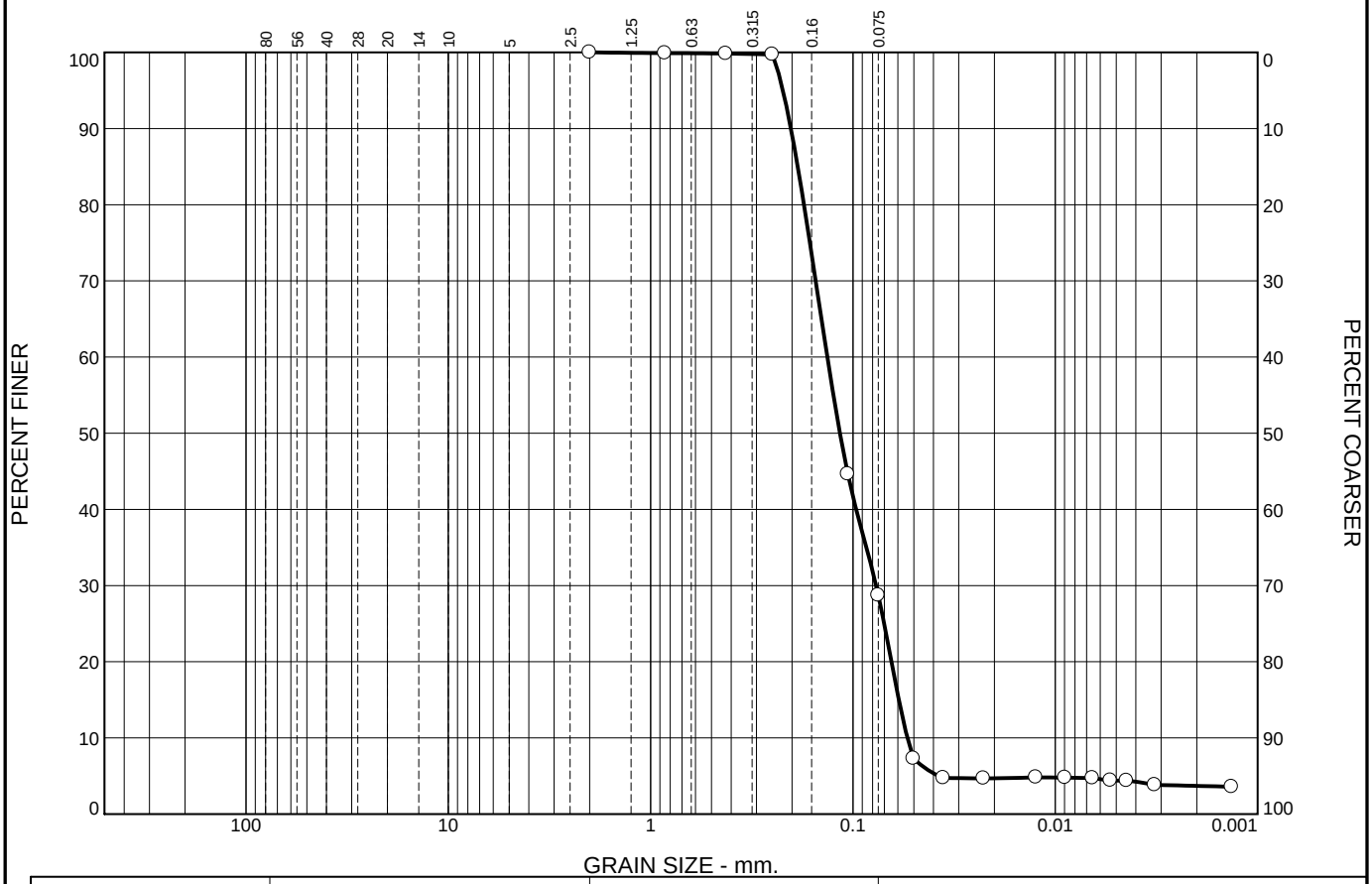
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: July 25, 2022

Figure 1

Tested By: AM/TH

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	0	0	71	25	4

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1874	0.1339	0.1160	0.0769	0.0593	0.0538	0.82	2.49

Material Description	USCS	AASHTO
○ SILTY SAND trace clay		

Project No. CA19009 **Client:** Palmer Environmental Consulting Group Inc. (PECG)

Project: PECG PRJ #2204701

○ **Sample Number:** BH 22-2, SS 7

Terrapex

Toronto, Ontario

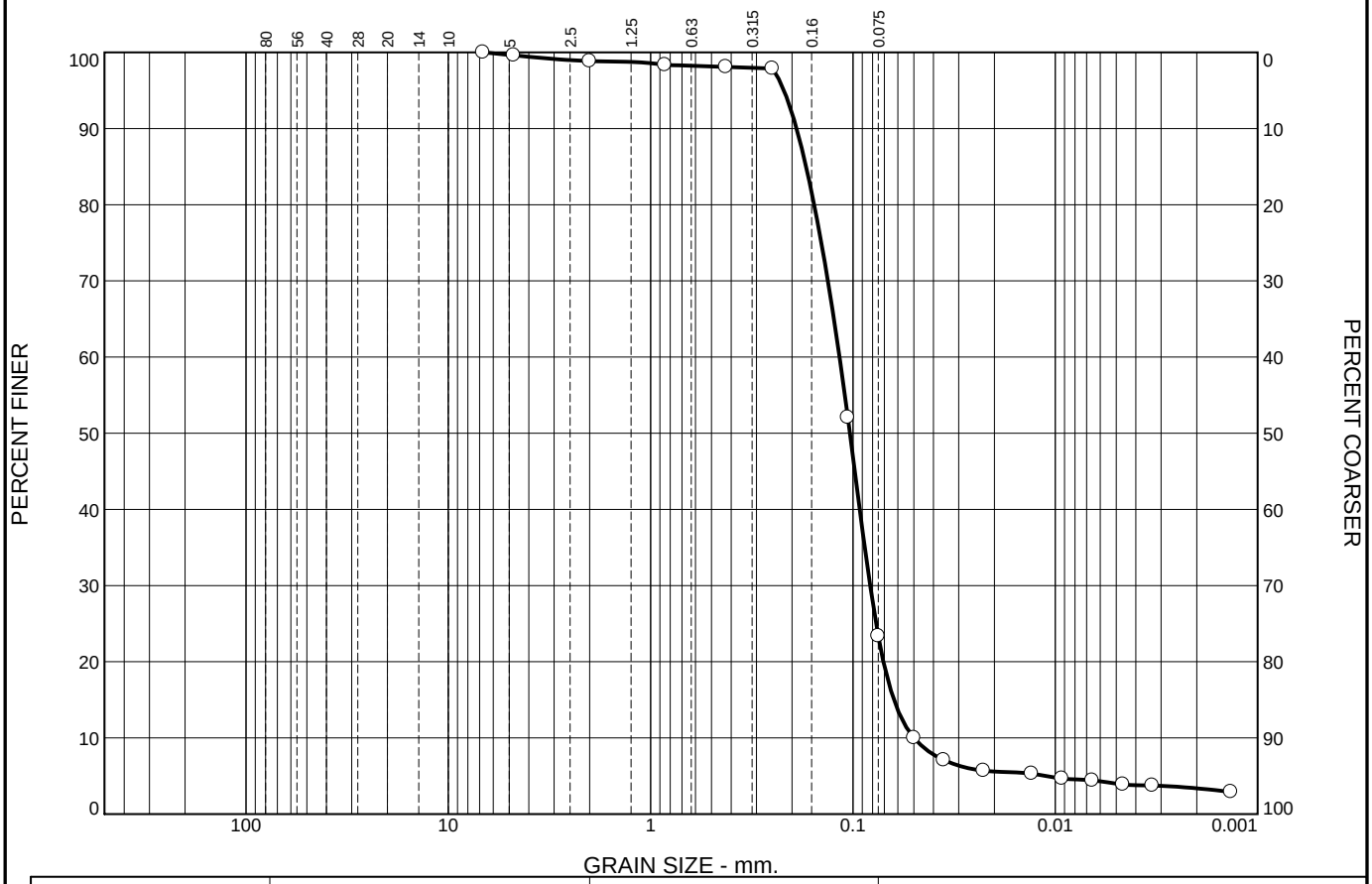
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: July 25, 2022

Figure 2

Tested By: AM

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	1	1	75	20	3

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1704	0.1165	0.1035	0.0823	0.0628	0.0499	1.16	2.34

Material Description	USCS	AASHTO
○ SILTY SAND trace clay trace gravel		

Project No. CA19009 **Client:** Palmer Environmental Consulting Group Inc. (PECG)

Project: PECG PRJ #2204701

○ **Sample Number:** BH 22-3, SS 5

Terrapex

Toronto, Ontario

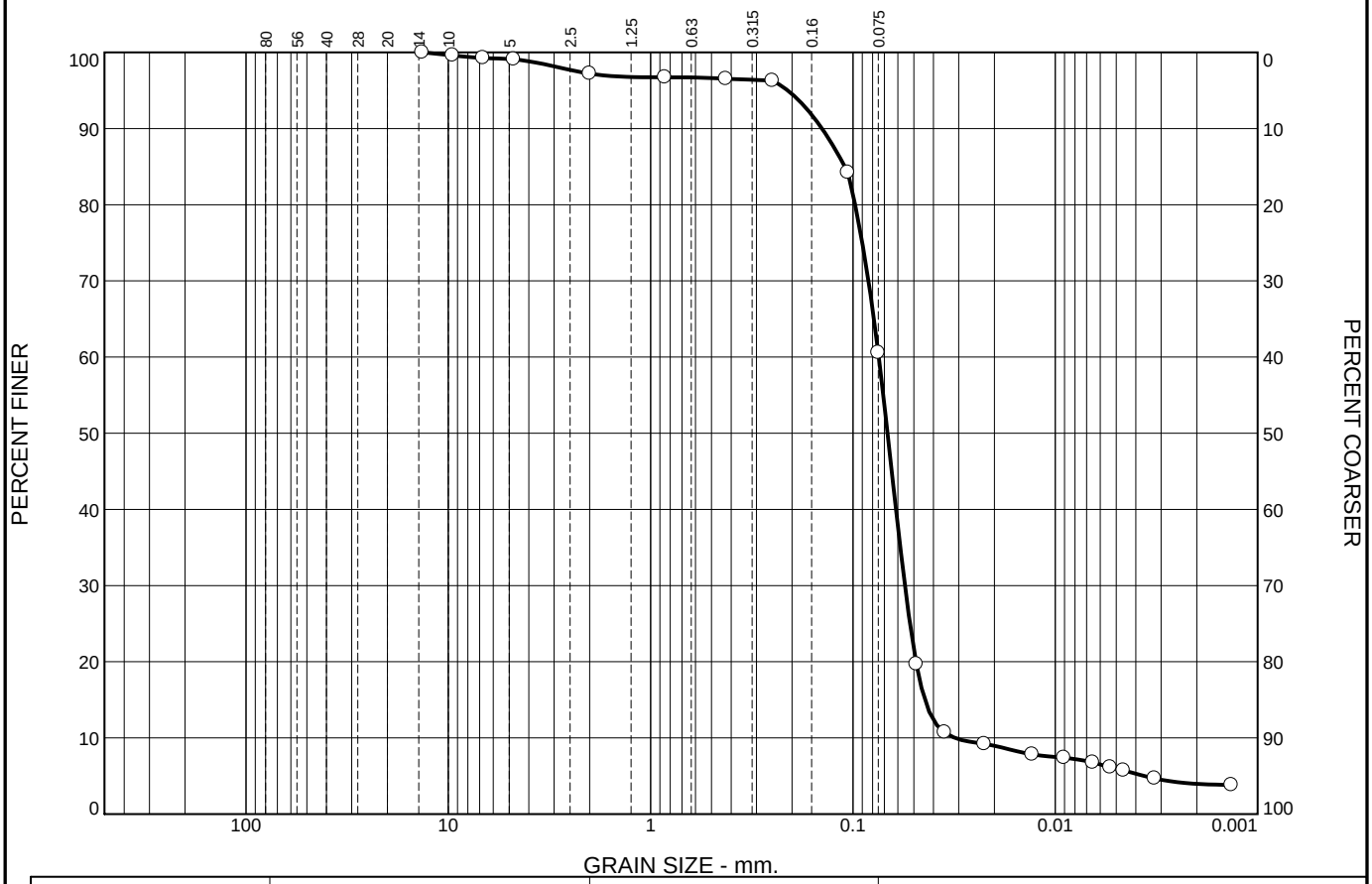
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: July 25, 2022

Figure 3

Tested By: AM

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	3	0	36	57	4

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.1097	0.0745	0.0674	0.0554	0.0442	0.0313	1.32	2.38

Material Description	USCS	AASHTO
○ SAND AND SILT trace gravel and trace clay		

Project No. CA19009 **Client:** Palmer Environmental Consulting Group Inc. (PECG)

Project: PECG PRJ #2204701

○ **Sample Number:** BH 22-3, SS 7

Terrapex

Toronto, Ontario

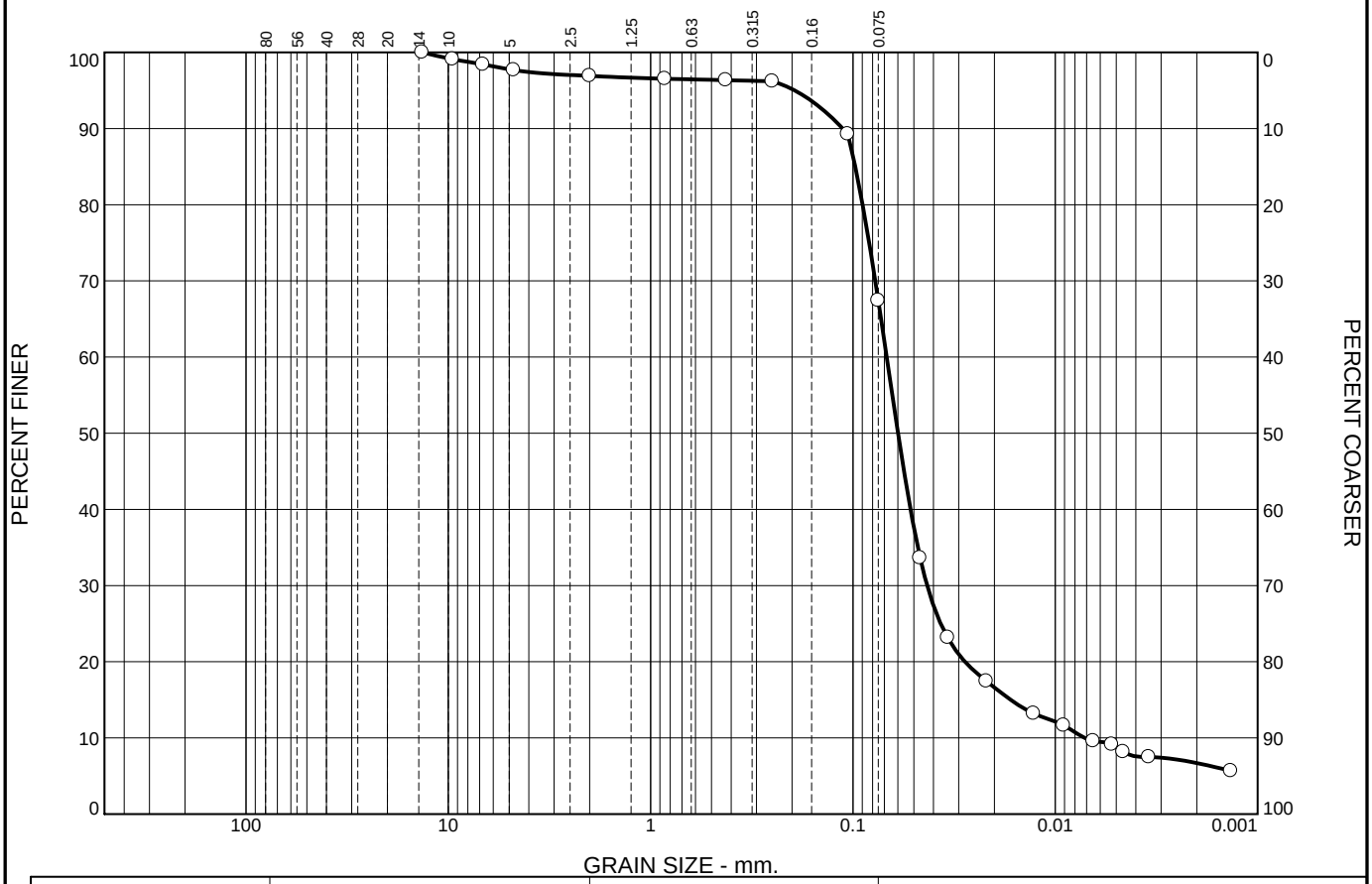
Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: July 25, 2022

Figure 4

Tested By: AM/TH

Particle Size Distribution Report



	% +3"	% Gravel	% Sand		% Fines	
			Coarse	Fine	Silt	Clay
○	0	3	1	29	60	7

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.0974	0.0681	0.0598	0.0430	0.0166	0.0072	3.79	9.52

Material Description	USCS	AASHTO
○ SANDY SILT trace clay trace gravel		

Project No. CA19009 **Client:** Palmer Environmental Consulting Group Inc. (PECG)

Project: PECG PRJ #2204701

○ **Sample Number:** BH 22-4, SS 6

Terrapex

Toronto, Ontario

Remarks:

○HYDROMETER DETAILS: Spec. Grav. 2.75(assumed);Vb=53cm^3; L2=13.8cm; L1=10.7cm; hs= 0.16cm/Div; A=30.2cm^2; Mass of Disp. Agent=40g/1 Test Date: July 25, 2022

Figure 5

Tested By: AM/TH

Appendix F

Groundwater Chemistry Analyses

ALS, 2022

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2208050**	Page	: 1 of 5
Client	: **Palmer Environmental Consulting Group Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Sarah Sipak	Account Manager	: Karanpartap Singh
Address	: 74 Berkeley Street Toronto ON Canada M5V 1E3	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: 19055076910
Project	: 2204701	Date Samples Received	: 20-Jul-2022 15:30
PO	: ----	Date Analysis Commenced	: 20-Jul-2022
C-O-C number	: 20-952328	Issue Date	: 29-Jul-2022 12:29
Sampler	: Wes		
Site	: ----		
Quote number	: (Q88296) PALMER 2022 STANDING OFFER		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Sarah Birch	Team Leader - Volatiles	Organics, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
CFU/100mL	colony forming units per 100 mL
mg/L	milligrams per litre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Qualifiers

Qualifier	*Description*
BODL	*Limit of Reporting for BOD was increased to account for the largest volume of sample tested.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
PEHR	*Parameter exceeded recommended holding time on receipt: Proceeded with analysis as requested.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	Method	LOR	Unit	Client sample ID: BH22-4 Sampling date/time: 20-Jul-2022 13:30 WT2208050-001		MISSUB STM
Physical Tests						
pH	E108	0.10	pH units	7.98		6 - 9 pH units
solids, total suspended [TSS]	E160	3.0	mg/L	58.0		15 mg/L
Anions and Nutrients						
phosphorus, total	E372-U	0.0020	mg/L	0.0566		0.4 mg/L
Cyanides						
cyanide, strong acid dissociable (total)	E333	0.0020	mg/L	<0.0020		0.02 mg/L
Inorganic Parameters						
chlorine, total	E326	0.050	mg/L	<0.050	PEHR	1 mg/L
Microbiological Tests						
coliforms, Escherichia coli [E. coli]	E012A.EC	1	CFU/100mL	<1		200 CFU/100mL
Total Metals						
aluminum, total	E420	0.0030	mg/L	1.57	DLHC	1 mg/L
arsenic, total	E420	0.00010	mg/L	0.00140	DLHC	0.02 mg/L
cadmium, total	E420	0.0000050	mg/L	<0.0000500	DLHC	0.008 mg/L
chromium, total	E420	0.00050	mg/L	<0.00500	DLHC	0.08 mg/L
copper, total	E420	0.00050	mg/L	0.0121	DLHC	0.04 mg/L
lead, total	E420	0.000050	mg/L	0.000704	DLHC	0.12 mg/L
manganese, total	E420	0.00010	mg/L	0.232	DLHC	0.05 mg/L
mercury, total	E508	0.0000050	mg/L	<0.0000050		0.0004 mg/L
nickel, total	E420	0.00050	mg/L	<0.00500	DLHC	0.08 mg/L
selenium, total	E420	0.000050	mg/L	<0.000500	DLHC	0.02 mg/L
silver, total	E420	0.000010	mg/L	<0.000100	DLHC	0.12 mg/L
zinc, total	E420	0.0030	mg/L	0.0331	DLHC	0.04 mg/L
Speciated Metals						
chromium, hexavalent [Cr VI], total	E532	0.00050	mg/L	<0.00050		
Aggregate Organics						
biochemical oxygen demand [BOD]	E550	2.0	mg/L	<3.0	BODL	15 mg/L
phenols, total (4AAP)	E562	0.0010	mg/L	0.0068		0.008 mg/L
Volatile Organic Compounds						
benzene	E611D	0.50	µg/L	<0.50		2 µg/L

Analyte	Method	LOR	Unit	WT2208050-001 (Continued)	MISSUB STM					
Volatile Organic Compounds - Continued										
dichlorobenzene, 1,2-	E611D	0.50	µg/L	<0.50						
dichlorobenzene, 1,4-	E611D	0.50	µg/L	<0.50						
dichloromethane	E611D	1.0	µg/L	<1.0						
ethylbenzene	E611D	0.50	µg/L	<0.50	2 µg/L					
tetrachloroethane, 1,1,2,2-	E611D	0.50	µg/L	<0.50						
tetrachloroethylene	E611D	0.50	µg/L	<0.50						
toluene	E611D	0.50	µg/L	0.56	2 µg/L					
trichloroethylene	E611D	0.50	µg/L	<0.50						
xylene, m+p-	E611D	0.40	µg/L	<0.40						
xylene, o-	E611D	0.30	µg/L	<0.30						
xylenes, total	E611D	0.50	µg/L	<0.50	4.4 µg/L					
bromofluorobenzene, 4-	E611D	1.0	%	82.1						
difluorobenzene, 1,4-	E611D	1.0	%	104						
Polycyclic Aromatic Hydrocarbons										
acenaphthene	E641A	0.010	µg/L	<0.010						
acenaphthylene	E641A	0.010	µg/L	<0.010						
anthracene	E641A	0.010	µg/L	<0.010						
benz(a)anthracene	E641A	0.010	µg/L	<0.010						
benzo(a)pyrene	E641A	0.0050	µg/L	<0.0050						
benzo(b+j)fluoranthene	E641A	0.010	µg/L	0.021						
benzo(g,h,i)perylene	E641A	0.010	µg/L	<0.010						
benzo(k)fluoranthene	E641A	0.010	µg/L	<0.010						
chrysene	E641A	0.010	µg/L	<0.010						
dibenz(a,h)anthracene	E641A	0.0050	µg/L	<0.0050						
fluoranthene	E641A	0.010	µg/L	<0.010						
fluorene	E641A	0.010	µg/L	<0.010						
indeno(1,2,3-c,d)pyrene	E641A	0.010	µg/L	<0.010						
methylnaphthalene, 1-	E641A	0.010	µg/L	<0.010						
methylnaphthalene, 2-	E641A	0.010	µg/L	<0.010						
naphthalene	E641A	0.050	µg/L	<0.050						
phenanthrene	E641A	0.020	µg/L	<0.020						
pyrene	E641A	0.010	µg/L	<0.010						
PAHs, total (CCME Sewer 18)	E641A	0.070	µg/L	<0.070	2 µg/L					
chrysene-d12	E641A	0.1	%	106						
naphthalene-d8	E641A	0.1	%	110						
phenanthrene-d10	E641A	0.1	%	107						
Polychlorinated Biphenyls										

Analyte	Method	LOR	Unit	WT2208050-001 (Continued)	MISSUB STM					
Polychlorinated Biphenyls - Continued										
Aroclor 1016	E687	0.020	µg/L	<0.020						
Aroclor 1221	E687	0.020	µg/L	<0.020						
Aroclor 1232	E687	0.020	µg/L	<0.020						
Aroclor 1242	E687	0.020	µg/L	<0.020						
Aroclor 1248	E687	0.020	µg/L	<0.020						
Aroclor 1254	E687	0.020	µg/L	<0.020						
Aroclor 1260	E687	0.020	µg/L	<0.020						
Aroclor 1262	E687	0.020	µg/L	<0.020						
Aroclor 1268	E687	0.020	µg/L	<0.020						
polychlorinated biphenyls [PCBs], total	E687	0.060	µg/L	<0.060						
decachlorobiphenyl	E687	0.1	%	86.4						
tetrachloro-m-xylene	E687	0.1	%	91.2						

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH22-4	Water	solids, total suspended [TSS]		MISSUB	STM	58.0 mg/L	15 mg/L
	Water	aluminum, total		MISSUB	STM	1.57 mg/L	1 mg/L
	Water	manganese, total		MISSUB	STM	0.232 mg/L	0.05 mg/L

Key:

MISSUB Ontario Mississauga Storm Sewer Use By-Law (0046-2022) (March 2022)

STM Mississauga Storm Sewer (0046-2022)

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2208055**	Page	: 1 of 6
Client	: **Palmer Environmental Consulting Group Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Sarah Sipak	Account Manager	: Karanpartap Singh
Address	: 74 Berkeley Street Toronto ON Canada M5V 1E3	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: ----	Telephone	: 19055076910
Project	: 2204701	Date Samples Received	: 20-Jul-2022 15:30
PO	: ----	Date Analysis Commenced	: 20-Jul-2022
C-O-C number	: 20-952327	Issue Date	: 27-Jul-2022 16:12
Sampler	: Wes		
Site	: ----		
Quote number	: (Q88296) PALMER 2022 STANDING OFFER		
No. of samples received	: 1		
No. of samples analysed	: 1		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Adam Boettger	Team Leader - LCMS	LCMS, Waterloo, Ontario
Amanda Ganouri-Lumsden	Department Manager - Microbiology and Prep	Microbiology, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Joseph Scharbach		Organics, Waterloo, Ontario
Sarah Birch	Team Leader - Volatiles	Organics, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

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Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

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Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg/L	micrograms per litre
CFU/100mL	colony forming units per 100 mL
mg/L	milligrams per litre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Qualifiers

Qualifier	*Description*
BODL	*Limit of Reporting for BOD was increased to account for the largest volume of sample tested.*
DLDS	*Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.*
DLHC	*Detection Limit Raised: Dilution required due to high concentration of test analyte(s).*
DLM	*Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).*
DLUI	*Detection Limit Raised: Unknown interference generated an apparent false positive test result.*

Analytical Results

Sub-Matrix: **Water**
(Matrix: **Water**)

Analyte	Method	LOR	Unit	Client sample ID: BH22-4 Sampling date/time: 20-Jul-2022 13:30 WT2208055-001		RMPSUB SAN	RMPSUB STM				
Physical Tests											
pH	E108	0.10	pH units	7.93		5.5 - 10 pH units	6 - 9 pH units				
solids, total suspended [TSS]	E160	3.0	mg/L	160		350 mg/L	15 mg/L				
Anions and Nutrients											
fluoride	E235.F	0.020	mg/L	0.692	DLDS	10 mg/L					
Kjeldahl nitrogen, total [TKN]	E318	0.050	mg/L	5.57	DLHC	100 mg/L	1 mg/L				
phosphorus, total	E372-U	0.0020	mg/L	0.126		10 mg/L	0.4 mg/L				
sulfate (as SO4)	E235.SO4	0.30	mg/L	123	DLDS						
Cyanides											
cyanide, strong acid dissociable (total)	E333	0.0020	mg/L	<0.0020		2 mg/L	0.02 mg/L				
Microbiological Tests											
coliforms, Escherichia coli [E. coli]	E012A.EC	1	CFU/100mL	<1			200 CFU/100mL				
coliforms, thermotolerant [fecal]	E012.FC	1	CFU/100mL	<2	DLM		1 CFU/100mL				
Total Metals											
aluminum, total	E420	0.0030	mg/L	1.44	DLHC	50 mg/L					
antimony, total	E420	0.00010	mg/L	<0.00100	DLHC	5 mg/L					
arsenic, total	E420	0.00010	mg/L	0.00171	DLHC	1 mg/L	0.02 mg/L				
cadmium, total	E420	0.0000050	mg/L	<0.0000500	DLHC	0.7 mg/L	0.008 mg/L				
chromium, total	E420	0.00050	mg/L	<0.00500	DLHC	5 mg/L	0.08 mg/L				
cobalt, total	E420	0.00010	mg/L	0.00125	DLHC	5 mg/L					
copper, total	E420	0.00050	mg/L	0.0174	DLHC	3 mg/L	0.05 mg/L				
lead, total	E420	0.000050	mg/L	0.000763	DLHC	3 mg/L	0.12 mg/L				
manganese, total	E420	0.00010	mg/L	0.271	DLHC	5 mg/L	0.05 mg/L				
mercury, total	E508	0.0000050	mg/L	<0.0000050		0.01 mg/L	0.0004 mg/L				
molybdenum, total	E420	0.000050	mg/L	0.00290	DLHC	5 mg/L					
nickel, total	E420	0.00050	mg/L	<0.00500	DLHC	3 mg/L	0.08 mg/L				
selenium, total	E420	0.000050	mg/L	<0.000500	DLHC	1 mg/L	0.02 mg/L				
silver, total	E420	0.000010	mg/L	<0.000100	DLHC	5 mg/L	0.12 mg/L				
tin, total	E420	0.00010	mg/L	<0.00100	DLHC	5 mg/L					
titanium, total	E420	0.00030	mg/L	<0.0300	DLHC DLUI	5 mg/L					
zinc, total	E420	0.0030	mg/L	0.0454	DLHC	3 mg/L	0.04 mg/L				
Aggregate Organics											

Analyte	Method	LOR	Unit	WT2208055-001 (Continued)	RMPSUB SAN	RMPSUB STM				
Aggregate Organics - Continued										
carbonaceous biochemical oxygen demand [CBOD]	E555	2.0	mg/L	<3.0 BODL	300 mg/L	15 mg/L				
oil & grease (gravimetric)	E567	5.0	mg/L	<5.0						
oil & grease, animal/vegetable (gravimetric)	EC567A.SG	5.0	mg/L	<5.0	150 mg/L					
oil & grease, mineral (gravimetric)	E567SG	5.0	mg/L	<5.0	15 mg/L					
phenols, total (4AAP)	E562	0.0010	mg/L	0.0128	1 mg/L	0.008 mg/L				
Volatile Organic Compounds										
benzene	E611D	0.50	µg/L	<0.50	10 µg/L	2 µg/L				
chloroform	E611D	0.50	µg/L	<0.50	40 µg/L	2 µg/L				
dichlorobenzene, 1,2-	E611D	0.50	µg/L	<0.50	50 µg/L	5.6 µg/L				
dichlorobenzene, 1,4-	E611D	0.50	µg/L	<0.50	80 µg/L	6.8 µg/L				
dichloroethylene, cis-1,2-	E611D	0.50	µg/L	<0.50	4000 µg/L	5.6 µg/L				
dichloromethane	E611D	1.0	µg/L	<1.0	2000 µg/L	5.2 µg/L				
dichloropropylene, trans-1,3-	E611D	0.30	µg/L	<0.30	140 µg/L	5.6 µg/L				
ethylbenzene	E611D	0.50	µg/L	<0.50	160 µg/L	2 µg/L				
methyl ethyl ketone [MEK]	E611D	20	µg/L	<20	8000 µg/L					
styrene	E611D	0.50	µg/L	<0.50	200 µg/L					
tetrachloroethane, 1,1,2,2-	E611D	0.50	µg/L	<0.50	1400 µg/L	17 µg/L				
tetrachloroethylene	E611D	0.50	µg/L	<0.50	1000 µg/L	4.4 µg/L				
toluene	E611D	0.50	µg/L	0.97	270 µg/L	2 µg/L				
trichloroethylene	E611D	0.50	µg/L	<0.50	400 µg/L	8 µg/L				
xylene, m+p-	E611D	0.40	µg/L	<0.40						
xylene, o-	E611D	0.30	µg/L	<0.30						
xylenes, total	E611D	0.50	µg/L	<0.50	1400 µg/L	4.4 µg/L				
bromofluorobenzene, 4-	E611D	1.0	%	82.4						
difluorobenzene, 1,4-	E611D	1.0	%	103						
Phthalate Esters										
bis(2-ethylhexyl) phthalate [DEHP]	E655F	2.0	µg/L	<2.0	12 µg/L	8.8 µg/L				
di-n-butyl phthalate	E655F	1.0	µg/L	<1.0	80 µg/L	15 µg/L				
Semi-Volatile Organics Surrogates										
fluorobiphenyl, 2-	E655F	1.0	%	100						
terphenyl-d14, p-	E655F	1.0	%	99.6						
Phenolics Surrogates										
tribromophenol, 2,4,6-	E655F	0.20	%	126						
Nonylphenols										

Analyte	Method	LOR	Unit	WT2208055-001 (Continued)	RMPSUB SAN	RMPSUB STM				
Nonylphenols - Continued										
nonylphenol diethoxylates [NP2EO]	E749B	0.10	µg/L	<0.10						
nonylphenol ethoxylates, total	E749B	2.0	µg/L	<2.0	200 µg/L					
nonylphenol monoethoxylates [NP1EO]	E749B	2.0	µg/L	<2.0						
nonylphenols [NP]	E749A	1.0	µg/L	<1.0	20 µg/L					
Polychlorinated Biphenyls										
Aroclor 1016	E687	0.020	µg/L	<0.020						
Aroclor 1221	E687	0.020	µg/L	<0.020						
Aroclor 1232	E687	0.020	µg/L	<0.020						
Aroclor 1242	E687	0.020	µg/L	<0.020						
Aroclor 1248	E687	0.020	µg/L	<0.020						
Aroclor 1254	E687	0.020	µg/L	<0.020						
Aroclor 1260	E687	0.020	µg/L	<0.020						
Aroclor 1262	E687	0.020	µg/L	<0.020						
Aroclor 1268	E687	0.020	µg/L	<0.020						
polychlorinated biphenyls [PCBs], total	E687	0.060	µg/L	<0.060	1 µg/L	0.4 µg/L				
decachlorobiphenyl	E687	0.1	%	99.6						
tetrachloro-m-xylene	E687	0.1	%	94.7						

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
BH22-4	Water	solids, total suspended [TSS]		RMPSUB	STM	160 mg/L	15 mg/L
	Water	Kjeldahl nitrogen, total [TKN]		RMPSUB	STM	5.57 mg/L	1 mg/L
	Water	coliforms, thermotolerant [fecal]		RMPSUB	STM	<2	1 CFU/100mL
	Water	manganese, total		RMPSUB	STM	0.271 mg/L	0.05 mg/L
	Water	zinc, total		RMPSUB	STM	0.0454 mg/L	0.04 mg/L
	Water	phenols, total (4AAP)		RMPSUB	STM	0.0128 mg/L	0.008 mg/L

Key:

RMPSUB	Ontario Reg. Mun. of Peel Sewer Bylaw #53-2010 (APR. 2011)
SAN	Reg. Mun. of Peel Sanitary by-law #53-2010
STM	Reg. Mun. of Peel Storm By-Law #53-2010