



January 11, 2022

Ms. Adriana Tantalo
Project Manager
City of Vaughan
2141 Major Mackenzie Dr.
Vaughan (ON) L6A 1T1

Subject: Sampling and Analysis Plan, Vaughan Fire Station 7-12
9541 Weston Road, Vaughan, Ontario
Project Reference: 02112512.000
01-02112512-0100-EN-002-00

1 INTRODUCTION

Englobe Corp. (Englobe) was retained by the City of Vaughan (hereinafter referred to as the “Client”) to complete a Sampling and Analysis Plan for the property located at 9541 Weston Road in Vaughan, Ontario (hereinafter referred to as “Site” or “Project Area”). The Site is located in the southeastern quadrant of the intersection of Weston Road and Ashberry Boulevard in the City of Vaughan, Ontario. The Project Area is approximately 4,092 m² and is irregular in shape. The location of the Site is shown in the Site Location Plan, Figure 1, Appendix A.

Englobe understands that the Project Area is proposed to redevelop from a parking lot to a fire station, including a two-storey building and remove the asphalt pavement and underlying material that may be required as part of the project. Based on the information provided by the Client, it is anticipated that approximately 4,000 m³ of excavated soil or excess soil may be removed during the fire station development.

Englobe previously completed an Assessment of Past Uses for the Project Area, which should be read in conjunction with this Sampling and Analysis Plan. Furthermore, the work described herein is to be completed in general accordance with the Ontario Regulation (O. Reg.) 406/19, On-Site and Excess Soil Management.

The purpose of the Sampling and Analysis Plan is to develop a field program to investigate any Areas of Potential Environmental Concern (APECs) within the Project Area as identified from the Assessment of Past Uses, which may have affected the soil quality within the areas where soil excavation is required as part of the proposed development activities.

2 ASSESSMENT OF PAST USES

Based on the information obtained and reviewed as part of the Assessment of Past Uses, current and/or historical Potentially Contaminating Activities (PCAs) associated with the Project Area and surrounding properties within the Study Area were identified. A summary of the PCAs and associated APECs identified at the Site is presented in Table 1.

Table 1: Areas of Potential Environmental Concern

APEC	Location of APEC	Potentially Contaminating Activity (PCA)	Location of PCA	Contaminants of Potential Concern*	Media Potentially Impacted
APEC 1	Entire Site	Historical use of fill materials PCA# 30 - Importation of Fill Materials of Unknown Quality	On-site	Metals, As, Sb, Se, Cr (VI), Hg, B-HWS, CN, EC, SAR and pH, PHCs, BTEX, VOCs, PAHs, PCBs, OCPs	Soil
APEC 2	The north portion of the Site	Registered as a waste generator of photo processing wastes and inorganic laboratory chemicals PCA# Undefined PCA No.	Off-site	Metals As, Sb, Se, Cr (VI), Hg, B-HWS, CN, VOCs	Soil

Notes:*

- PHCs - Petroleum Hydrocarbon Fractions F1 to F4
- BTEX - Benzene, Toluene, Ethylbenzene and Xylenes
- VOCs - Volatile Organic Compounds
- PAHs - Polycyclic Aromatic Hydrocarbons
- PCBs - Polychlorinated Biphenyl
- OCPs - Organochlorine Pesticides
- B-HWS - Hot Water Soluble Boron
- EC - Electrical Conductivity
- SAR - Sodium Absorption Ratio

3 PREVIOUS SAMPLING

No previous sampling program was conducted by Englobe on this Project Area.

4 SAMPLING AND ANALYSIS PLAN

Based on the information provided by the Client, the total estimated quantity of soil to be excavated/managed during the proposed Fire Station development activities is approximately 4,000 m³. According to the approximate volume of excess soil anticipated to be generated, the minimum number of soil samples by in situ sampling methodology would be twenty-two (22) soil samples (including 2 field duplicates) to meet the specifications outlined in the O. Reg. 406/19. The number of soil samples will be adjusted based on the site condition and findings of field work.

Therefore, the number of borehole locations, soil samples, and analytical parameters proposed for this Sampling and Analysis Plan are as follows:

- Fifteen (15) boreholes will be advanced, which seven (7) of them will be advanced to the depth of approximately 4.0 m and eight (8) to the depth of approximately 8.0 m below ground surface (bgs) at the Project Area;
- Twenty-two (22) soil samples (including two duplicates) for Metals and Inorganics and Petroleum Hydrocarbons (PHCs), including Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Seven (7) soil samples (including one duplicate) for Polycyclic Aromatic Hydrocarbons (PAHs);
- Five (5) soil samples (including one duplicate) for Volatile Organic Compounds (VOCs);
- Three (3) soil samples (including one duplicate) for Polychlorinated Biphenyl (PCBs);
- Three (3) soil samples (including one duplicate) for Organochlorine Pesticides (OCPs);
- Five (5) representative soil samples for analysis of modified Synthetic Precipitation Leaching Procedure (mSPLP) parameters for reuse purposes, including five samples (5) for metals; two (2) samples for VOCs, one (1) sample for semi-VOCs, and one (1) sample for OCPs analysis;
- Five (5) representative soil samples of Toxicity Characteristic Leaching Procedure (TCLP) parameters for disposal to the landfill facility.

The soil samples would be collected using a solid stem drill rig operated by an MECP-licensed drilling contractor in accordance with O. Reg. 903. Public and private utility locates would be completed before the drilling activities. The proposed borehole locations are presented in Appendix A, Borehole Location Plan, Figure 2.

Soil samples will be collected for field screening purposes to measure total organic vapours (TOVs) using a hand-held gas meter (i.e. RKL Eagle). Soil samples will be selected from each borehole based on the field screening results, visual/olfactory evidence of impacts, the APECs and contaminants of potential concern (COPCs) identified at the Project Area and submitted for laboratory analyses with Chain of Custody protocols. The details corresponding to sampling location, frequency, and analytical parameters are outlined in the following table.

Table 2: Sampling and Analysis Plan

Borehole ID	Associated APEC	Location	Total Borehole Depth	Soil Sample Collection Intervals	Parameters for Sample Submission*
BH-1	APEC 1 and APEC 2	Northwest portion of the Site	4.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, VOCs, PAHs, Metals, As, Sb, Se, Cr (VI), Hg, B-HWS, CN, EC, SAR, mSPLP, and TCLP
BH-2	APEC 1 and APEC 2	Central north portion of the Site	4.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, VOCs, PAHs, EC and SAR

Borehole ID	Associated APEC	Location	Total Borehole Depth	Soil Sample Collection Intervals	Parameters for Sample Submission*
BH-3	APEC 1 and APEC 2	Northeast portion of the Site	4.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, PCBs, Metals, mSPLP, TCLP, pH, EC and SAR
BH-4	APEC 1	Central west portion of the Site	8.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, PAHs, Metals, EC and SAR,
BH-5	APEC 1	Central east portion of the Site	8.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, Metals, OCPs
BH-6	APEC 1	Central east portion of the Site	8.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, PAHs, Metals, EC and SAR
BH-7	APEC 1	Southwest portion of the Site	4.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, PAHs, Metals, EC and SAR,
BH-8	APEC 1	Central portion of the Site	8.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, VOCs, PAHs, Metals, As, Sb, Se, Cr (VI), Hg, B-HWS, CN, EC, SAR, mSPLP, and TCLP
BH-9	APEC 1	Southwest portion of the Site	8.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, VOCs, PAHs, PCBs, Metals, As, Sb, Se, Cr (VI), Hg, B-HWS, CN, EC, SAR, and mSPLP
BH-10	APEC 1	Southeast portion of the Site	8.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, Metals, EC and SAR, mSPLP
BH-11	APEC 1	Southcentral portion of the Site	8.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, VOCs, Metals, EC and SAR,
BH-12	APEC 1	Southeast portion of the Site	8.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, VOCs, PAHs, Metals, As, Sb, Se, Cr (VI), Hg, B-HWS, CN, EC, SAR, and TCLP
BH-13	APEC 1	Southeast side out of the Site	4.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, Metals, EC and SAR, pH

Borehole ID	Associated APEC	Location	Total Borehole Depth	Soil Sample Collection Intervals	Parameters for Sample Submission*
BH-15	APEC 1	Northeast side out of the SIte	4.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	Metals, As, Sb, Se, Cr (VI), Hg, B-HWS, CN, EC, SAR, and TCLP
BH-16	APEC 1	Northeast side out of the SIte	4.0 m bgs	Topsoil and every 0.75 m interval in the underlying native material	PHCs, BTEX, VOCs, Metals, EC and SAR, mSPLP, and OCPs

Notes: * Selected sample is to be submitted for laboratory analysis
 PHCs - Petroleum Hydrocarbon Fractions F1 to F4
 BTEX - Benzene, Toluene, Ethylbenzene and Xylenes
 VOCs - Volatile Organic Compounds
 PAHs - Polycyclic Aromatic Hydrocarbons
 PCBs - Polychlorinated Biphenyl
 OCPs - Organochlorine Pesticides
 B-HWS - Hot Water Soluble Boron
 EC - Electrical Conductivity
 SAR - Sodium Absorption Ratio
 mSPLP - modified Synthetic Precipitation Leaching Procedure
 TCLP - Toxicity Characteristic Leaching Procedure

Bulk Soil Sample Selection and Submission: Based on the soil sample field screening results, apparent worst-case soil samples will be selected and reviewed with the Qualified Person/Project Manager prior to submitting to the contracted external laboratory (Eurofins Environment Testing Canada Inc.) for chemical analysis as listed in Table 2 above.

mSPLP Analysis: Five (5) representative or composite soil samples will be submitted to the laboratory for mSPLP analysis for the following parameters to determine the potential reuse of the excess soil on-site and/or off-site.

- mSPLP Metals and Hydride-forming metals
- mSPLP Volatile Organic Compounds (VOCs)
- mSPLP Semi-Volatile Organic Compounds (SVOCs)
- mSPLP OC Pesticides

TCLP Analyses: Five (5) worst-case or composite soil samples will be submitted to the laboratory for TCLP analysis for the following parameters to determine the off-site disposal of investigation-derived wastes and/or contaminated excess soil.

- TCLP Metals and Hydride-forming metals
- TCLP Volatile Organic Compounds (VOCs)
- TCLP Benzo(a)pyrene
- TCLP Ignitibility

Waste Management: soil characterization investigation-derived wastes (soil cuttings, purged groundwater) will be stored at the Site in sealed, labelled drums in a location agreed upon by the Client for future off-site disposal.

Soil QA/QC: The laboratory program includes the submission of Six (6) duplicate soil samples for analyses of metals and hydride-forming metals, EC and SAR, PAHs, VOCs, and PHCs F1 to F4, including BTEX. Soil samples are to be homogenized prior to collection in laboratory-supplied sample containers to minimize variance in soil heterogeneity.

It should be noted that soil samples will be collected from the select boreholes with the APECs identified at the Site. This Sampling and Analysis Plan is prepared to meet the requirements of O. Reg. 406/19, On-Site and Excess Soil Management.

We thank you for the opportunity to be of continuous service on this project and trust that the above Sampling and Analysis Plan meets your current requirements.

Yours very truly,

Englobe Corp.



Feng Li, M.Sc., P.Eng.
Project Engineer
Environment (GTA and East)



Sam Voore, M.Eng., P.Eng., QP_{ESA}
Director of Operations
Environment GTA/East - ON

Appendix A

Figures

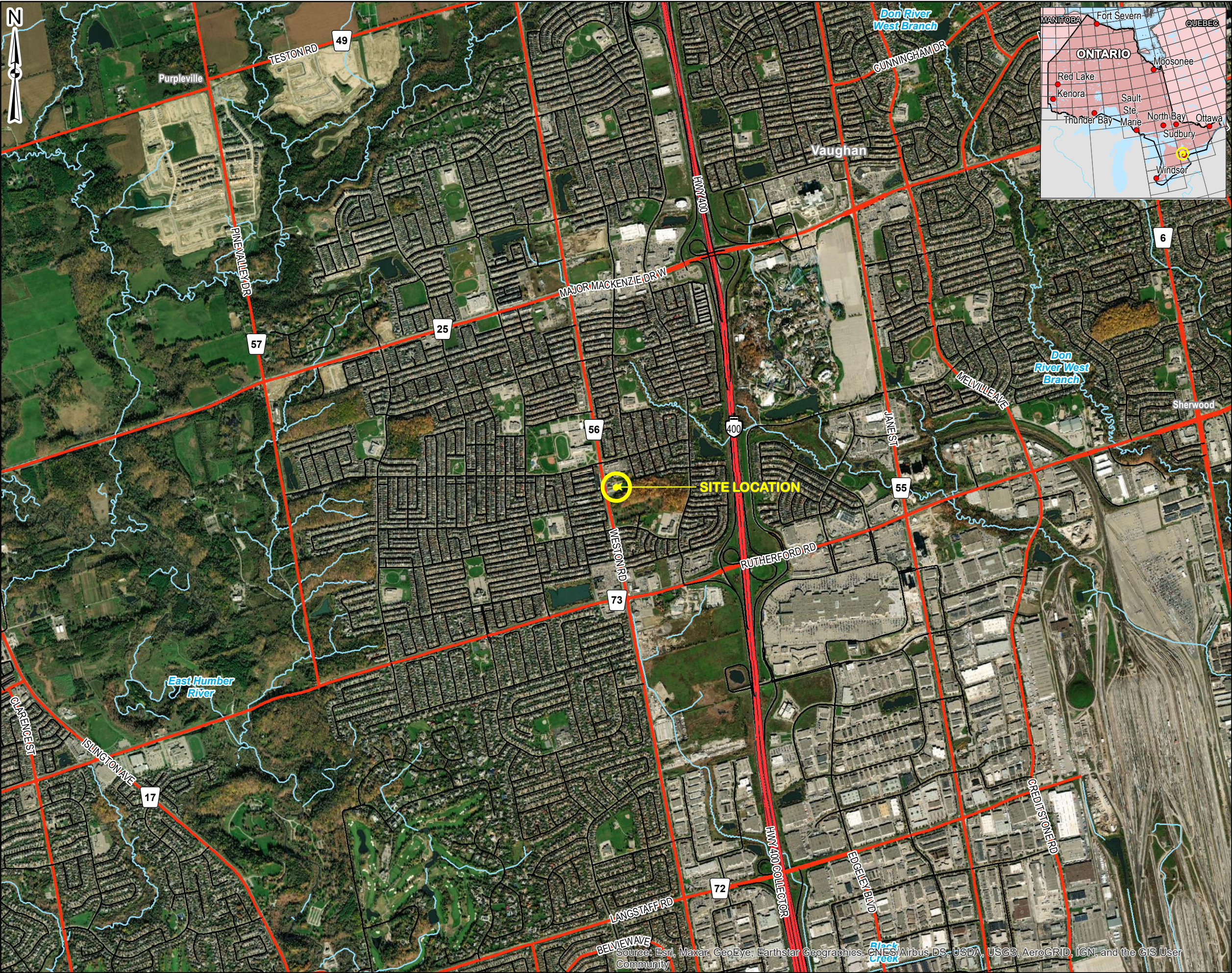
Figure 1: Site Location Plan

Figure 2: Borehole Location Plan



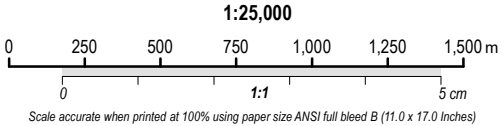
eNGLOBE

APPROX. DATE OF IMAGERY: 10/15/2019



- Notes**
1. This drawing shall be read in conjunction with the associated technical report.
 2. Coordinate System: NAD 1983 UTM Zone 17 T
Projection: Transverse Mercator
Datum: North American 1983

- Legend**
- Site Location
 - Expressway / Highway
 - Major Road
 - Minor Road
 - Railway
 - Watercourse



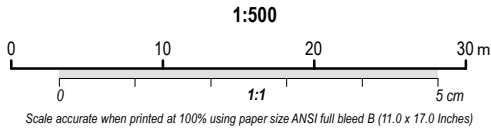
A	2022-04-05	-	02112512
Revision	Date	Issue	GIS #
Client			
City of Vaughan			
Site			
9541 Weston Road, Vaughan, Ontario			
Report Title			
Sampling and Analysis Plan			
Drawing Title			
Site Location Plan			
Designed By	S.W.	Scale	1:25,000
Drawn By	C.M.	Date	April, 2022
Approved By	W.J.	Project No.	02112512.000
Figure No.	1		

Drawing: Figure 01 - Site Location Folder: A:\GIS\02112512 Weston Road\Map Documents\SCR\Figure 01 - Site Location.mxd Tuesday, April 5, 2022 @ Time: 2:30:35 PM by Christopher Mitchell



- Notes**
- 1. This drawing shall be read in conjunction with the associated technical report.
 - 2. Coordinate System: NAD 1983 UTM Zone 17 T
Projection: Transverse Mercator
Datum: North American 1983

- Legend**
- Borehole
 - Site Boundary



A	2022-04-05	-	02112512
Revision	Date	Issue	GIS #

Client
City of Vaughan

Site
9541 Weston Road, Vaughan, Ontario

Report Title
Sampling and Analysis Plan

Drawing Title
Borehole Location Plan

Designed By	S.W.	Scale	1:500
Drawn By	C.M.	Date	April, 2022
Approved By	W.J.	Project No.	02112512.000

Figure No.
2