Appendix M – Groundwater Report

407 TRANSITWAY – WEST OF HURONTARIO STREET TO EAST OF HIGHWAY 400

MINISTRY OF TRANSPORTATION - CENTRAL REGION

July 9, 2018 Project No. 1525717

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SECONDARY SOURCE GROUNDWATER INVESTIGATION AND IMPACT ASSESSMENT
407 TRANSITWAY FROM WEST OF HURONTARIO STREET TO EAST OF HIGHWAY 400, GWP-14-20001

Ms. Speller

Golder Associates Ltd. ("Golder") was retained by LGL Limited ("LGL") on behalf of Parsons Corporation ("Parsons") and the Ministry of Transportation ("MTO") to carry out a review of existing background hydrogeological information and a visual "windshield reconnaissance" for an approximately 23 km section of the proposed 407 Transitway. Subsequently, Golder carried out a groundwater impact assessment for the 407 Transitway based on the identified existing groundwater conditions.

Background

The 23 km section of the 407 Transitway extends from west of Hurontario Street to east of Highway 400, generally in the Cities of Brampton and Vaughan, Ontario. The study area is also located directly adjacent to the City of Mississauga and City of Toronto and extends slightly within the City of Mississauga and City of Toronto boundaries in a few locations. Eleven station locations were initially investigated in the vicinity of the following interchanges: Hurontario Street, Highway 410, Dixie Road, Torbram Road/Bramalea Road, Airport Road, Goreway Drive, Highway 50, Highway 27, Martin Grove Road, Pine Valley Drive and Weston Road, although the stations at Highway 410, Torbram Road/Bramalea Road, Martin Grove Road, and Weston Road were not selected/carried forward for further assessment. The study area included an approximately 1,000 m wide corridor centred on the existing 407 ETR as shown on Figure 1 (i.e., the "study area").

The 407 Transitway assignment will follow the Transit Project Assessment Process (TPAP) prescribed in *Ontario Regulation 231/08, Transit Projects and Metrolinx Undertakings* under the *Environmental Assessment Act*. The 407 Transitway will be a two-lane, fully grade separated transit facility on an exclusive right-of-way, running along the 407 ETR Corridor. This section of the Transitway facility will consist of 23 km of runningway and seven stations. The station layouts will include vehicular and pedestrian access (es), park and ride and passenger pick-up/drop off (PPUDO) facilities, bus lay-by facilities, on street integration with local transit, shelters, buildings and other amenities. Subject to the outcome of the overall study, the 407 Transitway will be implemented initially as Bus Rapid Transit (BRT) with the opportunity to convert to Light Rail Transit (LRT) in the future.

Information Review

The purpose of the information review has been to identify hydrogeological conditions and resources in the study area which could impact the construction of the 407 Transitway route/station locations and to identify existing groundwater resources that could be impacted by the 407 Transitway construction. This information was used to assist in identifying a preferred route alignment and station locations for the Transitway within the study area. For the impact assessment, hydrogeological features such as significant groundwater recharge and discharge areas, municipal wellhead protection areas, groundwater dependent commercial enterprises, existing water wells and areas of shallow water table were considered.

The hydrogeological information reviewed as part of this summary of existing conditions has included:

- Information contained in water well records for the study area available from the Ontario Ministry of the Environment and Climate Change (“MOECC”);
- Quaternary geological mapping for the study area available from the Ontario Geological Survey;
- Topographic mapping from the National Topographic Survey Toporama web site 1:50,000;
- Aerial photographs;
- Wellhead protection area mapping and municipal water supply information available on-line from the Regional Municipality of York, the Regional Municipality of Peel and the City of Toronto; and,
- A windshield visual study area reconnaissance was carried out from public roadways between September 21 and September 23, 2016. Attention was paid to stream crossings and areas of surface water along the runningway and at station locations.

Geology

The study area is associated with the existing 407 ETR right-of-way, which passes through urbanized areas of commercial, industrial, residential and recreational land-use. The west portion of the study area is relatively flat lying with ground surface elevations typically in the range of 175 to 185 m above sea level, between Highway 427 and Highway 410. West of Highway 410 the ground surface rises gently to approximately 205 m above sea level (“masl”) at Hurontario Street. In the vicinity of the Humber River and its tributaries between Pine Valley Drive and Highway 427, the ground surface elevation drops to around 140 masl.

Numerous stream crossings are present within the study area associated with tributaries and the main branches of Fletcher’s Creek in the vicinity of Hurontario Street, Etobicoke Creek and Etobicoke Creek West in the vicinity of Highway 410, Spring Creek in the vicinity of Dixie Road, Mimico Creek between Torbram Road and Goreway Drive, the West Humber River in the vicinity of Highway 50, Albion Creek in the vicinity of Highway 427, the Humber River and Rainbow Creek from east of Highway 27 South to Islington Avenue, and Black Creek in the vicinity of Highway 400. Visual observations during the windshield reconnaissance of the stream crossings typically encountered visibly turbid water quality, a lack of stream bed vegetation and mostly sluggish flow characteristics.

Surface geology mapping as presented on the Ontario Geological Survey Preliminary Map 2204, Geological Series “Quaternary Geology, Toronto and Surrounding Area, Southern Ontario, scale 1:100,000” (D.S. Sharpe, 2000) and a recent Ontario Geological Survey/Geological Survey of Canada electronic compilation were reviewed by Golder (See Figure 2, attached). Based on the Quaternary geology mapping, the flat lying upland areas of the

proposed Transitway study area are underlain by relatively fine grained post-glacial lake sediments and glacial deposits of clayey silt till. On the eastern slope of the Humber River Valley, west of Pine Valley Drive, relatively coarse grained glacial lake deposits of sand are mapped. In the Humber River Valley and in the other stream valleys within the study area, relatively coarse grained recent stream deposits of sand are indicated. Outcrops of shale and limestone bedrock may be exposed in stream valleys in some locations to the west of the Humber River.

Based on the well record cross-sections on Figures 3.1, 3.2 and 3.3, the local geology in the western half of the study area, west of Goreway Drive, generally consists of glacial till or clay overburden over relatively shallow bedrock. In some wells, bedrock was encountered at less than 10 m below ground surface. Zones of sand within the overburden were reported in some of the records. Bedrock in this area was reported between elevations of approximately 170 m to 190 m and dipping to 150 masl from east of Airport Road to Goreway Drive.

East of Goreway Drive, the geology generally is logged as glacial till or clay at ground surface. Between Goreway Drive and the Humber River, a confined sand and gravel aquifer was generally encountered below an elevation of 150 masl or at depths of approximately 20 to 25 m below ground surface. East of the Humber River, thick deposits of glacial till and/or clayey soils were indicated, with thin water bearing sand zones below elevations of approximately 140 masl. In general, the geology indicated in the well records is consistent with the geology mapping reviewed.

One earth science Area of Natural and Scientific Interest (ANSI), the Woodbridge Pleistocene Cut, is located in the study area south of the preferred alignment approximately 900 m west of the Humber River as shown on Figure 2C in Appendix A. The presence of the ANSI within the study area does not represent a groundwater issue for the project.

Based on the surficial geology of the study area, significant areas of groundwater recharge are not expected within the study area, with the exception of the area of post-glacial lake sand west of Pine Valley Drive. Groundwater discharge is expected to be limited to the lower elevation stream valley areas in the study area. Given the local fine grained geology, the field observations of the stream crossings and the relative elevations of the streams, only the Humber River is expected to be a significant groundwater discharge zone, although it is likely that some discharge is occurring in the other stream channels as well.

Groundwater Resources

Based on a review and plot of the MOECC well records and field observations, water wells have been in use historically throughout the study area; however, given the expansion of the urban area of the Cities of Brampton, Mississauga, Toronto and Vaughan, it is anticipated that municipal water supplies are available to properties within the study area. As such, it is not expected that properties are dependent on groundwater wells for water supply.

Based on a review of the wells records, there are a total of 207 well records within the study area. The locations of the wells and hydrogeological cross-sections, based on the information provided in the well records, are shown on the attached Figures 2, 3.1, 3.2 and 3.3. Figure 3.4 provides a list of symbols used on Figures 3.1 to 3.3. Of the 207 well records, 78 records are for water supply production wells with 69 of the production wells having been drilled prior to 1980. The remaining records were for test holes and observation wells. Of the production wells, 15 were reported to be large diameter bored wells and three were reported to be shallow, less than 10 m deep. Nearly half of the production wells (38) were greater than 30 m deep and bedrock was reported at varying depths

in 53 of the well records. Five of the production wells had initial test pumping rates above 100 L/min, with one irrigation well (Record # 6906846) reportedly tested at a rate of 546 L/min. Well record # 6906846 is located in the Humber River Valley, west of Islington Avenue. Three of the wells were recorded as flowing at the time of drilling. These wells are also located in the Humber River Valley, west of Islington Avenue. Golder is aware, based on previous drilling experience, of flowing artesian groundwater conditions in the vicinity of 407 ETR and the Humber River. In addition to the flowing wells, of the 96 wells which reported static water levels, eight wells recorded a static water level of less than 3 m below the ground surface.

The presence of shallow stream valleys and ponds in the vicinity of the study area suggest the possible presence of high water table within the upland portion of the study area. High water table should also be anticipated in the stream valleys which cross the study area.

As part of our assessment, we have considered the MOECC's Interpretive Bulletin on Source Water Protection dated August 30, 2013. Based on on-line mapping available from the Regional Municipalities of York and Peel, there are no wellhead protection areas or municipal wells within the study area. The City of Toronto does not use groundwater for its municipal water supply. Therefore, the project is not located in or near any well head protection areas or intake protection zones and does not pose a significant drinking water threat.

Summary

Based on our review of the above information, the following hydrogeologic conditions are noted:

- Given the urbanized setting of the study area, it is unlikely that properties within the study area are wholly dependent on groundwater for supplies and it is possible that no wells remain in use in the study area.
- Given the relatively fine-grained nature of the soils mapped and logged in the information reviewed, the study area is not generally an area of significant groundwater recharge. Some local areas of higher groundwater recharge may be associated with the mapped sand areas immediately east of the Humber River and in the stream valleys. Recharge in these areas likely flows and discharges directly to the adjacent streams rather than recharging deeper aquifer systems;
- Areas of groundwater discharge are expected in stream channels and valley bottoms; and,
- Areas of relatively coarse-grained sandy soils may be present at shallow depths to the east of the Humber River. As well, areas of shallow water table may be present through the flat-lying upland sections of the study area and in conjunction with stream valleys. Excavation and construction below the water table in saturated soils may present challenges, including the need for de-watering. Excavations for culverts, bridges and buried utilities may encounter shallow groundwater that could need to be actively managed during construction.

Groundwater Impact Assessment

The groundwater impact assessment is based on similar transportation construction projects with consideration of the potential works to be undertaken. Construction activities associated with the development of the 407 Transitway are expected to consist of construction of the Transitway road bed and pavement, drainage infrastructure, bridges and culverts for road and stream crossings, station vehicular and pedestrian access (es), park and ride and passenger pick-up/drop off (PPUDO) facilities, bus lay-by facilitates, on street integration with local transit, shelters, buildings and other amenities. Most physical interaction with groundwater is expected to be as a result of deep excavations below the water table. Most excavation activities for the project are expected to be

relatively shallow; however, deeper excavations may be necessary for bridge and buried utility and sewer construction. Prior to construction, the potential impact of the proposed construction works should be reassessed and further investigation and monitoring carried out as necessary.

Runningway and Stations

The runningway and stations are shown on three figures provided by LGL and included in Appendix A of this report. The 407 Transitway lies south of 407 ETR between the project limits.

Physical Alteration of Existing Groundwater Regime

Based on potential construction works and the hydrogeologic conditions, potential alterations to the groundwater regime include:

- Construction excavation below the water table;
- Profile lowering and drainage improvements which have the potential to permanently de-water or lower the local water table;
- Bridge construction may cause temporary impact to local groundwater discharge to water courses; however, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures;
- Impacts associated with any positive dewatering implemented during construction. There is a strong possibility of positive dewatering being needed for bridge crossings for the deeper stream valleys and may be required elsewhere for culvert and buried utility construction. The measured impacts and effective radius of influence from any dewatering will be dependent on specific local hydrogeologic conditions and should be reviewed by a qualified hydrogeologist and additional investigation completed as necessary prior to construction. The impacts associated with the construction dewatering activities are expected to be temporary.

Given the fine grained soil expected to underlie much of the study area, the impact of any physical alteration of the groundwater flow system is not expected to be widespread, however, this should be re-assessed prior to construction based on additional site specific hydrogeologic data.

Impact on Groundwater Recharge and Discharge

A reduction in groundwater recharge to the subsurface will occur as a result of the expansion or construction of impermeable pavement surfaces. It is expected that new impermeable surfaces associated with the Transitway runningway and the station locations will reduce the overall recharge within the study area. Recharge lost to impermeable surfaces can in part be mitigated by direction of runoff to natural ground surfaces, by the construction of permeable pavements or by other low-impact development infiltration techniques. Based on the review of local surface geology maps, most of the flat lying upland areas of the proposed Transitway study area are underlain by relatively fine grained post-glacial lake sediments and glacial deposits of clayey silt till. On the eastern slope of the Humber River Valley, west of Pine Valley Drive, relatively coarse grained glacial lake deposits of sand are mapped. As such, the effectiveness of permeable pavements and low impact development infiltration techniques in areas west of the Humber River is expected to be limited. In the area of relatively coarse grained sandy soil, in the vicinity of the proposed Pine Valley station, there is likely an opportunity to effectively implement permeable pavements or other low impact development infiltration techniques. The actual effectiveness of any of these measures should be assessed prior to construction.

Based on the relatively large regional areas from which the local watersheds and aquifers derive recharge and the relatively low rate of groundwater recharge currently expected in most of the study area, the effect of the potential reduction in overall groundwater recharge is not expected to be significant. It is unlikely that the potential reduction in recharge would produce a measurable effect on groundwater recharge and discharge functions, including baseflow in streams.

Discharge functions within the study area may be reduced as a result of the proposed construction. Profile lowering activities could reduce the existing hydraulic gradients to an extent where a reduction in groundwater discharge is possible. Given the relatively small area of the construction activities compared to overall drainage basin areas, a localized decrease in discharge is not expected to be measureable.

Discharge functions at the bridge construction locations may be impacted temporarily during construction activities; however, this impact is expected to be negligible post-construction once water table conditions equilibrate around the new structures.

Water Well Interference

Concerns regarding water well supply interference will be for only those wells that remain in active use. Based on a review and plot of the MOECC well records and field observations, water wells have been in use historically throughout the study area; however, given the expansion of the urban area of the Cities of Brampton, Mississauga, Toronto and Vaughan, it is anticipated that municipal water supplies are available to properties within the study area. As such, it is not expected that properties are dependent on groundwater wells for water supply.

As part of our assessment, we have considered the MOECC's Interpretive Bulletin on Source Water Protection dated August 30, 2013. Based on on-line mapping available from the Regional Municipalities of York and Peel, there are no wellhead protection areas or municipal wells within the study area. The City of Toronto does not use groundwater for its municipal water supply. Therefore, the project is not located in or near any well head protection areas or intake protection zones and does not pose a significant drinking water threat.

Potential for Groundwater Contamination

Although groundwater is not expected to be a source of water for human use within the study area, the development of the Transitway has the potential to impact groundwater with corresponding risk to ecological receptors. Groundwater is susceptible to impact by de-icing salt application.

Because of the mobility of road salt constituents, mitigation of road salt impacts is difficult. However, where practical, road salt application within the right-of-way should be at the minimum levels allowed within the context of MTO's standard road salt application procedures. Given that the project consists of the construction of a new runningway, a new area of salt application will result from the construction of the project.

Mobile vehicle re-fuelling during construction presents a risk of impact to groundwater as a result of accidental releases of fuel. This risk can be minimized or managed by allowing re-fuelling only in designated areas, preferably situated on a paved, impermeable surface and by having an emergency response plan in place to clean up all releases of fuel.

Impact of High Water Table

Areas of high water table (i.e., less than 3 metres below ground surface) may affect construction progress and technique. Based on topography, geology and field observations there is the potential for a high water table to be

present within the study area. In areas of relatively fine grained soils such as till or clay west of the Humber River, the presence of the high water table should not represent a significant constraint for construction. For areas of relatively coarse silt and sand such as those thought to exist to the east of the Humber River the presence of a high water table could impact on construction techniques and progress. Excavation and construction below the water table in saturated sandy and/or silty soils may present challenges, including the need for de-watering. It should be noted that any pumping of water for road construction above 50,000 litres per day requires either registration on the Environmental Activity and Sector Registry ("EASR" - under certain criteria) or a Permit to Take Water from the MOECC. It is recommended that the Transitway selected design and future subsurface investigation data be reviewed prior to construction to further assess the impact of the suspected areas of high water table.

Summary

Based on the review of available published information, our windshield reconnaissance, and the expected construction activities, there is potential for impact to groundwater resources as a result of:

- Construction de-watering;
- Installation of structures and buried utilities below the water table;
- Road profile lowering in areas of high water table;
- Increased use of road salt over a larger area associated with the new Transitway alignment; and,
- Fuel releases during construction.

It is recommended that the potential impacts be reassessed along with more detailed site specific hydrogeological data prior to construction of the project and appropriate mitigation measures incorporated into the design. Based on the findings of the re-assessment, EASR registration or Permit(s) to Take Water for construction should be applied for as necessary.

Closure

This groundwater assessment presents a generalized interpretation of hydrogeological conditions and has been based on available background information in addition to a limited windshield reconnaissance as outlined above. Hydrogeological conditions within the study area will vary locally and are subject to confirmation with actual site specific investigations including (but not limited to) boreholes, monitoring wells, test pits, groundwater hydraulic testing, chemical analysis, etc. The potential impact of the proposed construction works on groundwater should be re-assessed and further investigation and monitoring carried out as necessary prior to construction.

We trust that this secondary source groundwater investigation meets your requirements. Should you have any questions please contact the undersigned.

Yours truly,

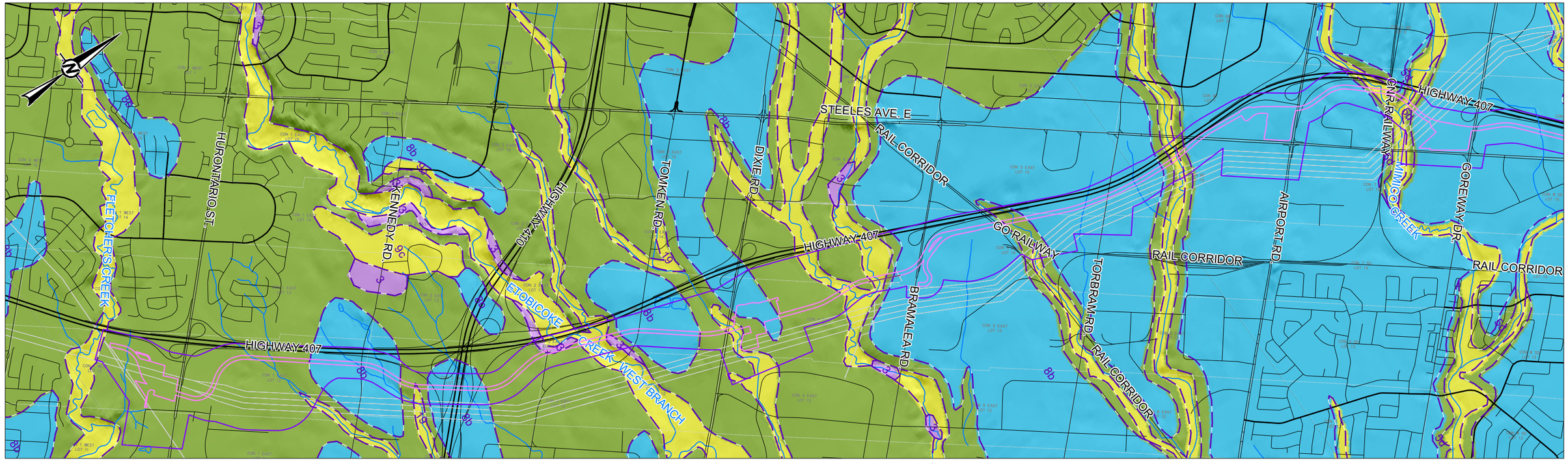
Golder Associates Ltd.

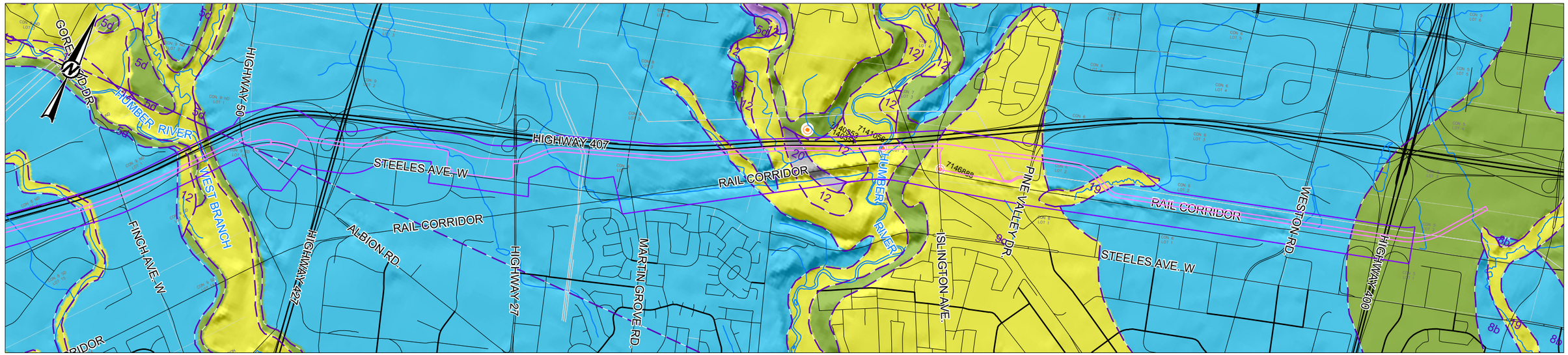
Shawn Lytle, P.Geo.
Principal, Senior Hydrogeologist

SDL/clg

Attachments: Figures 1 through 3.4
Appendix A

Figures





LEGEND

- Project Limits
- Alignment and Station Footprint

20	Organic Deposits	8b	Conglomeratic, Lacustrine Deposits
19	Fluvial Silt, Sand, Gravel	5d	Fine Grained Till
12	Fluvial Sand	3	Paleozoic Bedrock
9c	Glaciolacustrine Silt & Sand Deposits		

REFERENCE

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OBM FEATURES ESRI GEOGRAPHY NETWORK
QUATERNARY SOILS, OGS / GSC COMPILATION QUEEN'S PRINTER 2012

0 500 1,000
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CLIENT
LGL LIMITED ENVRIONMENTAL RESEARCH ASSOCIATES

CONSULTANT
GOLDER

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DESIGNED	
PREPARED	STB
REVIEWED	
APPROVED	

PROJECT
407 TRANSIT WAY, WEST OF HURONTARIO STREET, CITY OF BRAMPTOM, REGION OF PEEL TO EAST OF HIGHWAY 400, CITY OF VAUGHAN, REGION OF YORK

TITLE
SURFICIAL SOILS QUATERNARY GEOLOGY MAP

PROJECT NO.	Control	REV.	Figure
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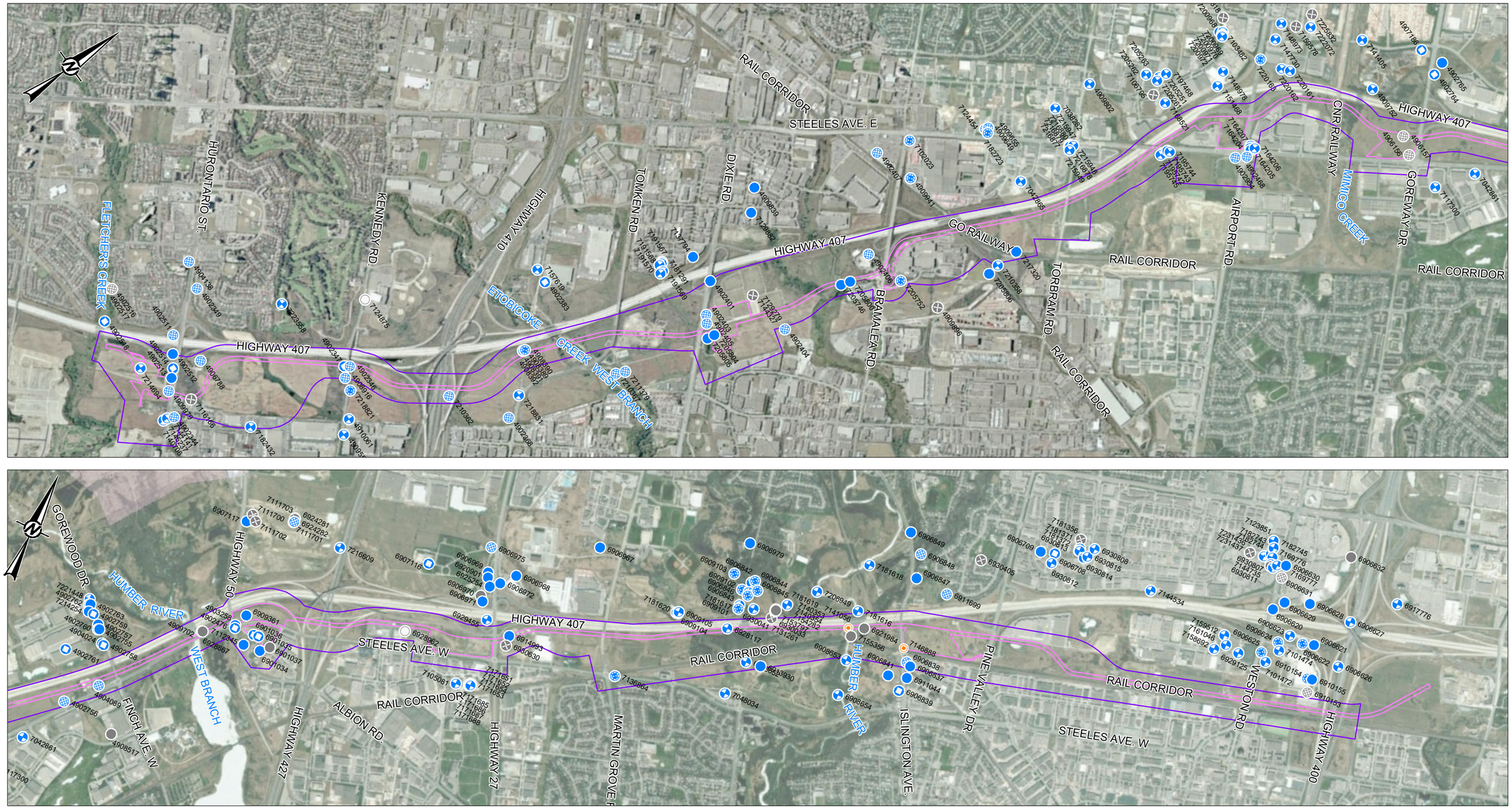

LEGEND

- Project limits
- Alignment and Station Footprint
- Shallow Dug or Bored <10 m
- Deep Bored Well >10 m
- Drilled Overburden Well
- Test or Observation Well

REFERENCE

DATUM IS UTM NAD 83 ZONE 17
OBM FEATURES ESRI GEOGRAPHY NETWORK
BASE IMAGERY ESRI MICROSOFT BING, 2015
MOECC WATER WELL LOCATIONS, DIGITAL WATER WELL DATABASE QUEEN'S PRINTER JUNE 2015

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CLIENT
LGL LIMITED ENVRIONMENTAL RESEARCH ASSOCIATES

CONSULTANT
GOLDER

YYYY-MM-DD	2018-07-04
PREPARED	STB
DESIGN	
REVIEW	
APPROVED	

PROJECT
407 TRANSIT WAY, WEST OF HURONTARIO STREET, CITY OF BRAMPTOM, REGION OF PEEL TO EAST OF HIGHWAY 400, CITY OF VAUGHAN, REGION OF YORK

TITLE
MOECC RECORDED WATER WELLS

PROJECT No.	Control	Rev.	Figure
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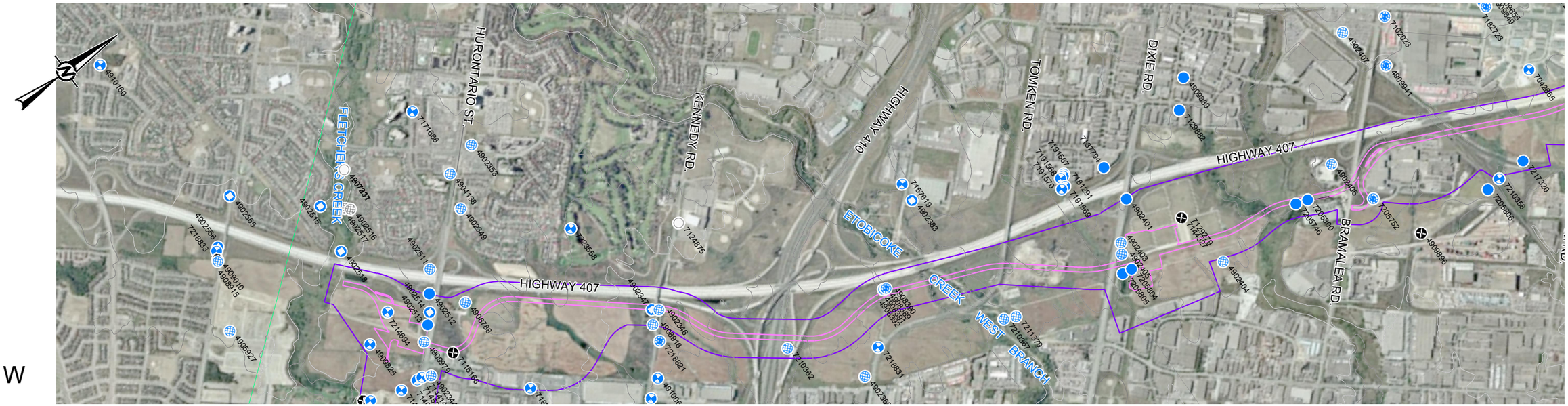

REFERENCES

REFER TO FIGURE 3.4 FOR LEGEND & NOTES

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CLIENT
LGL LIMITED ENVRIONMENTAL RESEARCH ASSOCIATES

CONSULTANT
GOLDER

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REVIEW	
APPROVED	

PROJECT
407 TRANSIT WAY, WEST OF HURONTARIO STREET, CITY OF BRAMPTOM, REGION OF PEEL TO EAST OF HIGHWAY 400, CITY OF VAUGHAN, REGION OF YORK

TITLE
MOECC RECORDED WATER WELL SECTION (WEST)

PROJECT No.	Control	Rev.	Figure
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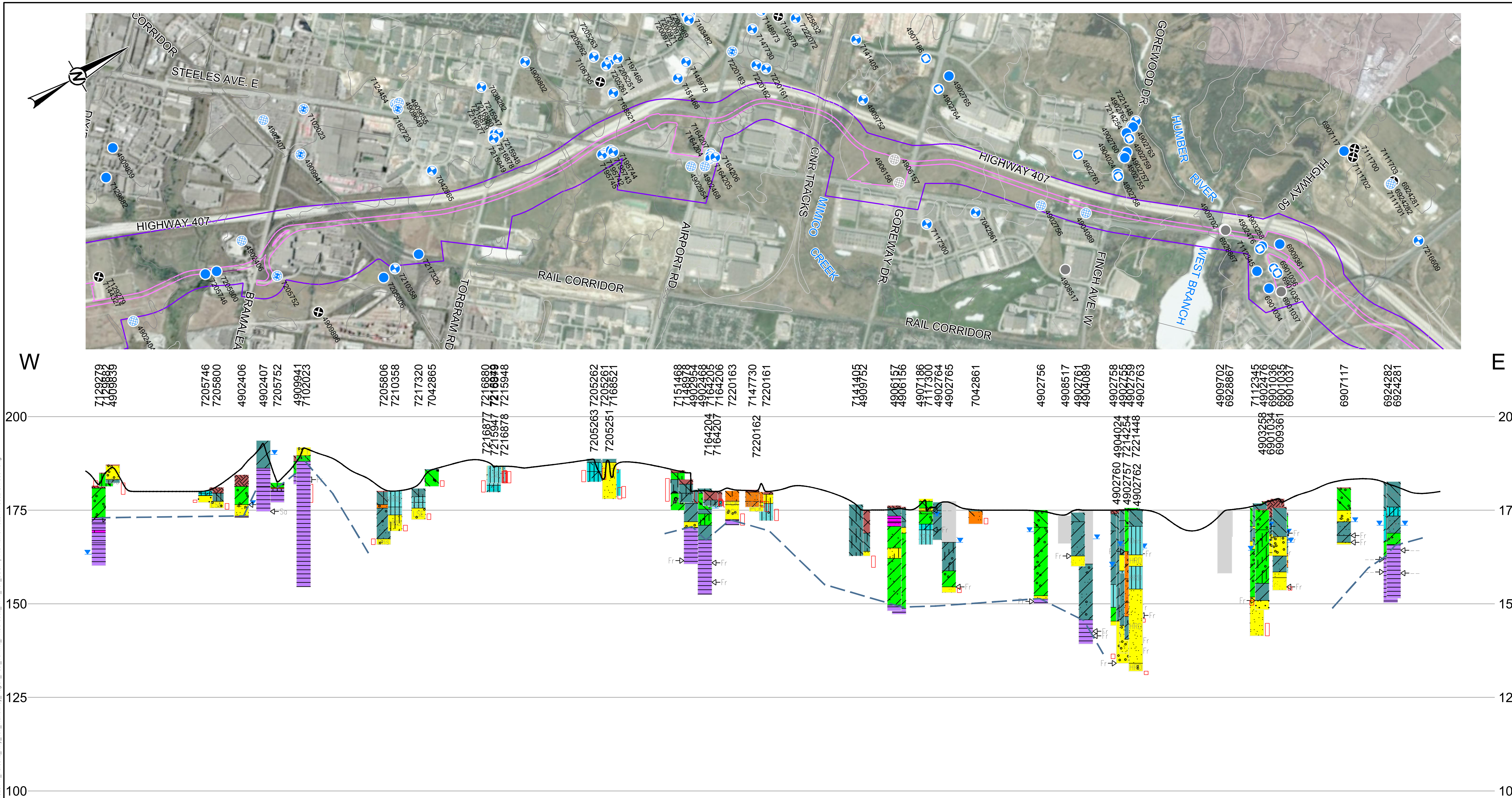

REFERENCES

REFER TO FIGURE 3.4 FOR LEGEND & NOTES

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CLIENT	LGL LIMITED ENVRIONMENTAL RESEARCH ASSOCIATES
PROJECT	407 TRANSIT WAY, WEST OF HURONTARIO STREET, CITY OF BRAMPTON, REGION OF PEEL TO EAST OF HIGHWAY 400, CITY OF VAUGHAN, REGION OF YORK
CONSULTANT	GOLDER
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TITLE	**MOECC RECORDED WATER WELL SECTION (CENTRAL)**
PROJECT No.	1525717
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Figure	3.2

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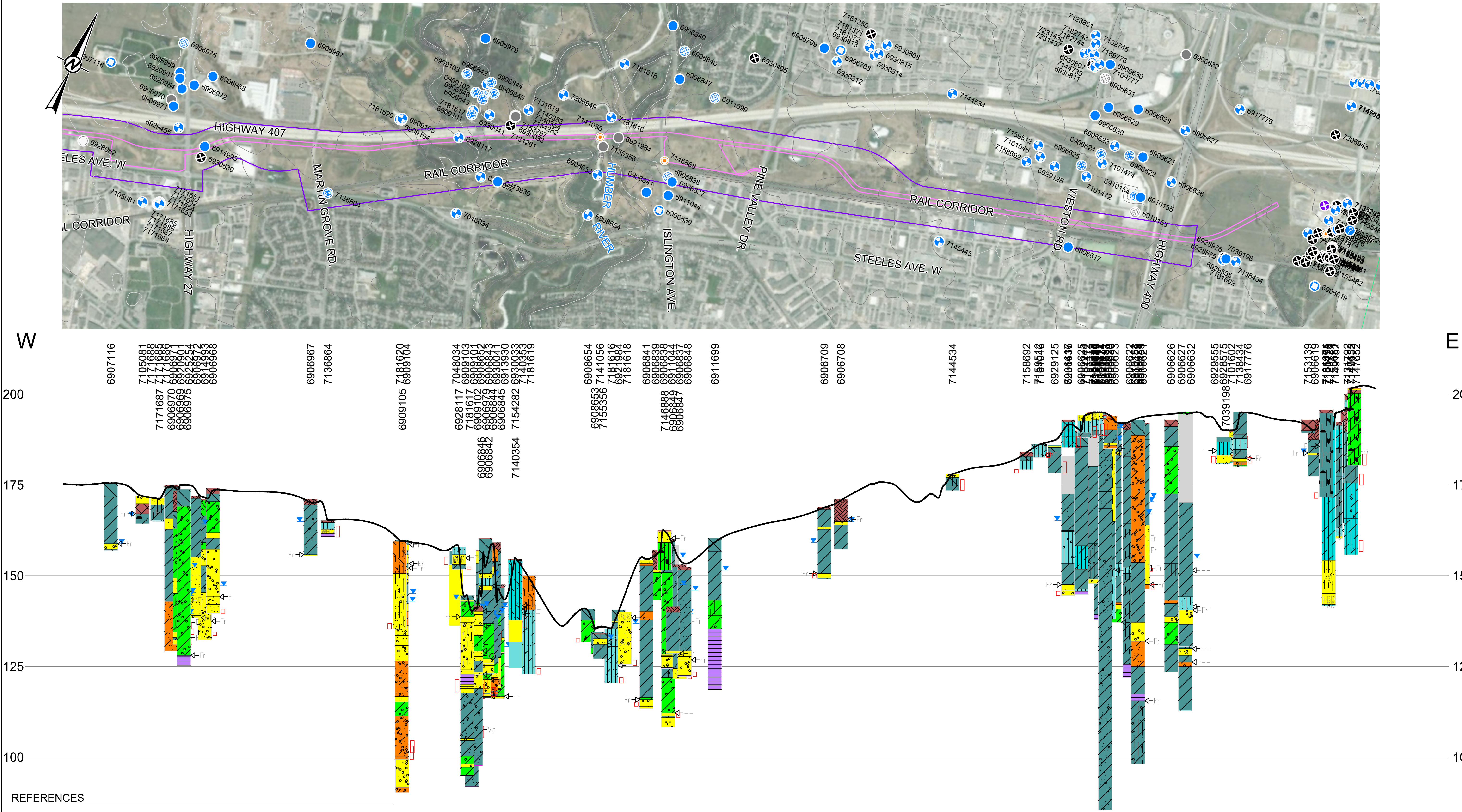

REFERENCES

REFER TO FIGURE 3.4 FOR LEGEND & NOTES

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CLIENT
LGL LIMITED ENVRIONMENTAL RESEARCH ASSOCIATES

CONSULTANT
GOLDER

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APPROVED	

PROJECT
407 TRANSIT WAY, WEST OF HURONTARIO STREET, CITY OF BRAMPTON, REGION OF PEEL TO EAST OF HIGHWAY 400, CITY OF VAUGHAN, REGION OF YORK

TITLE
MOECC RECORDED WATER WELL SECTION (EAST)

PROJECT No.	Control	Rev.	Figure
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STRATIGRAPHIC PATTERN

- Unoxidized CLAY, Blue, Grey, White, or Undefined CLAY
- Oxidized CLAY, Brown, Red, Yellow
- SILT
- SAND
- GRAVEL
- STONES, Rounded GRAVEL, PEBBLES
- BOULDER
- TILL
- SHALE
- DOLOSTONE
- LIMESTONE
- CRYSTALLINE ROCK

	SECONDARY/ SOME	TRACE	MINOR	
Clayey				Clay
Silty				Silt
Sandy				Sand
Stoney				Stone

GENERIC MATERIALS

- UNKNOWN OR PREVIOUSLY DUG
- PEAT/LOAM
- SANDS & GRAVELS
- GRANULAR TILL
- SILT
- SILT CLAYEY
- CLAY
- TILL
- LIMESTONES
- SHALES

STRATIGRAPHY (see Notes)

HYDROSTRATIGRAPHIC CONTACT

23453 MOE Recorded Private Well

Recorded Static Water Level

Water Producing Zone

Flowing Well

Screen

MAP SYMBOLS

Shallow Dug or Bored Well <10 m
Sandpoint Water Supply
Deep Bored Well >10 m
Drilled Overburden Well
Test or Observation Well
Drilled Bedrock Well

NOTES

On all sections, boundaries between soil strata have been determined only at well and test well locations. Between the wells and test wells, boundaries are not proven but are assumed from geological evidence.

Wells are located to MOECC Water Well Bulletin Data. Locations and elevations are subject to field verification.

CLIENT
LGL LIMITED ENVRIONMENTAL RESEARCH ASSOCIATES

CONSULTANT
GOLDER

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REVIEW	
APPROVED	

PROJECT
407 TRANSIT WAY, WEST OF HURONTARIO STREET, CITY OF BRAMPTOM, REGION OF PEEL TO EAST OF HIGHWAY 400, CITY OF VAUGHAN, REGION OF YORK

TITLE
HYDROGEOLOGICAL SYMBOLS

PROJECT No.	Control	Rev.	Figure
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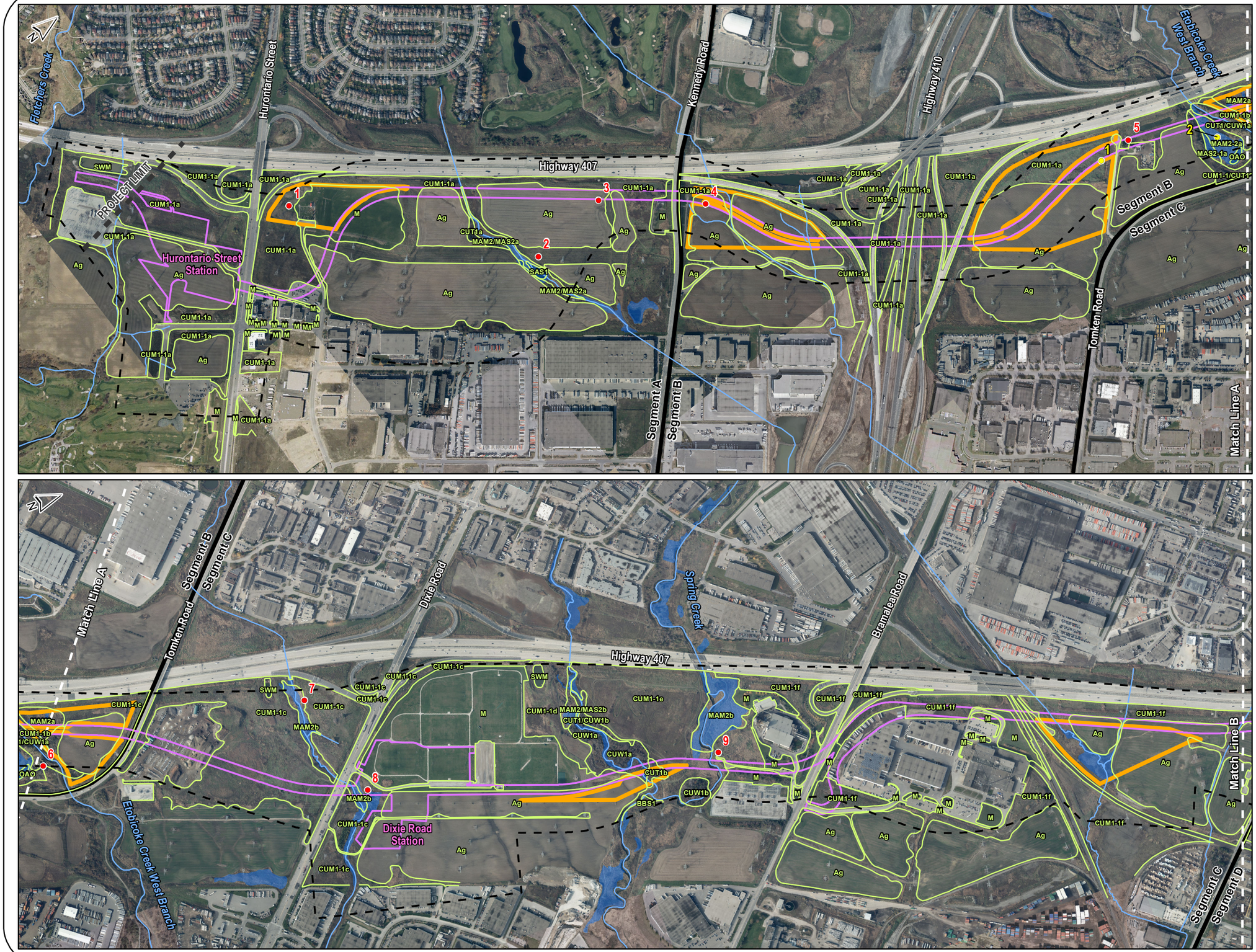
Appendix A



LEGEND

- Study Area
- Impact Assessment Corridor
- Protected Site
- Unevaluated Wetland
- Watercourse
- Anuran Call Monitoring Station
- Breeding Bird Point Count Station

Vegetation Communities

- Vegetation Community Boundary

Ag	Agricultural
BBS1	Mineral Shrub Beach/Bar Ecosite
CUM1-1 (a-f)	Dry-Moist Old Field Meadow Type
CUM1-1/CUT1 (a-b)	Dry-Moist Old Field Meadow Type/Mineral Cultural Thicket Ecosite
CUT1 (a-b)	Mineral Cultural Thicket Ecosite
CUT1/CUW1	Mineral Cultural Thicket Ecosite/Mineral Cultural Woodland Ecosite
CUW1 (a-b)	Mineral Cultural Woodland Ecosite
M	Manicured
MAM2 (a-b)	Mineral Meadow Marsh Ecosite
MAM2/MAS2 (a-b)	Mineral Meadow Marsh/Mineral Shallow Marsh Ecosite
MAM2-2a	Reed-canary Grass Mineral Meadow Marsh Type
MAS2-1a	Cattail Mineral Shallow Marsh Type
OAO	Open Aquatic
SAS1	Submerged Shallow Aquatic Ecosite
SWM	Storm Water Pond

Data Sources: LGL Limited field surveys, Ministry of Natural Resources and Forestry (LIO).

200 100 0 200 Metres

407 TRANSITWAY WEST - NATURAL HERITAGE

LGL LIMITED
environmental research associates

Project:	TA8558	**Figure:**	2a
Date:	June, 2018	**Prepared By:**	MWF
Scale:	1 : 14,000	**Checked By:**	NMF

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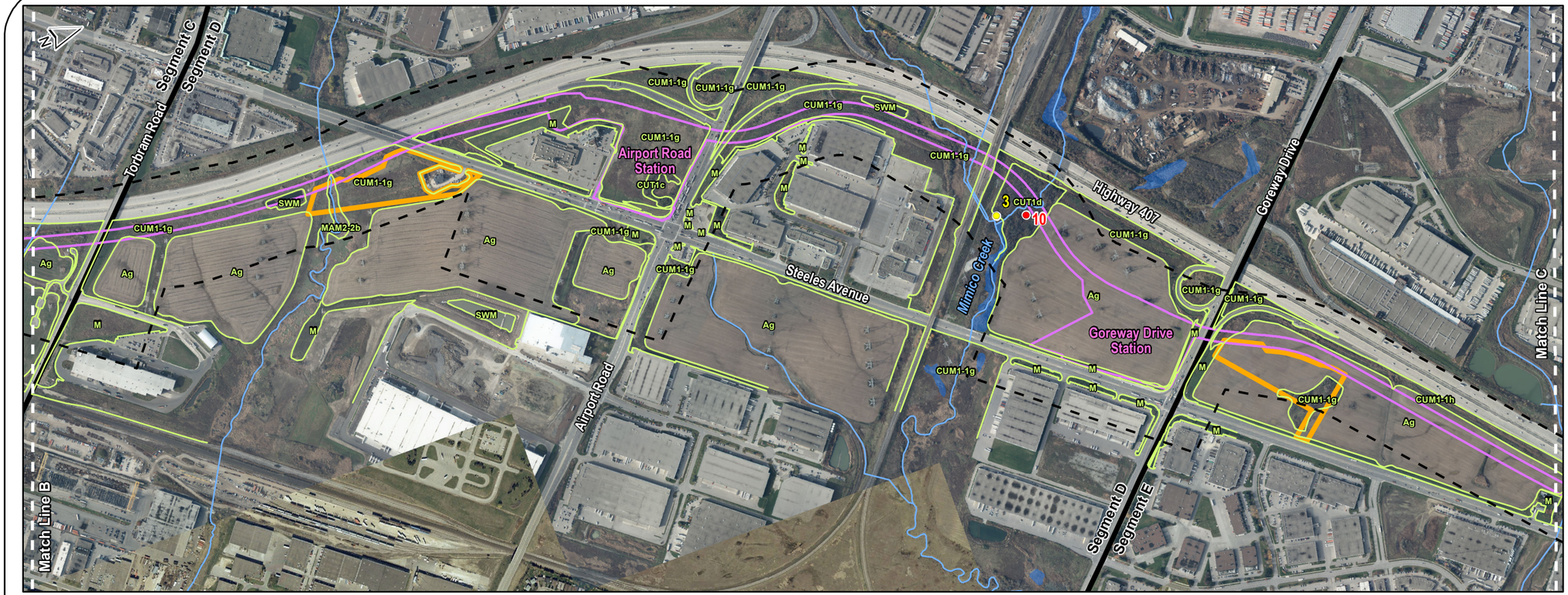

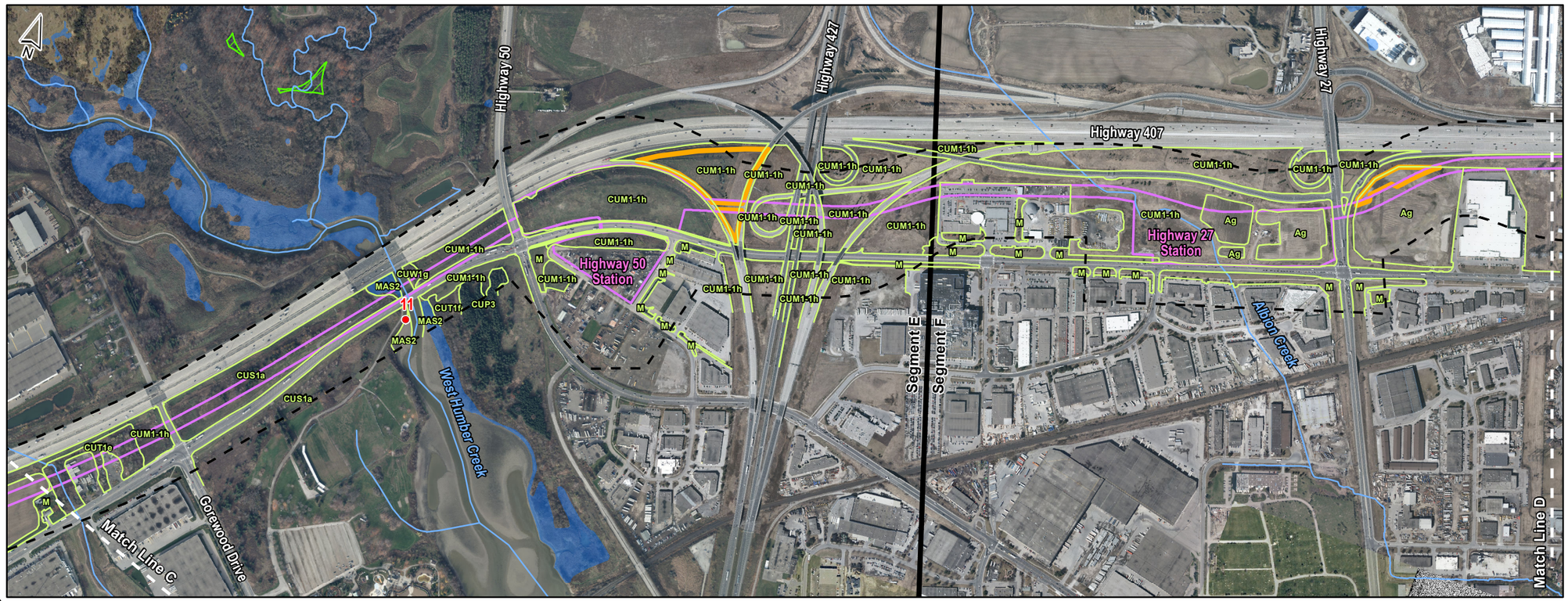

LEGEND

- Study Area
- Impact Assessment Corridor
- Protected Site
- Interior Forest Habitat (100 m From Edge)
- Unevaluated Wetland
- Watercourse
- Anuran Call Monitoring Station
- Breeding Bird Point Count Station

Vegetation Communities

- Vegetation Community Boundary

Ag	Agricultural
CUP3	Coniferous Plantations
CUS1a	Mineral Cultural Savannah Ecosite
CUM1-1 (g,h)	Dry-Moist Old Field Meadow Type
CUT1 (c-f)	Mineral Cultural Thicket Ecosite
CUW1g	Mineral Cultural Woodland Ecosite
M	Manicured
MAM2-2b	Reed-canary Grass Mineral Meadow Marsh Type
MAS2	Mineral Shallow Marsh Ecosite
SWM	Storm Water Pond

Data Sources: LGL Limited field surveys, Ministry of Natural Resources and Forestry (LIO).

200 100 0 200 Metres

407 TRANSITWAY WEST - NATURAL HERITAGE

LGL LIMITED
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Project:	TA8558	**Figure:**	2b
Date:	June, 2018	**Prepared By:**	MWF
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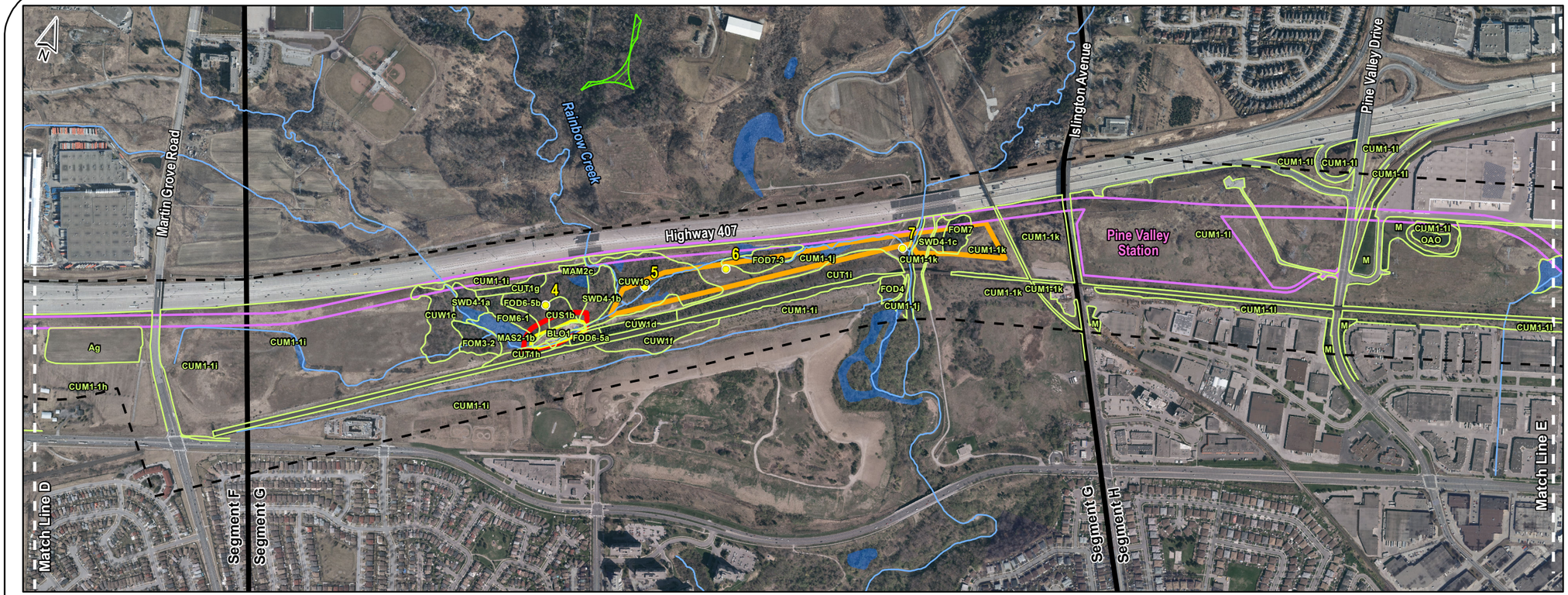

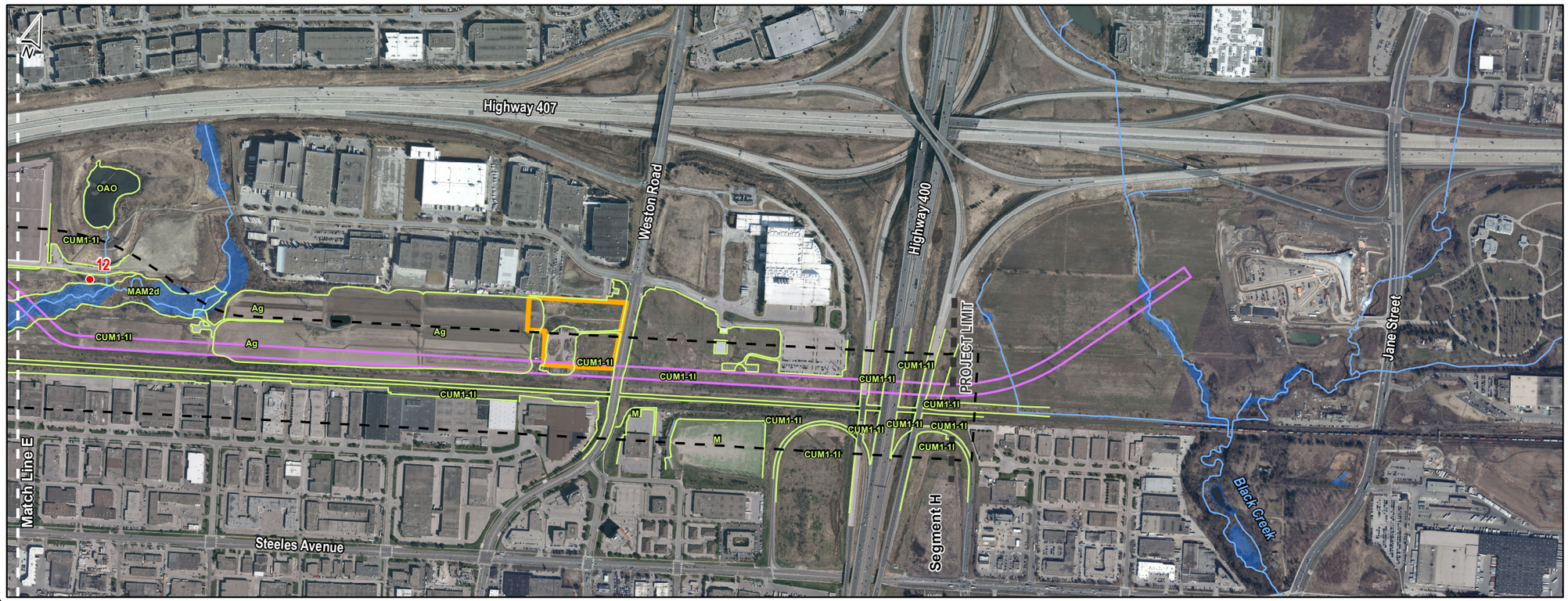

LEGEND

- Study Area
- Impact Assessment Corridor
- Protected Site
- Interior Forest Habitat (100 m From Edge)
- Unevaluated Wetland
- Area of Natural and Scientific Interest (Woodbridge Pleistocene Cut)
- Environmentally Significant Area (Woodbridge Cut)
- Watercourse
- Anuran Call Monitoring Station
- Breeding Bird Point Count Station

Vegetation Communities

- Vegetation Community Boundary

Ag	Agricultural
BLO1	Calcareous Fine Mineral Open Bluff Ecosite
CUM1-1 (h-l)	Dry-Moist Old Field Meadow Type
CUS1b	Mineral Cultural Savannah Ecosite
CUT1 (c-i)	Mineral Cultural Thicket Ecosite
CUW1 (c-i)	Mineral Cultural Woodland Ecosite
FOD4	Dry-Fresh Deciduous Forest Ecosite
FOD6-5 (b-h)	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest Type
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest Type
FOM3-2	Dry-Fresh Sugar Maple-Hemlock Mixed Forest Type
FOM6-1	Fresh-Moist Sugar Maple-Hemlock Mixed Forest Type
FOM7	Fresh-Moist White Cedar-Hardwood Mixed Forest Ecosite
M	Manicured
MAM2 (c-d)	Mineral Meadow Marsh Ecosite
MAS2-1b	Cattail Mineral Shallow Marsh Type
OAO	Open Aquatic
SWD4-1 (b-c)	Willow Mineral Deciduous Swamp Type

Data Sources: LGL Limited field surveys, Ministry of Natural Resources and Forestry (LIO), Toronto Region Conservation Authority.

200 100 0 200 Metres

407 TRANSITWAY WEST - NATURAL HERITAGE

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Project:	TA8558	**Figure:**	2c
Date:	June, 2018	**Prepared By:**	MWF
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