HYDROGEOLOGICAL INVESTIGATION REPORT

0 AIRPORT ROAD
PART LOT 21, CONCESSION 6 EAST OF HURONTARIO STREET

TOWN OF CALEDON
REGION OF PEEL

PREPARED FOR:

BROCCOLINI AIRPORT ROAD LIMITED PARTNERSHIP

PREPARED BY:

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CROZIER

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Broccolini Airport Road LP (Broccolini) to complete a Hydrogeological Investigation in support of a Zoning By-Law Amendment and Site Plan Application for 0 Airport Road, Legal Address Part of Lot 21, Concession 6, East of Hurontario Street. The following report has been prepared to characterize the existing hydrogeological conditions of the property and provide insight into the potential impact of the proposed development on the hydrogeological regime. The following report has been prepared in accordance with the Region of Peel Guidelines for Hydrogeologic Assessments and the Toronto and Region Conservation Authority Standards.

1.1 Existing Land Use

The subject property (herein referred to as the Site) covers an Area of 59.92 acres and is bounded by agricultural lands to the north, Airport Road to the east, and agricultural lands and woodlot to the south and west. The Site is currently home to agricultural lands and woodlot. Salt Creek, a tributary of the Humber River flows from northwest to southeast across the property. Salt Creek is a regulated tributary of the TRCA jurisdiction. Please refer to **Figure 1**.

Stretching 90,300 acres, the Humber River Watershed is the largest watershed within the TRCA jurisdiction and is subdivided into 5 subwatersheds—the Main, East, West and Lower Humber and the Black Creek Subwatersheds. The Site is located within the West Humber River Subwatershed (TRCA, 2008).

According to TRCA and Ontario Natural Heritage Mapping, an unevaluated wetland surrounds Salt Creek on the Site. GEI Consultants conducted further environmental studies as a part of the Tullamore North Secondary Plan Area Master Environmental Report (May 2025). The Ecological Land Classification communities on Site include Dry-Moist Old Field Meadow, Mineral Cultural Thicket, Hedgerow and Reed-Canary Grass Mineral Meadow Marsh (CUM1-1, CUT1, HR, MAM2-2) (GEI, 2025).

1.2 Proposed Land Use

According to the Overall Site Plan (drawing AS101) prepared by Powers Brown Architecture (October 2025), two (2) industrial buildings with associated parking and loading docks are proposed for the Site. Building A is proposed to be 23,576.12 m^2 and Building B is proposed to be 47,808.73 m^2. The buildings will be separated by a proposed future severance shown on AS101. Salt Creek and the surrounding natural heritage area is proposed to be retained (approximately 26.21 acres).

2.0 Geology

The following sections below outline the existing conditions of the Site based on literature review and field observations.

2.1 Physiography, Topography, & Drainage

According to Chapman and Putnam (1984), the study area is located within the South Slope physiographic region (**Figure 2**). The South Slope resides on the southern slope of the Oak Ridges Moraine which includes the strip of lands located south of the Peel Plain. The study area is located in the central portion of the South Slope and is equidistant between the Peel Plain and the Niagara Escarpment physiographic regions. The South Slope region is distinguished by low-lying, fine-grained, undulating moraines and knolls (Region of Peel, 2009). The central section of the South Slope has

many scattered drumlins with long, narrow, and pointed slopes. Due to this topography, surface water flows through streams down the slope, forming gullies and shallow ravines.

The Site is located in the West Humber River Watershed, which originates in Caledon and flows for over 45 km across the Peel Plain before merging with the Main Humber Watershed in Toronto. A surface water feature, a tributary of the Humber River known as Salt Creek flows southeastward through the Site, eventually joining the main branch of Salt Creek, the West Humber River, and ultimately reaching Lake Ontario.

According to the Ontario Digital Elevation Model, regional topography ranges from approximately 270 meters above sea level (masl) in the northwest close to Old School Road to 230 masl at Salt Creek in the southeast.

2.2 Regional Geology

According to Ontario Geological Survey (OGS) mapping, the study area sits atop a bedrock basement of the Queenston Formation and the Georgian Bay Formation. The Queenston Formation is characterized by brick-red shale and grey-green shale interbeds. The rocks of the Queenston Formation are mapped primarily on the west side of Salt Creek. The Georgian Bay Formation is stratigraphically older than the Queenston Formation and is composed of blue-grey shale and limestone interbeds (**Figure 3**). The rocks of the Georgian Bay Formation are mapped as the primary bedrock underlying the Site.

Surficial mapping indicates that the soils within the Site are primarily glacial and fluvial in origin (**Figure 4**). A blanket of fine-grained glacial till covers the Site known as the Halton Till. The Halton Till is a sandy silt to clayey silt till that covers a large portion of the Peel Region. As described in the Settlement Area Boundary Expansion Scoped Subwatershed Study, the Halton Till can be subdivided into three (3) main units—the Upper, Middle and Lower Halton Till. The units of the Halton Till are summarized below:

- Upper Till: generally sandy silty clay to clayey silt with sand, massive and weathered. Total thickness is roughly 5 m.
- Middle Till Complex: sandy silt clay to clayey silt till with interbeds of stratified silt, sand and gravel. The interbeds are discontinuous and the base of the Middle Till includes stratified glaciolacustrine clays and silts.
- Lower Till Complex: similar to Middle Till Complex with abundant gravel.

According to the Oak Ridges Moraine Groundwater Mapping Program, the Halton Till is the most surficial unit on the Site and extents from 10 m thick at Airport Road to 2 m thick at Salt Creek.

Below the Halton Till, roughly at an elevation of 240 masl (10 meters below ground surface)(mbgs)) is mapped as the Oak Ridges Moraine. Deposits of the Oak Ridges Moraine Complex are generally sands and silts and are generally discontinuous close to Mayfield Road. The Oak Ridges Moraine Mapping Program shows the complex is thin (< 5 m) across the Site.

The remaining hydrostratigraphic units of the Humber Watershed—described below in Section 3.0—are notably absent in regional cross sections and mapping including the Channel Deposits, Newmarket Till, Thorncliffe Formation, Sunnybrook Drift and the Scarborough Formation. Bedrock is estimated to be encountered at an elevation of 235 masl or approximately 15 mbgs. Drift thickness and depth to bedrock is shown in **Figures 5** and **6**.

2.3 Local Geology

A Geotechnical Investigation was completed by A & A Environmental Consultants Inc. (A & A) to characterize the onsite soils and aid in providing geotechnical recommendations for the proposed development at the Site. In April 2022, thirteen (13) boreholes and six (6) test pits were advanced. Five (5) boreholes were converted to monitoring wells for future monitoring purposes. According to the Geotechnical Investigation, the following stratigraphy was encountered:

- 0.0 – 0.2 m of topsoil
- 0.2 - 0.8 m of stiff and weathered clay and silt with trace topsoil and organics
- 0.8 – 6.1 m of stiff and moist clayey silt to silty clay with trace sand and gravel

The results of the Geotechnical Investigation performed by A & A generally align with the materials noted in OGS Mapping. For further details regarding the Geotechnical Investigation, please refer to the borehole and test pit logs prepared by A & A, which are provided in **Appendix A**.

Additional drilling was supervised by MTE Consultants in 2025 to supplement the existing monitoring network. Two (2) wells were extended to approximately 9.3 mbgs on the Site. Borehole logs are provided in **Appendix A**. The following stratigraphy was encountered:

- 0.0 – 0.25 m of topsoil
- 0.25 – 5.80 m of compact, moist, clayey, silt glacial till
- 5.80 – 9.30 m of dense, wet to saturated silt and sand.

The glacial till or silty clay to clayey silt material encountered are interpreted to be representative of the Halton Till. The texture, inclusions and depth correspond to regional mapping, OGS data and local well records. The saturated sands and silts encountered during the MTE investigation are interpreted to be representative of the Oak Ridges Moraine Complex sediments. The two (2) advanced boreholes were located closer to Salt Creek where the Halton Till is thinner and agree with Oak Ridges Moraine depth and texture.

2.4 Source Water Protection Information

According to the Ministry of Environment, Conservation, and Parks (MECP) Source Water Protection Information Atlas, the Site is located within the Toronto and Region Source Protection Area which is governed by the CTC (Credit Valley-Toronto and Region-Central Lake Ontario) Source Protection Plan. The Site is located atop a Highly Vulnerable Aquifer (HVA) with a vulnerability score of 6. No significant drinking water threats and source protection policies related to the HVA are identified for the Study area under Ontario's Clean Drinking Water Act (2006).

Despite no *significant* drinking water threats being identified for the Site Area, there are numerous activities identified in the CTC Source Protection Plan that pose low to moderate threats to future drinking water use, including the following:

- The establishment, operation or maintenance of a waste disposal site
- The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.
- The application, management or storage of agricultural source material to land.
- The application, handling or storage of non-agricultural source material to land.

- The application, handling or storage of commercial fertilizer to land.
- The application, handling or storage of pesticide to land.
- The application, handling or storage of road salt.
- The storage of snow.
- The handling and storage of fuel.
- The handling and storage of a dense non-aqueous phase liquid (DNAPL).
- The handling and storage of an organic solvent.
- The management of runoff that contains chemicals used in the de-icing of aircraft.
- An activity that takes water from an aquifer or a surface water body without returning the water taken to the same aquifer or surface water body.
- An activity that reduces the recharge of an aquifer.
- The use of land as livestock grazing or pasturing land, an outdoor confinement area or a farm-animal yard.
- Establishment and operation of a liquid hydrocarbon pipeline.

The proposed land use for the Site is industrial and there is potential that DNAPLs, commercial grade fertilizers, pesticides, solvents and/or fuels may be handled or stored on the property. Based on the parking lot proposed and the general climate of the Site, snow storage and salt application are likely. It is recommended that if any of the above activities are to occur, a risk management plan and/or winter maintenance plan should be prepared for the proposed development to the satisfaction of the Town and/or Region's Risk Management Official. The plans should outline the low to moderate source protection risks and mitigation measures and strategies to prevent significant drinking water threats from the activities in the future.

3.0 Hydrogeology

The following sections below detail the existing hydrogeological conditions of the study area based on regional studies, local studies, and field investigation.

3.1 MECP Well Records

Within 500 m of the Study Area, there are 45 well records identified on the Ministry of Environment, Conservation and Parks (MECP) well record database. A detailed summary table of the wells is provided in **Appendix B** and their locations are shown on **Figure 7**.

In general, the following can be noted from the identified well records:

- Total depth of wells ranges from approximately 5 mbgs to 50 mbgs. Most wells are installed within "shale" bedrock and installed deeper than 20 mbgs.

- Majority of well records are noted to be for domestic purposes or monitoring purposes. There is one well record identified—4908152—for municipal purposes. This well is noted to supply the Mayfield Golf Club and is likely misidentified as a municipal well.

- Static water levels range from less than 1 mbgs to approximately 6 mbgs.

As per the Region of Peel Guidelines, a door-to-door well survey has been conducted for the properties within 500 m of the Site. The survey was hand delivered to residents or tenants in October 2025 and will remain open until mid November 2025. Results of the survey are pending; results will be shared with the review agencies in subsequent submissions of the development application.

3.2 Hydrostratigraphy

The hydrostratigraphic framework of the Humber River Watershed has been outlined in the Humber River Watershed, Scenario Modelling and Analysis Report prepared by the TRCA. There are eight (8) hydrostratigraphic units in the Humber River Watershed. The hydrostratigraphic units are summarized in **Table 1** below.

Table 1: Hydrostratigraphy of the Humber River Watershed (TRCA, 2008)

Unit	Name	Function	System
Youngest – 1	Halton Aquitard	Aquitard	Overburden
2	Oak Ridges Aquifer	Aquifer	Overburden
3	Newmarket Aquitard	Aquitard	Overburden
4	Meltwater Channel Aquifers	Aquifer	Overburden
5	Thorncliffe Aquifer	Aquifer	Overburden
6	Sunnybrook Aquitard	Aquitard	Overburden
7	Scarborough Aquifer	Aquifer	Overburden
8	Upper Bedrock Aquitard	Aquitard	Bedrock Contact Zone

The majority of municipal water within the Toronto and Region Source Protection Area is supplied by Lake Ontario. However, north of Highway 407, groundwater serves as the primary water supply. Within the Region of Peel, there are two (2) municipal drinking water systems—the Palgrave-Caledon East Drinking Water System and the Caledon East Drinking Water System. Both systems rely on three (3) wells each, drawing from the Oak Ridges Moraine and Thorncliffe Aquifer. According to MECP Well Records, private rural well users primarily depend on the bedrock contact zone.

3.3 Regional Groundwater Levels

Regional shallow and deep groundwater flow direction is interpreted to follow surface and bedrock topography and flow south towards the West Humber River and Lake Ontario. According to the Oak Ridges Moraine Groundwater Program Mapping, regional groundwater elevations range approximately from 245 meters above sea level (masl) at the Site to 75 masl at Lake Ontario.

At the Site, shallow groundwater modelling predicts the groundwater tables is within 2 m of ground surface. Based on how the model was created, the water elevations indicated in the mapping only represent the static water levels reported for wells less than 20 mbgs and could indicate levels taken from different geologic units. As indicated by developers of model, the surface represents a "temporal average" and is an interpolated surface; actual onsite conditions may vary from the surface. Based on the geological conditions of the Site and surrounding areas, it is likely that the groundwater surface is representative of a potentiometric surface rather than true groundwater conditions.

Additional layers indicate that Salt Creek may be an area of potential groundwater discharge and contradictory, an area of downward vertical gradient. The model suggests that discharge is discontinuous along the stream based on the potentiometric surface and ground elevation.

The regional mapping is compared to local conditions on Site in Section 5.

3.4 Regional Groundwater Quality

Groundwater quality within the Humber River Watershed is obtained from monitoring wells within the Provincial Groundwater Monitoring Network (PGMN) and municipal data. Groundwater sampling results are compared to the Ontario Drinking Water Quality Standards (ODWQS) and any exceedances are flagged and investigated to determine the potential source and impact of the exceedance. According to the Humber River Watershed Report Card (2018), groundwater quality within the Humber River Watershed received an overall grading of "C" meaning the groundwater quality is fair. In general, exceedance of the guideline for chloride is noted in areas where excessive road salt application is occurring.

Local groundwater quality sampling was conducted on Site and is discussed further in Section 5.

4.0 Field Work

The following section outlines the field investigation conducted by Crozier staff and others to characterize the existing conditions.

4.1 Monitoring Well Installation

Five (5) monitoring wells were installed by A & A for both Geotechnical and Hydrogeological purposes in April 2022. To further expand the hydrogeological and geotechnical network, an additional two (2) monitoring wells were installed in January 2025 by MTE Consultants Inc. (MTE). Please see **Figure 8** for the location of monitoring wells.

Table 2 below provides a summary of the monitoring well construction details.

Table 2: Monitoring Well Details

<table>
<tr><th colspan="4">2022</th></tr>
<tr><th>Monitoring Well</th><th>Total Depth (m)</th><th>Screened Interval (m)</th><th>Material</th></tr>
<tr><td>MW1</td><td rowspan="2">6.10</td><td rowspan="2">2.90 – 6.10</td><td rowspan="5">Brown to grey clayey silt to silty clay till with trace sand and gravel. Very stiff.</td></tr>
<tr><td>MW3</td></tr>
<tr><td>MW4</td><td>5.30</td><td>2.10 – 5.30</td></tr>
<tr><td>MW5</td><td rowspan="2">6.10</td><td>3.00 - 6.10</td></tr>
<tr><td>MW9</td><td>2.90 – 6.10</td></tr>
<tr><th colspan="4">2025</th></tr>
<tr><td>MW201-25</td><td rowspan="2">9.30</td><td>7.60 – 9.30</td><td>Very dense grey silt and sand, trace clay. Very moist.</td></tr>
<tr><td>MW202-25</td><td>5.80 – 9.30</td><td>Very dense brown to grey silt, silty sand and sandy silt.</td></tr>
</table>

For detailed borehole logs, please refer to **Appendix A**.

4.2 Groundwater Monitoring

Manual groundwater measurements were collected using an electronic water level meter and automatic level loggers were deployed in select wells across the Site. The water level loggers were set to measure water levels on an hourly basis to collect a more comprehensive dataset for a greater understanding of the shallow groundwater system. Results of groundwater monitoring to date is covered in Section 5 below.

4.3 Piezometer Installation

On May 2, 2023, Crozier staff installed two (2) piezometers to assess the vertical gradient at the stream to Cold Creek through the study area. One (1) piezometer was placed in the northern reach of the tributary near the accessible land boundary, while the other was installed near the southern accessible land boundary. The locations of the piezometers are also shown in **Figure 8**. Please note that as of Summer 2025, the piezometers have been damaged due to weather conditions and variable stream flow. The piezometers will be re-established by the Crozier team in the Spring of 2026.

4.4 Surface Water Monitoring

Manual surface water measurements were collected using an electronic water level meter. Measurements were taken from the inside and outside of the piezometer to compare water levels and determine vertical gradients. Results of surface water monitoring to date is covered in Section 5 below.

5.0 Results

The following sections outline the results of the investigation at the time of this report. Note that groundwater monitoring is ongoing, and this report will be updated as additional results are obtained.

5.1 Groundwater Conditions

Manual groundwater measurements have been collected in all wells since November 2022. **Table 3** below summarizes the manual groundwater measurements collected to date.

Table 3: Groundwater Levels (mbgs) (2022-2025)

Name	Water Level (mbgs)								
	Nov. 28, 2022	Dec.14, 2022	Feb. 27, 2023	Mar. 28, 2023	May 2, 2023	May 27, 2023	Dec. 20, 2024	Feb. 27, 2025	Sept. 5, 2025
MW1[1]	3.11	3.01	2.54	2.20	2.36	1.59	2.34	-[3]	-
MW3	3.41	3.57	3.37	3.01	2.71	3.79	3.98	-	3.94
MW4	3.38	3.47	2.49	1.81	2.09	3.31	4.09	4.35	4.09
MW5	-	4.04	1.14	0.47	0.91	1.72	5.71	5.79	4.84
MW9	1.64	1.55	0.80	0.41	0.54	1.16	1.28	2.09	1.49
MW201-25[2]	-	-	-	-	-	-	-	3.23	4.30
MW202-25	-	-	-	-	-	-	-	7.29	7.20

1. Loggers were removed on March 27, 2024, and reinstalled in December 2024.
2. MW201-25 and MW202-25 were installed in January 2025. Loggers were installed in February 2025.
3. Monitoring well damaged; unable to capture accurate measurement.

As shown in **Table 3**, water levels across the field study area vary seasonally with the lowest water levels captured in the Fall of 2022 and the highest water levels captured in Spring of 2023. Peak manual water level was captured at MW9, the well closest to Airport Road at 0.54 mbgs. Table 4 below displays the manual water levels in masl.

Table 4: Groundwater Elevation (masl) (2022-2025)

Name	Water Level (masl)								
	Nov. 28, 2022	Dec.14, 2022	Feb. 27, 2023	Mar. 28, 2023	May 2, 2023	May 27, 2024	Dec. 20, 2024	Feb. 27, 2025	Sept. 5, 2025
MW1	249.05	249.15	249.62	249.96	249.80	**250.57**	249.82	-	-
MW3	246.64	246.48	246.68	247.04	**247.34**	246.26	246.07	-	246.11
MW4	245.15	245.06	246.04	**246.72**	246.44	245.22	244.44	244.18	244.44
MW5	-	246.56	249.46	**250.13**	249.69	248.88	244.90	244.81	245.76
MW9	248.95	249.04	249.79	**250.18**	250.05	249.43	249.31	248.49	249.10
MW201-25	-	-	-	-	-	-	-	246.18	245.11
MW202-25	-	-	-	-	-	-	-	243.15	243.24

BOLD – peak groundwater elevation measured manually

Automatic level loggers were deployed at all monitoring well locations with the exception of MW1 due to the absence of a casing and previous damage via farming equipment to the well. Note that MW1 should be decommissioned per Ontario Regulation 903 to prevent contaminants from surface from entering the groundwater.

Hydrographs of all monitored wells are displayed in **Appendix C**. From the graphs, water levels appear to respond gradually to seasonal change and no significant fluctuations due to precipitation are observed. Peak groundwater levels at MW3, MW4, MW5 and MW9 were observed in the spring of 2023 with the exception of a large spike in groundwater level in November 2023 when a 50 mm storm event occurred. Highest water levels captured at each well are shown in Table 5 below.

Table 5: Peak Groundwater Measurements (masl)

Well	Peak Automatic Elevation (masl)	Peak Manual Elevation (masl)
MW1	-	250.57
MW3	247.34	247.34
MW4	246.74	246.72
MW5	250.19	250.13
MW9	250.25	250.18
MW201-25	247.3	246.18
MW202-25	243.8	243.24

The water levels captured in March 2023 are interpreted to be representative of high groundwater conditions. It is noted that each monitoring wells were installed within the first water bearing unit encountered during drilling. In all cases, the first water bearing unit was a clayey silt to silty clay till. It is interpreted that water is held within silty seams within the till and the aquifer unit is considered semi-confined in nature. This is supported by minimal aquifer response to precipitation. Given the fine-grained nature of the overburden materials, lateral and vertical groundwater flow is restricted by the low permeability of the soils.

Given the confined nature of the shallow system, it is interpreted that the groundwater levels above are representative of a potentiometric surface rather than where groundwater would be encountered during excavation; groundwater is expected below the confining, fine-grained layer. The expected elevation where groundwater would be encountered is shown in **Table 6** below.

Table 6: Expected Groundwater Elevation During Excavation (masl)

Well	Anticipated Groundwater Elevation (masl)
MW1	251.36
MW3	249.25
MW4	247.73
MW5	249.80
MW9	249.79
MW201-25	247.91
MW202-25	248.94

The groundwater elevations above represent the highest expected groundwater elevations to be encountered during excavation. It is Crozier's opinion that the levels in Table 6 above are suitable for design purposes.

5.2 Surface Water Conditions

At the time of this report, two (2) measurements have been collected at the surface water piezometers. Field visits were paused for a portion of 2024 hence no measurements were collected in 2024. Water levels are shown in **Table 7** below.

Table 7: Surface Water Levels

Piezometer	*May 2023*			*March 2025*		
	In (mags)	Out (mags)	Gradient	In (mags)	Out (mags)	Gradient
P1	0.37	0.35	0.02	0.26	0.20	0.06
P2	0.29	0.31	-0.02	0.28	0.28	0.00

No significant trend is noted within the surface water levels captured, however, according to literature, baseflow of Salt Creek may be supplemented by the Oak Ridges Moraine deposit beneath the glacial till or from perched groundwater within the till. Modelling and mapping completed as a part of the SABE study (Wood, January 2022) show minor discharge along Salt Creek. Seeps are interpreted to occur where the stream elevation intersects the Oak Ridges Moraine deposits or water bearing seams of the glacial till.

According to the Environmental Impact Study (EIS) completed by NRSI in 2022, meadow marsh (MAM) community is located along the Salt Creek corridor. Vascular flora species such as *Impatiens capensis* (spotted jewelweed) were mapped within the wetland community. This species thrives in poorly drained, wet soils. These conditions on Site may be due to the fine-grained nature of the soils, limiting infiltration and/or minor groundwater contribution to the wetland community.

Please note that the piezometers were damaged or removed by others between March 2025 and present as the locations are no longer established. Crozier staff proposes to reinstall the piezometers in the Spring of 2026 to continue monitoring the surface water feature.

5.3 Groundwater Sampling

Localized groundwater sampling was conducted at MW9 in September 2025. Samples were collected using low flow sampling procedures. Three (3) well volumes were removed prior to sampling. Groundwater results were compared to the Region of Peel Sewer Use By-Law parameters (please refer to **Appendix D**). The following exceedances were observed:

- Total Suspended Solids (TSS): 1190 mg/L (Sanitary/Storm)
- Total Kjeldahl Nitrogen (TKN): <5.0 mg/L (Storm)
- Total Phosphorus: 1.74 mg/L (Storm)
- Coliforms: 240 CFU/100 mL (Storm)

The presence of total suspended solids is not uncommon for the type of sampling used. The pump—even at low flows—can pull fine grained materials into the water column, increasing the presence of solids in the sample. The exceedances of TKN, total phosphorus and coliforms is likely as a result of sample contamination from recently placed manure and fertilizers on the field. The exceedances above are interpreted to be representative of sampling and environmental conditions rather than true groundwater quality.

It is recommended that additional groundwater sampling be conducted prior to groundwater discharge for dewatering purposes. Results should be compared to the regulatory standards for the desired discharge outlet.

6.0 Design Considerations

The following sections outline potential design constraints and considerations that may be required to be addressed in the development process.

6.1 Construction Dewatering & Long-Term Dewatering

The proposed industrial buildings on the Site are proposed to be slab on grade. Any construction above the elevations listed in Table 6 are not anticipated to encounter groundwater. Limited construction dewatering is expected to facilitate the construction of the proposed development. Similarly, if no permanent structures are expected below the anticipated groundwater elevations, no long-term dewatering is required.

It is recommended that given the high groundwater conditions on site (<1.0 mbgs) that a sub-drainage layer be included as part of the foundation design. Please note that long term dewatering systems, drainage layers and foundation design is outside the scope of this report.

6.2 Site-Wide Balance

A water balance assessment was conducted to assess potential impacts of the proposed development on the local groundwater conditions. The water balance was conducted under existing (pre-development) and proposed (post-development) conditions. The water balance assessment was conducted in accordance with accepted site condition values from Table 6.3 of the Urban Storm Drainage Criteria Manual: Volume 1 (Urban Drainage and Flood Control District, 2016) and Table 3.1 of the MECP Stormwater Management Planning and Design Manual (MECP, 2003). The appropriate reference tables are provided in **Appendix E**.

The results of the water balance assessment are presented in **Table 8** below.

Table 8: Summary of Site Wide Water Balance

Pre-Development Infiltration (mm/yr)	Post-Development Infiltration without Mitigation (mm/yr)	Infiltration Deficit (mm/yr)
117	75	42

6.2.1 Methodology

The water balance on a site can be estimated from the following equation described in Thornthwaite and Mather 1957:

$$P = S + R + I + ET$$

Where: P = precipitation

S = change in groundwater storage

R = surface water runoff

I = infiltration

ET = evapotranspiration/evaporation

The components of the water balance equation can be estimated using field observations of drainage conditions, land cover, soil types, groundwater conditions and local climate records.

6.2.2 Precipitation (P)

The nearest climate station to the subject lands is located approximately 10.84 km south and is known as Albion Field Centre Climate Station, Climate ID 6150103 (43°55'00.000" N, 79°50'00.000" W, elevation of 281.90 masl). Monthly average precipitation and climate data from 1981 – 2010 was used to complete the water balance calculations for the secondary plan area. The long-term monthly average for precipitation and climate is shown in **Table 9** below.

Table 9: Climate Data (1981 – 2010) for Albion Climate Station

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Precipitation (mm)	60.4	50.2	50.3	67.0	76.1	75.5	81.8	77.4	75	68.3	81.7	57.7	**821.4**[1]
Temperature (°C)	-7	-5.9	1.4	6.1	12.4	17.3	19.9	19.1	14.3	8.1	2.1	-3.9	**6.75**[2]

1. Total average annual precipitation from 1981-2010.
2. Average annual temperature from 1981-2010.

Therefore, based on the data above, the long-term annual average precipitation for the area is 867.4 mm/year and the long-term average temperature for the Site area is 8.1 °C.

6.2.3 Storage (S)

Long-term groundwater storage (S) is assumed to be negligible as no evidence of groundwater impact on significant groundwater pumping or withdrawal is noted in regional studies of the area. The seasonal changes in water levels are expected to balance annually.

6.2.4 Evapotranspiration (ET)

The rate of evapotranspiration is a function of the water holding capacity of the soil, soil and vegetation type and land cover. Through the Thornthwaite and Mather method or a soil moisture balance approach and local climate data, the Potential Evapotranspiration (PET) and the Actual Evapotranspiration (AET) can be calculated (see **Appendix E**) using the following equations:

$$PET = 16 \times \left(\frac{10Ta}{H_i}\right)^a$$

Where: Ta = average daily temperature, 0 degrees for negative temperature months

Hi = heat index value, assuming 12 hours per day, 30 days a month of daylight

The average heat index value is estimated using the following equation:

$$Hi = \sum_{i=1}^{12} \left(\frac{10Ta}{5}\right)^{1.514}$$

The evapotranspiration factor (α) is determined using the following equation:

$$\alpha = 0.49 + (0.0179 \times H_i) - (0.0000771 \times H_i^2) + (0.000000675 \times H_i^3)$$

PET is adjusted to account for the average number of hours of daylight per month for a given location. The adjustment factor is dependent on the subject property's latitude and is presented in Appendix E (Thornthwaite and Mather, 1957). The PET is multiplied by the adjustment factor per month to determine the Adjusted Potential Evapotranspiration (PET_{adj}).

The Actual Evapotranspiration (AET) is determined using the following equation:

$$AET = PET_{adj} - \Delta S$$

The Change in Soil Storage (ΔS) is depended on the types of soil on the property and the Accumulated Potential Water Loss (APWL) per month. The Change in Soil Storage and Accumulated Potential Water Loss can be calculated using the following equations:

$$\Delta S = S_{mc}\,\mathrm{APWL}$$

Where: S_{mc} = soil moisture capacity

APWL = accumulated potential water loss

For ΔP < 0: $APWL = -\Sigma_{i=0}^{12} PET_i$

For ΔP < 0: $APWL = \frac{ln\left(\frac{|AET-PET|}{S_{mc}}\right)}{S_{mc}}$

The soils on the property were determined to be silty sands and silty clays. Using the Ministry Environment, Conservation and Parks (MECP) Stormwater Management and Design Manual Table 3.1. (2003), the soil moisture capacity was estimated to be 200 mm for clay loam soils in moderately rooted crops and 400 mm for clay loam in forest/wetland.

6.2.5 Water Surplus (R+I)

The difference between mean annual P and mean annual ET outputs the amount of water surplus for the Site. The water surplus either infiltrates (I) into the soil or travels across the site as runoff (R).

The distribution of water that infiltrates into the soil is a function of an infiltration factor as described in Table 3.1 of the MECP Stormwater Management Planning and Design Manual (MECP, 2003). The infiltration factor for the forested area is assumed to be 0.5 based on topographic factor of 0.2 for rolling land, a soils factor of 0.1 for clay loam and a land cover factor of 0.1 for open area and 0.4 for agricultural lands.

The water balance components were used to estimate the pre-development and post-development water balance scenarios. Detailed water balance calculations for the subject property can be seen in **Appendix E.**

6.2.6 Pre-Development Infiltration

The pre-development water balance calculations are presented in **Appendix E**. Under existing conditions, the infiltration for the subject lands is calculated to be 117 mm/yr.

6.2.7 Post-Development Infiltration

To complete the post-development infiltration calculation, the proposed development was separated by land use and assigned a percent imperviousness. Based on the water balance components, the calculated post-development infiltration volumes are estimated to be 75 mm/yr. In comparing the pre and post development infiltration volumes, the proposed development has the potential to decrease by 40%.

6.2.8 Water Balance Impact Assessment

Based on the results of the water balance, the proposed development has the potential to decrease infiltration by 42 mm/yr. Low impact development features should be designed to infiltrate 42 mm/yr to achieve site-wide water balance.

The onsite soils possess a hydraulic conductivity rate of approximately 8.07×10^{-9} m/s to 10^{-11} m/s based on grain size analysis completed by MTE and A & A (see Appendix A). Using the CVC LID design guide, Appendix C, the hydraulic conductivity rate of the soils convert to an infiltration rate of 12.7 mm/hr. Note that localized testing in the area of any proposed LID structure should be completed further in the design process.

Understanding that the proposed development is intended to be severed between building A and building B. Assuming only clean roof runoff is directed to any proposed LIDs, the required LID volumes to meet the water balance deficit are approximately 158 m^3 and 210 m^3 for building A and B respectively. For further calculation details please refer to **Appendix E**.

7.0 Feature Based Water Balance

A feature-based water balance assessment was undertaken to estimate the potential impact on the proposed development on Salt Creek and its surrounding wetland. A Thornthwaite and Mather assessment was conducted using the catchment areas directed to the wetland in the pre and post development scenarios. From pre- to post-, the area directed to the wetland is to Increase roughly 220%.

Under pre-development conditions, it is estimated that 9,220 m^3 contributes annually to infiltration and 3,205 m^3 contributes to runoff based on soil and topographic conditions. In the post-development scenario, infiltration decreases to 6,016 m^3 or 53 mm/yr. Mitigation measures associated with the feature-based water balance assessment is outlined within the Functional Servicing and Stormwater Management Report (Crozier, 2025). Please refer to **Appendix F** for details.

8.0 Conclusions & Recommendations

Based on the above study and field work results, Crozier is prepared to make the following conclusions:

- The surficial soils encountered during drilling are primarily clayey silt to silty clay till with trace sand and gravel.
- The water levels captured in March 2023 are interpreted to be representative of seasonally high potentiometric surface. Due to the fine-grained nature of the onsite soils, groundwater is not expected until approximately 0.8 mbgs or at an elevation of 247.7 masl to 251.4 masl.
- Groundwater is interpreted to flow towards Salt Creek, from the west to the southeast and from the east to the southwest across the Site.
- Groundwater sampling revealed exceedances of the Region of Peel Sewer Use By-Law for total suspended solids, total coliforms, TKN, and total phosphorus. It is interpreted that the exceedances are due to sampling methods rather than true groundwater quality. It is recommended that groundwater sampling be conducted prior to discharge of any groundwater.
- Construction and long-term dewatering is not anticipated since the industrial buildings will be constructed to be slab on grade.
- Pre-development to post-development infiltration deficit is determined to be 42 mm/yr based on the most recent Land Use Plan. Mitigation strategies are outlined in the Functional Servicing Report prepared by Crozier (under separate cover).

Respectfully submitted,

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CM/stm

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APPENDIX A

Borehole Logs

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH2

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 7978192 E 4380633

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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
0.0	**Topsoil:** 200mm											
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil, brown, moist, stiff		1	SS	8							
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	19							
			3	SS	17							
			4	SS	19							
	stiff below 3.8m		5	SS	18							
			6	SS	11							
	grey, wet below 4.6m		7	SS	7							
			8	SS	6							
6.1	**End of Borehole:**											

Notes:
Water Levels:
(i) During Drilling: 4.6m
(ii) At Completion (50mm monitoring was installed)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ε_{50}=3% Strain at Failure

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH/MW3

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 4850824 E 597885

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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, ● 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
0.0	**Topsoil:** 200mm										
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil, brown, moist, stiff		1	SS	12						
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	21						
			3	SS	24						
			4	SS	20						
	hard below 3.8m		5	SS	18						
			6	SS	32	▽	W. L. 4.5 mBGL Apr 05, 2022				
			7	SS	34						
	grey below 5.3m		8	SS	23						
6.1	**End of Borehole:**										

Notes:
Water Levels:
(i) During Drilling: -
(ii) At Completion (50mm monitoring was installed)

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

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH/MW4

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 7978214 E 438027

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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
0.0	**Topsoil:** 200mm										
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil and organic, brown, moist, stiff		1	SS	8						
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	21						
			3	SS	13						
	stiff below 2.3m		4	SS	12						
	hard below 3.1m		5	SS	30						
			6	SS	36		W. L. 4.3 mBGL Apr 05, 2022				
	grey below 4.6m		7	SS	22						
5.3	**End of Borehole:**										

Notes:
Auger refusal at 5.3m
Water Levels:
(i) During Drilling: -
(ii) At Completion (50mm monitoring was installed)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH/MW5

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 7978059 E 4389033

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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 / NATURAL MOISTURE CONTENT / LIQUID LIMIT (w_P w 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
0.0	**Topsoil:** 200mm										
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil, brown, moist, stiff		1	SS	5						
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	22						
			3	SS	21						
	stiff below 3.1m		4	SS	20						
			5	SS	14						
	grey below 3.8m		6	SS	13						
	wet below 4.6m		7	SS	13						
			8	SS	9						
6.1	**End of Borehole:**										

Notes:
Water Levels:
(i) During Drilling: 4.6m
(ii) At Completion (50mm monitoring was installed)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH6

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 4850854 E 597910

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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
0.0	**Topsoil:** 200mm											
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil, brown, moist, stiff		1	SS	13							
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	23							
			3	SS	20							
	stiff below 2.3m		4	SS	12							
			5	SS	14							
	very stiff below 3.8m		6	SS	23							
	grey below 4.6m		7	SS	17							
			8	SS	18							
6.1	**End of Borehole:**											

Notes:
Water Levels:
(i) During Drilling: -
(ii) At Completion (50mm monitoring was installed)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH7

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 7978134 E 4380360

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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 ● 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
0.0	**Topsoil:** 200mm											
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil and organics, brown, moist, stiff		1	SS	10							
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff to stiff		2	SS	21							
			3	SS	14							
			4	SS	14							
			5	SS	14							
			6	SS	12							
	grey, wet below 4.6m		7	SS	10							
	very stiff below 5.3m		8	SS	21							
6.1	**End of Borehole:**											

Notes:
Water Levels:
(i) During Drilling: 4.6m

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

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH8

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 7972136 E 430606

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

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 ● 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
0.0	**Topsoil:** 200mm										
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil, brown, moist, stiff		1	SS	10						
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff to stiff		2	SS	20						
			3	SS	14						
			4	SS	14						
			5	SS	10						
			6	SS	9						
	grey, wet below 4.6m		7	SS	9						
			8	SS	10						
6.1	**End of Borehole:**										

Notes:
Water Levels:
(i) During Drilling: 4.6m
(ii) At Completion (50mm monitoring was installed)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH/MW9

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 7978106 E 438056

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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
0.0	**Topsoil:** 200mm											
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil, brown, moist, stiff		1	SS	11							
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	18							
			3	SS	18							
			4	SS	18							
	stiff below 3.8m		5	SS	15							
			6	SS	7							
	wet, grey below 4.6m		7	SS	8							
			8	SS	8							
6.1	**End of Borehole:**											

Notes:
Water Levels:
(i) During Drilling: 4.6m
(ii) At Completion (50mm monitoring was installed)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH10

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 7977977 E 4320430

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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
0.0	**Topsoil:** 200mm										
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil, brown, moist, stiff		1	SS	7						
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	9						
			3	SS	15						
			4	SS	18						
	stiff below 3.1m		5	SS	13						
			6	SS	8						
	grey, wet below 4.6m		7	SS	7						
			8	SS	6						
6.1	**End of Borehole:**										

Notes:
Water Levels:
(i) During Drilling: 4.6m
(ii) At Completion (50mm monitoring was installed)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ε_{50}=3% Strain at Failure

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH11

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 7978153 E 438028

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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
0.0	**Topsoil:** 200mm											
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil, brown, moist, stiff		1	SS	13							
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	21							
			3	SS	17							
	stiff below 2.3m		4	SS	10							
			5	SS	10							
			6	SS	13							
	grey, very stiff to hard below 4.6m		7	SS	19							
			8	SS	44							
6.1	**End of Borehole:**											

Notes:
Water Levels:
(i) During Drilling: -
(ii) At Completion (50mm monitoring was installed)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH12

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N4850734 E597896

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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
0.0	**Topsoil:** 200mm											
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil and organic, brown, moist, stiff		1	SS	12							
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff		2	SS	20							
			3	SS	23							
	hard below 2.3m		4	SS	44							
	very stiff below 3.1m		5	SS	23							
	hard below 3.8m		6	SS	51							
			7	SS	34							
5.3	**End of Borehole:**											

Notes:
Auger refusal at 5.3m

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

A&A ENVIRONMENTAL CONSULTANTS INC.

LOG OF BOREHOLE BH13

PROJECT: Geotechnial Investigation for the Proposed Development
CLIENT: BVD Petroleum Inc.
PROJECT LOCATION: 0 Airport Road, Caledon, ON
DATUM: Geodetic
BH LOCATION: N 4850931 E 597893

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 0.2m
Date: May-03-2022

PROJECT NO.: 6903

(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
0.0	**Topsoil:** 200mm										
0.2	**Clay and Silt:** weathered/disturbed, trace sand, with trace topsoil and organics, brown, moist, stiff		1	SS	14						
0.8	**Clayey Silt to Silty Clay Till:** trace sand and gravel, brown, moist, very stiff to hard		2	SS	22						
			3	SS	16						
			4	SS	36						
			5	SS	66						
3.8	**End of Borehole:**										

Notes:
Auger refusal at 3.8m

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

ID No.: MW201-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/14/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: Monument Casing

Depth (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type
0 / 0	Ground Surface	249.6		
0	**TOPSOIL** dark brown silty clayey topsoil, with organics (150mm)	0.0	1	SS
2	**SILT TILL** compact brown silt, some clay, trace sand and gravel, with rootlets, very mosit		2	SS
4		248.1		
6 / 2	grey and brown, some sand, very moist to moist	1.5	3	SS
8			4	SS
10		246.6		
10 / 3	**CLAYEY SILT TILL** hard brown clayey silt, trace sand and gravel	3.0	5	SS
12				
14 / 4		245.0		
14	some sand, with cobbles	4.6	6	SS
16				
18				
20 / 6		243.5		
20	**SILT AND SAND** very dense grey silt and sand, trace clay, very moist	6.1	7	SS
22				

Dynamic Cone — Standard Penetration (20 40 60 80)

Sample	Blows
1	12
2	21
3	22
4	29
5	30
6	32
7	50/100mm

Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)

Water Content % (10 20 30)

Sample	Water Content (%)
1	32
2	23
3	19
4	17
5	17
6	12
7	6

Groundwater Observations and Standpipe Details

Concrete

Bentonite

51mm PVC Riser

Field Technician: A. Challis

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

MTE

ID No.: MW201-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/14/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: Monument Casing

Depth	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Dynamic Cone / Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
24			242.0						
26		trace gravel, with saturated seams	7.6	8	SS	50/50mm		14	Sand Pack; 51mm Slotted Screen
28									
30			240.3	9	SS	50/75mm		11	
32		Drilling Terminated	9.3						
34									
36									
38									
40									
42									
44									

8 10 12

Field Technician: A. Challis

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

MTE

ID No.: MW202-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/17/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: Monument Casing

Depth (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type
0 / 0	Ground Surface	250.6		
	TOPSOIL dark brown silty clayey topsoil, with organics (250mm)	0.0 / 250.3 / 0.3		
	SILT TILL compact to dense brown silt, some clay, trace sand and gravel, very moist		1	SS
		249.1		
	mottled light brown and brown, with cobbles	1.5	2	SS
		248.2		
	CLAYEY SILT TILL hard brown clayey silt, some sand, trace gravel, with cobbles and silt layers	2.4	3	SS
			4	SS
		246.3		
	SILT TILL dense brown silt, some clay and sand, trace gravel, very moist	4.3	5	SS
		245.7		
	SANDY SILT TILL very dense brown sandy silt, some clay, trace gravel, with silt seams, very moist	4.9		
		244.8		
	SILT very dense brown to grey silt, some clay and sand, trace gravel, moist	5.8	6	SS
		244.2		
22 / 6.4		6.4		

Sample Number	Standard Penetration (Dynamic Cone)	Shear Strength (PP) kPa	Shear Strength (FV) kPa	Water Content %
1	17			15
2	35			15
3	25			16
4	37			13
5	68			8
6	86			15

Groundwater Observations and Standpipe Details: Concrete; Bentonite; 51mm PVC Riser; 51mm Slotted Screen

Field Technician: B. Ehgoetz

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

ID No.: MW202-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/17/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: Monument Casing

Depth	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Dynamic Cone / Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
24		**SILTY SAND** very dense brown silty sand, wet to saturated	243.0						
		some to trace gravel, saturated	7.6	7	SS	50/125mm		9	Sand Pack; 51mm Slotted Screen
26	8								
28			242.1						
		SANDY SILT very dense grey sandy silt, moist	8.5	7B	AS				
30			241.3	8	SS	50/50mm			
		Drilling Terminated	9.3						
32									
	10								
34									
36									
38									
	12								
40									
42									
44									

Field Technician: B. Ehgoetz

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

MTE

ID No.: BH203-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/14/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: N/A

Depth (ft / m)	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Dynamic Cone – Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
0 / 0	Ground Surface	249.9						
	TOPSOIL dark brown silty clayey topsoil, with organics (300mm)	0.0 / 249.6	1	SS	8		30	
	SILT TILL loose to compact brown silt, some clay and sand, trace gravel, very moist	0.3	2	SS	13		21	
		248.4						
2	dense, some sand, trace gravel and clay, with cobbles	1.5 / 247.6	3	SS	34		24	
	SANDY SILT TILL compact brown sandy silt, some to trace clay and gravel, very moist	2.3	4	SS	20		15	
			5	SS	20		11	
4		245.3						
	SILT TILL dense brown silt, some clay and sand, trace gravel, very moist	4.6	6	SS	47		12	
6		243.8						
	SILT AND SAND very dense grey silt and sand, trace clay and gravel, very moist	6.1 / 243.5	7	SS	90		4	
	Drilling Terminated	6.4						

Bentonite and Cuttings

Dry Cave

Field Technician: A. Challis

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

MTE

ID No.: BH204-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/14/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: N/A

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Dynamic Cone / Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
0 ft / 0 m		Ground Surface	251.7						
0		**TOPSOIL** dark brown silty clayey topsoil, with organics (250mm)	0.0 / 251.4 / 0.3	1	SS	8		21	
2		**SILT TILL** loose to compact brown silt, some clay and sand, trace gravel, very moist		2	SS	19		20	
4				3	SS	21		20	
6 / 2			249.4						
8		**CLAYEY SILT TILL** very stiff brown clayey silt, trace sand and gravel, very moist	2.3	4	SS	20		25	
10				5	SS	17			← Bentonite and Cuttings
12 / 4			247.1						
14		**CLAY AND SILT TILL** stiff grey clay and silt, trace sand and gravel	4.6	6	SS	10		26	
16									
18									
20 / 6		with wet layers, APL	245.6 / 6.1	7	SS	20		21	← Dry Cave
22		Drilling Terminated	245.1 / 6.6						

Field Technician: A. Challis

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

MTE

ID No.: BH205-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/17/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: N/A

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Dynamic Cone / Standard Penetration	Shear Strength (PP) kPa / Shear Strength (FV) kPa	Water Content %	Groundwater Observations and Standpipe Details
0 / 0		Ground Surface	251.7						
		TOPSOIL dark brown silty clayey topsoil, with organics (225mm)	0.0	1	SS	6		22	
2 /		**CLAYEY SILT TILL** stiff mottled brown and grey clayey silt, trace sand and gravel, trace rootlets, DTPL	250.8 / 0.9	2	SS	20		20	
4 /		hard, turning grey, rootlets cease		3	SS	22		19	
6 / 2			249.4						
8 /		**SILTY CLAY TILL** hard grey silty clay, trace sand and gravel, DTPL	2.3	4	SS	20		22	
			248.7						
10 /		**CLAYEY SILT TILL** very stiff mottled brown and grey clayey silt, trace sand and gravel, DTPL	3.0	5	SS	16		23	
12 / 4									
14 /		grey	247.1 / 4.6	6	SS	12		27	
16 /									
18 /									
20 / 6			245.6						
		CLAY AND SILT TILL stiff to very stiff grey clay and silt, trace sand, DTPL to APL	6.1	7	SS	11		14	
22 /			245.0 / 6.7						

Bentonite and Cuttings

Dry Cave

Field Technician: B. Ehgoetz

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

Sheet: 1 of 1

ID No.: BH206-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/15/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: N/A

Depth (ft / m)	Symbol	Soil Description	Elevation (masl) / Depth (m)	Sample Number	Sample Type	Dynamic Cone – Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
0 / 0		Ground Surface	249.9						
		TOPSOIL dark brown silty clayey topsoil, with organics (125mm)	0.0	1	SS	8		21	
		SILT TILL loose to compact brown silt, some clay, trace sand and gravel, trace rootletsvery moist		2	SS	20		17	
				3	SS	28		16	
			247.6						
		CLAYEY SILT TILL hard brown clayey silt, trace sand and gravel, with cobbles	2.3	4	SS	32		16	
				5	SS	51		12	Bentonite and Cuttings
			245.3						
		SANDY SILT very dense brown sandy silt, some clay and gravel, with cobbles, moist	4.6	6	SS	71		4	
			243.8						Dry Cave
		grey, trace gravel	6.1	7	SS	50/125mm		4	

Field Technician: A. Challis

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

MTE

ID No.: BH206-25

Project Name: Airport Road - Geotechnical Investigation

MTE File No.: 56106-100

Client: Broccolini

Site Location: Airport Road, Caledon, ON

Date Completed: 1/15/2025

Drilling Contractor: Direct Environmental Drilling Inc

Drill Rig: Mobi Drill B57 Track Mount

Drill Method: Hollow Stem Augers

Protective Cover: N/A

Subsurface Profile				Sample		Dynamic Cone / Standard Penetration (20 40 60 80)	Shear Strength (PP) kPa / Shear Strength (FV) kPa (50 100 150 200)	Water Content % (10 20 30)	Groundwater Observations and Standpipe Details
Depth	Symbol	Soil Description	Elevation (masl) Depth (m)	Number	Type				
24									
26			242.0	8	SS	50/50mm		5	
8		Drilling Terminated	7.9						
28									
30									
32									
10									
34									
36									
38									
12									
40									
42									
44									

Field Technician: A. Challis

Drafted by: B. Ehgoetz

Reviewed by: B. Thorner

MTE

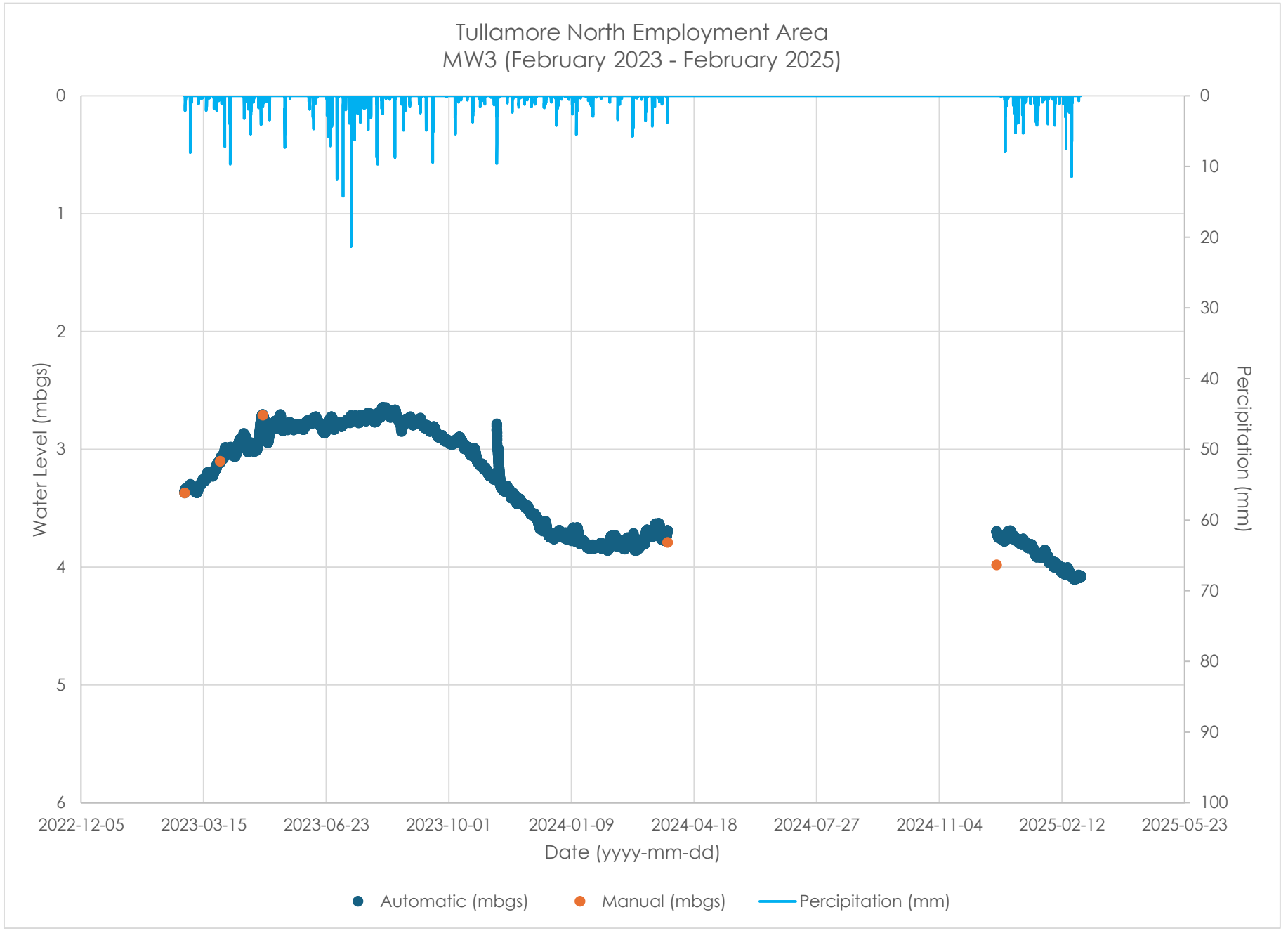
APPENDIX B

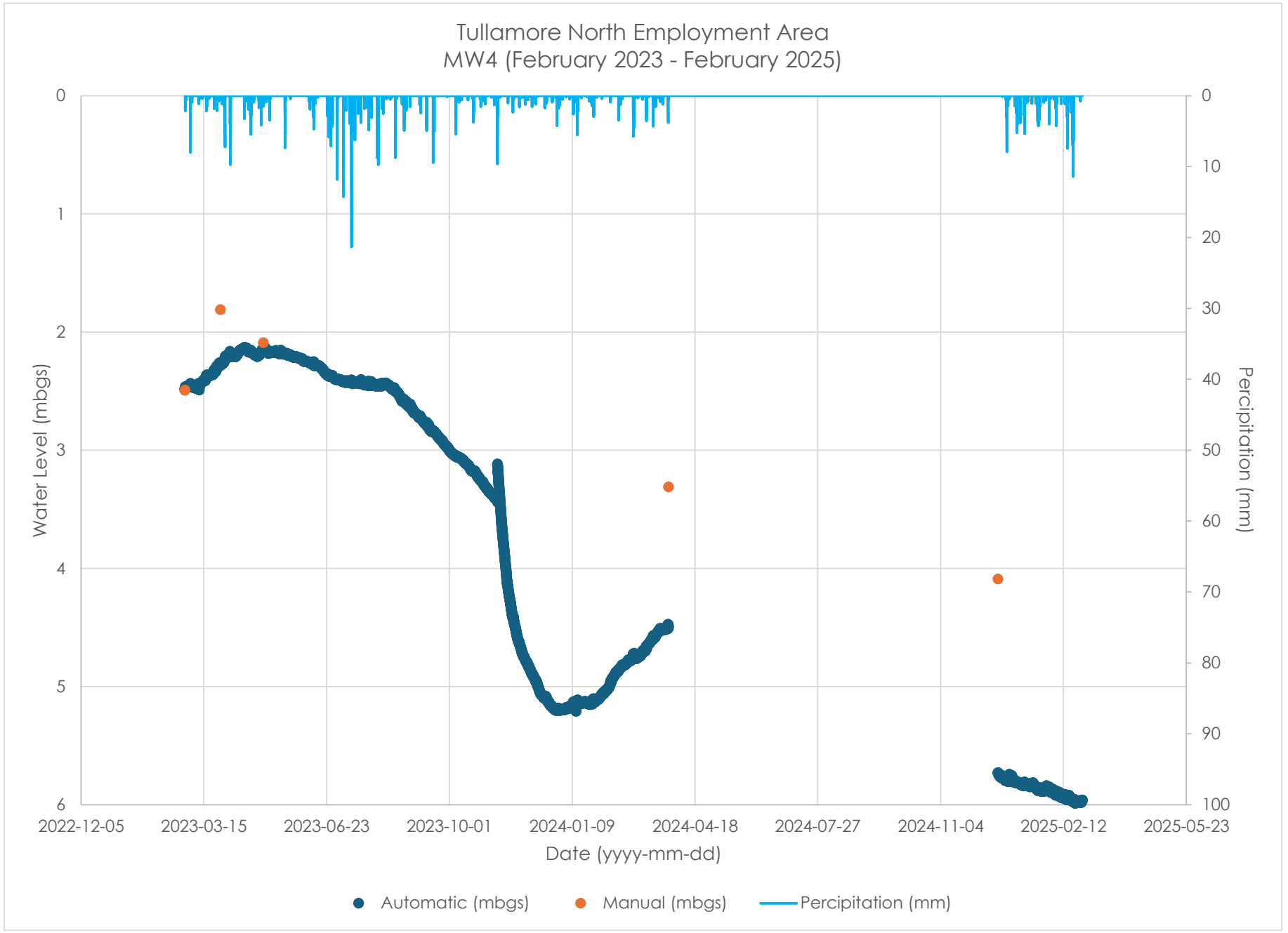
MECP Well Record Summary

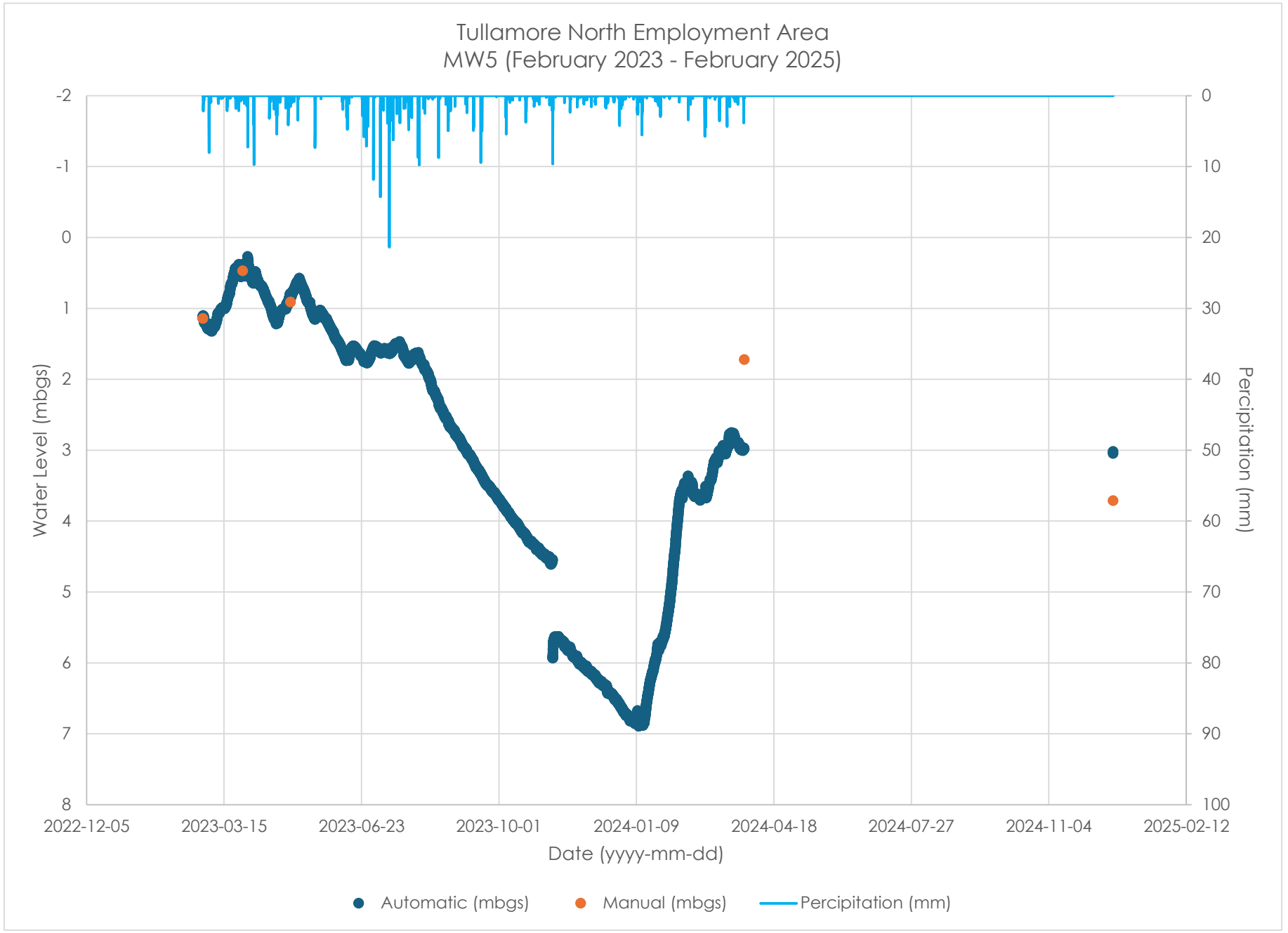
Key Number	Well ID	Completion Data	Total Depth	Depth to Bedrock	Static Water Level	Use
1	7338302	2019-07-12	24.40	-	-	Abandoned
2	7338301	2019-07-12	13.10	-	-	Abandoned
3	4903640	1971-07-15	12.80	-	2.10	Domestic
4	4908178	1997-01-15	10.70	10.70	-	Monitoring
5	4903332	1969-09-10	20.40	-	0.60	Domestic
6	4905023	1976-11-26	11.60	-	4.60	Domestic
7	4903114	1968-08-13	15.50	12.80	2.40	Domestic
8	4908179	1997-01-14	4.60	-	-	Monitoring
9	4908180	1997-01-15	11.00	11.00	-	Monitoring
10	7116736	2008-10-02	6.10	-	-	Testhole
11	4901542	1949-07-13	7.60	7.00	-	Domestic
12	4908388	1998-11-21	18.60	17.10	4.60	Domestic
13	4909902	2005-09-19	12.84	-	2.10	Abandoned
14	4903822	1972-05-20	13.40	13.40	6.10	Domestic
15	4907173	1989-09-18	15.80	15.20	3.00	Domestic
16	7336381	2019-07-03	6.10	-	-	Monitoring
17	4901543	1967-08-11	21.30	15.80	9.10	Domestic
18	4901473	1961-11-02	20.40	-	9.10	Stock
19	4904226	1973-05-20	15.80	-	10.70	Domestic
20	4908073	1995-11-10	19.50	15.80	-	Abandoned
21	4904809	1975-12-24	15.20	13.40	6.10	Municipal
22	4905428	1978-08-03	10.10	-	2.40	Domestic
23	4903469	1970-03-23	26.80	19.80	3.00	Domestic
24	4909650	2004-05-18	12.50	-	-	Testhole
25	4903045	1968-06-28	31.10	17.40	5.50	Domestic
26	7117883	2008-04-28	5.50	-	-	Testhole
27	4904120	1973-06-02	15.80	-	10.70	Domestic
28	4900009	1966-08-02	41.10	15.80	15.50	Farm
29	4909901	2005-09-19	16.40	-	2.30	Abandoned
30	4904739	1975-09-06	12.80	-	4.60	Domestic
31	4901544	1966-08-06	10.70	-	7.60	Domestic
32	4908181	1997-01-13	10.70	10.70	-	Monitoring
33	4903033	1968-05-21	55.80	10.70	11.60	Domestic
34	4908183	1997-01-14	11.30	11.30	-	Domestic
35	4909812	2005-06-15	12.10	-	0.80	Abandoned
36	4900006	1963-04-26	12.20	10.70	6.10	Domestic
37	4900005	1962-08-04	11.30	9.10	4.90	Domestic
38	4903841	1972-06-06	10.40	-	5.50	Domestic
39	4909900	2005-09-19	6.00	-	1.70	Abandoned
40	7118693	2009-01-20	-	-	1.70	Abandoned
41	7248954	2015-09-10	55.70	-	-	Abandoned
42	4905464	1978-06-14	17.40	-	12.20	Domestic
43	4908182	1997-01-13	9.10	7.00	-	Monitoring
44	4906285	1984-08-12	17.40	-	3.00	Domestic
45	4908152	1996-05-24	12.80	-	4.60	Domestic

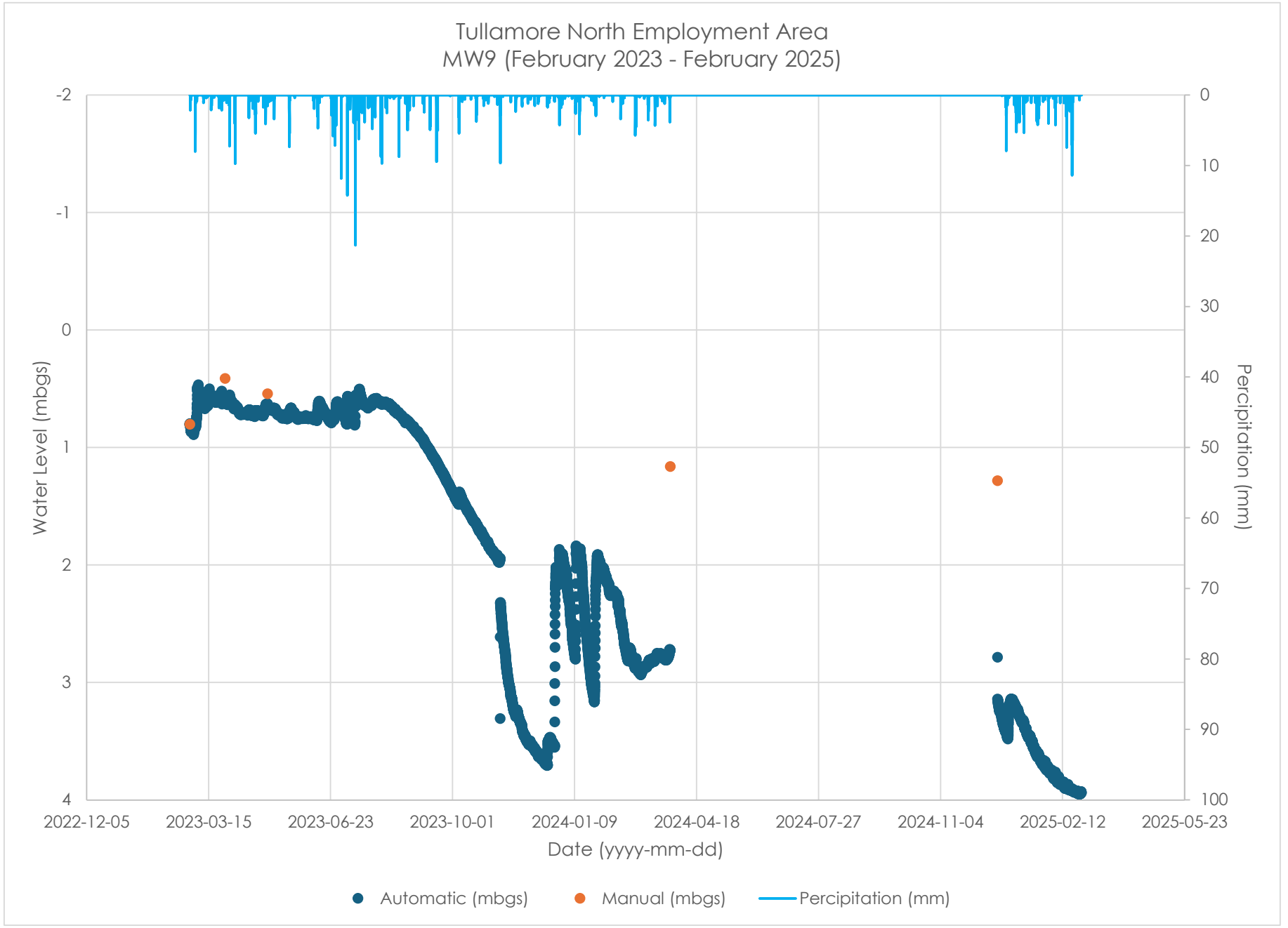
APPENDIX C

Hydrographs


Tullamore North Employment Area
MW3 (February 2023 - February 2025)
Water Level (mbgs)
Percipitation (mm)
0
1
2
3
4
5
6
0
10
20
30
40
50
60
70
80
90
100
2022-12-05
2023-03-15
2023-06-23
2023-10-01
2024-01-09
2024-04-18
2024-07-27
2024-11-04
2025-02-12
2025-05-23
Date (yyyy-mm-dd)
Automatic (mbgs)
Manual (mbgs)
Percipitation (mm)


Tullamore North Employment Area
MW4 (February 2023 - February 2025)
Water Level (mbgs)
Percipitation (mm)
0
1
2
3
4
5
6
0
10
20
30
40
50
60
70
80
90
100
2022-12-05
2023-03-15
2023-06-23
2023-10-01
2024-01-09
2024-04-18
2024-07-27
2024-11-04
2025-02-12
2025-05-23
Date (yyyy-mm-dd)
Automatic (mbgs)
Manual (mbgs)
Percipitation (mm)


Tullamore North Employment Area
MW5 (February 2023 - February 2025)
Water Level (mbgs)
Percipitation (mm)
-2
-1
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
2022-12-05
2023-03-15
2023-06-23
2023-10-01
2024-01-09
2024-04-18
2024-07-27
2024-11-04
2025-02-12
Date (yyyy-mm-dd)
Automatic (mbgs)
Manual (mbgs)
Percipitation (mm)


Tullamore North Employment Area
MW9 (February 2023 - February 2025)
Water Level (mbgs)
-2
-1
0
1
2
3
4
Percipitation (mm)
0
10
20
30
40
50
60
70
80
90
100
2022-12-05
2023-03-15
2023-06-23
2023-10-01
2024-01-09
2024-04-18
2024-07-27
2024-11-04
2025-02-12
2025-05-23
Date (yyyy-mm-dd)
Automatic (mbgs)
Manual (mbgs)
Percipitation (mm)

APPENDIX D

Groundwater Sampling Results

ALS Canada Ltd.

right solutions.
right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	:	**WT2524915**			
Amendment	:	**1**			
Client	:	**C.F. Crozier & Associates Inc.**	Laboratory	:	ALS Environmental - Waterloo
Contact	:	Victoria Mazur	Account Manager	:	Colby Coutu
Address	:	2800 High Point Drive Milton Ontario Canada L9T 6P4	Address	:	60 Northland Road, Unit 1 Waterloo ON Canada N2V 2B8
Telephone	:	(548) 708-0039	Telephone	:	+1 519 886 6910
Project	:	2278-6368	Date Samples Received	:	05-Sep-2025 11:20
PO	:	----	Date Analysis Commenced	:	06-Sep-2025
C-O-C number	:	20-1050694	Issue Date	:	07-Oct-2025 13:48
Sampler	:	CLIENT			
Site	:	----			
Quote number	:	2024/2025 SOA			
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*
Danielle Gravel	Supervisor - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
David Tremblett	VOC Section Supervisor	VOC, Waterloo, Ontario
Hannah Lewis	Inorganics Analyst	Inorganics, Waterloo, Ontario
Johanna Vargas	Analyst	Microbiology, Waterloo, Ontario
Jon Fisher	Laboratory Manager - Environmental	Metals, Waterloo, Ontario
Parth Goswami	Team Leader - LCMS	LCMS, Waterloo, Ontario
Rachel Cameron	Supervisor - Semi-Volatile Extractions	Organics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Inorganics, Waterloo, Ontario
Walt Kippenhuck	Supervisor - Inorganic	Metals, Waterloo, Ontario

Summary of Guideline Breaches by Sample

SampleID/Client ID	Matrix	Analyte	Analyte Summary	Guideline	Category	Result	Limit
MW9 ----	Water	Solids, total suspended [TSS]		RMPSUB	SAN	1190 mg/L	350 mg/L
	Water	Solids, total suspended [TSS]		RMPSUB	STM	1190 mg/L	15 mg/L
	Water	Kjeldahl nitrogen, total [TKN]		RMPSUB	STM	<5.00 mg/L	1 mg/L
	Water	Phosphorus, total		RMPSUB	STM	1.74 mg/L	0.4 mg/L
	Water	Coliforms, thermotolerant [fecal]		RMPSUB	STM	240 CFU/100mL	1 CFU/100mL

Key:

RMPSUB	Ontario Reg.Mun. of Peel Sewer Bylaw #53-2010 (APR, 2019)
SAN	Peel Sanitary Sewer (53-2010)
STM	Peel Storm Sewer (53-2010)

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: CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

LOR: Limit of Reporting (detection limit).

Unit	*Description*
CFU/100mL	colony forming units per hundred millilitres
mg/L	milligrams per litre
MPN/100mL	most probable number per hundred millilitres
pH units	pH units
µg/L	micrograms per litre

>: greater than.
<: less than.

Red shading is applied where the result or the LOR is greater than the Guideline Upper Limit (or lower than the Guideline Lower Limit, if applicable).
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.

Lavender shading is applied where the LOR itself is greater than the Guideline Upper Limit (or Lower than the Guideline Lower Limit, if applicable).

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Workorder Comments

<1 or Not Detected with LOR of 1 equals Zero (0).

Not Detected = Absent; Detected = Present.

Amendment (07/10/2025): This report has been amended to include requested guideline(s). All analysis results are as per the previous report.

Qualifiers

Qualifier	Description
BODL	Limit of Reporting for BOD was increased to account for the largest volume of sample tested.
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
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).
SUR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Analytical Results

SubMatrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: MW9 ----		RMPSUB SAN	RMPSUB STM	---- ----	---- ----	---- ----	---- ----
					Client sampling date / time: 05-Sep-2025 00:00							
					WT2524915-001							
Physical Tests												
pH	----	E108/WT	0.10	pH units	7.95		5.5 - 10 pH units	6 - 9 pH units	----	----	----	----
Solids, total suspended [TSS]	----	E160/WT	3.0	mg/L	1190	DLHC	350 mg/L	15 mg/L	----	----	----	----
Anions and Nutrients												
Fluoride	16984-48-8	E235.F/WT	0.020	mg/L	0.215	DLDS	10 mg/L	----	----	----	----	----
Kjeldahl nitrogen, total [TKN]	----	E318/WT	0.050	mg/L	<5.00	DLM	100 mg/L	1 mg/L	----	----	----	----
Phosphorus, total	7723-14-0	E372-U/WT	0.0020	mg/L	1.74		10 mg/L	0.4 mg/L	----	----	----	----
Sulfate (as SO4)	14808-79-8	E235.SO4/WT	0.30	mg/L	366	DLDS	1500 mg/L	----	----	----	----	----
Cyanides												
Cyanide, strong acid dissociable (Total)	----	E333/WT	0.0020	mg/L	<0.0020		2 mg/L	0.02 mg/L	----	----	----	----
Microbiological Tests												
Coliforms, thermotolerant [fecal]	----	E012.FC/WT	1	CFU/100mL	240	DLM	----	1 CFU/100mL	----	----	----	----
Coliforms, Escherichia coli [E. coli]	----	E010.QT97/WT	1	MPN/100mL	<10	DLM	----	200 MPN/100mL	----	----	----	----
Total Metals												
Aluminum, total	7429-90-5	E420/WT	0.0030	mg/L	<0.0300	DLHC	50 mg/L	----	----	----	----	----
Antimony, total	7440-36-0	E420/WT	0.00010	mg/L	<0.00100	DLHC	5 mg/L	----	----	----	----	----
Arsenic, total	7440-38-2	E420/WT	0.00010	mg/L	<0.00100	DLHC	1 mg/L	0.02 mg/L	----	----	----	----
Cadmium, total	7440-43-9	E420/WT	0.0000050	mg/L	<0.0000500	DLHC	0.7 mg/L	0.008 mg/L	----	----	----	----
Chromium, total	7440-47-3	E420/WT	0.00050	mg/L	<0.00500	DLHC	5 mg/L	0.08 mg/L	----	----	----	----
Cobalt, total	7440-48-4	E420/WT	0.00010	mg/L	<0.00100	DLHC	5 mg/L	----	----	----	----	----
Copper, total	7440-50-8	E420/WT	0.00050	mg/L	0.0101	DLHC	3 mg/L	0.05 mg/L	----	----	----	----
Lead, total	7439-92-1	E420/WT	0.000050	mg/L	<0.000500	DLHC	3 mg/L	0.12 mg/L	----	----	----	----
Manganese, total	7439-96-5	E420/WT	0.00010	mg/L	0.0486	DLHC	5 mg/L	0.05 mg/L	----	----	----	----
Mercury, total	7439-97-6	E508/WT	0.0000050	mg/L	0.0000065		0.01 mg/L	0.0004 mg/L	----	----	----	----
Molybdenum, total	7439-98-7	E420/WT	0.000050	mg/L	0.00117	DLHC	5 mg/L	----	----	----	----	----
Nickel, total	7440-02-0	E420/WT	0.00050	mg/L	<0.00500	DLHC	3 mg/L	0.08 mg/L	----	----	----	----
Selenium, total	7782-49-2	E420/WT	0.000050	mg/L	<0.000500	DLHC	1 mg/L	0.02 mg/L	----	----	----	----
Silver, total	7440-22-4	E420/WT	0.000010	mg/L	<0.000100	DLHC	5 mg/L	0.12 mg/L	----	----	----	----
Tin, total	7440-31-5	E420/WT	0.00010	mg/L	<0.00100	DLHC	5 mg/L	----	----	----	----	----
Titanium, total	7440-32-6	E420/WT	0.00030	mg/L	<0.00300	DLHC	5 mg/L	----	----	----	----	----
Zinc, total	7440-66-6	E420/WT	0.0030	mg/L	<0.0300	DLHC	3 mg/L	0.04 mg/L	----	----	----	----
Aggregate Organics												
Carbonaceous biochemical oxygen demand [CBOD]	----	E555/WT	2.0	mg/L	<3.0	BODL	300 mg/L	15 mg/L	----	----	----	----
Oil & grease (gravimetric)	----	E567/WT	5.0	mg/L	<5.0		----	----	----	----	----	----
Oil & grease, animal/vegetable (gravimetric)	----	EC567A.SG/WT	5.0	mg/L	<5.0		150 mg/L	----	----	----	----	----
Oil & grease, mineral (gravimetric)	----	E567SG/WT	5.0	mg/L	<5.0		15 mg/L	----	----	----	----	----
Phenols, total (4AAP)	----	E562/WT	0.0010	mg/L	0.0074		1 mg/L	0.008 mg/L	----	----	----	----
Volatile Organic Compounds												
Benzene	71-43-2	E611D/WT	0.50	µg/L	<0.50		10 µg/L	2 µg/L	----	----	----	----

SubMatrix: Groundwater
(Matrix: Water)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: MW9 ---- / Client sampling date / time: 05-Sep-2025 00:00 — WT2524915-001	RMPSUB SAN	RMPSUB STM	----	----	----	----
Volatile Organic Compounds											
Chloroform	67-66-3	E611D/WT	0.50	µg/L	<0.50	40 µg/L	2 µg/L	----	----	----	----
Dichlorobenzene, 1,2-	95-50-1	E611D/WT	0.50	µg/L	<0.50	50 µg/L	5.6 µg/L	----	----	----	----
Dichlorobenzene, 1,4-	106-46-7	E611D/WT	0.50	µg/L	<0.50	80 µg/L	6.8 µg/L	----	----	----	----
Dichloroethylene, cis-1,2-	156-59-2	E611D/WT	0.50	µg/L	<0.50	4000 µg/L	5.6 µg/L	----	----	----	----
Dichloromethane	75-09-2	E611D/WT	1.0	µg/L	<1.0	2000 µg/L	5.2 µg/L	----	----	----	----
Dichloropropylene, trans-1,3-	10061-02-6	E611D/WT	0.30	µg/L	<0.30	140 µg/L	5.6 µg/L	----	----	----	----
Ethylbenzene	100-41-4	E611D/WT	0.50	µg/L	<0.50	160 µg/L	2 µg/L	----	----	----	----
Methyl ethyl ketone [MEK]	78-93-3	E611D/WT	20	µg/L	<20	8000 µg/L	----	----	----	----	----
Styrene	100-42-5	E611D/WT	0.50	µg/L	<0.50	200 µg/L	----	----	----	----	----
Tetrachloroethane, 1,1,2,2-	79-34-5	E611D/WT	0.50	µg/L	<0.50	1400 µg/L	17 µg/L	----	----	----	----
Tetrachloroethylene	127-18-4	E611D/WT	0.50	µg/L	<0.50	1000 µg/L	4.4 µg/L	----	----	----	----
Toluene	108-88-3	E611D/WT	0.50	µg/L	<0.50	270 µg/L	2 µg/L	----	----	----	----
Trichloroethylene	79-01-6	E611D/WT	0.50	µg/L	<0.50	400 µg/L	8 µg/L	----	----	----	----
Xylene, m+p-	179601-23-1	E611D/WT	0.40	µg/L	<0.40	----	----	----	----	----	----
Xylene, o-	95-47-6	E611D/WT	0.30	µg/L	<0.30	----	----	----	----	----	----
Xylenes, total	1330-20-7	E611D/WT	0.50	µg/L	<0.50	1400 µg/L	4.4 µg/L	----	----	----	----
Volatile Organic Compounds Surrogates											
Bromofluorobenzene, 4-	460-00-4	E611D/WT	1.0	%	97.1	----	----	----	----	----	----
Difluorobenzene, 1,4-	540-36-3	E611D/WT	1.0	%	97.0	----	----	----	----	----	----
Phthalate Esters											
bis(2-Ethylhexyl) phthalate [DEHP]	117-81-7	E625A/WT	0.60	µg/L	<3.60 DLB	12 µg/L	8.8 µg/L	----	----	----	----
Di-n-butyl phthalate	84-74-2	E625A/WT	1.0	µg/L	<1.0	80 µg/L	15 µg/L	----	----	----	----
Semi-Volatile Organics Surrogates											
Fluorobiphenyl, 2-	321-60-8	E625A/WT	1.0	%	67.6	----	----	----	----	----	----
Nitrobenzene-d5	4165-60-0	E625A/WT	1.0	%	82.2	----	----	----	----	----	----
Terphenyl-d14, p-	1718-51-0	E625A/WT	1.0	%	57.1 SUR-ND	----	----	----	----	----	----
Phenolics Surrogates											
Tribromophenol, 2,4,6-	118-79-6	E625A/WT	0.50	%	109	----	----	----	----	----	----
Nonylphenols											
Nonylphenol [NP]	84852-15-3	E749A/WT	0.40	µg/L	<0.40	20 µg/L	----	----	----	----	----
Nonylphenol diethoxylate [NP2EO]	20427-84-3	E749B/WT	0.10	µg/L	<0.10	----	----	----	----	----	----
Nonylphenol ethoxylates, mono+di	n/a	E749B/WT	2.0	µg/L	<2.0	200 µg/L	----	----	----	----	----
Nonylphenol monoethoxylate [NP1EO]	27986-36-3	E749B/WT	0.40	µg/L	<0.40	----	----	----	----	----	----
Polychlorinated Biphenyls											
Aroclor 1016	12674-11-2	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1221	11104-28-2	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1232	11141-16-5	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1242	53469-21-9	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1248	12672-29-6	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1254	11097-69-1	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----

SubMatrix: Groundwater
(Matrix: Water **)**

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID: MW9 ---- / Client sampling date / time: 05-Sep-2025 00:00 WT2524915-001	RMPSUB SAN	RMPSUB STM	---- ----	---- ----	---- ----	---- ----
Polychlorinated Biphenyls											
Aroclor 1260	11096-82-5	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1262	37324-23-5	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----
Aroclor 1268	11100-14-4	E687/WT	0.020	µg/L	<0.020	----	----	----	----	----	----
Polychlorinated biphenyls [PCBs], total	n/a	E687/WT	0.060	µg/L	<0.060	1 µg/L	0.4 µg/L	----	----	----	----
Polychlorinated Biphenyls Surrogates											
Decachlorobiphenyl	2051-24-3	E687/WT	0.1	%	83.6	----	----	----	----	----	----
Tetrachloro-m-xylene	877-09-8	E687/WT	0.1	%	96.5	----	----	----	----	----	----

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

APPENDIX E

Site-Wide Water Balance

CROZIER

Project Information

Thornthwaite & Mather Method

Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By: CM
Date: 2025.10.07

Pre-Development Conditions

Landuse	Wetland	Agricultural					
Area (m^2)	106551.6	137051.4					
Pervious Area (m^2)	106551.6	137051.4					
Impervious Area (m^2)	0	0					
Percent Imperviousness (%)	0%	0%					
Infiltration Factors							
Topography - Description	Rolling	Rolling					
Topography - Infiltration Factor	0.20	0.20					
Soil - Description	Clay Loam	Clay Loam					
Soil - Infiltration Factor	0.10	0.10					
Cover - Description	Mature Forests	Shallow Rooted Crops					
Cover - Infiltration Factor	0.20	0.10					
Total Infiltration Factor	0.50	0.40					
Soil Moisture Capacity (mm)	400	200					

Post-Development Conditions

Landuse	Buildings	Pavement	Wetland	Green Space			
Area (m^2)	71376.32	45632.22	106551.6	20042.86			
Pervious Area (m^2)	0	0	106551.6	20042.86			
Impervious Area (m^2)	71376.32	45632.22	0	0			
Percent Imperviousness (%)	100%	100%	0%	0%			
Infiltration Factors							
Topography - Description	Flat	Flat	Rolling	Flat			
Topography - Infiltration Factor	0.30	0.30	0.20	0.30			
Soil - Description	Clay Loam	Clay Loam	Clay Loam	Clay Loam			
Soil - Infiltration Factor	0.10	0.10	0.10	0.10			
Cover - Description	Urban Lawns	Urban Lawns	Mature Forests	Urban Lawns			
Cover - Infiltration Factor	0.10	0.10	0.20	0.10			
Total Infiltration Factor	0.50	0.50	0.50	0.50			
Soil Moisture Capacity (mm)	100	100	100	100			

CROZIER

Climate Parameters

Thornthwaite & Mather Method

Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By: CM
Date: 2025.10.07

PROJECT LOCATION
PROJECT LATITUDE ° **43**

Month	Mean Temperature (C°)[1]	Heat Index [i =(t/5)$^{1.514}$]	α	Potential Evapotranspiration (PET) (mm)	Correction Factor[2]	Adjusted Potential Evapotranspiration (APET) (mm)	Precipitation (P) (mm)[1]
January	-7.0	0.00		0.0	1.37	0.0	60.4
February	-5.9	0.00		0.0	0.82	0.0	50.2
March	-1.4	0.00		0.0	1.02	0.0	50.3
April	6.1	1.35		28.9	1.12	32.3	67.0
May	12.4	3.96		60.8	1.26	76.6	76.1
June	17.3	6.55		86.3	1.28	110.5	75.5
July	19.9	8.10		100.0	1.29	129.0	81.8
August	19.1	7.61		95.8	1.2	114.9	77.4
September	14.3	4.91		70.7	1.04	73.5	75.0
October	8.1	2.08		38.9	0.95	36.9	68.3
November	2.1	0.27		9.4	0.81	7.6	81.7
December	-3.9	0.00		0.0	0.77	0.0	57.7
TOTAL	6.8	**34.8**	**1.1**	**490.8**		**581.5**	**821.4**

NOTES: 1. Precipitation and temperature data referenced from the Albion Field Centre, Climate ID: 6150103.
2. Latitude adjustment/correction factors determined based on site location assuming 12 hours of sunlight per day for 30 days

CROZIER

Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By: CM
Date: 2025.10.07

Pre-Development Water Balance

Thornthwaite & Mather Method

Landuse	**Wetland**												
Parameters	**Pervious Area**			10.66 ha	**Impervious Area**			0.00 ha	**Total Area**			10.66 ha	
	Soil Moisture Holding Capacity			400 mm	**Infiltration Factor**			0.50	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	109	123	107	73	37	8	0	**565**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	3	58	**256**
Infiltration (mm)	30	25	25	17	0	0	0	0	0	0	2	29	**128**
Surface Water Runoff (mm)	30	25	25	17	0	0	0	0	0	0	2	29	**128**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	3443	8166	11610	13058	11352	7830	3935	812	0	**60207**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	3218	2674	2680	1848	0	0	0	0	0	0	163	3074	**13657**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	3218	2674	2680	1848	0	0	0	0	0	0	163	3074	**13657**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Water Balance Summary: Wetland				
Pre-Development Evapotranspiration	60207	m^3/yr	565	mm/yr
Pre-Development Infiltration	13657	m^3/yr	128	mm/yr
Pre-Development Runoff	13657	m^3/yr	128	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Evapotranspiration does not occur when average temperature is below zero.
- Infiltration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

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Pre-Development Water Balance

Thornthwaite & Mather Method

Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By: CM
Date: 2025.10.07

Landuse	**Agricultural**												
Parameters	**Pervious Area**			13.71 ha	**Impervious Area**			0.00 ha	**Total Area**			13.71 ha	
	Soil Moisture Holding Capacity			200 mm	**Infiltration Factor**			0.40	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	108	117	100	73	37	8	0	**552**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	17	58	**270**
Infiltration (mm)	24	20	20	14	0	0	0	0	0	0	7	23	**108**
Surface Water Runoff (mm)	36	30	30	21	0	0	0	0	0	0	10	35	**162**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	4429	10504	14735	16036	13710	10072	5062	1044	0	**75592**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	3311	2752	2757	1901	0	0	0	0	0	0	908	3163	**14793**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	4967	4128	4136	2852	0	0	0	0	0	0	1362	4745	**22189**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Water Balance Summary:Agricultural				
Pre-Development Evapotranspiration	75592.0	m^3/yr	551.6	mm/yr
Pre-Development Infiltration	14792.8	m^3/yr	107.9	mm/yr
Pre-Development Runoff	22189.2	m^3/yr	161.9	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

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Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By: CM
Date: 2025.10.07

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: **Airport Road**
Location: **Caledon**

Landuse	**Buildings**												
Parameters	**Pervious Area**			0.00 ha	**Impervious Area**			7.14 ha	**Total Area**			7.14 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.50	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	30	25	25	17	0	0	0	0	0	0	18	29	**145**
Surface Water Runoff (mm)	30	25	25	17	0	0	0	0	0	0	18	29	**145**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious ET (m^3)	647	537	539	717	815	808	876	829	803	731	875	618	**8794**
Pervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious Runoff (m^3)	3664	3046	3052	4065	4617	4581	4963	4696	4550	4144	4957	3501	**49834**

Post-Development Water Balance Summary:Buildings				
Post-Development Evapotranspiration	8794.3	m^3/yr	123.2	mm/yr
Post-Development Infiltration	0.0	m^3/yr	0.0	mm/yr
Post-Development Runoff	49834.2	m^3/yr	698.2	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

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Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By: CM
Date: 2025.10.07

Pre-Development Water Balance

Thornthwaite & Mather Method

Project Name: **Airport Road**
Location: **Caledon**

Landuse	**Pavement**												
Parameters	**Pervious Area**			0.00 ha	**Impervious Area**			4.56 ha	**Total Area**			4.56 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.50	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	30	25	25	17	0	0	0	0	0	0	18	29	**145**
Surface Water Runoff (mm)	30	25	25	17	0	0	0	0	0	0	18	29	**145**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious ET (m^3)	413	344	344	459	521	517	560	530	513	468	559	395	**5622**
Pervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious Runoff (m^3)	2343	1947	1951	2599	2952	2928	3173	3002	2909	2649	3169	2238	**31860**

Post-Development Water Balance Summary: Pavement				
Post-Development Evapotranspiration	5622.3	m^3/yr	123.2	mm/yr
Post-Development Infiltration	0.0	m^3/yr	0.0	mm/yr
Post-Development Runoff	31860.0	m^3/yr	698.2	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.

2. Assumptions:

- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

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Project: Broccolini Secondary Plan
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Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: **Airport Road**
Location: **Caledon**

Landuse	**Wetland**												
Parameters	**Pervious Area**			10.66 ha	**Impervious Area**			0.00 ha	**Total Area**			10.66 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.50	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	30	25	25	17	0	0	0	0	0	0	18	29	**145**
Surface Water Runoff (mm)	30	25	25	17	0	0	0	0	0	0	18	29	**145**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	3443	8166	11174	11527	9705	7830	3935	812	0	**56592**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	3218	2674	2680	1848	0	0	0	0	0	0	1971	3074	**15465**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	3218	2674	2680	1848	0	0	0	0	0	0	1971	3074	**15465**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Post-Development Water Balance Summary: Catchment Wetland				
Post-Development Evapotranspiration	56592.5	m^3/yr	531.1	mm/yr
Post-Development Infiltration	15464.5	m^3/yr	145.1	mm/yr
Post-Development Runoff	15464.5	m^3/yr	145.1	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

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Project: Broccolini Secondary Plan
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Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: **Airport Road**
Location: **Caledon**

Landuse	**Green Space**												
Parameters	**Pervious Area**			2.00 ha	**Impervious Area**			0.00 ha	**Total Area**			2.00 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.50	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	30	25	25	17	0	0	0	0	0	0	18	29	**145**
Surface Water Runoff (mm)	30	25	25	17	0	0	0	0	0	0	18	29	**145**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	648	1536	2102	2168	1826	1473	740	153	0	**10645**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	605	503	504	348	0	0	0	0	0	0	371	578	**2909**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	605	503	504	348	0	0	0	0	0	0	371	578	**2909**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Post-Development Water Balance Summary: Catchment Green Space				
Post-Development evapotranspiration	10645.3	m^3/yr	531.1	mm/yr
Post-Development Infiltration	2908.9	m^3/yr	145.1	mm/yr
Post-Development Runoff	2908.9	m^3/yr	145.1	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By: CM
Date: 2025.10.07

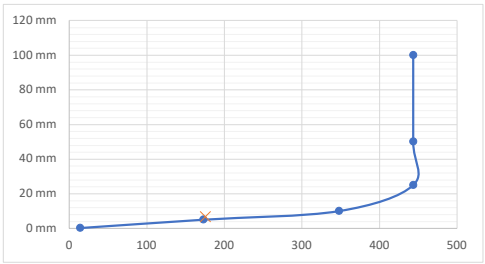
Design Storm Determination
Building A
Water Balance/Water Budget Assessment

Days with Precipitation (From Climate Data)

Storm Event (mm)	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
≥ 0.2 mm	9.9	10.3	10.2	9	9.8	10.8	11.2	**71**
≥ 5 mm	4.2	5	4.4	4.9	4.5	4.5	4.2	**32**
≥ 10 mm	2	2.3	2.9	2.6	2.8	2.5	2.4	**18**
≥ 25 mm	0.37	0.53	0.61	0.68	0.63	0.68	0.33	**3.8**
≥ 50 mm	0	0	0	0	0	0	0	**0.0**
≥ 100 mm	0	0	0	0	0	0	0	**0.0**

Available Precipitation

Storm Event (mm)	Total Days Per Year	Incremental Precipitation (mm/yr)	Cummulative Precipitation (mm/yr)
≥ 0.20 mm	71.2	14.2	14.2
≥ 5 mm	31.7	158.5	172.7
≥ 10 mm	17.5	175.0	347.7
≥ 25 mm	3.8	95.8	443.5
≥ 50 mm	0.0	0.0	443.5
≥ 100 mm	0.0	0.0	443.5
Total	**124**	**443.5**	



Infiltration Deficit Target:	3930 m^3/yr	39% of total target based on proposed severance
Area contributing to mitigation:	23574 m^2	Building A footprint (assume only rooftop runoff)
	167 mm/yr	
Runoff Coefficient for Impervious Area:	0.95	Runoff coefficient for surface draining to LID
Design Precipitation:	175 mm/yr	
Therefore Design Storm:	6.7 mm	
LID Volume:	157.9 m^3	

Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By: CM
Date: 2025.10.07

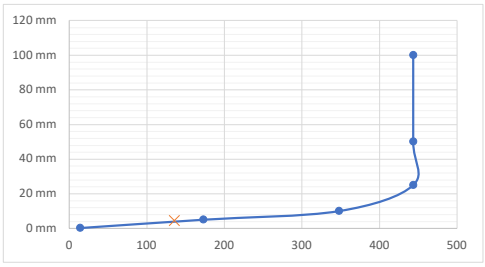
Design Storm Determination
Building B
Water Balance/Water Budget Assessment

Days with Precipitation (From Climate Data)

Storm Event (mm)	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
≥ 0.2 mm	9.9	10.3	10.2	9	9.8	10.8	11.2	**71**
≥ 5 mm	4.2	5	4.4	4.9	4.5	4.5	4.2	**32**
≥ 10 mm	2	2.3	2.9	2.6	2.8	2.5	2.4	**18**
≥ 25 mm	0.37	0.53	0.61	0.68	0.63	0.68	0.33	**3.8**
≥ 50 mm	0	0	0	0	0	0	0	**0.0**
≥ 100 mm	0	0	0	0	0	0	0	**0.0**

Available Precipitation

Storm Event (mm)	Total Days Per Year	Incremental Precipitation (mm/yr)	Cummulative Precipitation (mm/yr)
≥ 0.20 mm	71.2	14.2	14.2
≥ 5 mm	31.7	158.5	172.7
≥ 10 mm	17.5	175.0	347.7
≥ 25 mm	3.8	95.8	443.5
≥ 50 mm	0.0	0.0	443.5
≥ 100 mm	0.0	0.0	443.5
Total	**124**	**443.5**	



Infiltration Deficit Target:	6147 m^3/yr	61% of total target based on proposed severance
Area contributing to mitigation:	47803 m^2	Building B footprint (assume only rooftop runoff)
	129 mm/yr	
Runoff Coefficient for Impervious Area:	0.95	Runoff coefficient for surface draining to LID
Design Precipitation:	135 mm/yr	
Therefore Design Storm:	4.4 mm	
LID Volume:	210.3 m^3	

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Site Water Balance Summary

Thornthwaite & Mather Method

Project: Broccolini Secondary Plan
Project No.: 2278-7228
Created By: VM
Checked By:
Date: 2025.10.07

Pre-Development Water Balance							
Landuse	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)
Wetland	10.65516	60207	565	13657	128	13657	128
Agricultural	13.70514	75592	552	14793	108	22189	162
Total	**24.3603**	**135799**	**557**	**28450**	**117**	**35846**	**147**

Post-Development Water Balance							
Landuse	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)
Buildings	7.137632	8794	123	0	0	49834	698
Pavement	4.563222	5622	123	0	0	31860	698
Wetland	10.65516	56592	531	15465	145	15465	145
Green Space	2.004286	10645	531	2909	145	2909	145
Total	**24.3603**	**81654**	**335**	**18373**	**75**	**100068**	**411**

Site Water Balance Summary							
Scenario	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3)	(mm)	(m^3)	(mm)	(m^3)	(mm)
Pre-Dev.	24.3603	135799	557	28450	117	35846	147
Post-Dev.	24.3603	81654	335	18373	75	100068	411
Difference	0	-54145	-222	-10076	-41	64221	264
% Difference	0%	-40%	-40%	-35%	-35%	179%	179%

Annual Infiltration Deficit **10076 m^3**

Soil Moisture Capacity	50 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	50	50	50	50	49	25	10	5	6	37	50	50	
Change in Storage (mm)	0	0	0	0	-1	-25	-15	-5	2	31	13	0	
Evapotranspiration (mm)	0	0	0	32	77	100	97	82	73	37	8	0	507
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	61	58	315

Soil Moisture Capacity	75 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	75	75	75	75	74	47	25	15	17	48	75	75	
Change in Storage (mm)	0	0	0	0	-1	-28	-22	-10	2	31	27	0	
Evapotranspiration (mm)	0	0	0	32	77	103	104	87	73	37	8	0	521
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	47	58	300

Soil Moisture Capacity	100 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	100	100	100	100	99	70	44	30	32	63	100	100	
Change in Storage (mm)	0	0	0	0	-1	-29	-26	-14	2	31	37	0	
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	531
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	290

Soil Moisture Capacity	125 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	125	125	125	125	124	94	64	48	49	81	125	125	
Change in Storage (mm)	0	0	0	0	-1	-30	-30	-17	2	31	44	0	
Evapotranspiration (mm)	0	0	0	32	77	106	111	94	73	37	8	0	538
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	30	58	283

Soil Moisture Capacity	150 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	150	150	150	150	149	118	86	67	69	100	150	150	
Change in Storage (mm)	0	0	0	0	-1	-31	-32	-19	2	31	50	0	
Evapotranspiration (mm)	0	0	0	32	77	107	114	97	73	37	8	0	544
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	24	58	278

Soil Moisture Capacity	200 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	200	200	200	200	199	167	132	110	111	142	200	200	
Change in Storage (mm)	0	0	0	0	-1	-32	-35	-23	2	31	58	0	
Evapotranspiration (mm)	0	0	0	32	77	108	117	100	73	37	8	0	552
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	17	58	270

Soil Moisture Capacity	250 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	250	250	250	250	249	217	180	155	156	187	250	250	
Change in Storage (mm)	0	0	0	0	-1	-33	-37	-25	2	31	63	0	
Evapotranspiration (mm)	0	0	0	32	77	108	119	102	73	37	8	0	557
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	11	58	265

Soil Moisture Capacity	300 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	300	300	300	300	299	266	228	201	202	234	300	300	
Change in Storage (mm)	0	0	0	0	-1	-33	-39	-27	2	31	66	0	
Evapotranspiration (mm)	0	0	0	32	77	108	121	104	73	37	8	0	560
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	8	58	261

Soil Moisture Capacity	350 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	350	350	350	350	349	316	276	248	250	281	350	350	
Change in Storage (mm)	0	0	0	0	-1	-33	-40	-28	2	31	69	0	
Evapotranspiration (mm)	0	0	0	32	77	109	122	106	73	37	8	0	563
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	5	58	258

Soil Moisture Capacity	400 mm												
Evapotranspiration Analysis													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation (P)	60	50	50	67	76	76	82	77	75	68	82	58	821
Adjusted Potential Evapotranspiration (APET)	0	0	0	32	77	110	129	115	73	37	8	0	581
P-APET	60	50	50	35	-1	-35	-47	-38	2	31	74	58	240
Cummulative moisture deficit	0	0	0	0	-1	-36	-83	-120	0	0	0	0	
Storage (S) (mm)	400	400	400	400	399	366	325	296	298	329	400	400	
Change in Storage (mm)	0	0	0	0	-1	-33	-41	-29	2	31	71	0	
Evapotranspiration (mm)	0	0	0	32	77	109	123	107	73	37	8	0	565
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	3	58	256

Adjustment Factors Based on Site Latitude Based on 12 hours of Sunlight per day for 30 days

Latitude °	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
50	0.74	0.78	1.02	1.15	1.33	1.36	1.37	1.25	1.06	0.92	0.76	0.70
49	0.75	0.79	1.02	1.14	1.32	1.34	1.35	1.24	1.05	0.93	0.76	0.71
48	0.76	0.80	1.02	1.14	1.31	1.33	1.34	1.23	1.05	0.93	0.77	0.72
47	0.77	0.80	1.02	1.14	1.30	1.32	1.33	1.22	1.04	0.93	0.78	0.73
46	0.79	0.81	1.02	1.13	1.29	1.31	1.32	1.22	1.04	0.94	0.79	0.74
45	0.80	0.81	1.02	1.13	1.28	1.29	1.31	1.21	1.04	0.94	0.79	0.75
44	0.81	0.82	1.02	1.13	1.27	1.29	1.30	1.20	1.04	0.95	0.80	0.76
43	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.20	1.04	0.95	0.81	0.77
42	0.82	0.83	1.03	1.12	1.26	1.27	1.28	1.19	1.04	0.95	0.82	0.79
41	0.83	0.83	1.03	1.11	1.25	1.26	1.27	1.19	1.04	0.96	0.82	0.80
40	0.84	0.83	1.03	1.11	1.24	1.25	1.27	1.18	1.04	0.96	0.83	0.81
39	0.85	0.84	1.03	1.11	1.23	1.24	1.26	1.18	1.04	0.96	0.84	0.82
38	0.85	0.84	1.03	1.10	1.23	1.24	1.25	1.17	1.04	0.96	0.84	0.83
37	0.86	0.84	1.03	1.10	1.22	1.23	1.25	1.17	1.03	0.97	0.85	0.83
36	0.87	0.85	1.03	1.10	1.21	1.22	1.24	1.16	1.03	0.97	0.86	0.84
35	0.87	0.85	1.03	1.09	1.21	1.21	1.23	1.16	1.03	0.97	0.86	0.85
34	0.88	0.85	1.03	1.09	1.20	1.20	1.22	1.16	1.03	0.97	0.87	0.86
33	0.88	0.86	1.03	1.09	1.19	1.20	1.22	1.15	1.03	0.97	0.88	0.86
32	0.89	0.86	1.03	1.08	1.19	1.19	1.21	1.15	1.03	0.98	0.88	0.87
31	0.90	0.87	1.03	1.08	1.18	1.18	1.20	1.14	1.03	0.98	0.89	0.88
30	0.90	0.87	1.03	1.08	1.18	1.17	1.20	1.14	1.03	0.98	0.89	0.88
29	0.91	0.87	1.03	1.07	1.17	1.16	1.19	1.13	1.03	0.98	0.90	0.89
28	0.91	0.88	1.03	1.07	1.16	1.16	1.18	1.13	1.02	0.98	0.90	0.90
27	0.92	0.88	1.03	1.07	1.16	1.15	1.18	1.13	1.02	0.99	0.90	0.90
26	0.92	0.88	1.03	1.06	1.15	1.15	1.17	1.12	1.02	0.99	0.91	0.91
25	0.93	0.89	1.03	1.06	1.15	1.14	1.17	1.12	1.02	0.99	0.91	0.91
20	0.95	0.90	1.03	1.05	1.13	1.11	1.14	1.11	1.02	1.00	0.93	0.94
15	0.97	0.91	1.03	1.04	1.11	1.08	1.12	1.08	1.02	1.01	0.95	0.97
10	1.00	0.91	1.03	1.03	1.08	1.06	1.08	1.07	1.02	1.02	0.98	0.99
5	1.02	0.93	1.03	1.02	1.06	1.03	1.06	1.05	1.01	1.03	0.99	1.02
0	1.04	0.94	1.04	1.01	1.04	1.01	1.04	1.04	1.01	1.04	1.01	1.04
-5	1.06	0.91	1.04	1.00	1.02	0.99	1.02	1.03	1.00	1.05	1.03	1.06
-10	1.08	0.97	1.05	0.99	1.01	0.96	1.00	1.01	1.00	1.06	1.05	1.10
-15	1.12	0.98	1.05	0.98	0.98	0.94	0.97	1.00	1.00	1.07	1.07	1.12
-20	1.14	1.00	1.05	0.97	0.96	0.91	0.95	0.99	1.00	1.08	1.09	1.15
-25	1.17	1.01	1.05	0.96	0.94	0.88	0.93	0.98	1.00	1.10	1.11	1.18
-30	1.20	1.03	1.06	0.95	0.92	0.85	0.90	0.96	1.00	1.12	1.14	1.21
-35	1.23	1.04	1.06	0.94	0.89	0.82	0.87	0.94	1.00	1.13	1.17	1.25
-45	1.27	1.06	1.07	0.93	0.86	0.78	0.84	0.92	1.00	1.15	1.20	1.29
-42	1.28	1.07	1.07	0.92	0.85	0.76	0.82	0.92	1.00	1.16	1.22	1.31
-44	1.30	1.08	1.07	0.92	0.83	0.74	0.81	0.91	0.99	1.17	1.23	1.33
-46	1.32	1.10	1.07	0.91	0.82	0.72	0.79	0.90	0.99	1.17	1.25	1.35
-48	1.34	1.11	1.08	0.90	0.80	0.70	0.76	0.89	0.99	1.18	1.27	1.37
-50	1.37	1.12	1.08	0.89	0.77	0.67	0.74	0.88	0.99	1.19	1.29	1.41

Source: Dunne, T. and Leopold, L.B., 1978. Water in environmental planning, Freeman Publishers.

APPENDIX F

Feature Based Water Balance

CROZIER

Project Number: 2278-7228
Project Name: Broccolini Airport Road
Municipality: Caledon
Designer: CM
Reviewer: CM
Date: 23-Oct-25

Project Information

Thornthwaite & Mather Method

Pre-Development Conditions

Landuse	**101**	**102**	**EXT1**					
Total Area (m^2)	39600	55000	19300					
Pervious Area (m^2)	39600	55000	19300					
Impervious Area (m^2)	0	0	0					
Percent Imperviousness (%)	0%	0%	0%					
Infiltration Factors								
Topography - Description	Hilly	Hilly	Hilly					
Topography - Infiltration Factor	0.10	0.10	0.10					
Soil - Description	Clay Loam	Clay Loam	Clay Loam					
Soil - Infiltration Factor	0.10	0.10	0.10					
Cover - Description	Moderately Rooted Crops	Moderately Rooted Crops	Moderately Rooted Crops					
Cover - Infiltration Factor	0.10	0.10	0.10					
Total Infiltration Factor	0.30	0.30	0.30					
Soil Moisture Capacity (mm)	200	200	200					

Post-Development Conditions

Landuse	**201**	**202**	**203**	**204**	**UC1**	**UC2**	**EXT1**	
Total Area (m^2)	24000	236000	36500	47800	1100	1400	19300	
Pervious Area (m^2)	6200	0	8800	0	1100	1400	19300	
Impervious Area (m^2)	17800	236000	27700	47800	0	0	0	
Percent Imperviousness (%)	74%	100%	76%	100%	0%	0%	0%	
Infiltration Factors								
Topography - Description	Hilly	Hilly	Hilly	Hilly	Hilly	Hilly	Hilly	
Topography - Infiltration Factor	0.10	0.10	0.10	0.10	0.10	0.10	0.10	
Soil - Description	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam	
Soil - Infiltration Factor	0.10	0.10	0.10	0.10	0.10	0.10	0.10	
Cover - Description	Urban Lawns	Urban Lawns	Urban Lawns	Urban Lawns	Urban Lawns	Urban Lawns	Urban Lawns	
Cover - Infiltration Factor	0.10	0.10	0.10	0.10	0.10	0.10	0.10	
Total Infiltration Factor	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
Soil Moisture Capacity (mm)	100	100	100	100	100	100	100	

CROZIER CONSULTING ENGINEERS

Climate Parameters

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

LATITUDE °	**43**

Month	**Mean Temperature** (C°)[1]	**Heat Index** [i =(t/5)$^{1.514}$]	**α**	**Potential Evapotranspiration (PET)** (mm)	**Correction Factor**[2]	**Adjusted Potential Evapotranspiration (APET)** (mm)	**Precipitation (P)** (mm)[1]	**P - APET** (mm)	**APET- P** (mm)
January	-7.0	0.00	0.4924	0.0	0.81	0.0	60.4	60.4	0.0
February	-5.9	0.00	0.4924	0.0	0.82	0.0	50.2	50.2	0.0
March	-1.4	0.00	0.4924	0.0	1.02	0.0	50.3	50.3	0.0
April	6.1	1.35	0.5165	28.9	1.12	32.3	67.0	34.7	0.0
May	12.4	3.96	0.5621	60.8	1.26	76.6	76.1	0.0	0.5
June	17.3	6.55	0.6066	86.3	1.28	110.5	75.5	0.0	35.0
July	19.9	8.10	0.6328	100.0	1.29	129.0	81.8	0.0	47.2
August	19.1	7.61	0.6246	95.8	1.2	114.9	77.4	0.0	37.5
September	14.3	4.91	0.5786	70.7	1.04	73.5	75.0	1.5	0.0
October	8.1	2.08	0.5293	38.9	0.95	36.9	68.3	31.4	0.0
November	2.1	0.27	0.4972	9.4	0.81	7.6	81.7	74.1	0.0
December	-3.9	0.00	0.4924	0.0	0.77	0.0	57.7	57.7	0.0
TOTAL	6.8	**34.8**	**1.1**	**490.8**		**581.5**	**821.4**	**360.24**	**120.30**

TOTAL WATER DEFICIT = 120.30 mm
TOTAL WATER SURPLUS (SURPLUS - DEFICIT) = 239.94 mm

NOTES: 1. Precipitation and temperature data referenced from the Caledon Normals (1991-2020).
2. Latitude adjustment/correction factors determined based on site location assuming 12 hours of sunlight per day for 30 days

CROZIER CONSULTING ENGINEERS

Pre-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Landuse	**101**												
Parameters	**Pervious Area**			3.96 ha	**Impervious Area**			0.00 ha	**Total Area**			3.96 ha	
	Soil Moisture Holding Capacity			200 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	108	117	100	73	37	8	0	**552**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	17	58	**270**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	5	17	**81**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	12	40	**189**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	1280	3035	4258	4634	3961	2910	1463	302	0	**21842**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	718	596	598	412	0	0	0	0	0	0	197	685	**3206**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	1674	1392	1394	961	0	0	0	0	0	0	459	1599	**7480**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Water Balance Summary: 101				
Pre-Development Evapotranspiration	21842	m^3/yr	552	mm/yr
Pre-Development Infiltration	3206	m^3/yr	81	mm/yr
Pre-Development Runoff	7480	m^3/yr	189	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.

2. Assumptions:

- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

CROZIER CONSULTING ENGINEERS

Pre-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Landuse	**102**												
Parameters	**Pervious Area**			5.50 ha	**Impervious Area**			0.00 ha	**Total Area**			5.50 ha	
	Soil Moisture Holding Capacity			200 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	108	117	100	73	37	8	0	**552**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	17	58	**270**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	5	17	**81**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	12	40	**189**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	1777	4215	5913	6436	5502	4042	2031	419	0	**30336**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	997	828	830	572	0	0	0	0	0	0	273	952	**4452**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	2325	1933	1937	1335	0	0	0	0	0	0	637	2221	**10389**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Water Balance Summary: 102				
Pre-Development Evapotranspiration	30335.8	m^3/yr	551.6	mm/yr
Pre-Development Infiltration	4452.4	m^3/yr	81.0	mm/yr
Pre-Development Runoff	10388.9	m^3/yr	188.9	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.

2. Assumptions:

- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

Pre-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Landuse	**EXT1**												
Parameters	**Pervious Area**			1.93 ha	**Impervious Area**			0.00 ha	**Total Area**			1.93 ha	
	Soil Moisture Holding Capacity			200 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	108	117	100	73	37	8	0	**552**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	17	58	**270**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	5	17	**81**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	12	40	**189**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	624	1479	2075	2258	1931	1418	713	147	0	**10645**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	350	291	291	201	0	0	0	0	0	0	96	334	**1562**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	816	678	680	469	0	0	0	0	0	0	224	780	**3646**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Pre-Development Water Balance Summary: EXT1				
Pre-Development Evapotranspiration	10645.1	m^3/yr	551.6	mm/yr
Pre-Development Infiltration	1562.4	m^3/yr	81.0	mm/yr
Pre-Development Runoff	3645.5	m^3/yr	188.9	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.

2. Assumptions:

- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

CROZIER CONSULTING ENGINEERS

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Area	**201**												
Parameters	**Pervious Area**			0.62 ha	**Impervious Area**			1.78 ha	**Total Area**			2.40 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	11	17	**87**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	26	40	**203**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	200	475	650	671	565	456	229	47	0	**3293**
Impervious ET (m^3)	161	134	134	179	203	202	218	207	200	182	218	154	**2193**
Pervious Infiltration (m^3)	112	93	94	65	0	0	0	0	0	0	69	107	**540**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	262	218	218	151	0	0	0	0	0	0	161	250	**1260**
Impervious Runoff (m^3)	914	760	761	1014	1151	1142	1238	1171	1135	1033	1236	873	**12428**

Post-Development Water Balance Summary: 201				
Post-Development Evapotranspiration	5486.1	m^3/yr	228.6	mm/yr
Post-Development Infiltration	539.9	m^3/yr	22.5	mm/yr
Post-Development Runoff	13687.6	m^3/yr	570.3	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

CROZIER CONSULTING ENGINEERS

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Area	**202**												
Parameters	**Pervious Area**			0.00 ha	**Impervious Area**			23.60 ha	**Total Area**			23.60 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	11	17	**87**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	26	40	**203**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious ET (m^3)	2138	1777	1781	2372	2694	2673	2896	2740	2655	2418	2892	2043	**29078**
Pervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious Runoff (m^3)	12116	10070	10090	13440	15266	15145	16409	15526	15045	13701	16389	11575	**164773**

Post-Development Water Balance Summary: 202				
Post-Development Evapotranspiration	29077.6	m^3/yr	123.2	mm/yr
Post-Development Infiltration	0.0	m^3/yr	0.0	mm/yr
Post-Development Runoff	164772.8	m^3/yr	698.2	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

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Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Area	**203**												
Parameters	**Pervious Area**			0.88 ha	**Impervious Area**			2.77 ha	**Total Area**			3.65 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	11	17	**87**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	26	40	**203**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	284	674	923	952	802	647	325	67	0	**4674**
Impervious ET (m^3)	251	209	209	278	316	314	340	322	312	284	339	240	**3413**
Pervious Infiltration (m^3)	159	133	133	92	0	0	0	0	0	0	98	152	**766**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	372	309	310	214	0	0	0	0	0	0	228	355	**1788**
Impervious Runoff (m^3)	1422	1182	1184	1578	1792	1778	1926	1822	1766	1608	1924	1359	**19340**

Post-Development Water Balance Summary: 203				
Post-Development Evapotranspiration	8086.8	m^3/yr	221.6	mm/yr
Post-Development Infiltration	766.3	m^3/yr	21.0	mm/yr
Post-Development Runoff	21127.9	m^3/yr	578.8	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Area	**204**												
Parameters	**Pervious Area**			0.00 ha	**Impervious Area**			4.78 ha	**Total Area**			4.78 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	11	17	**87**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	26	40	**203**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious ET (m^3)	433	360	361	480	546	541	587	555	538	490	586	414	**5889**
Pervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Impervious Runoff (m^3)	2454	2040	2044	2722	3092	3068	3324	3145	3047	2775	3319	2344	**33373**

Post-Development Water Balance Summary: 204				
Post-Development Evapotranspiration	5889.4	m^3/yr	123.2	mm/yr
Post-Development Infiltration	0.0	m^3/yr	0.0	mm/yr
Post-Development Runoff	33373.5	m^3/yr	698.2	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

CROZIER CONSULTING ENGINEERS

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Area	**UC1**												
Parameters	**Pervious Area**			0.11 ha	**Impervious Area**			0.00 ha	**Total Area**			0.11 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	11	17	**87**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	26	40	**203**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	36	84	115	119	100	81	41	8	0	**584**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	20	17	17	11	0	0	0	0	0	0	12	19	**96**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	47	39	39	27	0	0	0	0	0	0	28	44	**224**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Post-Development Water Balance Summary: UC1				
Post-Development Evapotranspiration	584.2	m^3/yr	531.1	mm/yr
Post-Development Infiltration	95.8	m^3/yr	87.1	mm/yr
Post-Development Runoff	223.5	m^3/yr	203.2	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

CROZIER CONSULTING ENGINEERS

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Area	**UC2**												
Parameters	**Pervious Area**			0.14 ha	**Impervious Area**			0.00 ha	**Total Area**			0.14 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	11	17	**87**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	26	40	**203**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	45	107	147	151	128	103	52	11	0	**744**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	25	21	21	15	0	0	0	0	0	0	16	24	**122**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	59	49	49	34	0	0	0	0	0	0	36	57	**284**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Post-Development Water Balance Summary: UC2				
Post-Development Evapotranspiration	743.6	m^3/yr	531.1	mm/yr
Post-Development Infiltration	121.9	m^3/yr	87.1	mm/yr
Post-Development Runoff	284.5	m^3/yr	203.2	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

CROZIER CONSULTING ENGINEERS

Post-Development Water Balance

Thornthwaite & Mather Method

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Project Name: **Broccolini Airport Road**
Location: **Caledon**

Area	**EXT1**												
Parameters	**Pervious Area**			1.93 ha	**Impervious Area**			0.00 ha	**Total Area**			1.93 ha	
	Soil Moisture Holding Capacity			100 mm	**Infiltration Factor**			0.30	**% Impervious Evaporation**			15%	
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Precipitation	60	50	50	67	76	76	82	77	75	68	82	58	**821**
Pervious Area Water Balance													
Evapotranspiration (mm)	0	0	0	32	77	105	108	91	73	37	8	0	**531**
Water Surplus (mm)	60	50	50	35	0	0	0	0	0	0	37	58	**290**
Infiltration (mm)	18	15	15	10	0	0	0	0	0	0	11	17	**87**
Surface Water Runoff (mm)	42	35	35	24	0	0	0	0	0	0	26	40	**203**
Impervious Area Water Balance													
Evaporation (mm)	9	8	8	10	11	11	12	12	11	10	12	9	**123**
Surface Water Runoff (mm)	51	43	43	57	65	64	70	66	64	58	69	49	**698**
Combined Water Balance													
Pervious ET (m^3)	0	0	0	624	1479	2024	2088	1758	1418	713	147	0	**10251**
Impervious ET (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Infiltration (m^3)	350	291	291	201	0	0	0	0	0	0	214	334	**1681**
Impervious Infiltration (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Pervious Runoff (m^3)	816	678	680	469	0	0	0	0	0	0	500	780	**3922**
Impervious Runoff (m^3)	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Post-Development Water Balance Summary: EXT1				
Post-Development Evapotranspiration	10250.8	m^3/yr	531.1	mm/yr
Post-Development Infiltration	1680.7	m^3/yr	87.1	mm/yr
Post-Development Runoff	3921.6	m^3/yr	203.2	mm/yr

NOTES: 1.The infiltration factor is determined using the MECP methodology outlined in the Stormwater Management Planning and Design Manual 2003.
2. Assumptions:
- Surplus water is unavailable for runoff and recharge in months where water losses from APET exceed precipitation inputs.
- Evapotranspiration does not occur when average temperature is below zero.
- Approximately 15% of the precipitation on impervious surfaces will evaporate.

Project Name: Broccolini Airport Road
Project Number: 2278-7228
Created By: CM
Checked By: CM
Date: 2025-10-23

Site Water Balance Summary

Thornthwaite & Mather Method

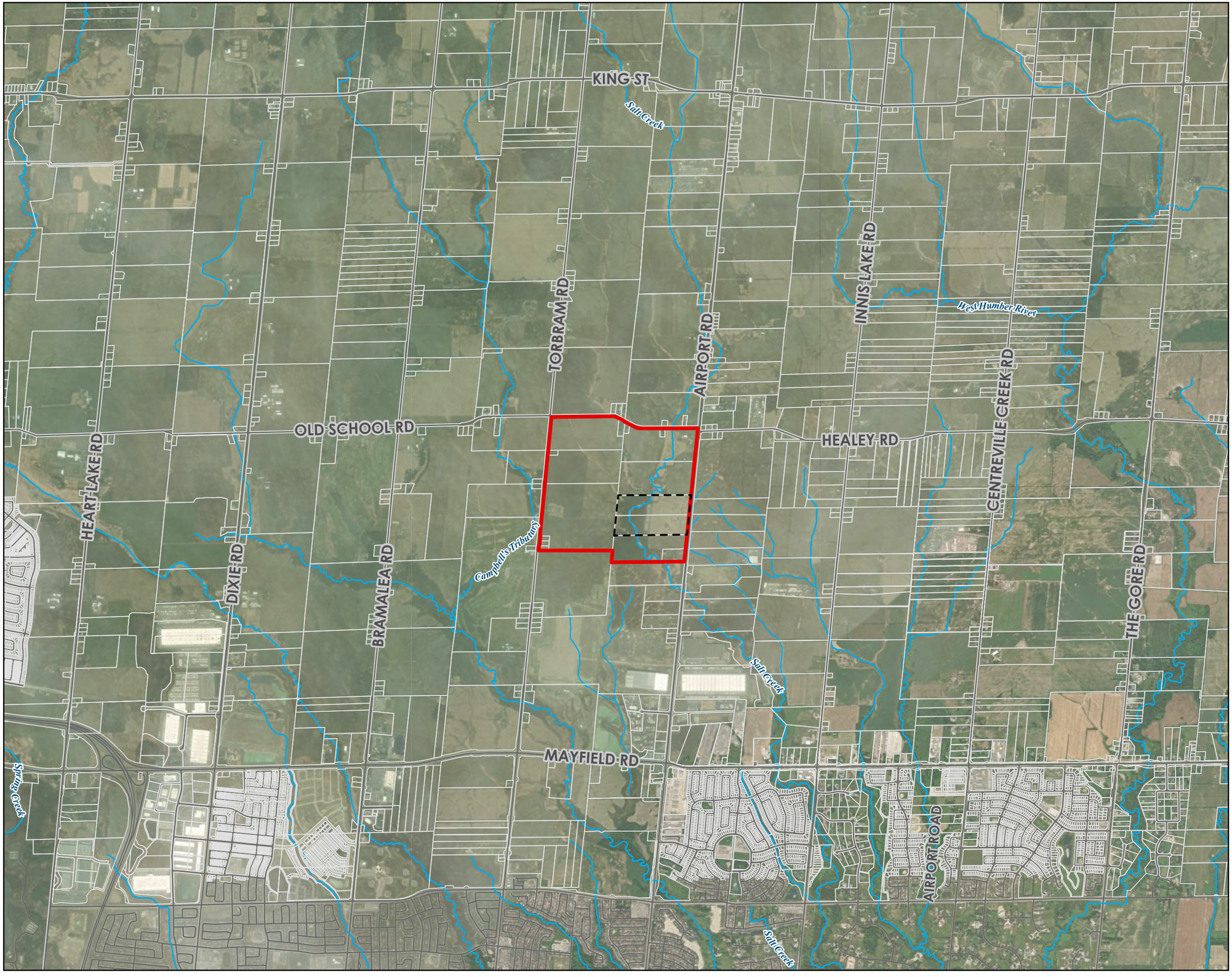
Pre-Development Water Balance							
Catchment ID	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)
101	3.96	21842	552	3206	81	7480	189
102	5.5	30336	552	4452	81	10389	189
EXT1	1.93	10645	552	1562	81	3646	189
Total	**11**	**62823**	**1655**	**9220**	**243**	**21514**	**567**

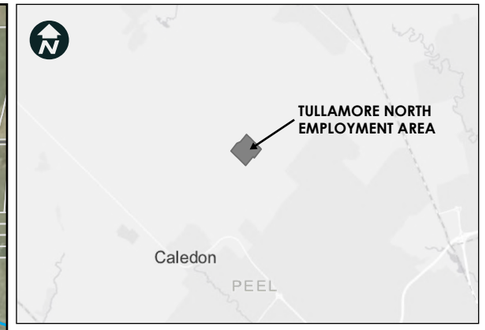
Post-Development Water Balance							
Catchment ID	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)	(m^3/yr)	(mm/yr)
201	2.4	5486	229	540	22	13688	570
202	23.6	29078	123	0	0	164773	698
203	3.65	8087	222	766	21	21128	579
204	4.78	5889	123	0	0	33373	698
UC1	0.11	584	531	96	87	224	203
UC2	0.14	744	531	122	87	284	203
EXT1	1.93	10251	531	1681	87	3922	203
Total	**37**	**60119**	**2290**	**3205**	**305**	**237391**	**3155**

Site Water Balance Summary							
Scenario	Area	Evapotranspiration		Infiltration		Runoff	
	(ha)	(m^3)	(mm)	(m^3)	(mm)	(m^3)	(mm)
Pre-Dev.	11.39	62823	1655	9220	243	21514	567
Post-Dev.	36.61	60119	2290	3205	305	237391	3155
Difference	25	-2704	635	-6016	62	215877	2588
% Difference	221%	-4%	38%	-65%	25%	1003%	457%

Annual Infiltration Deficit **6016 m^3**
53 mm/yr

FIGURES





LEGEND

- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Assessment Parcel (Peel)
- Watercourse

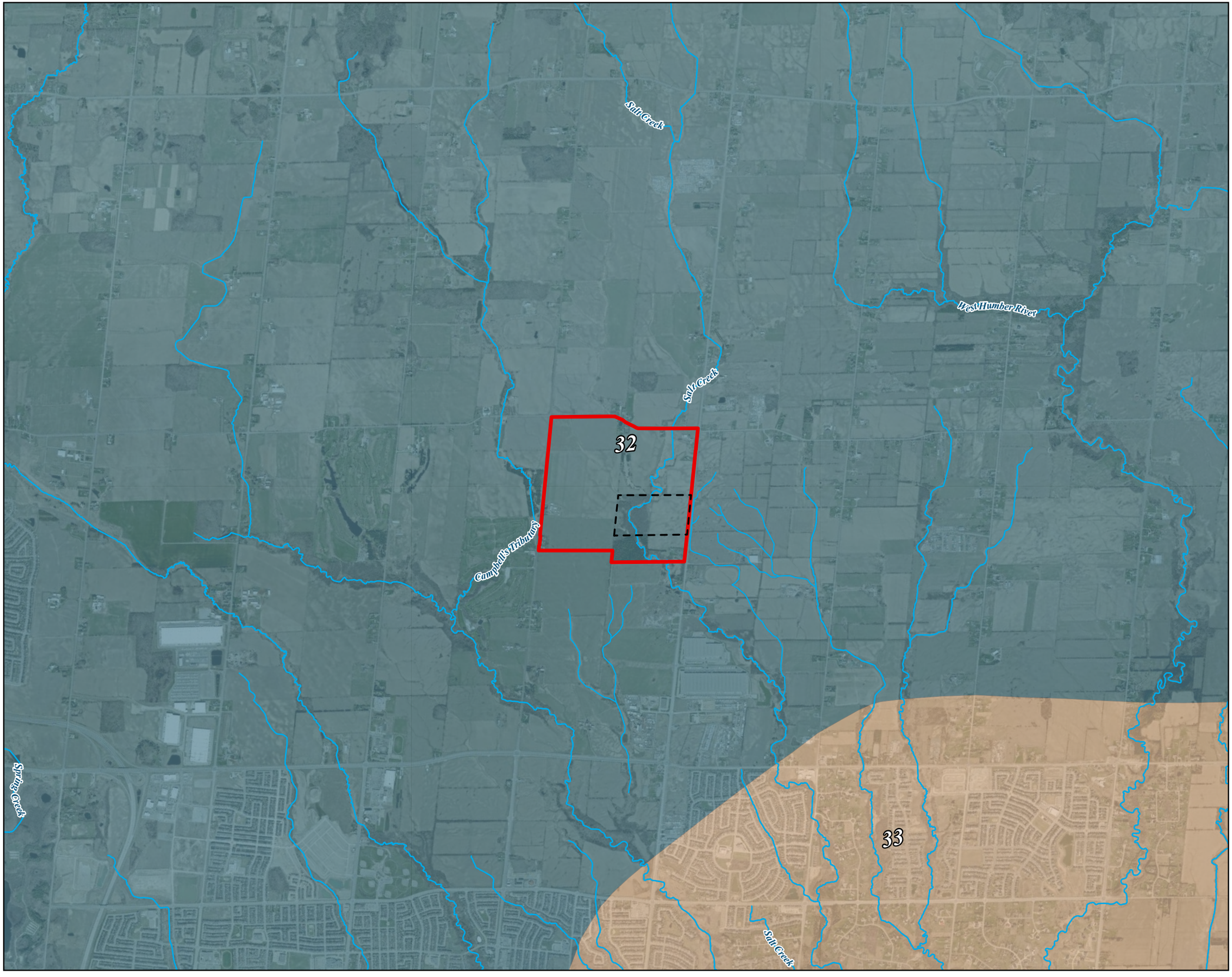
0 475 950 1,900 Metres

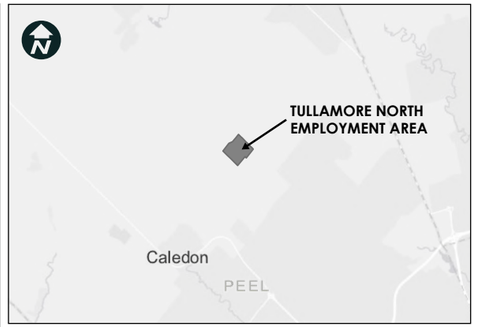
Source: Peel Region, Maxar, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, EPA, NPS, NRCan

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

SITE LOCATION PLAN

CROZIER





LEGEND

- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Watercourse

Physiographic Region

- 32: South Slope
- 33: Peel Plain

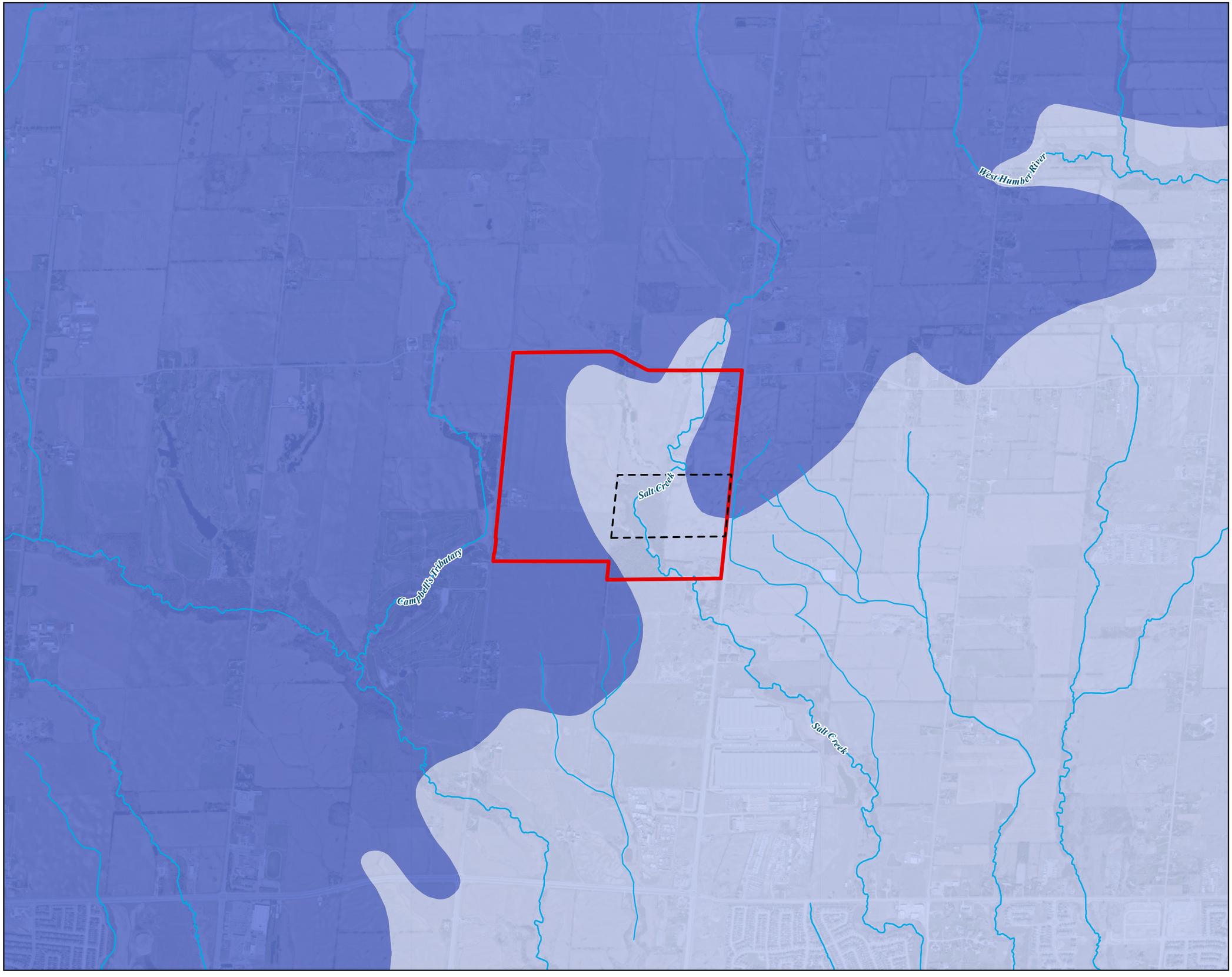
0 75 150 300 Metres

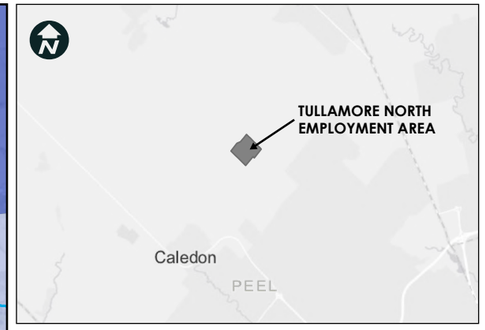
Source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, EPA, NPS, NRCan

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

PHYSIOGRAPHY

CROZIER





LEGEND

- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Watercourse

Bedrock Geology

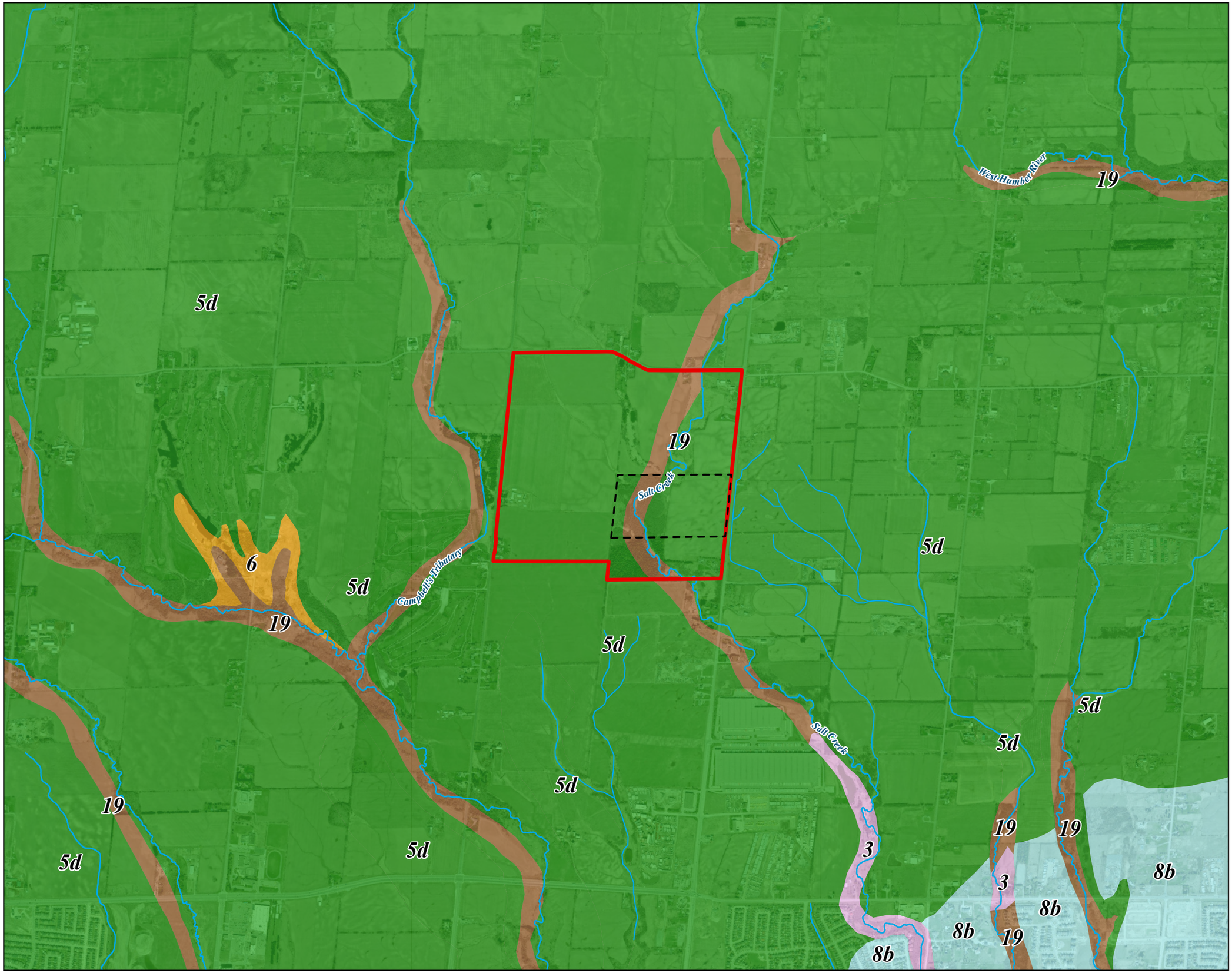
- 14: Georgian Bay - grey-green shale, siltstone, limestone
- 16: Queenston Formation - red shale, siltstone, minor limestone

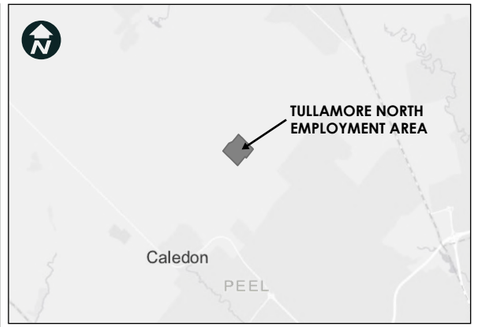
0 75 150 300 Metres

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

BEDROCK GEOLOGY

CROZIER





LEGEND

- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Watercourse

Surficial Geology

- 20: Organic deposits
- 19: Modern fluvial silt, clay, sand
- 9c: Glaciolacustrine sand
- 8b: Glaciolacustrine silt, clay
- 6: Ice-contact sand
- 5d: Clayey silt to silty clay till
- 3: Paleozoic bedrock

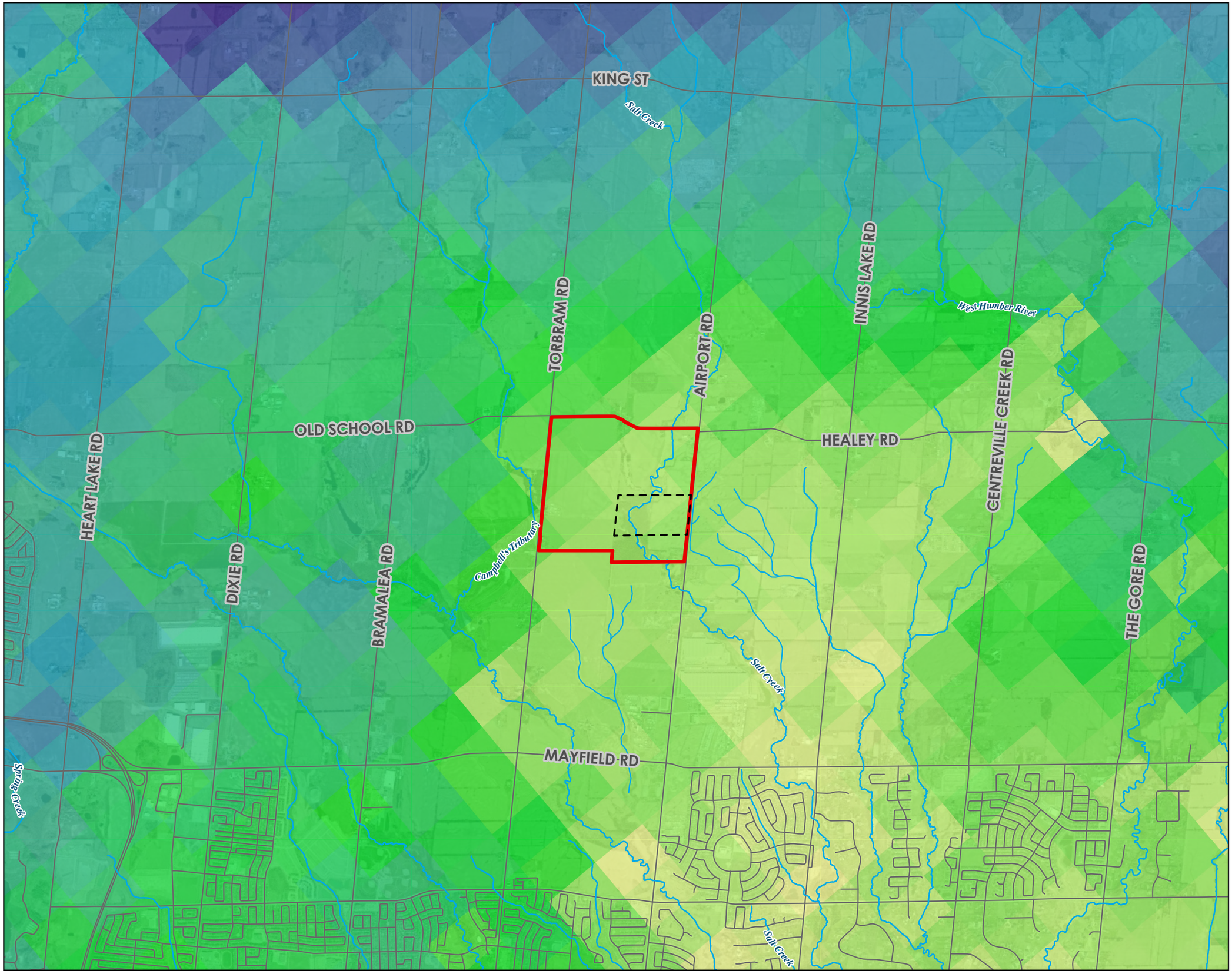
0 75 150 300 Metres

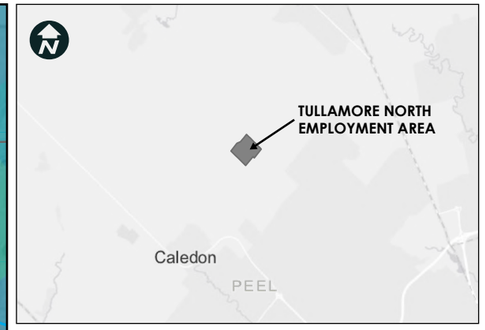
Source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, EPA, NPS, NRCan

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

SURFICIAL GEOLOGY

CROZIER





LEGEND

- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Watercourse

Drift Thickness

Thickness in m

262

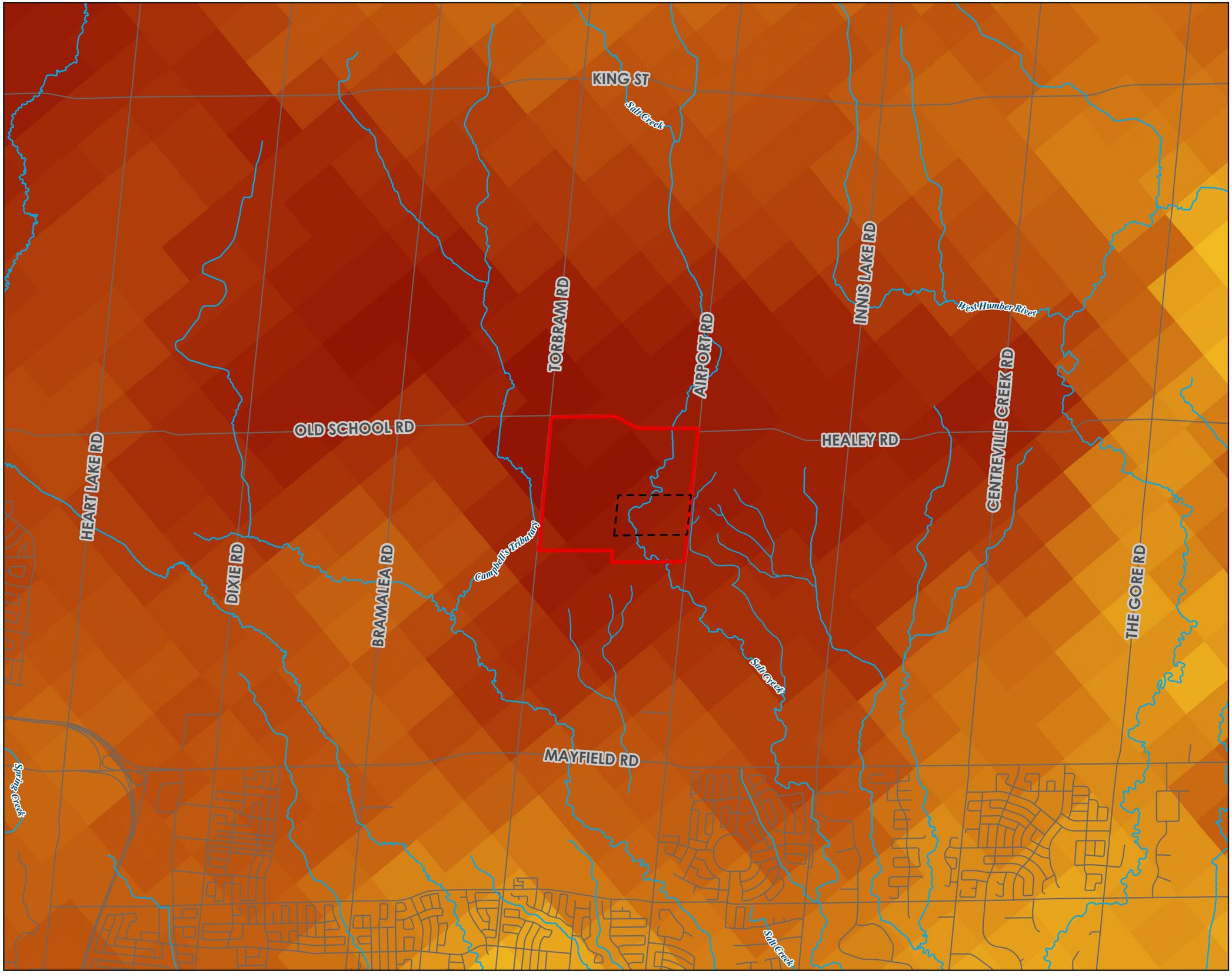
0

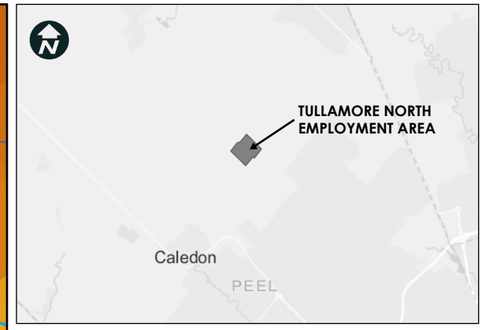
0 75 150 300 Metres

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

DRIFT THICKNESS

CROZIER





LEGEND

- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Watercourse

Bedrock Topography

masl

587

-50

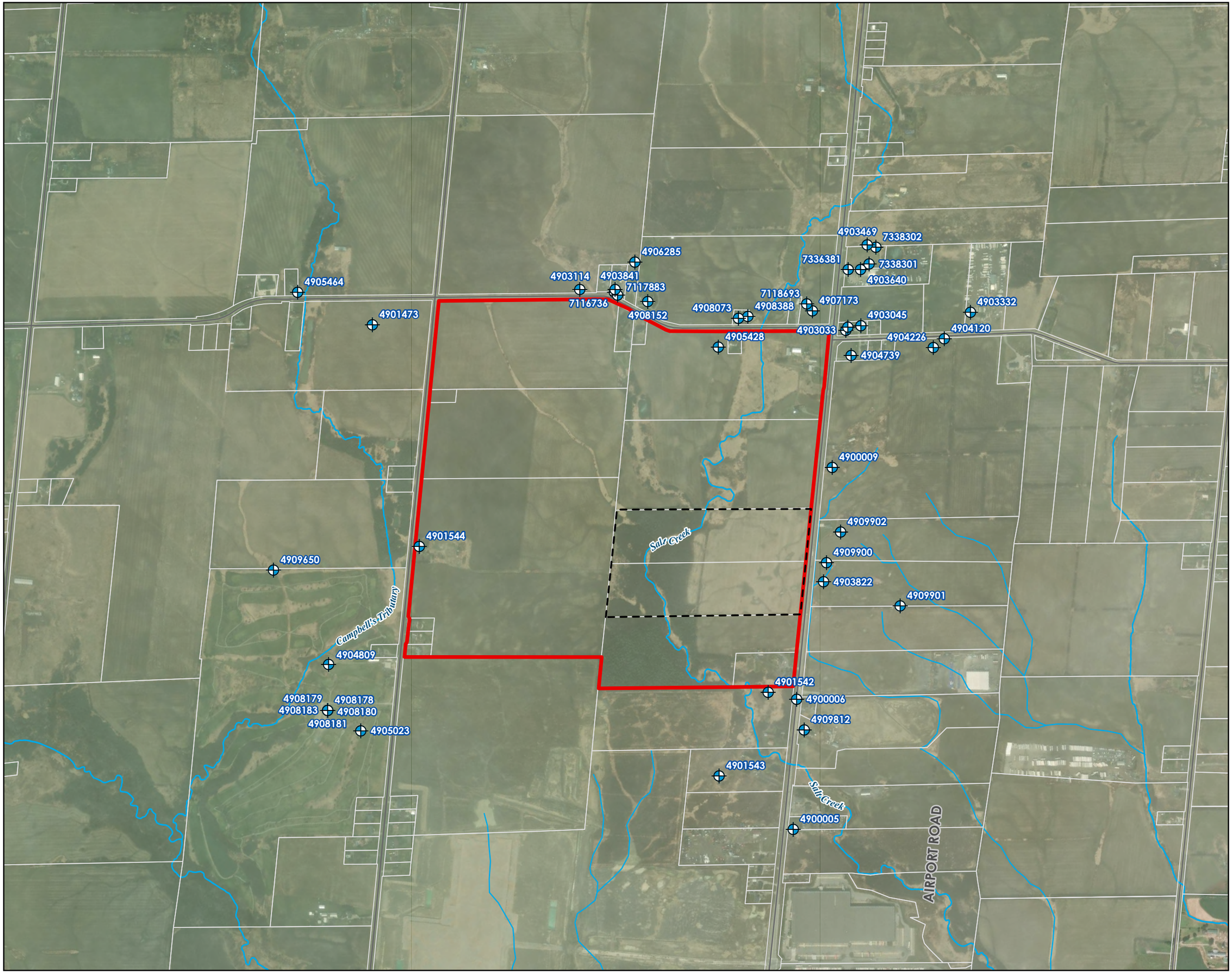
0 75 150 300 Metres

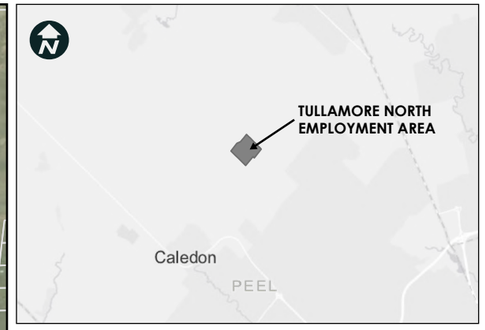
Source: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, EPA, NPS, NRCan

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

BEDROCK TOPOGRAPHY

CROZIER





LEGEND

- MECP Well
- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Assessment Parcel (Peel)
- Watercourse

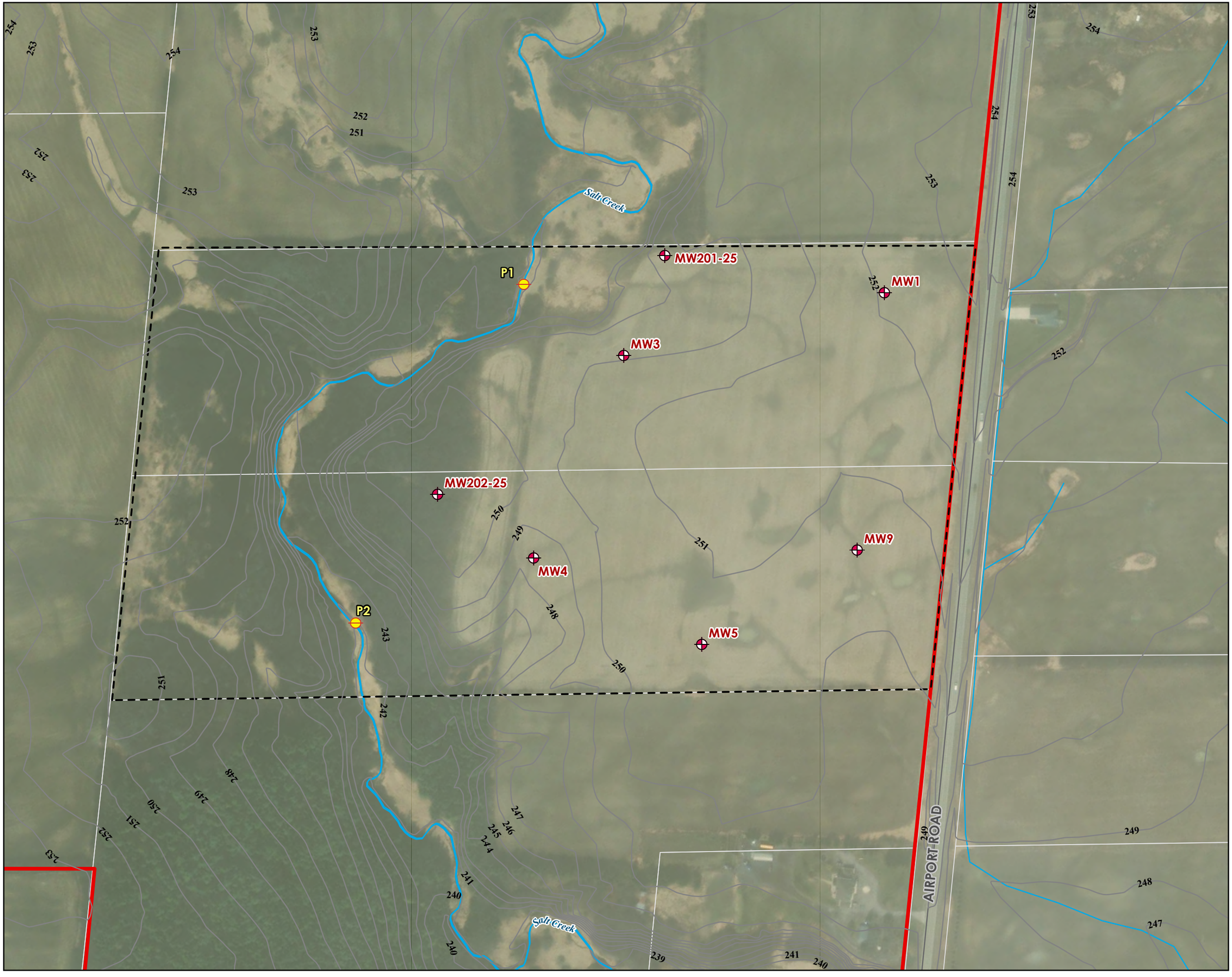
0 180 360 720 Metres

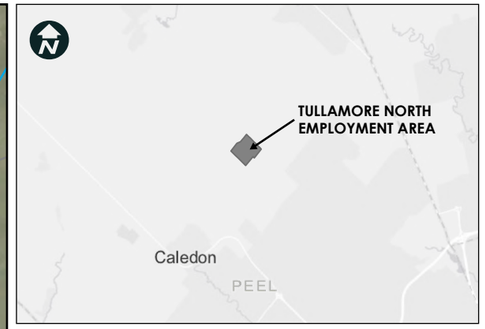
Source: Peel Region, Maxar, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, EPA, NPS, NRCan

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

MECP WELL LOCATION PLAN

CROZIER





LEGEND

- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Assessment Parcel (Peel)
- Watercourse
- Monitoring Well
- Piezometer
- Contours

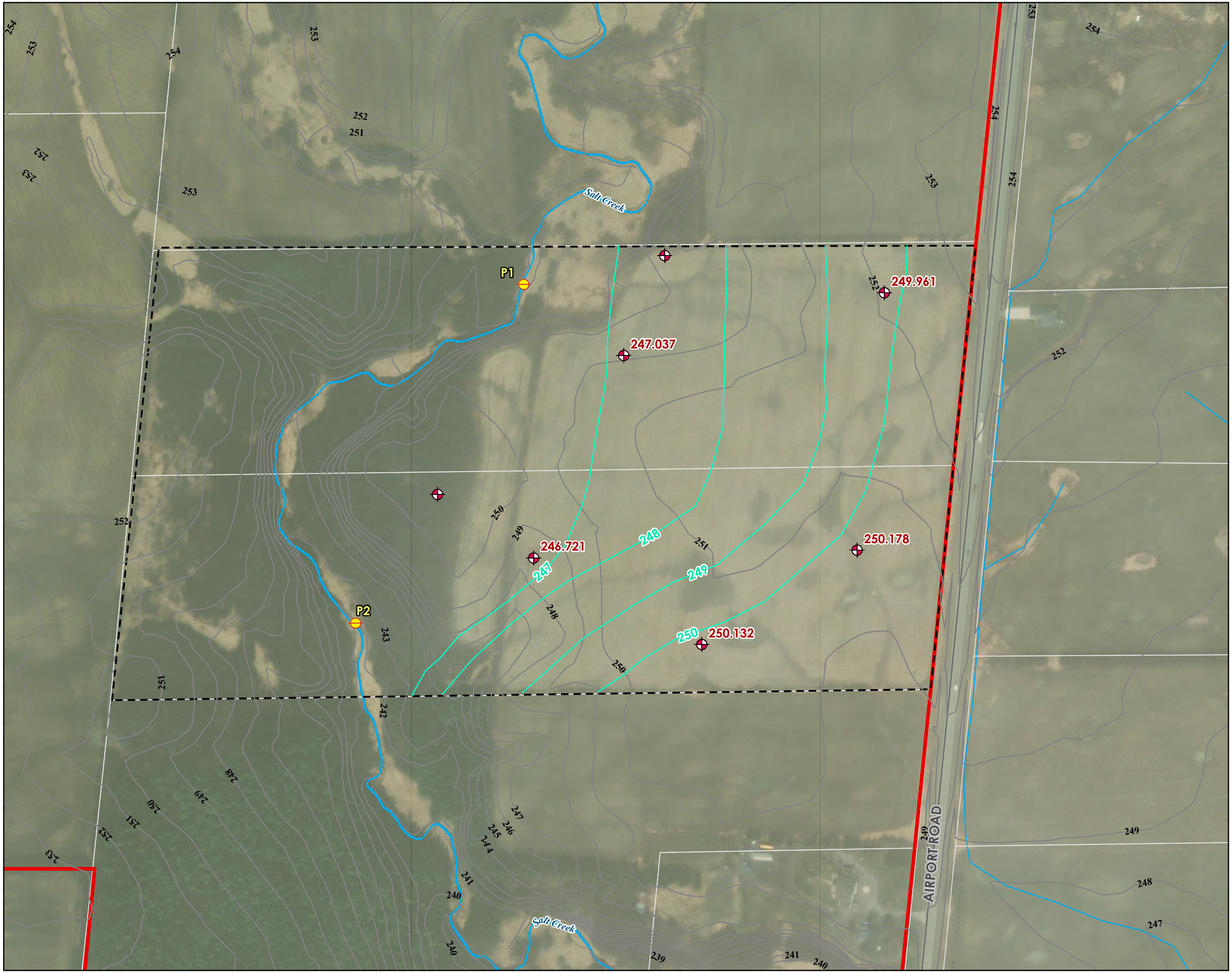
0 40 80 160 Metres

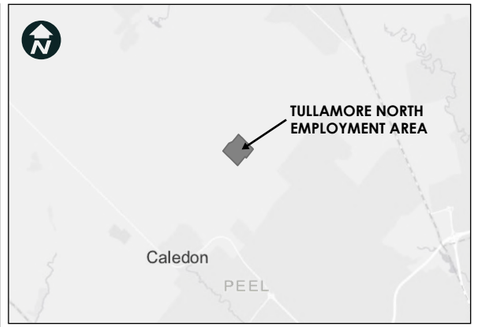
Source: Peel Region, Maxar, Microsoft, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, EPA, NPS, NRCan

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

MONITORING WELL PLAN

CROZIER





LEGEND

- Broccolini Lands
- Primary Study Area (Secondary Plan Limits)
- Assessment Parcel (Peel)
- Watercourse
- Monitoring Well
- Piezometer
- Contours
- Interpreted Groundwater Contour (masl)

0 40 80 160 Metres

TULLAMORE NORTH EMPLOYMENT AREA SECONDARY PLAN

INTERPRETED GROUNDWATER FLOW DIRECTION

CROZIER