Technical Memorandum

Project Name:	Hydrogeological Investigation 1589 Fanshawe Park Road East London, ON	**MTE File No.:**	61395_002
To:	Adam Lagrou Monteith Brown Planning Consultants 302-219 Oxford Street West London, ON N6H 1S5	**Date:**	May 7, 2026
		From:	Tomson Hecky, P.Geo.

RE: Desktop Feature-Based Water Balance

A desktop feature-based water balance for the pre-development (i.e., existing) condition of 1589 Fanshawe Park Road East, London (herein referred to as “the Site”) was completed for the Provincially Significant Wetland (PSW) known as the Highbury Swamp (herein referred to as “the Feature”) that occupies a portion of the southwest corner of the Site. The water balance was completed to provide preliminary estimates of infiltration and runoff for the feature to support the Site design.

The on-Site portion of the Feature is currently instrumented with a nested piezometer and staff gauge to monitor groundwater-surface water levels and assess their interaction (**Figure 1**).

Methodology

Following the Thornthwaite and Mather (1957) approach, the monthly water balance for the Site may be expressed as:

$$P = RO + ET + I + \Delta S$$

Where:

P = precipitation

RO = runoff

ET = evapotranspiration

I = infiltration

ΔS = change in groundwater storage (assumed to be negligible over long term)

The difference between precipitation and evapotranspiration is the estimated water surplus (WS) available for infiltration (I) and runoff (RO) and is expressed as:

$$WS = P - ET$$

The estimated water surplus is used to estimate infiltration by applying an infiltration factor (IF), as follows:

$$I = WS \; x \; IF$$

This infiltration factor (IF) is estimated based on topography, soil type and ground cover, as described in the MECP Stormwater Management Planning and Design Manual (Ministry of the Environment, 2003).

And finally, runoff (RO) is estimated from:

$$RO = WS - I$$

The following sections describes the sub-catchment areas contributing to the Feature and summarize the estimated input parameters for the water balance equation.

In the existing condition, portions of the Site provide surface and groundwater inputs to the on-Site wetland feature. In order to determine the amount of water that is being directed to the wetland feature, a monthly water budget analysis was completed using Thornwaite & Mather method (1957). The Canadian Climate Normals between 1990 and 2020 for the London Climate Station provide an average annual precipitation estimate of 961.6mm/yr for the area.

Sub-Catchment Areas

The pre-development sub-catchments that contribute water to the wetland feature are shown on **Figure 2.** The sub-catchments were delineated based on topographic contours provided by the City of London (City of London, 2019).

The land uses and hydrologic soil types for each of the sub-catchments were assessed using available aerial imagery and surficial geological mapping (Ontario Geological Survey, 2010)]. The results are summarized below in **Table 1**.

Table 1 – Sub-Catchment Characterization

Sub-Catchment ID	Land Use	Hydrologic Soil Group	Area (ha)
101A	pasture and shrubs	fine sandy loam	2.71
101B	mature forest	silt loam soil	0.73
101C	mature forest	fine sandy loam	0.03
102A	urban lawn	fine sandy loam	2.49
102B	mature forest	fine sandy loam	0.44
102C	pasture and shrubs	fine sandy loam	0.15
102D	urban lawn	silt loam soil	0.19
102E	pasture and shrubs	silt loam soil	0.14
102F	mature forest	silt loam soil	13.75
102G	mature forest	fine sandy loam	0.1
102H	urban lawn	fine sandy loam	0.69
102I	urban lawn	silt loam soil	0.21
102J	pasture and shrubs	silt loam soil	0.93

Based on the Site topography, each of the sub-catchment areas were identified as “hilly”, as defined by the Ministry of Agriculture and Food document *Determination of Runoff from Agricultural Lands Chart 2.4.*

For the purpose of estimating infiltration and run-off volumes each of the individual sub-catchment areas were combined into groupings with other sub-catchment areas that shared the same land use and hydrologic soil group classifications. Each grouping is assigned a soil moisture retention capacity and runoff factor to calculate monthly infiltration and runoff volumes in the water balance.

Precipitation

The Canadian Climate Normals (1990 to 2020) for the London Climate Station provide an average annual precipitation estimate of 961.6 millimeters per year (mm/yr) for the area (Environment Canada, 2021).

Evapotranspiration

Potential evapotranspiration (PE) is estimated in three steps as per Thornthwaite and Mather (1957):

- Heat Index (*i*) is obtained based on average monthly temperature values as provided in Table 2 of Section II of Thornthwaite and Mather (1957). *i* is zero when the average temperature is 0°C or less.
- Unadjusted PE is obtained based on average monthly temperature values as provided in Table 4 of Section II of Thornthwaite and Mather (1957). PE is zero when the average temperature is 0°C or less.
- PE is then adjusted by a correction factor used to compensate for latitude given in Tables 6 of Section III of Thornthwaite and Mather (1957).

Pre-Development Results

The results of the pre-development feature-based water balance analyses are provided in **Appendix A** and summarized in **Table 2**, below.

Table 2 - Pre-Development Feature-Based Water Balance

Month	Total ET (mm)	Total Runoff (mm)	Total Infiltration (mm)	Total ET (m^3)	Total Runoff (m^3)	Total Infiltration (m^3)
January	0.0	4.6	4.0	0	1,040	904
February	0.0	2.3	2.0	0	520	452
March	0.3	27.2	24.5	58	6,131	5,527
April	32.7	61.8	55.7	7,370	13,944	12,574
May	79.7	33.3	30.0	17,971	7,513	6,777
June	178.7	12.0	10.9	40,309	2,715	2,459
July	91.0	6.0	5.4	20,540	1,357	1,229
August	118.9	3.0	2.7	26,814	679	615
September	81.3	1.5	1.4	18,347	339	307
October	42.3	0.8	0.7	9,550	170	154
November	11.5	9.5	8.0	2,601	2,141	1,815
December	0.0	9.5	8.3	0	2,146	1,867
Annual Total	636.4	171.5	153.7	143,559	38,693	34,678

Based on the above, the estimated annual runoff and infiltration volumes contributing to the wetland feature under the pre-development condition are approximately 38,690m^3/year and 34,680m^3/year, respectively. Seasonally, the estimated monthly runoff and infiltration volumes are anticipated to peak in April with monthly volumes of approximately 13,940m^3/year and 12,570m^3/year, respectively. The lowest estimated monthly runoff and infiltration volumes are anticipated to occur in October with monthly volumes of approximately 170m^3/year and 154m^3/year, respectively.

RECOMMENDATIONS

Based on the results of the desktop feature-based water balance analysis, we recommend the following:

- Pre-development infiltration and runoff contributions within to the Feature should be maintained post-development. To the extent feasible, the stormwater design should replicate the pre-development infiltration and runoff distribution.
- Monitoring of nested piezometers and staff gauge installed at the Site be continued through construction and following build out to maintain a record of seasonal fluctuation of groundwater and surface water levels within the accessible on-site portion of the Feature and confirm the effectiveness of the stormwater design.

LIMITATIONS

The above desktop feature-based water balance is based on publicly available surficial geological and topographical mapping at the time of assessment. Actual subsurface and topographic conditions may vary from regional scale mapping which may affect the estimated infiltration and runoff volumes contributing to the feature catchment area.

It is assumed that the information provided by the Client and others is factual and accurate. MTE accepts no responsibility or liability for any deficiency, misstatements or inaccuracies contained in this *assessment* as a result of errors, omissions, misinterpretations, negligence or fraudulent acts of others.

CLOSING

We trust that this information meets your current needs. Should you have any questions or require additional information, please contact the undersigned.

All of which is respectfully submitted,

MTE Consultants Inc.

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Encl: Figures
Appendices

https://mte85.sharepoint.com/sites/61395_002/Shared Documents/5 - Deliverables/3 - Memos/61395_002_2026-05-07_Technical_Memo_1589 Fanshawe Park Road E.docx

REFERENCES

City of London. (2019, July 17). Open Data.

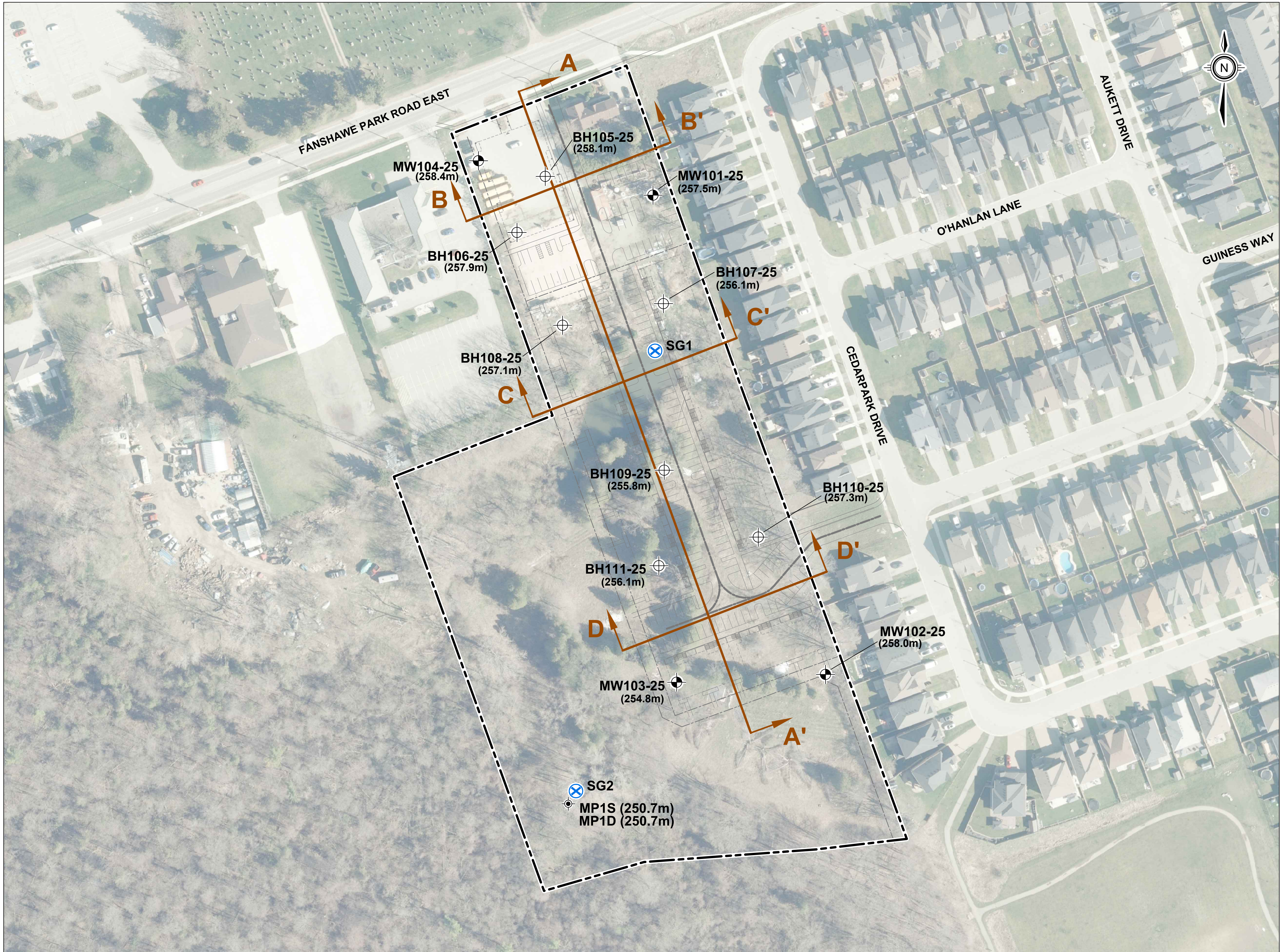
Environment Canada. (2021, February). *Canadian Climate Normals*. Retrieved from https://climate.weather.gc.ca/climate_normals/index_e.html

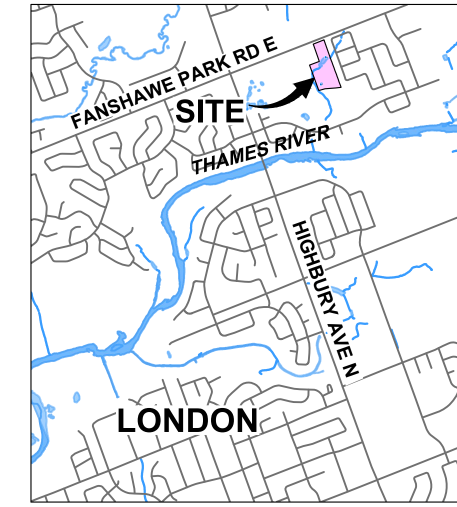
Ministry of the Environment. (2003). *Stormwater Management Planning and Design Manual.*

Ontario Geological Survey. (2010). Surficial geology of southern Ontario; Ontario Geological Survey. *Miscellaneous Relase - Data 128 - Revised*.

Figures

CAD: P:\P\61395_002\61395_002-HYG1.1.DWG





KEY PLAN (nts)

LEGEND

SITE

BOREHOLE

BOREHOLE/MONITORING WELL

MONITORING PIEZOMETER

STAFF GAUGE

(258.3m) ELEVATION (m AMSL)

A A' GEOLOGICAL CROSS-SECTION

REFERENCES

CITY OF 2024 LONDON PARCEL, ROAD AND WATER NETWORK, AND AERIAL IMAGERY, OPEN DATA SET;
PRELIMINARY DRAFT PLAN OF CONDOMINIUM, 1589 AND 1579 FANSHAWE PARK ROAD EAST, DATED: NOV 26, 2024, BY: MONTEITH BROWN PLANNING CONSULTANTS; AND
GEOSPATIAL ONTARIO, ROAD AND WATER NETWORK © KINGS PRINTER FOR ONTARIO, 2025 (key plan).

NOTES

THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

0 25 50 75m

MTE

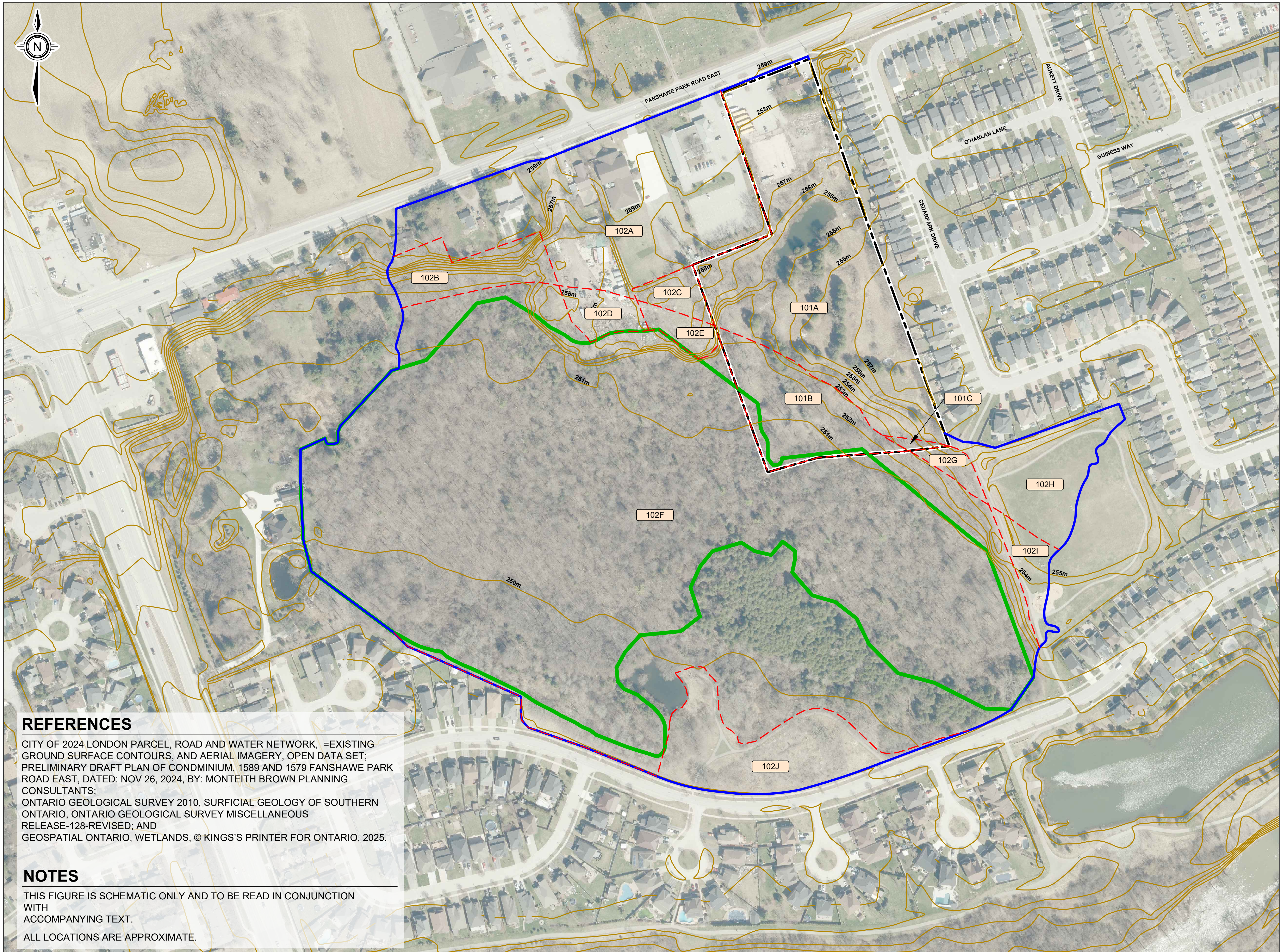
Engineers, Scientists, Surveyors

PROJECT
FEATURE-BASED WATER BALANCE
1579 AND 1589 FANSHAWE PARK ROAD EAST
LONDON, ONTARIO

TITLE
SITE PLAN

Drawn	Scale	Figure
DCH	1:1,500	1
Checked	Project No. 61395_001	
Date 2025-08-05	Rev No. 0	

Plot Date: August 5, 2025 – 8:19 AM



LEGEND

SITE

GROUND SURFACE CONTOUR (m AMSL)

FEATURE

CATCHMENT DIVIDE

SUB-CATCHMENT DIVIDE

ON-SITE

101A	PASTURE AND SHRUBS (Fine Sandy Loam) (27,135m^2)
101B	MATURE FOREST (Silt Loam) (7,345m^2)
101C	MATURE FOREST (Fine Sandy Loam) (264m^2)

OFF-SITE

102A	URBAN LAWN (Fine Sandy Loam) (24,905m^2)
102B	MATURE FOREST (Fine Sandy Loam) (4,417m^2)
102C	PASTURE AND SHRUBS (Fine Sandy Loam) (1,478m^2)
102D	URBAN LAWN (Silt Loam) (1,896m^2)
102E	PASTURE AND SHRUBS (Silt Loam) (1,367m^2)
102F	MATURE FOREST (Silt Loam) (137,483m^2)
102G	MATURE FOREST (Fine Sandy Loam) (972m^2)
102H	URBAN LAWN (Fine Sandy Loam) 6,879m^2)
102I	URBAN LAWN (Silt Loam) (2,116m^2)
102J	PASTURE AND SHRUBS (Silt Loam) (9,334m^2)

0 30 60 90 120 150m

REFERENCES

CITY OF 2024 LONDON PARCEL, ROAD AND WATER NETWORK, =EXISTING GROUND SURFACE CONTOURS, AND AERIAL IMAGERY, OPEN DATA SET;
PRELIMINARY DRAFT PLAN OF CONDOMINIUM, 1589 AND 1579 FANSHAWE PARK ROAD EAST, DATED: NOV 26, 2024, BY: MONTEITH BROWN PLANNING CONSULTANTS;
ONTARIO GEOLOGICAL SURVEY 2010, SURFICIAL GEOLOGY OF SOUTHERN ONTARIO, ONTARIO GEOLOGICAL SURVEY MISCELLANEOUS RELEASE-128-REVISED; AND
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NOTES

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ALL LOCATIONS ARE APPROXIMATE.

MTE
Engineers, Scientists, Surveyors

PROJECT
FEATURE-BASED WATER BALANCE
1579 AND 1589 FANSHAWE PARK ROAD EAST
LONDON, ONTARIO

TITLE
SUB-CATCHMENT AREAS

Drawn DCH	Scale 1:3,000	Figure 2
Checked	Project No. 61395_002	
Date 2025-10-20	Rev No. 0	

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Plot Date: October 20, 2025 – 3:58 PM

Appendices

1589 &1579 Fanshawe Park Road East

PRE-DEVELOPMENT SITE WATER BUDGET ANALYSIS

London, Ontario

Project Number: 61395_002
Date: October 20, 2025
Design By: TMH
File: https://mte85.sharepoint.com/sites/61395_002/Shared Documents/4 - Data and Analysis/6 - Tables/61395-002_Water Balance.xlsx

Landuse			Pasture and Shrubs - Fine Sandy Loam (mm)			Pasture and Shrubs - Silt Loam (mm)			Mature Forest - Fine Sandy Loam (mm)			Mature Forest - Silt Loam (mm)			Urban Lawn - Fine Sandy Loam (mm)			Urban Lawn - Silt Loam (mm)			Total (mm)			Total (m^3)		
Area (ha)			2.86			1.07			0.57			14.48			3.18			0.40			22.56					
Month	T (Cº)	P (mm)	ET	R	I	ET	R	I	ET	R	I	ET	R	I	ET	R	I	ET	R	I	ET	R	I	ET	R	I
Jan	-5.4	78.6	0.0	6.2	4.2	0.0	3.4	5.2	0.0	5.6	2.4	0.0	3.6	3.6	0.0	8.1	5.4	0.0	4.5	6.7	0.0	4.6	4.0	0	1040	904
Feb	-4.8	62.8	0.0	3.1	2.1	0.0	1.7	2.6	0.0	2.8	1.2	0.0	1.8	1.8	0.0	4.0	2.7	0.0	2.2	3.3	0.0	2.3	2.0	0	520	452
Mar	0.1	67.4	0.3	31.4	20.9	0.3	20.6	30.9	0.3	36.0	15.4	0.3	25.6	25.6	0.3	32.2	21.4	0.3	21.0	31.6	0.3	27.2	24.5	58	6131	5527
Apr	6.8	88.5	32.7	71.2	47.5	32.7	46.8	70.3	32.7	81.9	35.1	32.7	58.2	58.2	32.7	72.8	48.5	32.7	47.7	71.5	32.7	61.8	55.7	7370	13944	12574
May	13.5	88.8	79.7	38.4	25.6	79.7	25.3	37.9	79.7	44.2	18.9	79.7	31.4	31.4	79.7	39.1	26.1	79.7	25.7	38.5	79.7	33.3	30.0	17971	7513	6777
Jun	18.8	85.9	168.5	13.5	9.0	173.5	9.0	13.6	183.9	16.0	6.9	188.5	11.6	11.6	145.9	13.5	9.0	162.9	8.9	13.4	178.7	12.0	10.9	40309	2715	2459
Jul	21	80.5	87.9	6.7	4.5	97.9	4.5	6.8	91.5	8.0	3.4	92.9	5.8	5.8	83.5	6.7	4.5	87.5	4.5	6.7	91.0	6.0	5.4	20540	1357	1229
Aug	20.1	66.9	118.9	3.4	2.2	118.9	2.3	3.4	118.9	4.0	1.7	118.9	2.9	2.9	118.9	3.4	2.2	118.9	2.2	3.4	118.9	3.0	2.7	26814	679	615
Sep	16.3	92.7	81.3	1.7	1.1	81.3	1.1	1.7	81.3	2.0	0.9	81.3	1.4	1.4	81.3	1.7	1.1	81.3	1.1	1.7	81.3	1.5	1.4	18347	339	307
Oct	9.9	82.6	42.3	0.8	0.6	42.3	0.6	0.8	42.3	1.0	0.4	42.3	0.7	0.7	42.3	0.8	0.6	42.3	0.6	0.8	42.3	0.8	0.7	9550	170	154
Nov	3.6	87.7	11.5	13.9	9.2	11.5	6.9	10.3	11.5	10.6	4.6	11.5	6.3	6.3	11.5	20.5	13.7	11.5	10.3	15.4	11.5	9.5	8.0	2601	2141	1815
Dec	-2	79.2	0.0	12.8	8.6	0.0	7.1	10.7	0.0	11.6	5.0	0.0	7.4	7.4	0.0	16.5	11.0	0.0	9.1	13.7	0.0	9.5	8.3	0	2146	1867
Total		961.60	623.0	203.1	135.4	638.0	129.4	194.1	642.0	223.7	95.9	648.0	156.8	156.8	596.0	219.3	146.2	617.0	137.8	206.7	636.4	171.5	153.7	143,559	38,693	34,678

Where:
ET = Evapotranspiration
R= Runoff
I = Infiltration