M E M O R A N D U M

DATE: FEBRUARY 18, 2025

TO: JASDEEP BRAR

FROM: MELANIE SCHROEDER, P.ENG.

RE: 541 SOMME STREET
WATER BUDGET ASSESSMENT
NOVATECH PROJECT NO.: 124111

CC: GREG MACDONALD, JEFFERY KELLY, DEREK KULYK

1.0 INTRODUCTION

This memorandum has been prepared to provide a water budget assessment for the proposed office/warehouse building and outdoor storage area located at 541 Somme Street within the Hawthorne Industrial Park in the City of Ottawa. The site location is shown in **Figure 1** Key Plan.

1.1 Background

The site is approximately 0.801 hectares (ha) in area and is currently vacant, consisting of a meadow/grass area with a small, treed portion on the east side of the site. The site is bordered by Somme Street to the west, the Hawthorne Industrial Park SWMF to the north, a vacant undeveloped lot to the south and a bedrock resource area to the east. The existing ground surface of most of the subject site is ranges between approximately 1 to 2% slope. According to the "*Geotechnical Investigation Proposed Commercial Storage Building, 541 Somme Street, Ottawa, Ontario" report (PG7327-1),* prepared by Paterson Group Inc., dated November 25, 2024, the on-site soils are a mix of silty sand to sandy silt. **Figure 2** Existing Conditions shows the existing site conditions.

The proposed development is intended to be an office/ warehouse. The building will be a warehouse and office with second floor mezzanine. A lean-to will project towards the south lot line. A surface parking lot is proposed in front of the proposed building, with access to the site via two entrances from Somme Street. Refer to **Figure 3** for a copy of the latest Site Plan (by Novatech) showing the general layout of the proposed development.

A summary of the pre- and post-development land use is provided in **Table 1**.

Table 1: Land Use Summary

Scenario	Site Area (ha)	Land Use as Percent of Site Area			
		Forest	Meadow	Urban Lawn	Impervious Areas
Pre-Development	0.801	19.5%	80.5%	0.0%	0.0%
Post-Development	0.801	19.5%	0.0%	24.7%	55.8%

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 www.novatech-eng.com

2.0 WATER BUDGET CALCULATIONS

The Thornthwaite-Mather (1957) water balance methodology was used to determine conceptual values for precipitation, evapotranspiration, runoff, and infiltration from the proposed development. Water budget calculations have been provided as attachments. A summary of the results is provided in **Table 2**.

Table 2: Water Budget Summary

Scenario	Precipitation (mm/yr)	ET (mm/yr)	Infiltration (mm/yr)	Runoff (mm/yr)
Pre-Development	920	570	199	150
Post-Development	920	536	101	283
Difference	0	-34	-98	132

Due to the increase in impervious area, there is a decrease in annual evapotranspiration and infiltration and an increase in annual runoff. The annual infiltration from the site will decrease by 98 mm/year (or 788 m^3/year). The summary for annual infiltration volume is provided in **Table 3.**

Table 3: Infiltration Results Summary

Infiltration Depth (mm/yr)			Infiltration Volume (m^3/yr)		
Pre-Dev.	Post-Dev.	Difference	Pre-Dev.	Post-Dev.	Difference
199	101	-98	1,594	806	-788

It should be noted that these infiltration results are conservative due to assumptions made in the calculations for the impervious areas. A considerable portion of the calculated impervious area is gravel which will have some capacity for infiltration compared to a paved surface. The site also outlets to roadside ditches through on-site grassed swales which will also provide an opportunity for infiltration for the impervious runoff generated from the site.

3.0 CONCLUSIONS

Based on the water budget assessment, there will be a decrease in infiltration of 98 mm/year (or 788 m^3/year). This result is conservative due to the following assumptions:

- Not accounting for the infiltration capacity of the gravel area by assuming it is fully impervious; and,
- Not accounting for the potential infiltration of impervious runoff outletting through grassed ditches.

<u>Attachments</u>:

1. Figure 1: Key Plan
2. Figure 2: Existing Conditions
3. Figure 3: Site Plan
4. Figure SRF: Surface Types
5. Water Budget Calculations

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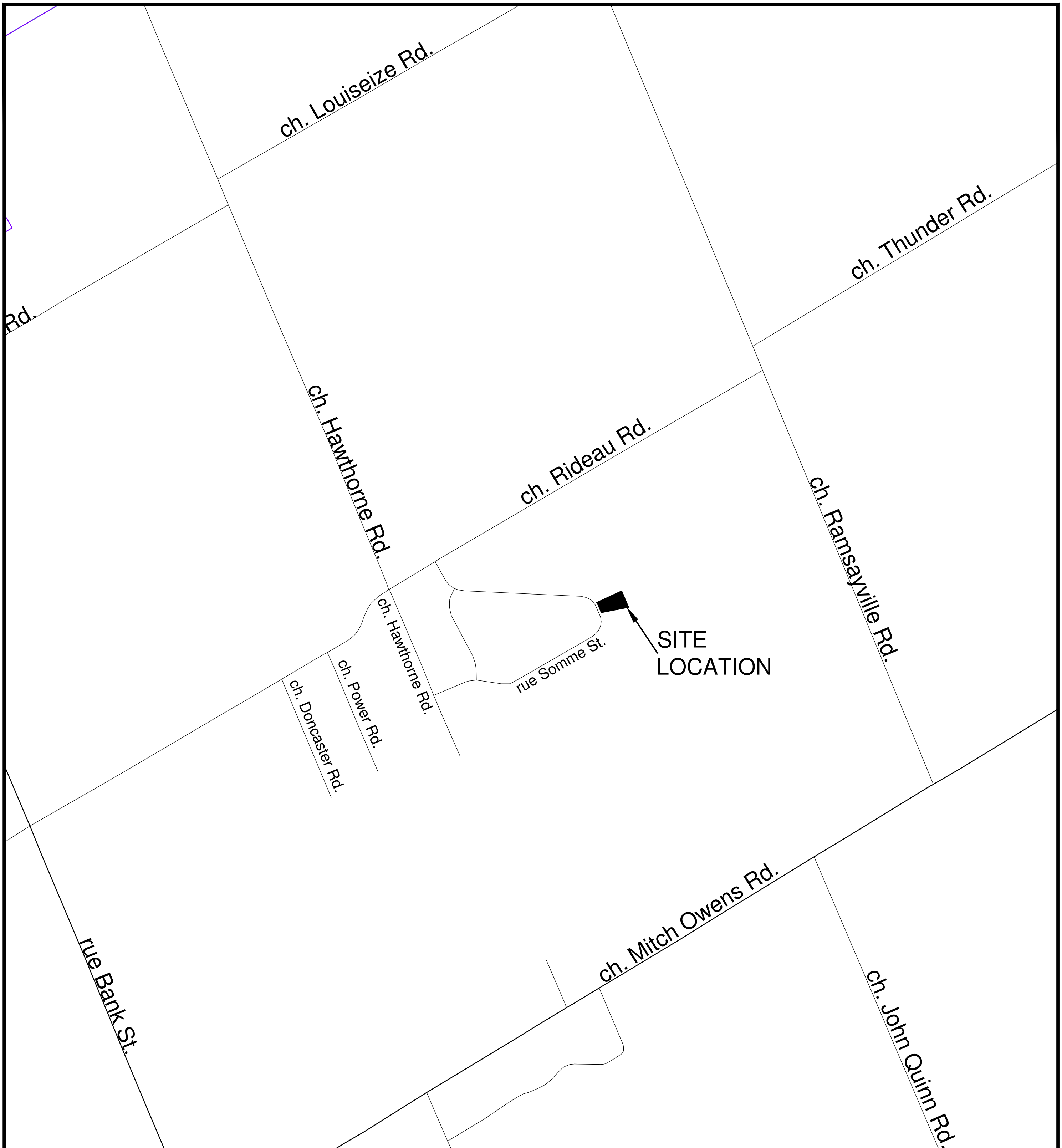

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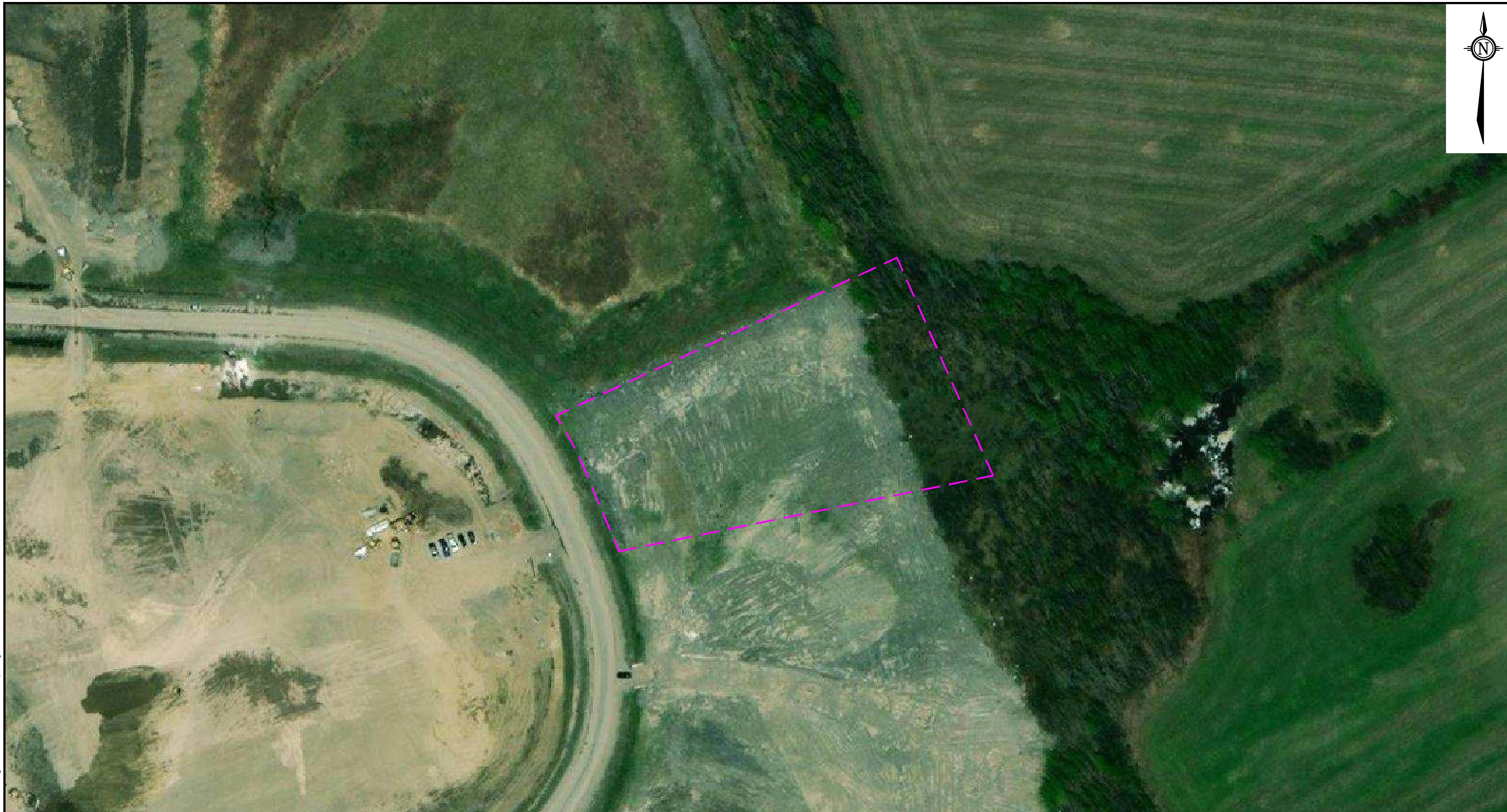
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
541 SOMME STREET

KEY PLAN

SCALE N.T.S		
DATE FEB 2025	JOB 124111	FIGURE FIGURE 1

SHT8X11.DWG - 216mmx279mm



LEGEND

SITE BOUNDARY

NOVATECH

Engineers, Planners & Landscape Architects

Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

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541 SOMME STREET

EXISTING CONDITIONS

SCALE 1 : 1250 (0 10 20 30 40 50)

DATE FEB 2025 | JOB 124111 | FIGURE FIGURE 2

SHT11X17.DWG - 279mmX432mm

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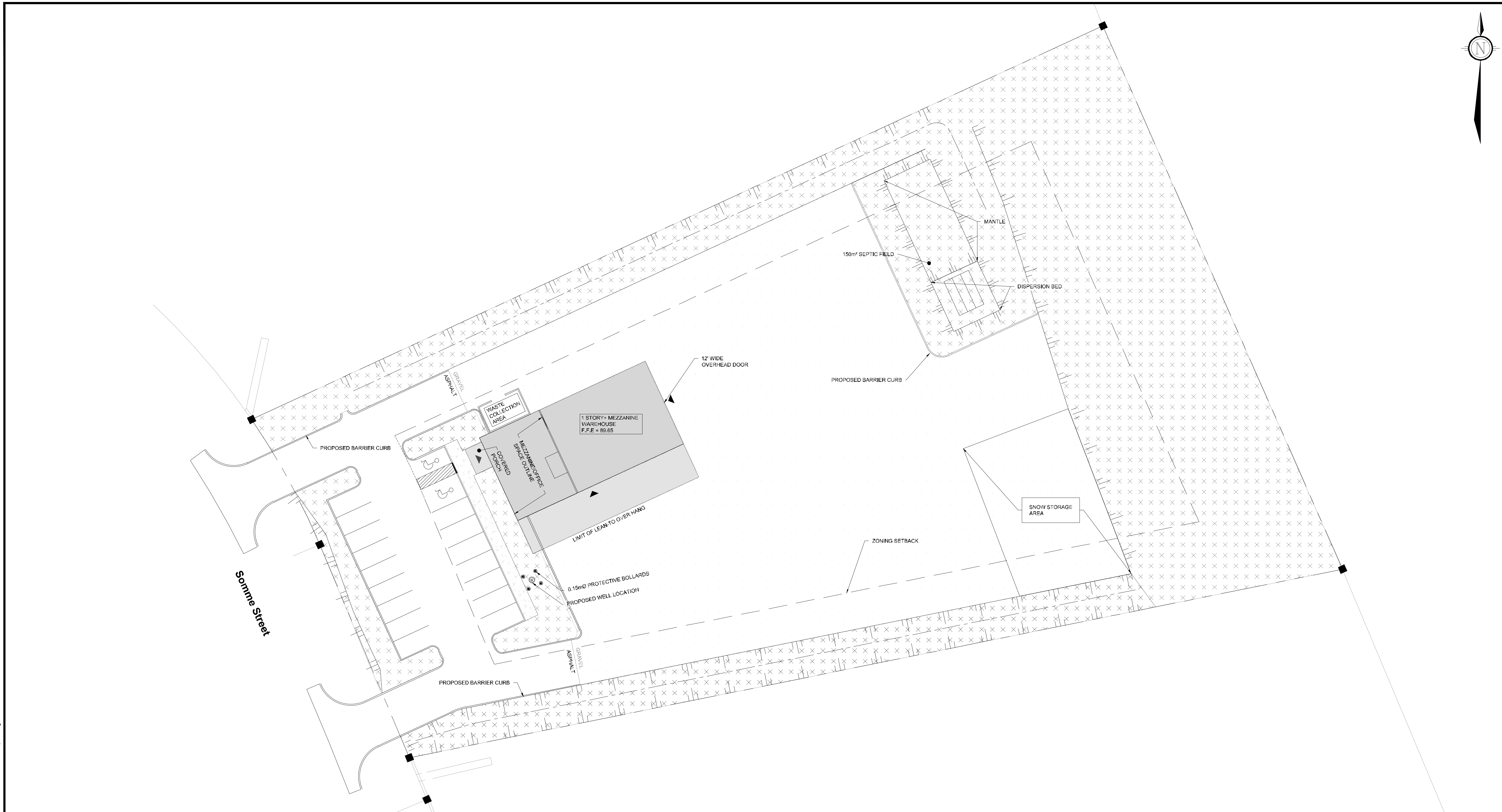

LEGEND

	SITE BOUNDARY		3:1 (MAX) TERRACING
	BUILDING		PROPOSED SWALE
	GRAVEL AREA		GRASS AREA

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
541 SOMME STREET

SITE PLAN

SCALE 1 : 500 (0, 5m, 10m, 20m)

DATE JAN 2025 | JOB 124111 | FIGURE FIGURE 3

SHT11X17.DWG - 279mmX432mm
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WEIGHTED C VALUE CALCULATIONS:

TOTAL SITE AREA = 0.801 HACTARES
BUILDING AREA = 0.043 HECTARES C =1.00
ASPHALT AREA = 0.084 HECTARES C = 0.90
GRAVEL AREA = 0.320 HECTARES C = 0.70
GRASS AREA = 0.355 HECTARES C = 0.25
WEIGHTED RUNOFF COEFFICIENT (C) = ((0.043*1)+(0.084*0.90)+(0.320*0.70)+(0.355*0.25))/0.801
WEIGHTED RUNOFF COEFFICIENT (C) = 0.54

LEGEND

BUILDING = 0.043 HECTARES

ASPHALT = 0.084 HECTARES

GRAVEL = 0.320 HECTARES

GRASS = 0.355 HECTARES

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
541 SOMME STREET

SURFACE TYPES

SCALE	1 : 500
DATE	FEB 2025
JOB	124111
FIGURE	SRF

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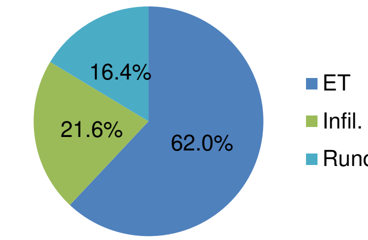
541 Somme Street (124111)
Water Budget Calculations

Pre-Development

Drainage Area 0.801 ha

Landuse	% of Watershed	Watershed Area	% of Pervious Area within Watershed	Water Holding Capacity	Infiltration Factor	Factor	Condition	Infiltration Factor
Mature Forest	19.5%	0.156	19.5%	350 mm	0.20	**Topography**	Rolling to Hilly Land	0.15
Pasture/Meadow	80.5%	0.645	80.5%	200 mm	0.10	**Soils**	Silty sand / sand silt	0.30
Urban Lawns	0.0%	0.000	0.0%	100 mm	0.10		**Pervious Infiltration Factor**	**0.57**
Imp. Areas	0.0%	0.000	-	0 mm	0.00		**Weighted Infiltration Factor**	**0.57**
Average				**229 mm**	**0.12**		**Runoff Factor**	**0.43**

*table 3.1 MOE

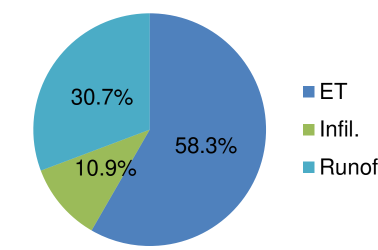


		Ottawa (6105976) 1981-2010												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Precipitation (mm)	**P**	63	50	58	71	87	93	84	84	93	86	83	70	**920**
Potential Evapotranspiration (mm)	**PE**	0	0	0	0	112	129	136	115	72	43	0	0	**607**
Total Precip. - Potential ET (mm)	P-PE	63	50	58	71	-25	-36	-52	-31	21	43	83	70	
Soil Moisture Storage (mm)	ST	229	229	229	229	205	175	140	122	143	185	229	229	
Change in Soil Moisture Storage (mm)	ΔST	0	0	0	0	-24	-30	-36	-18	21	43	44	0	
Deficit (mm)	D	0	0	0	0	1	6	16	13	0	0	0	0	**37**
Actual Evapotranspiration (mm)	**AE**	0	0	0	0	110	123	120	101	72	43	0	0	**570**
Water Surplus (mm)	**S**	63	50	58	71	0	0	0	0	0	0	39	70	**349**
Annual Infiltration (mm)	**I**													**199**
Annual Runoff (mm)	**R**													**150**

Post-Development

Drainage Area 0.801 ha

Landuse	% of Watershed	Watershed Area	% of Pervious Area within Watershed	Water Holding Capacity	Infiltration Factor	Factor	Condition	Infiltration Factor
Mature Forest	19.5%	0.156	44.1%	350 mm	0.20	**Topography**	Rolling to Hilly Land	0.15
Pasture/Meadow	0.0%	0.000	0.0%	200 mm	0.10	**Soils**	Silty sand / sand silt	0.30
Urban Lawns	24.7%	0.198	55.9%	100 mm	0.10		**Pervious Infiltration Factor**	**0.59**
Imp. Areas	55.8%	0.447	-	0 mm	0.00		**Weighted Infiltration Factor**	**0.26**
Average				**93 mm**	**0.14**		**Runoff Factor**	**0.74**



		Ottawa (6105976) 1981-2010												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Total Precipitation (mm)	**P**	63	50	58	71	87	93	84	84	93	86	83	70	**920**
Potential Evapotranspiration (mm)	**PE**	0	0	0	0	112	129	136	115	72	43	0	0	**607**
Total Precip. - Potential Evap. (mm)	P-PE	63	50	58	71	-25	-36	-52	-31	21	43	83	70	
Soil Moisture Storage (mm)	ST	93	93	93	93	71	48	27	19	40	83	93	93	
Change in Soil Moisture Storage (mm)	ΔST	0	0	0	0	-22	-23	-21	-8	21	43	10	0	
Deficit (mm)	D	0	0	0	0	3	13	31	23	0	0	0	0	**71**
Actual Evapotranspiration (mm)	**AE**	0	0	0	0	109	116	105	92	72	43	0	0	**536**
Water Surplus (mm)	**S**	63	50	58	71	0	0	0	0	0	0	72	70	**383**
Annual Infiltration (mm)	**I**													**101**
Annual Runoff (mm)	**R**													**283**

Notes:
1) Uses measured average monthly total precipitation and potential evaporation data (converted to evapotranspiration based on a cover coefficient of 1.0).
2) Actual evapotranspiration and water surplus calculated using the Thornthwaite & Mather (1957) methodology.
3) Runoff and infiltration calculated as per the MOE SWM Planning and Design Manual (2003) methodology.
4) Impervious areas consist of rooftops, roads, and driveways.

Annual Summary

Sceneario	Precipitation	ET		Surplus		Infil.		Runoff	
Pre-Development	920 mm	570 mm	62.0%	349 mm	38.0%	199 mm	21.6%	150 mm	16.4%
Post-Development	920 mm	536 mm	58.3%	383 mm	41.7%	101 mm	10.9%	283 mm	30.7%
Difference (Post - Pre)	0 mm	-34 mm	-3.7%	34 mm	3.7%	-98 mm	-10.7%	132 mm	14.4%

Thornthwaite, C.W., and Mather, J.R. 1957. Instructions and tables for computing potential evapotranspiration and the water balance. Centerton, N.J., Laboratory of Climatology, Publications in Climatology, v.10, no.3, p.185-311

Table 3.1: Hydrologic Cycle Component Values

	Water Holding Capacity mm	Hydrologic Soil Group	Precipitation mm	Evapo-transpiration mm	Runoff mm	Infiltration* mm
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)						
Fine Sand	50	A	940	515	149	276
Fine Sandy Loam	75	B	940	525	187	228
Silt Loam	125	C	940	536	222	182
Clay Loam	100	CD	940	531	245	164
Clay	75	D	940	525	270	145
Moderately Rooted Crops (corn and cereal grains)						
Fine Sand	75	A	940	525	125	291
Fine Sandy Loam	150	B	940	539	160	241
Silt Loam	200	C	940	543	199	199
Clay Loam	200	CD	940	543	218	179
Clay	150	D	940	539	241	160
Pasture and Shrubs						
Fine Sand	100	A	940	531	102	307
Fine Sandy Loam	150	B	940	539	140	261
Silt Loam	250	C	940	546	177	217
Clay Loam	250	CD	940	546	197	197
Clay	200	D	940	543	218	179
Mature Forests						
Fine Sand	250	A	940	546	79	315
Fine Sandy Loam	300	B	940	548	118	274
Silt Loam	400	C	940	550	156	234
Clay Loam	400	CD	940	550	176	215
Clay	350	D	940	549	196	196

Notes: Hydrologic Soil Group A represents soils with low runoff potential and Soil Group D represents soils with high runoff potential. The evapotranspiration values are for mature vegetation. Streamflow is composed of baseflow and runoff.

* *This is the total infiltration of which some discharges back to the stream as base flow. The infiltration factor is determined by summing a factor for topography, soils and cover.*

Topography	Flat Land, average slope < 0.6 m/km	0.3
	Rolling Land, average slope 2.8 m to 3.8 m/km	0.2
	Hilly Land, average slope 28 m to 47 m/km	0.1
Soils	Tight impervious clay	0.1
	Medium combinations of clay and loam	0.2
	Open Sandy loam	0.4
Cover	Cultivated Land	0.1
	Woodland	0.2