Evolugen

South March BESS OE's Engineering Service

2555 and 2625 Marchurst Road , Ottawa, ON

Letter Report

Site Servicing Study

BBA Document No.-Rev.: 7154023-100000-41-ERA-0003-RAB

June 19, 2025

FOR PERMITTING

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South March BESS OE's Engineering Service
Letter Report
Site Servicing Study

2025-06-19
FOR PERMITTING

LICENSED PROFESSIONAL ENGINEER
E. AMELI
100617996
PROVINCE OF ONTARIO

2025-06-19

2025-06-19

Prepared by:
Emmanuel Ameli, P.Eng.
PEO No. 100617996

Verified by:
Mina Shahraki, P.Eng.
EGBC No. 45275

BBA Document No.-Rev.: 7154023-100000-41-ERA-0003-RAB

REVISION HISTORY

Revision	Document Status – Revision Description	Date
RAA	For comments	2024-01-16
RAB	For permitting	2025-06-19

This study has been conducted in support of the applicant (Evolugen) with the permitting process for the South Marsh – Battery Energy Storage System project (BESS). The applicant is proposing an industrial development located at 2555 and 2625 Marchurst Road, Ottawa, ON. The two properties cover a total area of approximately 84.5 ha. The proposed area for the BESS and substation portion of the project is approximately 5.3 ha. Existing residential dwellings are located on the east side of the properties, and most of the property is covered by trees and grass. The project is a proposed installation of 250 MW batteries and a substation. BBA Inc. has been retained by the Client to prepare a site servicing study for the proposed development. The site servicing report is prepared to address how the design of the site complies with the City design guidelines, to discuss the existing and future service connections, and to provide information about the access roads, and fire service for the development area.

This report will evaluate the serviceability of the site with respect to sanitary, water and storm services, and also evaluate the stormwater management (SWM) strategy that will be implemented to meet the City of Ottawa SWM requirements. These requirements have been provided by the City of Ottawa, listed in the pre-consultation letter dated March 31, 2025 and received April 2, 2025. The project's overall site layout and general arrangement plans can be found in Appendix A.

It is important to note that an arborist will be retained by the Client to identify trees to be retained/removed within the site, where required. For detailed topography of the existing site conditions, refer to the topographic survey prepared by Tulloch Geomatics in Appendix B

Property and Right-of-Way Requirements

The project location has a 30 m setback from an existing turtle habitat pond. In addition, the project site has a 100 m setback from HONI statutory right of way (SRW). Site survey plan is attached to this letter in Appendix B. The new development area does not have any conflicts with existing easements.

Transportation/Traffic Management

The proposed development will be connected to Marchurst Road through a new gravel access road. This access road is approximately 8 m wide and was found to be adequate for commuting project design vehicles. Additional information can be found in the General notes plan 7154023-100000-41-D01-0002 prepared by BBA Inc.

Stormwater Management

Stormwater management for the proposed development will follow the stormwater criteria as set out by the City of Ottawa Guidelines for quantity control. The allowable post-development peak flow for the proposed development up to the 100-year storm event will be set to the 2-year pre-development flow rate. Only the areas of redevelopment where the existing elevations are being altered will be considered for stormwater management. For this development, this includes areas of a wet pond, substation and battery area.

A summary of the results showing that the peak flow rate for a 100-year storm event (post-development) is equivalent to the peak flow rate of a 2-year storm event (pre-development) is presented in Table 1. Further discussion about the stormwater management model can be found in the Stormwater Management Report in Appendix D.

Table 1: Post-development controlled flows vs pre-development flows

Return Period	2-year pre	100-year post
SCS Type 2 Duration	**m^3/s**	**m^3/s**
24-hr	0.0394	0.0366

Servicing Requirements

- **Drainage/Environmental**

  A watercourse runs through the site and will be rerouted along the west edge of the site with a ditch and led to the same existing pond to which it initially drained. The stormwater from the site will be drained to a new wet pond through a network of ditches around the site and culverts. A control structure at the end of the wet pond will discharge the stormwater with a controlled rate to a proposed swale that connects to the existing ditch in front of the lots. Stormwater management modelling was used to size a wet pond to meet water quantity, water quality, as well as erosion & sediment control criteria caused by additional runoff due to the new developed area. All elements of the stormwater management system are based on City of Ottawa design criteria and rainfall values.

  An erosion and sediment control plan during construction was completed by BBA and can be found in documents "7154023-100000-41-D70-0001" and "7154023-100000-41-D70-0002".

  The plans were developed in accordance with applicable land development guidelines and best management practices to manage soil erosion and sedimentation during the construction phase of the project.

- **Water Balance**

  The site is used for industrial development and will contain Battery Storage Systems which may leak heavy metals or lithium. An impervious geomembrane will be installed across the entire site (except the substation area) to protect the groundwater.

- **Fire Water**

  There are no proposed buildings within the new development area. As such, the proposed development does not require any domestic water connection. However, for fire protection, a proposed underground water tank with a capacity of 38,000 L (10,000 gallons) is proposed to be placed east of the wet pond and be connected to a series of fire hydrants throughout the site. The size of the water tank has been recommended by the Fire Service Department of the City of Ottawa.

  The minimum pipe size for a water line that supports a fire hydrant is 150 mm. This was established from the City of Ottawa Design Guidelines (Water Distribution Guideline). The average depth for the water pipes will be 1.0 m and the pressures and volumes must be sufficient under fire conditions as established by the Ontario Building Code 2006. To avoid any problem due to freezing of the water, the hydrant test shall be completed in the spring.

  In accordance with the Ontario Code & Guide for Plumbing, the maximum pressure at any point in the distribution system in occupied areas outside of the public right-of-way shall not exceed 552 kPa (80 psi). In this site, the water network has been designed to provide 60 psi pressure along the pipes.

  A draft hydrant connected to the water tank has been designed to be used by the fire truck at the time of a fire incident. The fire truck will connect the hose to this draft hydrant and then pump the water to the water network on the site. Each fire hydrant covers a circle with a 60 m radius, assuming 30 m for the hose length and 30 m spray distance.

  For the draft and remote hydrants, a gate valve is designed and since the water table is quite high in this site (almost 1m below the existing grades after snow melt) the fire hydrants will require sealed weep (drain) holes. So, when there is water in the system and the fire hydrants are closed, the water will not drain out of the hydrant barrel and will need to be manually pumped out after the fire incident or the annual tests. However, this also prevents the water from entering the water network due to the high-water table.

  It should be mentioned that the access roads are all designed to provide enough space for maneuvering of the fire trucks. Additional details can be found in road plan number "7154023-100000-41-D20-0005".

The proposed fire system in the BESS containers will include gas monitoring, heat sensors, alarming, active ventilation, etc. The proposed fire system will be certified to the latest NFPA 855.

- **Sanitary Waste Water Disposal**

  There are no proposed buildings within the new development area. As such, the proposed development does not require any sanitary connection.

- **Commercial Utilities**

  The proposed development will be serviced with hydro and telecommunication lines in accordance with utility requirements and city standards.

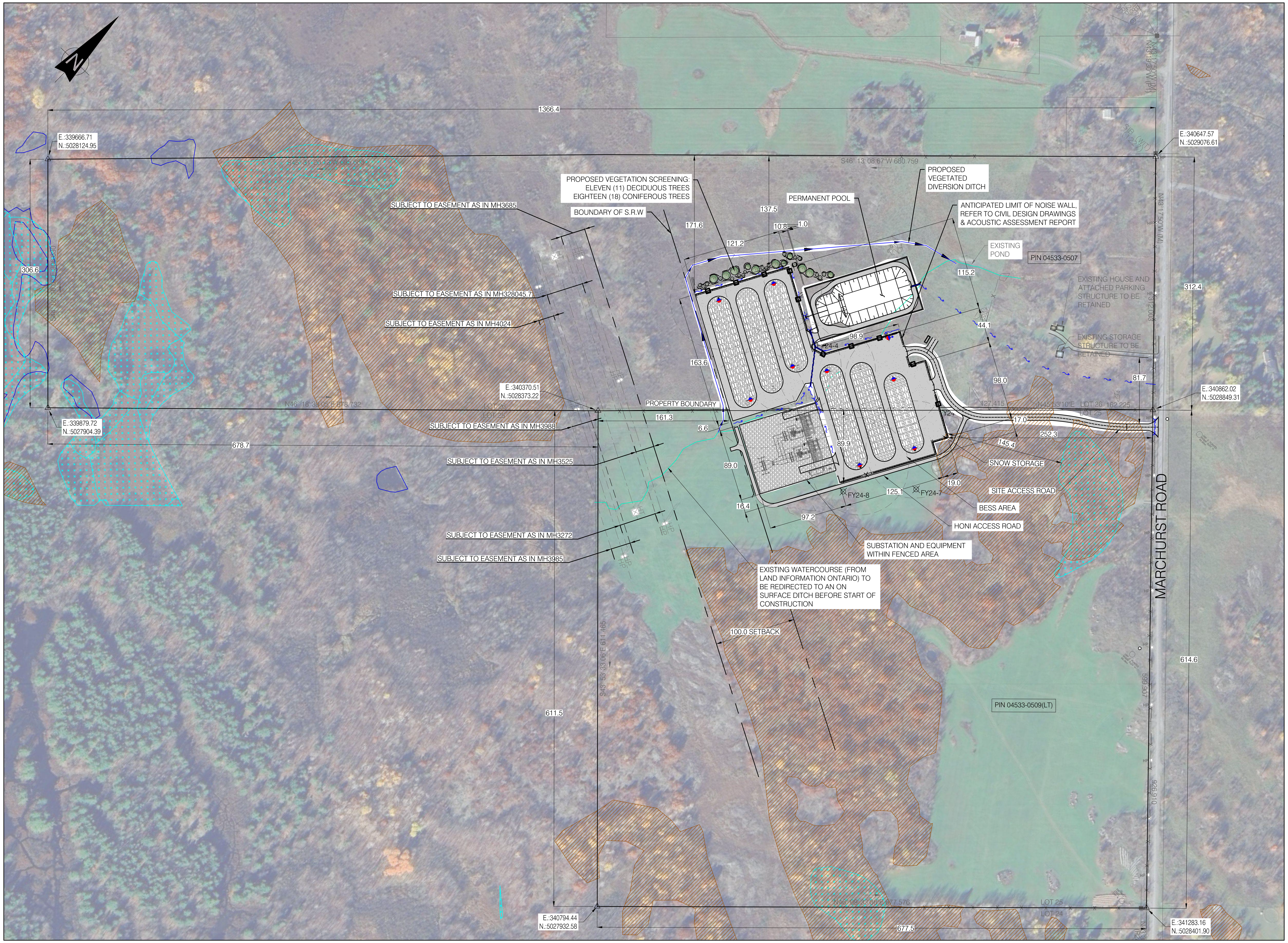
- **Gas Service**

  No gas connection is required for this site.

- **Project Management**

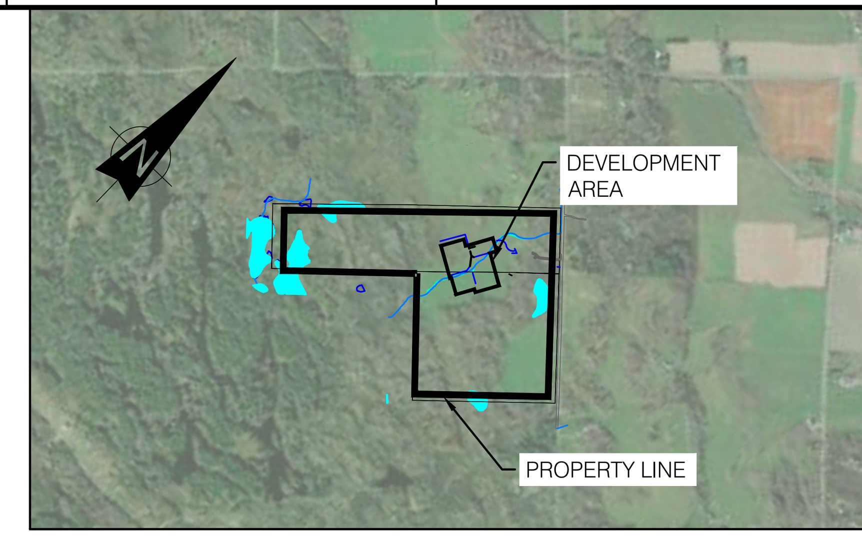
  A service agreement will be generated based on the municipality criteria before the construction phase starts. All engineering legal documents required for this project will be prepared prior to the issuance of the service agreement plan.

Appendix A: Proposed Site Layout



PLAN VIEW

SCALE 1:2500



KEY PLAN

SCALE: N.T.S.

NOTES:

1. PROJECT COORDINATES ARE SET IN NAD83(CSRS) / MTM ZONE 9 - EPSG:2952.
2. SITE SURVEY PROVIDED BY TULLOCK GEOMATCICS INC, ISSUED MARCH 11, 2025, SURVEY FILE #241451.
3. ALL REQUIRED PERMITS MUST BE IN PLACE BEFORE START OF CONSTRUCTION.
4. BATTERY ARRANGEMENT IS PER SOUTH MARCH BESS - 250 MW 230 kV - 34.5 kV SUBSTATION BESS LAYOUT - SUNGROW, 7154023-300000-47-D20-0001-02.DWG.
5. FOR LOCATION OF THE PROPOSED UNDERGROUND UTILITIES SEE SITE SERVING PLAN 7154023-100000-41-D20-0003.DWG
6. FOR CLEARING AND GRUBBING BOUNDARIES, REFER TO EROSION AND SEDIMENT CONTROL - CLEARING AND GRUBBING PLAN ON DRAWING NO. 7514023-100000-41-D70-0001-01.
7. CONTRACTOR TO REVIEW THE PRELIMINARY GEOTECHNICAL REPORT PREPARED BY HATCH DATED 2025-02-28, FILE H375142-0000-2A0-230-0001 BEFORE STARTING CONSTRUCTION.
8. THE ENTIRE DEVELOPMENT AREA WILL BE COVERED BY AN IMPERVIOUS LINER TO PROTECT THE UNDERGROUND WATER FROM ANY CONTAMINATION THAT MAY LEAK FROM THE BATTERIES AND TRANSFORMERS.

LEGEND:

- HP EXISTING HYDRO POLE
- BESS
- MV TRANSFORMER
- BESS (AUGMENTATION)
- MV TRANSFORMER (AUGMENTATION)
- DISTRIBUTION PANELS
- EXISTING HOUSE
- EXISTING FENCE
- PROPOSED FENCE
- OFFSET LINE
- EXISTING TRANSMISSION LINE
- PROPERTY LINE
- EXISTING WATERCOURSE (LAND INFORMATION ONTARIO)
- WETLAND (LAND INFORMATION ONTARIO)
- WATERBODIES (LAND INFORMATION ONTARIO)
- WOODED AREA (LAND INFORMATION ONTARIO)
- PROPOSED DITCH
- PROPOSED GRAVEL SURFACE AREA
- PROPOSED INSULATING STONE SURFACE AREA
- PROPOSED VEGETATED DIVERSION DITCH
- PROPOSED CULVERT

SCALE 1:2500 — 50 25 0 50 100 150 200 250 m

FOR PERMITTING

DRAWING No.	DESCRIPTION	REV	DESCRIPTION	PREPARED BY	CHECKED BY	DATE
		AC	FOR PERMITTING	E. AMELI	M. SHAHRAKI	2025-06-19
		AB	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-06-03
7154023-402000-47-D20-0001	SOUTH MARCH BESS-250 MW 230kV-34.5 kV SUBSTATION	AA	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-04-29
REFERENCE DRAWINGS		REVISIONS				

SEAL:

LICENSED PROFESSIONAL ENGINEER
E. AMELI
100617996
PROVINCE OF ONTARIO

2025-06-19

CLIENT:

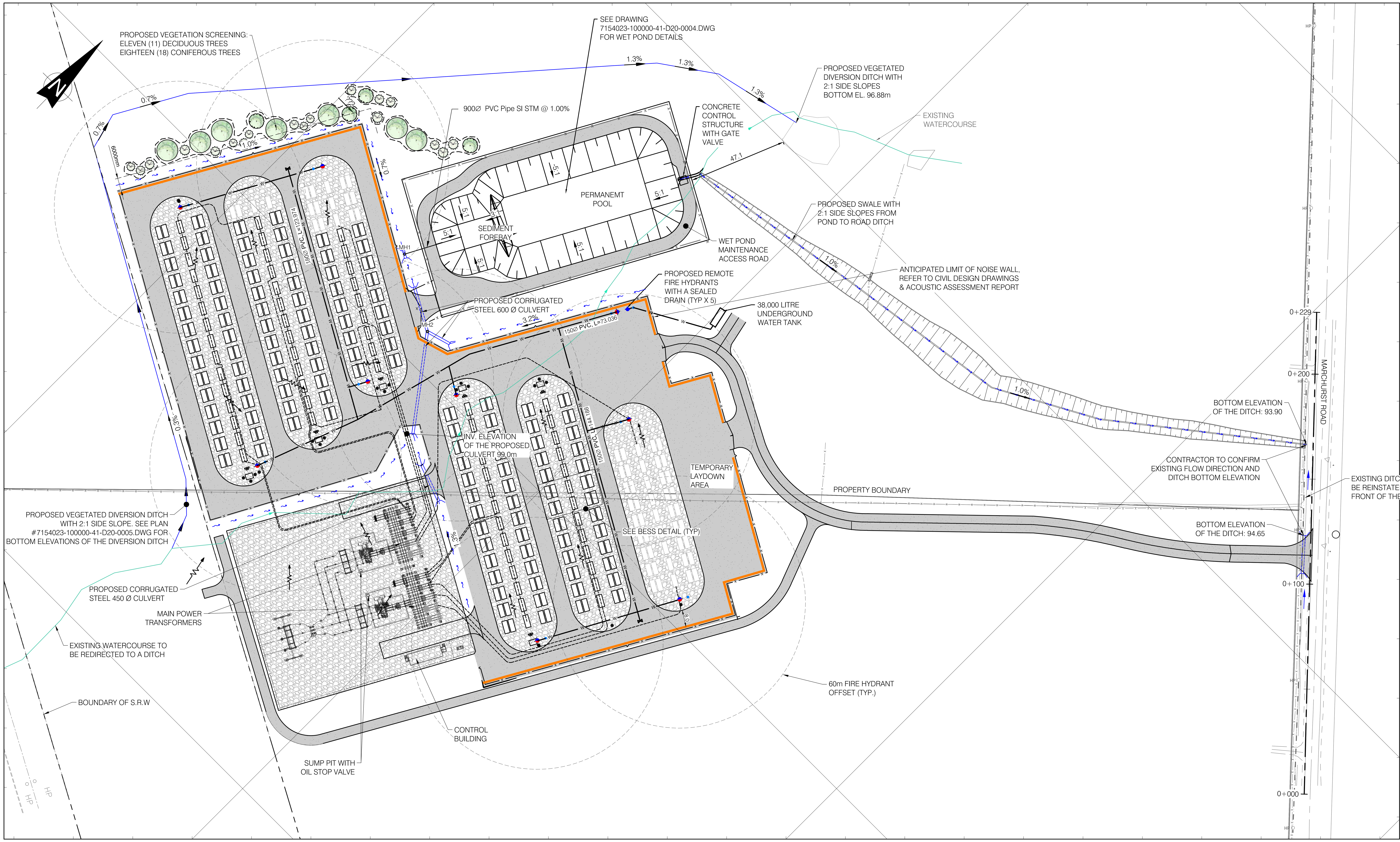
Evolugen by Brookfield Renewable

PROJECT:	SOUTH MARCH 2555 AND 2625 MARCHURST RD, OTTAWA		
TITLE:	SITE PLAN SHEET 1		
PREPARED BY: E. AMELI	DRAFTED BY: D.JAMES		
CHECKED BY: E. AMELI	APPROVED BY: M.SHAHRAKI		
SCALE: 1:2500	DATE: 2025-04-29		
DRAWING No.: 7154023-100000-41-D20-0001-01	SHEET: 01	SIZE: A1	REV. AC

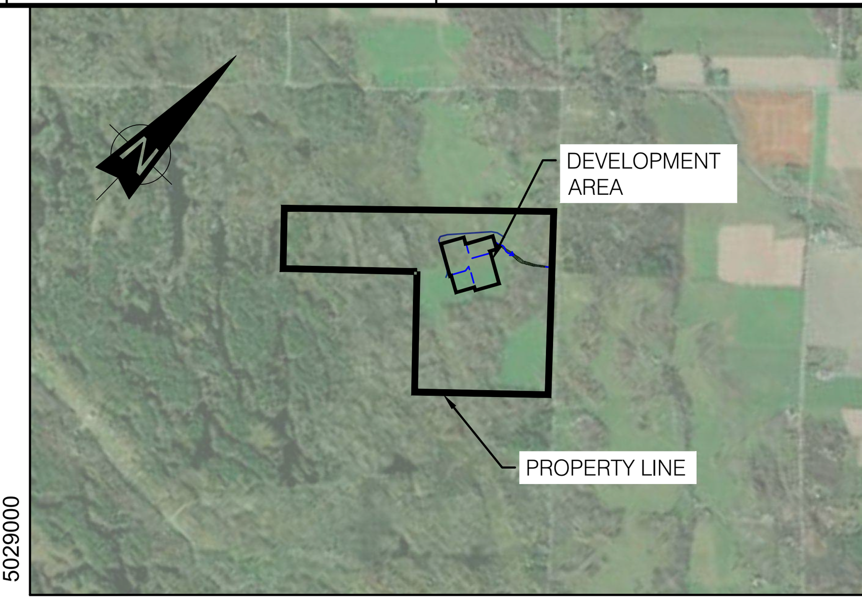
0 1 2 3 4 5 6 7 8 9 10 cm

G:\7154\023\40_ING_ENG\41_CIVIL\DESS_DWGS\EN _COURS_IN PROGRESS\7154023-100000-41-D20-0001-01.DWG

BY:JAMES, DONNA
PRINTED:2025-06-19 2:33:00 PM



PLAN VIEW
SCALE 1:1000



KEY PLAN
SCALE: N.T.S.

NOTES:

1. PROJECT COORDINATES ARE SET IN NAD83(CSRS) / MTM ZONE 9 - EPSG:2952.
2. COORDINATES ARE IN METERS AND ELEVATIONS ARE METERS.OBSERVED REFERENCE POINTS ARE DERIVED FROM REAL TIME KINEMATIC (RTK) GNSS OBSERVATIONS USING SPECIFIED CONTROL POINTS AND ARE REFERRED TO MTM ZONE 9, (76°30' WEST LONGITUDE) NAD83 (CSRS) (2010).COORDINATES TO URBAN ACCURACY PER SEC. 14(2) OF O.REG. 216/10.
3. SITE SURVEY PROVIDED BY TULLOCK GEOMATCICS INC, ISSUED MARCH 11, 2025, SURVEY FILE #241451.
4. ALL REQUIRED PERMITS MUST BE IN PLACE BEFORE START OF CONSTRUCTION.
5. BATTERY ARRANGEMENT IS PER 7154023-300000-47-D20-0001-02.DWG.
6. INSULATION IS REQUIRED WHERE PIPE COVER IS LESS THAN 1.8m TO SPRINGLINE OF PIPE.
7. ALL STORMWATER PIPES ARE ARMTEC BOSS 2000 HDPE PIPE WITH 320 kPa STIFFNESS, UNLESS OTHERWISE NOTED.
8. GROUNDING GRID NOT SHOWN. REFER TO DRAWING 7154023-402000-47-D50-0001 FOR MORE DETAILS.
9. ALL MANHOLE COVERS TO BE CL-625 ONT LOAD RATED.
10. MINIMUM 300mm VERTICAL CLEARANCE IS REQUIRED AT STORM PIPE CROSSINGS WITH ELECTRICAL UTILITIES AND WATER PIPES.
11. CONTRACTOR TO REVIEW THE GEOTECHNICAL REPORT PROVIDED BY HATCH: "SOUTH MARCH ROAD BATTERY ENERGY STORAGE SYSTEM (BESS), PRELIMINARY GEOTECHNICAL INVESTGATION", PROJECT #H375142-0000-2A0-230-0001, REV. A, DATED FEBRUARY 28, 2025.
12. THE MIN. CAPACITY FOR THE WATER TANK IS 38,000 LITRES BASE ON CITY OF OTTAWA FIRE SERVICES DEPARTMENT ADVISE.
13. THE FIRE NETWORK IS DESIGNED TO PROVIDE AN OPERATING PRESSURE OF 60 PSi UNDER THE CONDITION OF FIRE.

LEGEND:

- GATE VALVE
- PROPOSED CATCHBASIN
- DRAFT FIRE HYDRANT
- REMOTE FIREHYDRANT
- LIGHT STANDARD
- PROPOSED MANHOLE
- CATCH BASIN MANHOLE
- EXISTING HYDRO POLE
- UNDERGROUND UTILITY MARKER
- TERMINAL BOX
- ANCHOR
- BOLLARD
- BLOW OFF VALVE
- VENT
- EXISTING BOREHOLE
- BESS
- MV TRANSFORMER
- BESS (AUGMENTATION)
- MV TRANSFORMER (AUGMENTATION)
- DISTRIBUTION PANELS
- FLOW DIRECTION
- EXISTING FENCE
- PROPOSED FENCE
- PROPOSED NOISE WALL
- STORM PIPE
- WATER LINE
- EXISTING WATERCOURSE
- OFFSET LINE
- EXISTING TRANSMISSION LINE
- PROPERTY LINE
- BURIED TELECOMMUNICATIONS
- BURIED ELECTRIC
- SWALE
- PROPOSED GRAVEL SURFACE AREA
- PROPOSED INSULATING STONE SURFACE AREA
- PROPOSED DIVERSION DITCH
- PROPOSED CULVERT

MANHOLES

MH/CB	INVERTS	NORTHING	EASTING
MH1	SE: 197.02 NE: 96.90 NW: 198.02	5028634.38	340474.64
MH2	NW: 97.40 E: 97.50 SE: 97.50	5028616.05	340508.38

SCALE 1:1000 — 20 10 0 20 40 60 80 100 m

FOR PERMITTING

REFERENCE DRAWINGS

DRAWING No.	DESCRIPTION
7154023-402000-47-D20-0001	SOUTH MARCH BESS-250 MW 230kV-34.5 kV SUBSTATION

REVISIONS

REV	DESCRIPTION	PREPARED BY	CHECKED BY	DATE
AC	FOR PERMITTING	E. AMELI	M. SHAHRAKI	2025-06-19
AB	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-06-06
AA	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-03-03

SEAL:
LICENSED PROFESSIONAL ENGINEER
E. AMELI
100617996
PROVINCE OF ONTARIO
2025-06-19

BBA

CLIENT:
Evolugen by Brookfield Renewable

PROJECT: SOUTH MARCH BESS
2555 AND 2625 MARCHURST RD, OTTAWA

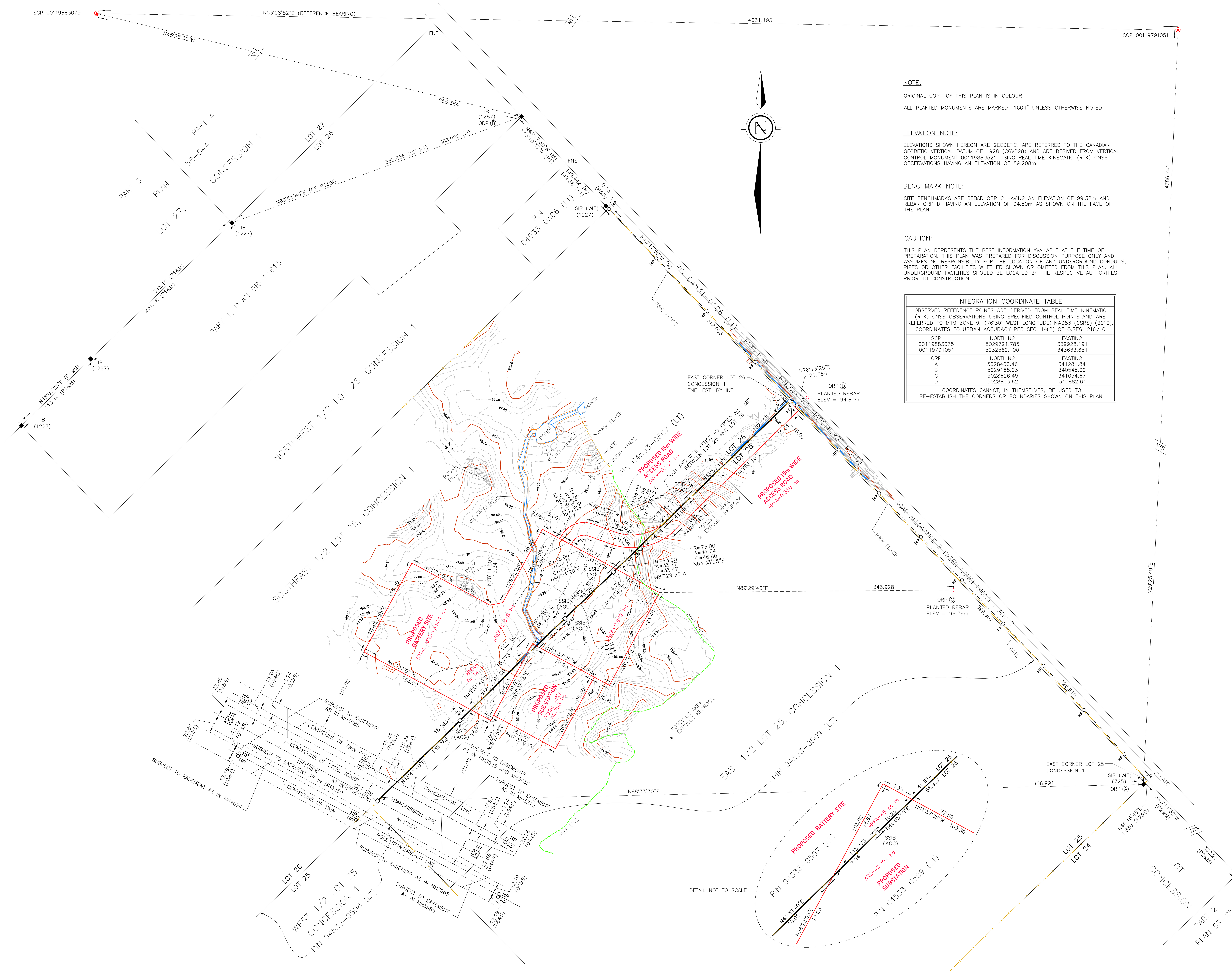
TITLE: CIVIL
SITE SERVICING AND FIRE PROTECTION PLAN

PREPARED BY: E. AMELI	DRAFTED BY: J. MUGGERIDGE
CHECKED BY: E. AMELI	APPROVED BY: M. SHAHRAKI
SCALE: 1:1000	DATE: 2025-03-03

DRAWING No.	SHEET:	SIZE:	REV.
7154023-100000-41-D20-0003	01	A1	AC

BY:JAMES, DONNA
PRINTED:2025-06-19 2:27:13 PM
G:\7154\023\40_ING_ENG\41_CIVIL\DESS_DWGS\EN _COURS_IN PROGRESS\7154023-100000-41-D20-0003.DWG

Appendix B: Site Survey Plan



TOPOGRAPHIC PLAN OF SURVEY OF PART OF THE EAST 1/2 LOT 25 AND PART OF THE SOUTHEAST 1/2 LOT 26 CONCESSION 1 GEOGRAPIC TOWNSHIP OF MARCH CITY OF OTTAWA

TULLOCH GEOMATICS INC.
2025
SCALE 1:2000

20m 0 20 100m

THE INTENDED PLOT SIZE OF THIS PLAN IS 914mm IN WIDTH BY 610mm IN HEIGHT WHEN PLOTTED AT A SCALE OF 1:2000.

NOTE:

ORIGINAL COPY OF THIS PLAN IS IN COLOUR.

ALL PLANTED MONUMENTS ARE MARKED "1604" UNLESS OTHERWISE NOTED.

ELEVATION NOTE:

ELEVATIONS SHOWN HEREON ARE GEODETIC, ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928 (CGVD28) AND ARE DERIVED FROM VERTICAL CONTROL MONUMENT 0011988U521 USING REAL TIME KINEMATIC (RTK) GNSS OBSERVATIONS HAVING AN ELEVATION OF 89.208m.

BENCHMARK NOTE:

SITE BENCHMARKS ARE REBAR ORP C HAVING AN ELEVATION OF 99.38m AND REBAR ORP D HAVING AN ELEVATION OF 94.80m AS SHOWN ON THE FACE OF THE PLAN.

CAUTION:

THIS PLAN REPRESENTS THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION. THIS PLAN WAS PREPARED FOR DISCUSSION PURPOSE ONLY AND ASSUMES NO RESPONSIBILITY FOR THE LOCATION OF ANY UNDERGROUND CONDUITS, PIPES OR OTHER FACILITIES WHETHER SHOWN OR OMITTED FROM THIS PLAN. ALL UNDERGROUND FACILITIES SHOULD BE LOCATED BY THE RESPECTIVE AUTHORITIES PRIOR TO CONSTRUCTION.

INTEGRATION COORDINATE TABLE

OBSERVED REFERENCE POINTS ARE DERIVED FROM REAL TIME KINEMATIC (RTK) GNSS OBSERVATIONS USING SPECIFIED CONTROL POINTS AND ARE REFERRED TO MTM ZONE 9, (76°30' WEST LONGITUDE) NAD83 (CSRS) (2010). COORDINATES TO URBAN ACCURACY PER SEC. 14(2) OF O.REG. 216/10

SCP	NORTHING	EASTING
00119883075	5029791.785	339928.191
00119791051	5032569.100	343633.651

ORP	NORTHING	EASTING
A	5028400.46	341281.84
B	5029185.03	340545.09
C	5028626.49	341054.67
D	5028853.62	340882.61

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH THE CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

METRIC:

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DISTANCE NOTE:

GROUND DISTANCES SHOWN HEREON CAN BE CONVERTED TO MTM GRID BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.999906.

BEARING NOTE:

BEARINGS ARE MTM GRID DERIVED FROM REAL TIME KINEMATIC (RTK) GNSS OBSERVATIONS USING SPECIFIED CONTROL POINTS 00119883075 AND 00119791051 ARE REFERRED TO THE CENTRAL MERIDIAN OF MTM ZONE 9 (76°30' WEST LONGITUDE) NAD83 (CSRS) (2010.0).

ROTATION NOTE:

A ROTATION OF 0°20'00" COUNTER CLOCKWISE HAS BEEN APPLIED TO THE ASTRONOMIC BEARINGS OF UNDERLYING PLAN P1 TO ACCOUNT FOR DIFFERENT REFERENCE MERIDIANS.

NO ROTATION HAS BEEN APPLIED TO THE MTM GRID BEARINGS OF UNDERLYING PLAN P2.

LEGEND:

■	DENOTES FOUND MONUMENT
□	DENOTES PLANTED MONUMENT
▲	DENOTES FOUND SPECIFIED CONTROL POINT
○	DENOTES PLANTED REBAR
SIB	DENOTES STANDARD IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
IB	DENOTES IRON BAR
SCP	DENOTES SPECIFIED CONTROL POINT
ORP	DENOTES OBSERVED REFERENCE POINT
PIN	DENOTES PROPERTY IDENTIFICATION NUMBER
M	DENOTES MEASURED
S	DENOTES SET
WIT	DENOTES WITNESS
CF	DENOTES CALCULATED FROM
ELEV	DENOTES ELEVATION
BM	DENOTES BENCHMARK
EST.	DENOTES ESTABLISHED
INT.	DENOTES INTERSECTION
725	DENOTES R.W. ARNETT, O.L.S
1227	DENOTES L.E. ROSS, O.L.S
1287	DENOTES P.G. SMITH OF FARLEY, SMITH AND MURRAY SURVEYING LTD.
1604	DENOTES TULLOCH GEOMATICS INC.
AOG	DENOTES ANNIS O'SULLIVAN VOLLEBEKK LTD., O.L.S.
P	DENOTES PLAN ATTACHED TO INSTRUMENT CT189441, BY L.E. ROSS, DATED DECEMBER 21, 1972
P1	DENOTES PLAN 5R-11615
P2	DENOTES PLAN 4R-25606
D1	DENOTES INSTRUMENT MH3280
D2	DENOTES INSTRUMENT MH3685
D3	DENOTES INSTRUMENT MH4024
D4	DENOTES INSTRUMENT MH3272
D5	DENOTES INSTRUMENT MH3525 & MH3632
D6	DENOTES INSTRUMENT MH3985
NTS	DENOTES NOT TO SCALE

TOPOGRAPHIC LEGEND:

P&W	DENOTES POST AND WIRE
○ HP	DENOTES HYDRO POLE
☒ HT	DENOTES TRANSMISSION LINE TOWER
	DENOTES WOOD OUTLINE
	DENOTES BOTTOM OF DITCH
—x—x—x—	DENOTES FENCE LINE
	DENOTES OVERHEAD WIRES
	DENOTES TREE LINE
100.00	DENOTES 1.00m MAJOR CONTOUR LINE
100.40	DENOTES 0.2m MINOR CONTOUR LINE

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT AND THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.

(2) THE SURVEY WAS COMPLETED ON THE 5th DAY OF MARCH, 2025.

MARCH 11, 2025
DATE

THOMAS J. CORTENS
ONTARIO LAND SURVEYOR

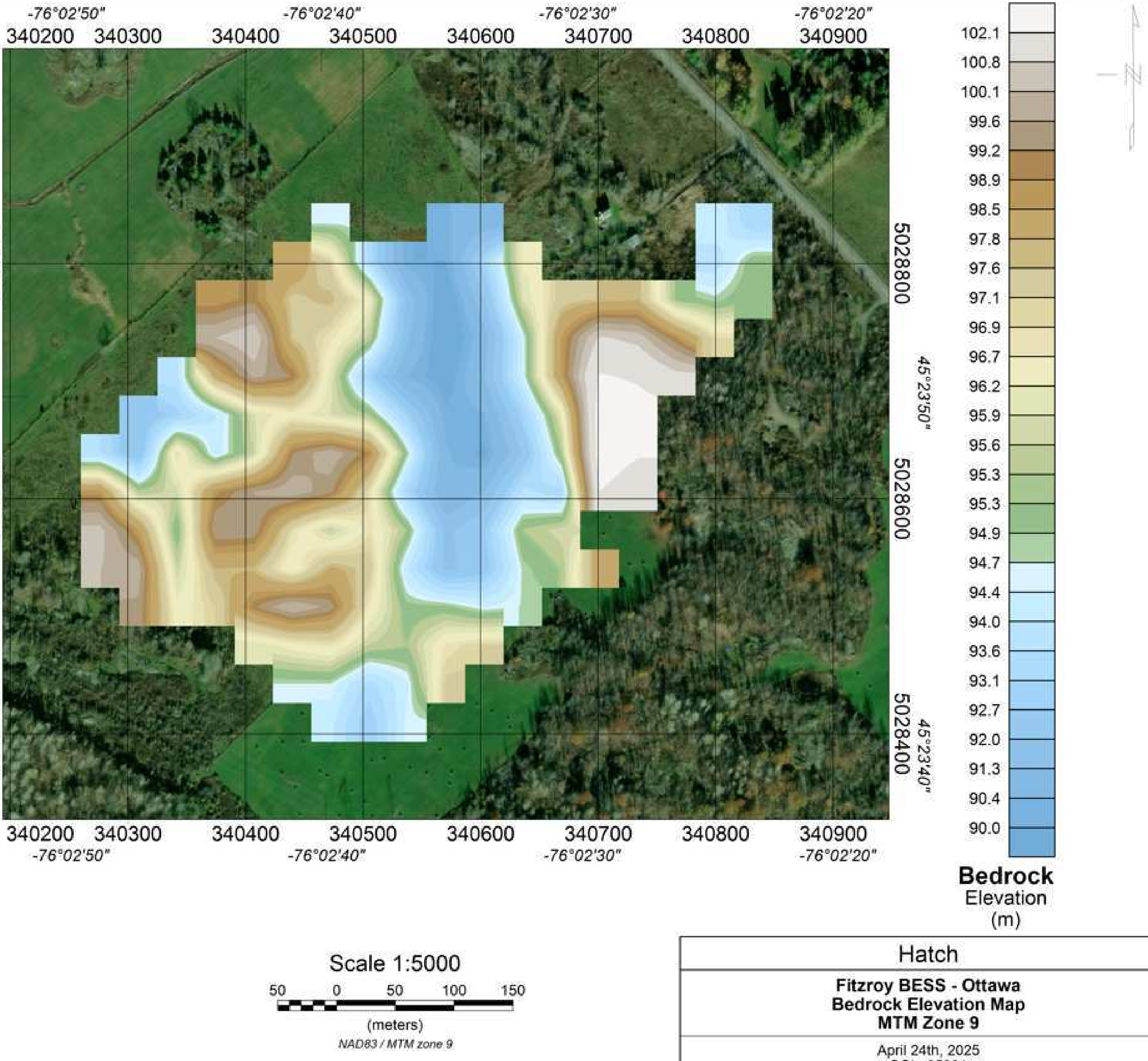
THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-97472.

TULLOCH GEOMATICS INC.
900 MORRISON DR.
SUITE 208
OTTAWA, ON
K2H 8K7
T. 613 721.1138
TF. 800 797.2997
ottawa@tulloch.ca

DRAWN BY: MAL | FILE: 241451

ACAD FILE:P:\2024\241451 EVOLUGEN FITZROY BESS\GEOMATICS\06 PRODUCTION\241451-South March_BESS-MTM9-Rev0.dwg

Appendix C: GPR Scan



Hatch
Fitzroy BESS - Ottawa Bedrock Elevation Map MTM Zone 9
April 24th, 2025 SGL_25381
Simcoe Geoscience Limited

Appendix D: Stormwater Management Report

Evolugen

South March BESS
Ottawa, ON

Technical Report
Stormwater Management Plan and Water Budget Assessment

BBA Document No.-Rev.: 7154023-100000-41-ERA-0001-RAB
June 19, 2025

FOR PERMIT

10 Carlson Court
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Toronto, ON M9W 6L2
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BBAconsultants.com

South March BESS
Technical Report
Stormwater Management Plan and Water Budget Assessment

2025-06-19
FOR PERMIT

LICENSED PROFESSIONAL ENGINEER
E. AMELI
100617996
PROVINCE OF ONTARIO

2025-06-19

Prepared by:
Andrew Siew, EIT

Verified by:
Emmanuel Ameli, P.Eng.
PEO No. 100617996

Approved by:
Mina Shahraki, P.Eng.
EGBC No. 45275

BBA Document No.-Rev.: 7154023-100000-41-ERA-0001-RAB

REVISION HISTORY

Revision	Document Status – Revision Description	Date
RAA	For comments	2025-03-07
RAB	For permit	2025-06-19

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LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. Introduction

The South March Battery Energy Storage System (BESS) project is defined to meet Ontario's growing electricity expenditure and demand by constructing an energy storage facility. The facility will increase renewable grid capacity and storage in addition to providing a low-carbon initiative to avoid greenhouse gas emissions by reducing reliance on higher carbon-intensive facilities.

The South March BESS project is a proposed installation of 250 MW Battery Energy Storage System. The project site is located on 2555 & 2625 Marchurst Road, Ottawa, Ontario and within the Mississippi Valley Conservation Authority. The location is shown in Figure 1 indicated by the red pin.

Figure 1: Site location (source: geoOttawa)

This report has been prepared to summarize the stormwater management plan (SWMP) and water budget assessment for this development and discusses the following:

- Site information;
- The design criteria applied in the development of the stormwater management plan of the BESS project in accordance with applicable standards and guidelines;
- The modeling approach employed to evaluate the stormwater management controls;
- Spill prevention and response;
- Water budget assessment;
- Erosion and sediment control; and
- Maintenance and monitoring.

1.1. Abbreviations and acronyms

The table below lists all abbreviations and acronyms used in this document along with their definition.

Table 1: Abbreviations and acronyms

Abbreviation or acronym	Definition
BESS	Battery Energy Storage System
Dstorm	Design Storm Wizard
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
IDF	Intensity Duration Frequency
MECP	Ministry of the Environment, Conservation and Parks (formerly Ministry of Environment (MOE))
MTO	Ministry of Transportation
MVCA	Mississippi Valley Conservation Authority
SCS CN	Soil Conservation Service Curve Number
SWMM	Stormwater Management Model
SWMP	Stormwater Management Plan
WBA	Water Budget Assessment
TSS	Total Suspended Solids
US EPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture

1.2. Units and symbols

All units of measurement must be in accordance with the International System of Units (SI). If exceptions need to be made, SI shall be used as the primary dimensions, with the corresponding conversion to the other system of units in brackets.

All units used in this document are listed in the following table:

Table 2: Units and symbols

Unit / Symbol	Description
m	Metre
cm	Centimetre
mm	Millimetre
m^3	Cubic metres
s	Seconds
ha	Hectares
min	Minutes
hr	Hour
yr	Year
mbgs	Metres below ground surface
masl	Metres above sea level
MW	Megawatt
MWh	Megawatt-hour

1.3. Codes, standards, regulations, and guidelines

Unless otherwise specified, the design will be based on applicable sections of the following codes, standards, regulations, guidelines, and other reference documents.

Table 3: Codes, standards, regulations, and guidelines

Document code/Author	Document title
City of Ottawa	Official Plan (November 2022)
City of Ottawa	Ottawa Sewer Design Guidelines, SDG002 (October 2012)
City of Ottawa	Sewer Use Bylaw (Bylaw No. 2003-514) (January 2004)
City of Ottawa	Technical Bulletin ISDTB-2014-01, Revisions to Ottawa Design Guidelines – Sewer (February 2014)
City of Ottawa	Technical Bulletin PIEDTB-2016-01, Revisions to Ottawa Design Guidelines – Sewer (September 2016)
City of Ottawa	Technical Bulletin ISDTB-2018-01, Revisions to Ottawa Design Guidelines – Sewer (March 2018)
City of Ottawa	Technical Bulletin ISDTB-2018-04, Revisions to Ottawa Design Guidelines – Sewer (June 2018)
City of Ottawa	Technical Bulletin ISDTB-2019-02, Revisions to Ottawa Design Guidelines – Sewer (July 2019)
City of Ottawa	City of Ottawa Water Budget Assessment guidelines
IEEE 980	Guide for Containment and Control of Oil Spills in Substations
MVC	Mississippi Valley Conservation
Mississippi Valley Conservation Authority (MVCA)	MVCA Regulation Policies (April 2024)
The Mississippi-Rideau Source Protection Region	Mississippi Valley Source Protection Area Assessment report, Chapter 3 water budget, August 2022.
MNR	Ontario Ministry of Natural Resources
Ontario MOE	Design Guidelines for Sewage Works (2008)
Ontario MOE	Stormwater Management Planning and Design Manual (March 2003)
Ontario MTO	MTO Drainage Management Manual (1997)
Province of Ontario	Conservation Authorities Act – Ontario Regulation 41/24
Environment Canada 2005	Environment Canada 2005
US Department of the Interior (H.J. Tracy)	Discharge Characteristics of Broad-Crested Weirs (1957)
US EPA (Lewis A. Rossman)	Storm Water Management Model User's Manual Version 5.1 (September 2015)
USDA	Urban Hydrology for Small Watersheds TR-55 (June 1986)
Ontario Technical Guide to Renewable Energy Approval (REA) under O. Reg. 359/09 of the Environmental Protection Act	

1.4. Reference documents

The reference documents are summarized in Table 4.

Table 4: Reference documents

Document code/Author	Document title
Tulloch	Topographic Plan of Survey of Part of the East ½ Lot 25 and Part of the Southeast ½ Lot 26 Concession 1 Geographic Township of March (241451-South March_BESS-MTM9-Rev0), dated March 11, 2025)
Hatch Ltd.	South March BESS Site Geotechnical Investigation - Hydrogeological and Terrain Analysis Study (H375142-0000-2A4-030-0001), dated March 5, 2025
Hatch Ltd.	South March Battery Energy Storage System (BESS) Preliminary Geotechnical Investigation (H375142-0000-2A0-230-0001), dated February 28, 2025
Hatch Ltd.	South March Battery Energy Storage System (BESS) Fluvial Geomorphology Assessment (H375142-0000-2B0-066-0001), dated June 04, 2025

2. Background

2.1. Site description

The BESS and substation portions of the South March BESS project are approximately 5.1 ha of two properties totalling 84.5 ha at 2625 & 2555 Marchurst Road, Ottawa, Ontario. The project is a proposed installation of 250 MW Battery Energy Storage System (BESS). The proposed development (Figure 2) consists of the BESS area, substation, stormwater pond, and an access road. The substation and wet pond are located on the south and north ends of the site, respectively. Access to the site is provided via road from Marchurst Road. Refer to Appendix A for drawings.

Figure 2: Developed areas for the BESS site (source: Google Earth)

The site is relatively flat with an elevation change of approximately 99 to 104 masl across the site based on MTM zone 9 from the Tulloch site survey. The BESS site runoff is planned to drain north to a proposed stormwater pond in the post-development situation.

The project site is located within the Ottawa River Watershed. The existing watercourse that runs through the site will be redirected through a diversion ditch around the site to exit the developed area and discharge its water to the natural pond located on the north side. The proposed watercourse's new arrangement is shown in Figure 3 (in blue). No municipal drains are present within the site.

The nearby Old Carp Road, located south of the site, is identified as a Scenic Route as per Schedule C13 of the "Official Plan" (City of Ottawa, 2022). The proposed development must meet the requirements of Section 4.6.2, policy 4 of the "Official Plan" as it is adjacent to the Scenic Route. This project follows the policy by having the site located away from Old Carp Road and remaining hidden by existing trees.

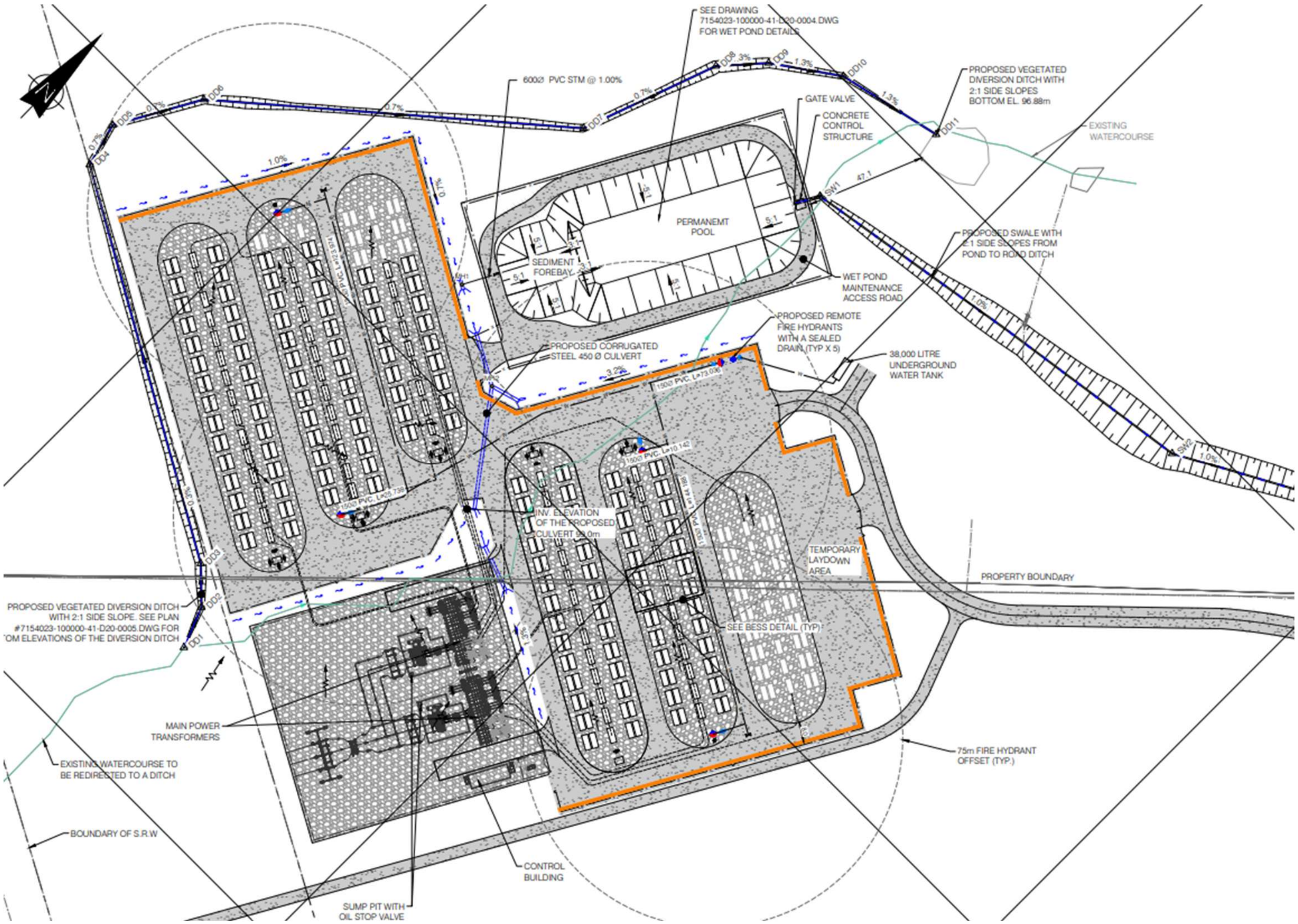


Figure 3: Watercourse path through the BESS site

The stormwater detention wet pond will be used as the end-of-pipe control to manage quantity, quality, and erosion controls. A storm pipe will be installed at the pond outlet that connects to a proposed swale that conveys stormwater from the wet pond to the ditch along the Marchurst road, and then drains to watercourses leading to Constance Lake. This is done to ensure the destination of the water will not change with the construction of the development. (Figure 4).

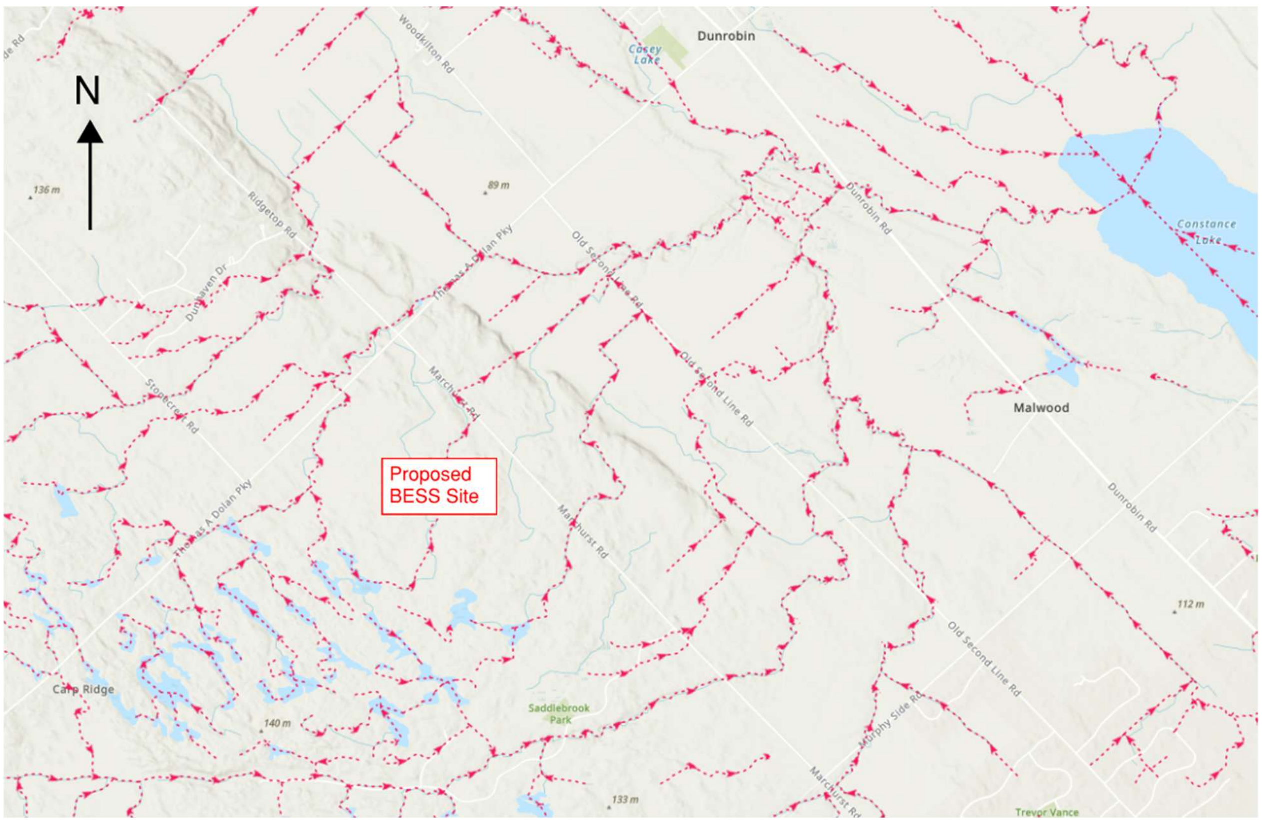


Figure 4: Overland Flow direction (Source: GeoOttawa)

2.2. Regulation area and flooding hazard

The Regulation Limit Boundary, obtained from the MVCA Regulation Map, is shown in Figure 5 and Figure 6. Ontario Regulation 41/24 applies to the lot due to the presence of a waterway (Figure 5). The yellow line shows the regulated zones which are defined in MVCA Regulation Policies as 30 m from wetlands (green line) and 15 m from the 100-yr flood area (red line). The actual setback of the developed area is approximately 150 m from non-Provincially Significant wetlands and 950 m from the 100-year flood line. As the South March BESS site is located outside of the setback of the 100-year flood and wetland area, no flooding hazard is present. Following

MVCA Regulation Policies, the existing watercourse will be redirected through a diversion ditch to maintain the base flow throughout the construction and operation of the site.

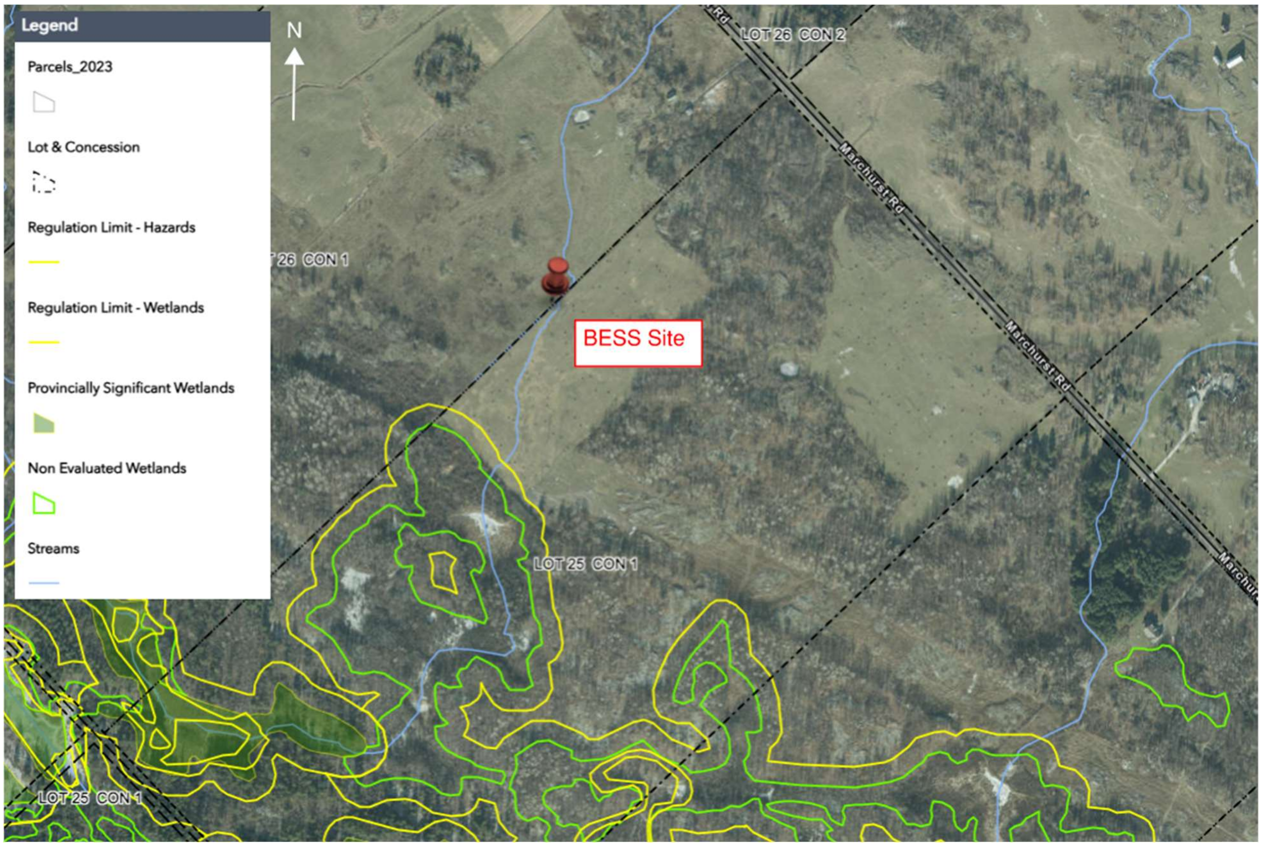


Figure 5: Close up of MVCA regulated areas (Source: MVCA Regulation Public Mapping Browser)

A Provincially Significant Wetland (PSW) is present on the southwest edge of the lot. These wetlands have been determined as being valuable to the environment through acting as a wildlife habitat and a source of clean water through the Ontario Wetland Evaluation System. Surface groundwater could not be observed, which suggests that the wetland is dependent on surface water runoff and appears due to the shallow groundwater table.

No further assessment of the Provincially Significant Wetland is required as it is located approximately 600 m from any developed area. The required setback is 30 m, according to MVCA policies. Furthermore, the site development will not interact with the shallow groundwater table.

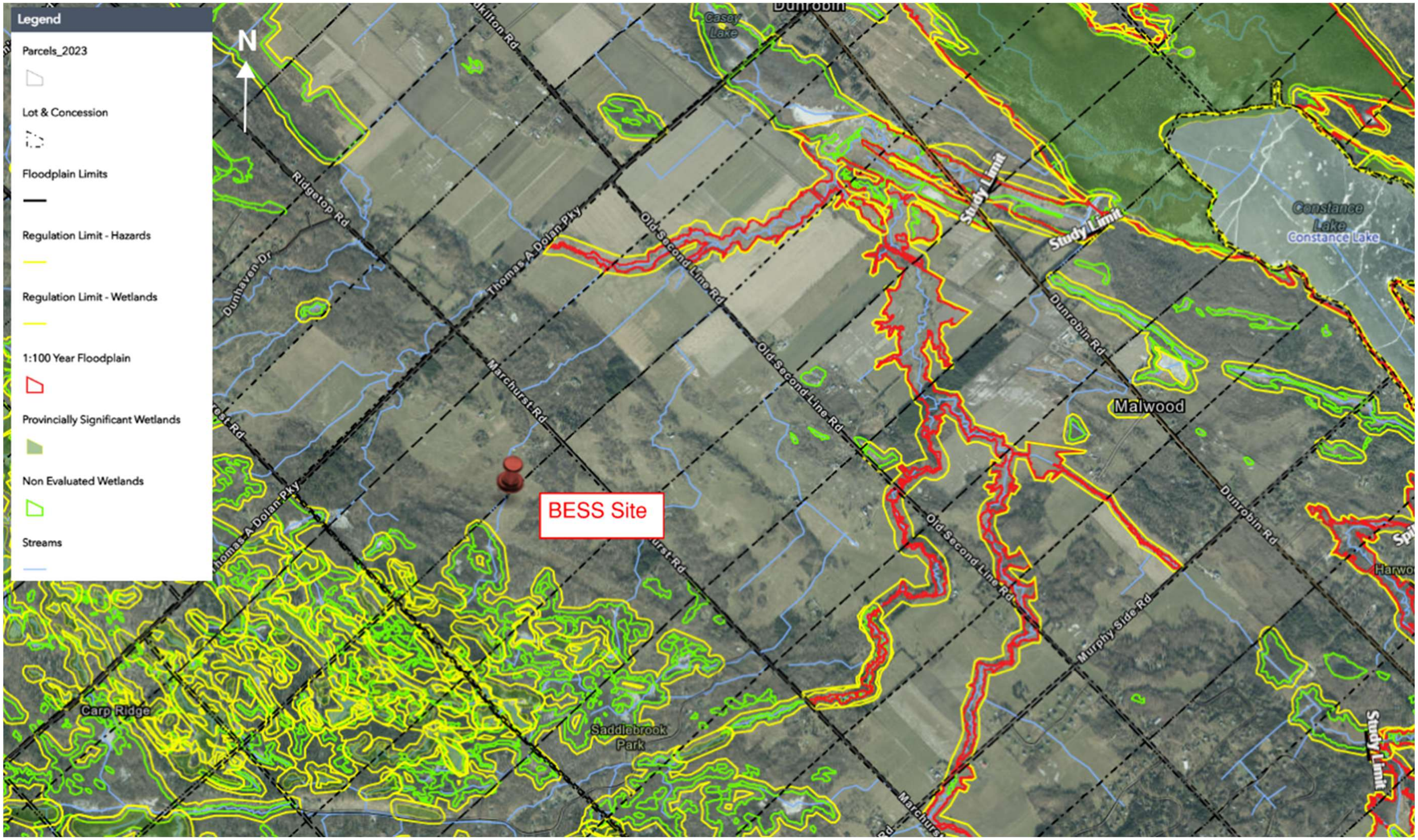


Figure 6: MVCA regulated areas (Source: MVCA Regulation Public Mapping Browser)

3. Water Budget Assessment

A water budget assessment for a battery storage facility site evaluates how water moves into, through, and out of the property, considering both natural and site-specific engineered conditions. The assessment begins by quantifying inputs such as local precipitation and any water supplied to the facility. Outputs like evapotranspiration, surface runoff from impervious surfaces, and infiltration into subsoils are analyzed. Since battery storage facilities are typically characterized by large impervious areas, the assessment emphasizes surface water management and minimizing stormwater impacts through the use of an appropriate stormwater storage facility.

Understanding the site's water budget is essential for regulatory compliance, environmental protection, and operational safety. Effective management of runoff is especially important to prevent flooding, erosion, and potential contamination from accidental spills or leaks of battery chemicals. Additionally, water budget results inform stormwater permitting requirements and guide design features that promote infiltration and reduce peak flows. Overall, a water budget assessment supports both environmental stewardship and long-term functionality of the facility.

3.1. Water Budget Equation

A quantitative evaluation of the movement, storage, and use of water in a watershed over a specific time period is needed for a water budget assessment study. It helps to understand how water enters, flows through, and leaves the watershed.

Quantifying the water budget equation before and after development requires breaking it down into its components and estimating how each is affected. As mentioned, an impervious geomembrane will be laid down across the entire site (except the substation area), so the groundwater has not been considered in the water budget equation for the BESS area. The general water budget equation is:

$$P + I_a = ET + R + I_g + \Delta S$$

Where:

P = Precipitation

I_a = Anthropogenic inputs (e.g., irrigation, imported water)

ET = Evapotranspiration (actual)

R = Runoff

I_g = Infiltration to groundwater (recharge)

ΔS = Change in storage (soil moisture, surface water, groundwater)

Actual evapotranspiration (ET) is the quantity of water that is removed from a surface due to the processes of evaporation and transpiration and is measured in millimeters (mm). For the city of Ottawa, 468 millimeters is considered for evapotranspiration (Statistics Canada, Environmental, Energy and Transportation Statistics Division, 2017).

The amount of precipitation that falls in a watershed is the key factor affecting surface water and groundwater flows. Precipitation is considered to be the only source of water to the watersheds in the Mississippi Valley Conservation Area. Annually, approximately 77% of precipitation in the Mississippi-Rideau Source Protection Region (MRSPR) falls as rain and 23% as snowfall. The driest month of the year is February, and the wettest month is September. The greatest amount of snowfall occurs in December (Mississippi Valley Source Protection Area water budget report-2011). Figure 7 shows average annual precipitation across the MRSPR and the climate stations used to develop these models. For the South March site, 876-900mm is considered for the mean total annual precipitation for both pre- and post-development situations.

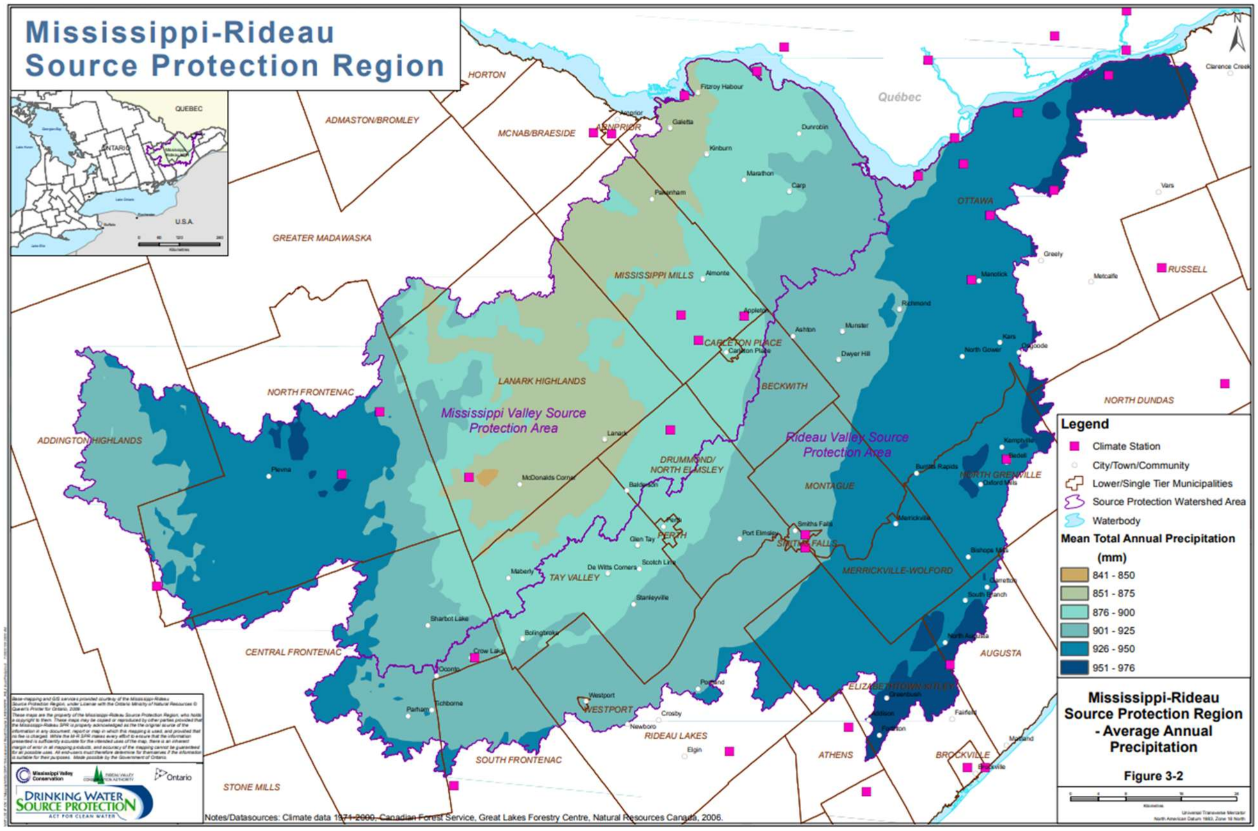


Figure 7: Average annual precipitation across the MRSPR and the climate stations used to develop these models

The average temperature was calculated from the Canadian Forest Service data as the average of minimum and maximum temperatures. Average annual temperature varies across the MRSPR from 4°C in the west to 7°C in the southeast. Figure 8 shows the distribution of average annual temperature across the MRSPR. Based on this figure, the average annual temperature for the site area is from 5.1°C to 6.0°C.

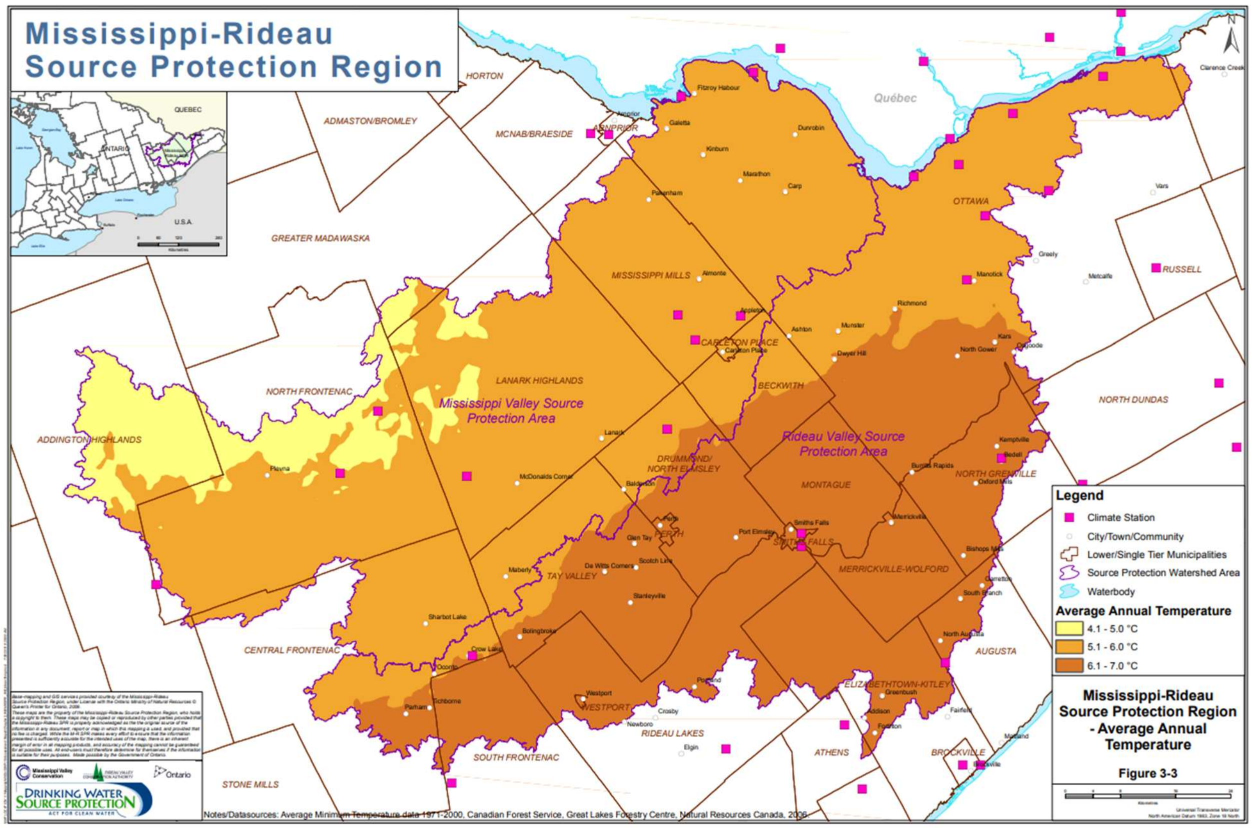


Figure 8: Average annual temperature - Environment Canada Great Lakes Forestry Study (McKenney et al., 2006)

Based on the type of soil and the PCSWMM model, on average, 70% of the net rainfall (precipitation minus evaporation) will infiltrate into the soil in pre-development conditions. In the post-development situation, a geomembrane layer will be installed across the entire site (except the substation), and so there will be no infiltration in the development boundary except the substation area. The proposed ditches around the site and the wet pond will also be equipped with an impervious geomembrane, so the runoff flow from the battery area will be collected and discharged to the stormwater storage facility directly without having any infiltration.

The evapotranspiration (ET) ratio for different ground covers—like grass and gravel—refers to how much water is lost to the atmosphere through a combination of evaporation and plant transpiration. Since the site's natural surface is undisturbed, the ET rate is assumed to be 1.0. For the post-development condition, the ET rate is calculated to be 0.3, based on the weighted average of gravel and concrete surfaces. In Table 5, pre-development (natural/undeveloped land) and post-development conditions are compared.

Table 5: Comparison Table: Pre- vs. Post-Development (per 1000 mm/year)

Component	Pre-development (mm)	Post-development (mm)
Precipitation (P)	888	888
ET	468	193
Runoff (R)	126	648
Infiltration (I_g)	294	47
Anthropogenic Input (I_a)	N/A	N/A
Anthropogenic Output	N/A	N/A

3.2. Groundwater and surface water flow

The site-specific hydrogeological and geotechnical conditions are an important input to be considered in the planning and design of the stormwater management plan.

The site lies in the Ottawa Valley Clay Plain physiographic region. This region commonly has thick layers of sensitive marine clay, silty clay, and silt from the Champlain Sea Basin. These layers typically lie on top of a relatively thin layer of glacial till and glaciofluvial deposits which overlie bedrock (Hatch, 2025).

Geotechnical site investigations were conducted by Hatch Ltd. at the BESS site. The soil conditions consist of a 100 to 600 mm thick layer of non-organic topsoil. Localized areas of different topsoil thickness with varying organic content are expected throughout the site, depending on the topography. A layer of 0.5 m to 0.6 m silty sand was encountered at two of the nine boreholes, which was underlain by silty clay. The remaining boreholes encountered a layer of silty clay, 0.2 m to 4.8 m thick, underneath the topsoil. A bedrock core was taken at 6.1 m below ground surface underneath the silty clay layer at Borehole FY24-1(located at the south end of the proposed developed area). Additionally, bedrock outcrops were observed throughout the site which will be challenging to excavate due to the strength of the rock. Large hydraulic rock breakers with enough percussive force to break the rock should be used if blasting techniques are not allowed (Hatch, 2025). The bedrock surface is verified using ground-penetrating radar (GPR) scanning.

The Creek in the Project site drains a watershed area of approximately 0.35 km^2 in the area upstream (west) of the Project site and is located at the beginning of the watershed (the headwater zone of the watershed), which drains into Constance Lake. Note that the headwater streams have relatively steeper slopes compared to the downstream zones, with a V-shaped valley. Hydrological analysis, including catchment and stream delineation, was performed using ArcGIS to assess surface flow directions. Figure 9 shows the drainage patterns within the study area using the topographic data (Hatch, 2025).

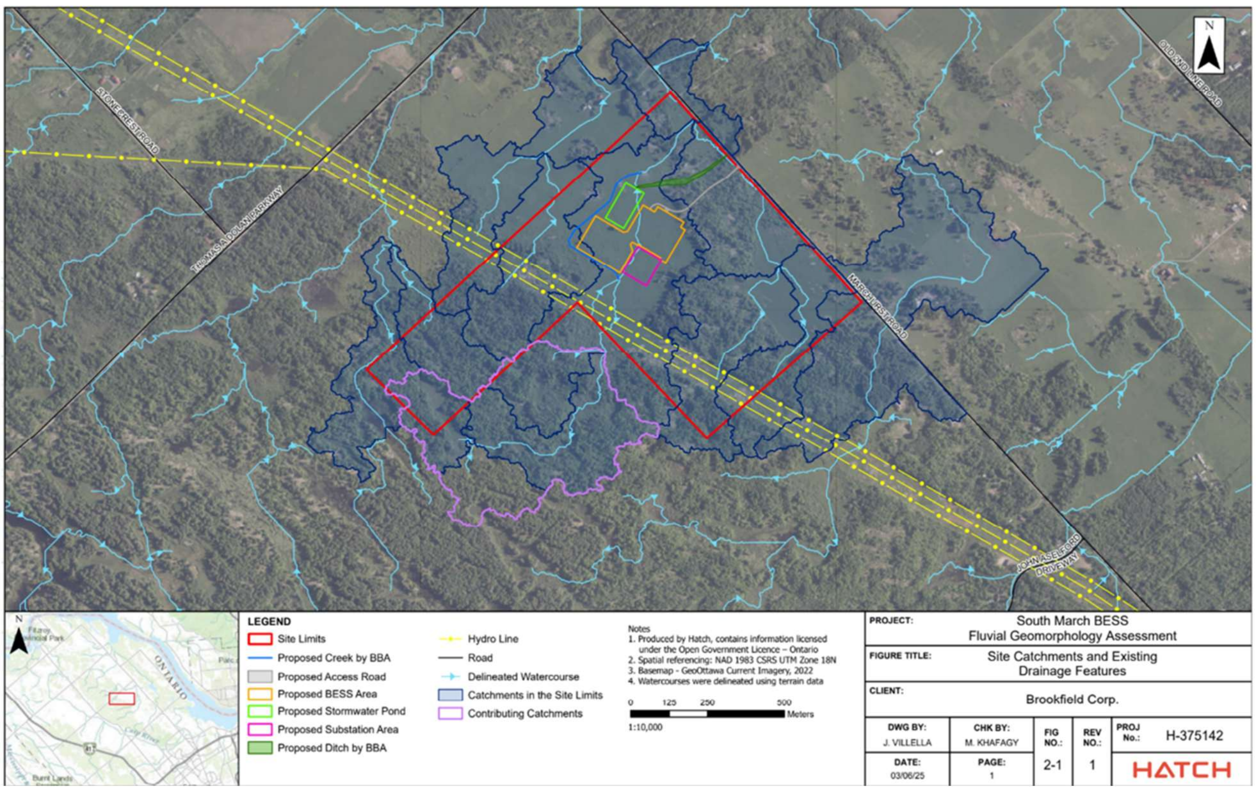


Figure 9: Catchments Within the Study Area with Existing Drainage Features and General Drainage Patterns

Hatch installed a monitoring well in Borehole FY24-1. Groundwater was measured at depths ranging from 1.0 m to 1.3 m below the ground surface in the middle of the site and is expected to fluctuate with the seasons (Hatch, 2025). Moreover, based on the site visit, the BBA team observed saturated soils along the Creek corridor, the presence of stagnant water zones, and high groundwater levels (as identified in the geotechnical investigation) in the proposed development area. Which means that infiltration-based SWM storage facilities may not be suitable for this site.

3.3. Sensitive features

Within the study area, it is crucial to identify and map all sensitive surface water and groundwater features to ensure their protection through targeted management strategies. Sensitive surface water features may include rivers, lakes, wetlands, and streams that support biodiversity, provide drinking water, or are integral to cultural and recreational values. Similarly, vulnerable groundwater resources, such as shallow aquifers or those connected to surface water systems, require detailed hydrogeological assessments to determine their recharge zones, flow patterns, and susceptibility to contamination. As mentioned before, within the proposed development area, there is an existing stream that will be filled and replaced with a diversion ditch on the west side of the batteries. Moreover, an impervious geomembrane will be laid down across the whole site (except the substation area, which does not have any batteries). The clearing and grubbing area during the construction will be limited to this development boundary, and the rest of the project site will not be disturbed. The purpose of the erosion and sediment control plan is to protect the existing stream during the construction, so the water that flows into this ditch will be clean and can be discharged to the right-of-way without any contamination. After the construction and during the operation period, the runoff flow will be drained to the proposed ditches around the site (these ditches are separated from the diversion ditch). This drainage pattern is supported by the finished grades of the site and can guarantee the required protection for the groundwater and the surface water.

Establishing clear protection targets for these sensitive features depends on a comprehensive understanding of their ecological functions, water quality status, and exposure to threats such as pollution or land use change. Based on the SWM design, this site will use a wet pond equipped with an impervious geomembrane (as a liner) and a gate valve. The wet pond structure will remove a minimum of 80% of the total suspended solids (TSS) from stormwater runoff and work as a detention storage facility. And the gate valve can block any contamination that may be discharged to the right-of-way in case of emergency.

3.4. Climate change

Technically, climate change study is in two ways: by documenting current climate change information available for the region for the next 25 years, and by considering how climate change may affect results found in the Assessment Report. Trend data for the region shows that some changes in temperature and precipitation patterns have already occurred over the past fifty years, and these patterns continue to change in the MRSPR during the next thirty years (chapter 7 of the Mississippi Valley Source Protection Area Climate Change Assessment Report, 2022).

The list of the major changes is as follows:

- An increase in air temperatures in both warm and cold seasons in the range of 0-2°C by 2040 is projected for eastern Ontario;
- Minimum temperatures are projected to increase at a faster rate than maximum temperatures;
- Monthly precipitation patterns and amounts are projected to change;
- Evapotranspiration (ET) is anticipated to increase. Approximately 60% of water is currently lost through ET, the remainder leaving as surface water flow; and
- Weather variability is projected to increase, with increased frequency of weather extremes and events.

Studies conducted by source protection planning demonstrate that climate change will bring warmer temperatures to the Eastern Ontario region in the next thirty years (and beyond) and eventually will impact the groundwater and surface water quality and quantity. Table 6 shows the Monthly Average Climate Data for Drummond Centre (MVSPA) and Kemptville (RVSPA) 1954-2004.

Table 6: Monthly Average Climate Data for Drummond Centre (MVSPA) and Kemptville (RVSPA) 1954-2004

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
A) MVSPA - Drummond Centre													
Precipitation (mm)	61	55	59	65	73	76	75	77	81	74	80	71	848
Snow water equivalent (mm)	42	38	30	9	1	0	0	0	0	2	16	44	181
Rainfall (mm)	16	17	29	57	72	76	75	77	81	72	64	27	667
Temperature (°C)													
Min.	-15	-14	-7	0	7	11	13	12	8	2	-3	-10	0
Max.	-4	-3	4	12	20	24	27	26	20	13	5	-2	12
Mean	-10	-9	-2	6	13	18	20	19	14	8	1	-6	6
Potential ET1	0	1	6	33	82	116	135	112	71	34	10	1	602
B) RVSPA - Kemptville													
Precipitation (mm)	61	60	63	72	79	79	84	81	85	77	80	77	898
Snow water equivalent (mm)	42	37	36	11	0	0	0	0	0	3	18	45	192
Rainfall (mm)	25	20	34	64	75	80	85	84	83	74	65	34	722
Temperature (°C)													
Min.	-14	-14	-10	-3	4	10	13	13	10	5	0	-8	1
Max.	-5	-4	0	8	16	22	26	26	22	17	9	0	11
Mean	-9	-9	-5	3	10	16	19	19	16	11	5	-4	6
Potential ET1	0	1	6	32	82	115	132	108	70	34	10	1	591
1. All Values are measured except for potential ET. Potential ET is calculated (Thornthwaite and Mather).													

Notes:
MVSPA - Mississippi Valley Source Protection Area
RVSPA - Rideau Valley Source Protection Area

Recent temperature data indicates that Ottawa has experienced an increase in temperatures in the past 50 years. Average winter temperatures have increased approximately 1.5°C, spring temperatures have increased approximately 1.0°C and summer temperatures have increased

0.5-0.7°C. Fall temperatures were the exception, not showing any major change (chapter 7 of the Mississippi Valley Source Protection Area Climate Change Assessment Report, 2022). The following table shows the projected maximum (tmax) and minimum (tmin) seasonal temperatures for the period 2010-2039 from the base period 1984-2003, as calculated by Mississippi Valley Conservation (MVC). Table 7 shows the projected maximum (tmax) and minimum (tmin) seasonal temperatures for the period 2010-2039 from the base period 1984-2003, as calculated by MVC.

Table 7: Projected maximum and minimum seasonal temperatures for 2010-2039 (Source: Chapter 7 of Mississippi Valley Source Protection Area Climate Change Assessment Report, 2022)

Projected Temperature Changes
For the period 2010-2039 (0C/30yr)

Summer	tmax	tmin	Fall	tmax	tmin
June	0.9	0.9	September	0.9	0.6
July	1.2	1.5	October	0	0.3
August	0.9	0.9	November	1.2	0.3
average	**1**	**1.1**	**average**	**0.7**	**0.4**
Winter	**tmax**	**tmin**	**Spring**	**tmax**	**tmin**
December	0.6	1.2	March	0.3	1.5
January	2.4	5.1	April	0.6	1.5
February	0.9	1.8	May	2.1	1.2
average	**1.3**	**2.7**	**average**	**1**	**1.4**

Trend data for Ottawa demonstrates a statistically significant increase in the number of days with heavy rain (greater or equal to 95 percentile rainfall), with other stations immediately surrounding the region having non-significant increases in the 1950-2003 period. Although there is no strong indication of trend at this time, the percentage of precipitation that falls as winter rain or occurs as freezing rain may rise as winter temperatures increase. The trend in the number of freezing rain hours per year shows a small but steady increase (Environment Canada 2005).

MVC predicted the changes in precipitation as below:

- Fall (September, October, and November) precipitation will increase by 2039.
- Winter (December, January, and February) precipitation will decrease in December, with increases in January and February.
- Spring (March, April, and May) precipitation will show no change in April and decreases in March and May by 2039.
- Summer (June, July, and August) average precipitation projections by 2039 indicate an increase in June and July with a decrease in August.

3.5. Implementation plan

To meet post-development water budget targets for the battery storage facility site, the design should incorporate a combination of low-impact development (LID) strategies and stormwater best management practices (BMPs). The main purpose is to retain runoff on-site, promote infiltration, and match pre-development flow volumes and peak discharges. However, since an impervious geomembrane is used for most of the site area, the runoff flow from the BESS area will be collected and discharged to the wet pond. The Hydrologic models (PCSWMM model) confirm that total runoff and infiltration volumes under post-development conditions align with target thresholds, even with having an impervious layer across the site (except the substation area). Evapotranspiration is maintained where possible through using vegetated ditches around the site.

Downstream mitigation measures have been evaluated based on watershed modeling and local hydraulic capacity. No immediate downstream channel reinforcements are required, but monitoring will be conducted during the first operational year to detect any unforeseen impacts. Should flow exceedances be observed, wet pond or conveyance improvements will be coordinated with local agencies and adjoining landowners. The plan also anticipates future climate conditions, incorporating stormwater infrastructure designed for higher-intensity rainfall events.

4. Stormwater management plan

4.1. SWM concept

The South March BESS site stormwater management concept is to collect and discharge the runoff from the developed area to a proposed stormwater pond north of the developed area to manage the stormwater quantity and quality and provide erosion control for the site. This concept is to prevent discharging the stormwater to the existing watercourse and adjacent properties. Refer to Appendix A for the site serving and fire protection drawing.

The proposed stormwater system consists of a network of culverts and ditches, which collect all the surface runoff (except the substation area) and discharge to the wet pond. The storm system is designed for the 100-yr (major storm) event. The wet pond will be designed such that the 100-yr post-development peak flow will match the 2-year pre-development peak flow rate.

The increased runoff resulting from using an impervious geomembrane across the entire site (except the substation area) will be directed to ditches around the substation and the battery container area, which eventually flows to the wet pond; the drains will help protect the development from flooding as required by Section 4.7.1 policy 6 of Ottawa's Official Plan.

The entire storm network, including the pond and pond outlet structure, will be sized to manage the stormwater demand from the BESS site and meet all applicable standards and guidelines; these are described further in Section 5.3.4.

There will be no change in the drainage pattern for the rest of the site (undisturbed areas), so runoff flow is calculated and compared in pre- and post-development situations only for the disturbed area. It should be mentioned that the existing stream will be replaced with a diversion ditch on the west side of the site to drain the runoff flow coming from the upstream of the watershed.

The surface materials of the proposed BESS site are composed of gravel for the roads, substation and BESS area; concrete for substation equipment, building foundations and for miscellaneous equipment in the BESS area; as well as, grass and vegetation elsewhere. A geomembrane will be laid down across the entire site, except the substation area, to protect underground water in case of any chemical material leakage. The proposed vegetated ditches and the wet pond will be equipped with the geomembrane too.

4.2. Design criteria

The stormwater management design criteria are based on the guidelines outlined in the Ministry of the Environment, Conservation and Parks (MECP), formerly the Ministry of Environment (MOE) "Stormwater Management Planning and Design Manual" (MOE, 2003) (refer to Table 3).

A summary of how each SWM criteria is addressed is provided in Table 8. A discussion of the design criteria and the applied control measures is included in this section.

Table 8: Summary of stormwater management design criteria

SWM Criteria	Subcomponent	Control measures
Water Quantity	Peak Flow Control	▪ The proposed stormwater detention pond will be used for quantity control.
	Volume Control	▪ Site-specific conditions limit the use of L.I.D. features, namely: high groundwater table and exposed bedrock in some locations. ▪ No additional volume control measures are required.

SWM Criteria	Subcomponent	Control measures
	Major-Minor System Conveyance	▪ A system of culverts and ditches will collect the BESS site's surface runoff and discharge the major storm (100-yr) to the wet pond.
	External Drainage Conveyance	▪ Not applicable.
Water Quality	Suspended Solids	▪ The proposed stormwater detention pond will be used for quality control.
	Temperature	▪ The wet pond will have plants along the banks and top of the pond/forebay to minimize insolation of the permanent pool volume.
	Other Contaminants	▪ Oil-water separator system will be implemented to manage the risk of oil spills from the oil-filled transformer in the substation area.
Stream Erosion Control		▪ Runoff from a 25-mm design storm (4-hour, Chicago distribution) will be detained and released over a period of at least 24 hours.
Water Balance/Groundwater Recharge		▪ Water balance study and the groundwater quality and quantity assessment are discussed in this report and in Hatch's Hydrogeological report.
Erosion and Sediment Control		▪ Erosion and sediment control plan to reduce, contain, and treat sediment-laden runoff. More details are in Section 7 of this report.

Water quantity

The stormwater detention wet pond will be used for water quantity control under normal operational and emergency conditions. For normal operational conditions, the proposed pond size has been evaluated to ensure that the 100-yr post-development peak flow rates of the BESS site do not exceed the 2-yr pre-development flow values. The pond is equipped with a weir and reverse-sloped pipe (orifice) to pass these design storm flow rates. An emergency gate valve will be installed in the control structure to protect the right-of-way from any potential contamination that may be discharged to the ditch along the Marchurst Road.

In general, storm sewers must be designed to convey design flows when full or when the hydraulic grade line (HGL) is at or below the crown of the pipe. However, in some instances, the HGL may be elevated due to boundary conditions. In this project, the on-site stormwater network is designed to have the maximum hydraulic grade line elevation min. 0.3 m below the finished grades of concrete foundations for the 100-yr event (Ottawa Sewer Design Guidelines, Oct 2012).

Water quality

Wet ponds usually require a minimum drainage area of about 5 hectares to sustain the permanent pool. In this site, due to the high local groundwater table, a wet pond will be used as an end-of-pipe stormwater storage facility. Wet ponds are the most common end-of-pipe stormwater management tool and are normally reliable in operation, especially during adverse conditions (e.g., winter/spring). The stormwater pond will be used for water quality control as the end-of-pipe SWM facility. The proposed pond has been evaluated to ensure it provides water quality, erosion, and quantity control. The pond will provide an Enhanced Level (80% removal of suspended solids) of water quality treatment according to “Stormwater Management Planning and Design Manual” (Ontario, 2003). The permanent pool volume required for the wet pond for water quality control is per Table 3.2 “Water Quality Storage Requirements based on Receiving Waters” (MOE, 2003). The role of the permanent pool is to minimize the resuspension and blockage of the outlet. Moreover, it provides extended settling and removes the biological pollutants. It should be mentioned that the runoff flow of the BESS site will not be mixed with the water from the existing streams (which will be replaced with the proposed diversion ditch) within the lots.

A sediment forebay facilitates maintenance and improves pollutant removal by trapping larger particles near the inlet of the pond. Furthermore, vegetated ditches will provide water quality pre-treatment upstream of the wet pond through the removal of suspended solids.

The potential release of oil to the environment from transformers will be managed to meet water quality objectives. The oil-filled substation transformer will have a secondary containment and a sump pit with an oil control system to eliminate the risk of spills to the environment. See Section 6 for further details.

Stream erosion control

Erosion control is implemented to protect the receiving watercourses downstream of the site vulnerable to erosion. The stormwater pond has been evaluated for erosion control by controlling runoff from more frequent storm events, corresponding to a 4-hour 25-mm Chicago storm, detained for 24 hours. The pond is equipped with a reverse-sloped pipe (which acts as an orifice) to meet the detention time requirements.

Water balance

The groundwater level was measured during and after drilling at depths from 1.0 m to 1.3 m bgs. These shallow groundwater levels were found in boreholes located in the middle of the development area, which constitutes approximately 50% of the developed areas. In the remaining area, no groundwater was observed. Using the measurements of groundwater level, it appears that the groundwater generally moves towards the northeast and southwest of the site (Hatch, 2025).

Groundwater levels at the site are expected to fluctuate seasonally. Higher groundwater levels are anticipated during wet periods, such as spring or after prolonged precipitation events. Groundwater flow is shown in Figure 10. Refer to Hatch's Hydrogeological and Terrain Analysis Study (H375142-0000-2A4-030-0001) for more information.

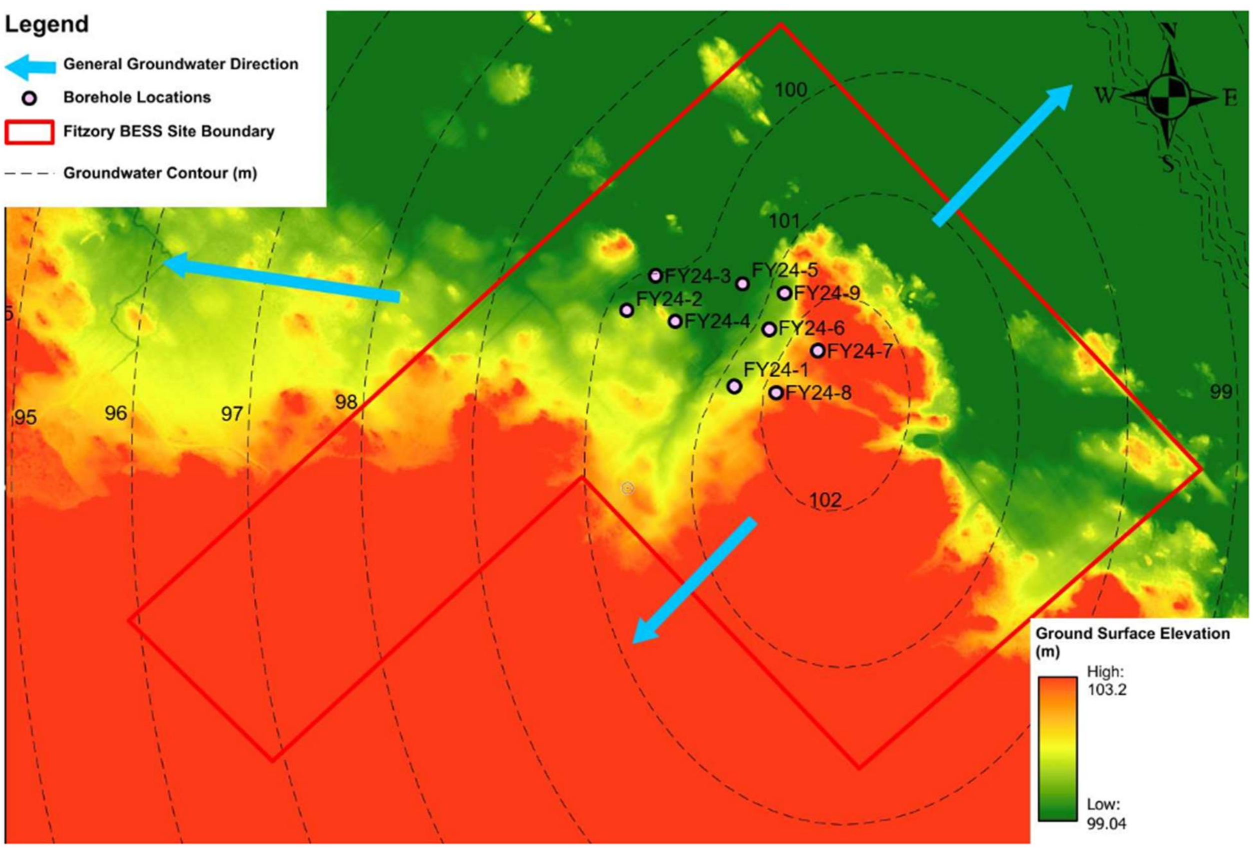


Figure 10: General groundwater flow
(Source: Hydrogeological and Terrain Analysis Study: Figure 2-3 – Hatch, 2025)

As previously stated, an impervious geomembrane will be laid down across the whole site (except the substation area) to protect the groundwater from any potential contamination. Because there will be no battery in the substation area, a geomembrane is not needed for this area.

Erosion and sediment control

Erosion and sediment control (ESC) measures will be incorporated during the phases of the project: prior to construction (grubbing, pre-grading), construction, and post-construction, to reduce sediment-laden runoff.

Ditches within the BESS site will be grass-lined and designed such that velocities are within permissible velocities to prevent erosion.

Refer to Section 7 for more details on ESC.

Planting Strategy

A planting strategy is required for the wet pond to provide shading, aesthetics, safety, bird control, enhanced pollutant removal, and other benefits. The environmental consultant of the project will provide more details in the detailed design process.

5. SWM modeling

The Computation Hydraulics Inc. (CHI) PCSWMM software version 5.2.4 was used for modeling the pre- and post-development storm scenarios. SWMM is a dynamic rainfall-runoff simulation model used for single-event or long-term (continuous) simulation of runoff quantity and quality for primarily urban areas. The software was used to simulate overland flow and routing through various hydraulic structures such as swales, pipes, culverts, weirs, orifices, and the wet pond. The calculations for the stormwater management facility sizing are attached in Appendix C with the SWMM modelling results in Appendix D.

5.1. Parameters and assumptions

5.1.1. Topography

For the pre-development site, sub-catchment areas were delineated based on the topographic survey “241451-South March_BESS-MTM9-Rev0” received from Tulloch in March 2025; refer to

Appendix D. For post-development conditions, sub-catchment areas were delineated based on the layout of the proposed drainage system and the proposed grading design.

5.1.2. Storm events

Storm events of 2-, 5-, 10-, 25-, 50-, and 100-year return periods of the 12-hour SCS Type 2, 24-hour SCS Type 2, 3-hour Chicago, and 6-hour Chicago storm distributions, obtained from "Ottawa Sewer Design Guidelines Second Edition" (City of Ottawa, 2012), were simulated for the pre- and post-development conditions for evaluating the quantity control.

IDF data was obtained from the MTO IDF Curve Lookup website (MTO, 2010); refer to Appendix B. The resulting IDF curves are taken from a location approximately 2 km east of the site at 2520 Old Second Line Road. The IDF curves were input into Dstorm to derive hydrographs for the SCS Type 2 and Chicago storm distributions. The 25-mm storm event utilizing a 4-hour Chicago storm distribution was also simulated in the post-development condition for evaluating the erosion quality control.

5.1.3. Hydrologic parameters

The infiltration and runoff potential of soils can be defined by the Soil Conservation Service Curve Number (CN). The CN values for the soils on the BESS site were selected based on findings from the "Hydrogeological and Terrain Analysis Study (H375142-0000-2A4-030-0001)" (Hatch, 2025) and Geotechnical Investigation (Hatch, 2025). The findings of these two reports suggest that the site soils have decent infiltration capacity, but that the groundwater table is high.

The site consists of two main soil types which were identified using geological data from Geology Ontario: Till in the northwest and southeast and Offshore Marine Deposits in the center. The Till is composed of sandy and silty diamicton, which is calcareous when formed from sedimentary rocks that have not been leached. The calcareous composition indicates moderate drainage capacity; this means the area is suitable for surface-level construction without significant concerns for water retention or drainage issues. The Offshore Marine Deposits consist of clay, silty-clay and silt. The composition of the soil suggests low permeability in the area (Hydrogeological and Terrain Analysis Study – Hatch, 2025).

The hydrologic soil group is expected to be soil group "BC" with a CN value of 69 for the project site. The estimated Horton infiltration rate is 9 mm/h (minimum infiltration rate) to 170 mm/h (maximum infiltration rate) as per the MTO Drainage Manual. The site soil condition is suitable for infiltration (Hatch, 2025).

The CN values are summarized in Table 9. For sub-catchments having mixed surfaces, a weighted average was used in the model.

Table 9: Curve number

Surface	Curve Number
Native site soils / Grass	69
Gravel	85
Concrete	98
Areas with geomembrane	98

The pre-development runoff coefficient is the lesser value between 0.5 and the value described in "Sewer Design Guidelines" (City of Ottawa, 2012) and any of the technical bulletins. Based on the type of vegetation, the runoff coefficient value for the pre-development site is 0.25 on average.

For overland and drainage system flows, Manning's roughness coefficients and discharge coefficients were obtained from the "EPA SWMM User's Manual Version 5.1" (Rossman, 2015) as well as Appendix 6-C.1 of "Ottawa Sewer Design Guidelines" (City of Ottawa, 2012). These are presented in Table 10 and Table 11. The discharge coefficient for the weir is determined based on the water depth over the weir to width of weir ratio, per the "Discharge Characteristics of Broad-Crested Weirs" (Tracy, 1957).

Table 10: Manning's n

Surface	Manning's n
Grass, short (overland flow)	0.15
Gravel (overland flow)	0.09
Concrete	0.013
Grass (open channel)	0.03
Drainage pipe, material type to be finalized (closed conduits)	0.013

Table 11: Discharge coefficient

Parameter	Discharge Coefficient
Weir	1.8
Orifice	0.63

5.2. Pre-development results

The pre-development sub-catchments, within the property limits of the BESS site, are shown in Figure 11.

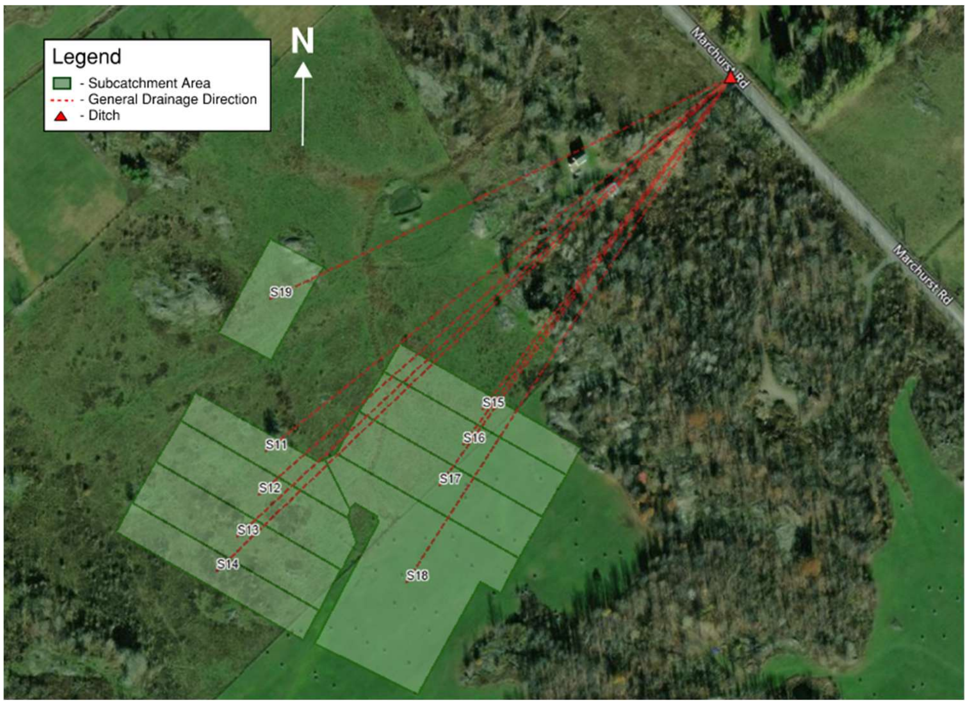


Figure 11: Pre-development sub-catchments (From PCSWMM model)

The sub-catchments are delineated by the extents of the proposed BESS layout and the flow lines of the surface runoff; the existing site appears to drain northeast to the existing ditch based on the topographic survey. In post-development conditions, the runoff flow will be discharged to the same ditch in front of the site, so there will be no change in the drainage pattern of the watershed in general.

Details of the sub-catchment areas are summarized in Table 12.

Table 12: Sub-catchment area characteristics

Sub-catchment	Total Area (ha)	Grassed Area (ha)	Impervious Area	CN
S11	0.33	0.33	0%	69
S12	0.58	0.58	0%	69
S13	0.59	0.59	0%	69
S14	0.41	0.41	0%	69
S15	0.39	0.39	0%	69
S16	0.58	0.58	0%	69
S17	0.57	0.57	0%	69
S18	1.32	1.32	0%	69
S19	0.37	0.37	0%	69

To meet quantity control requirements, the 100-yr post-development controlled outflow rates from the pond should be equal to or less than the 2-yr pre-development flow rates of the site. The pre-development peak flow rates of the site are summarized in Table 13 and Table 14 for the SCS Type 2 and Chicago storm distributions, respectively.

As mentioned before, the pre-development runoff coefficients are in the range of 0.25 for all catchments in the pre-development situation, which means that the C factor (runoff coefficient) is less than 0.5.

The SCS Type 2 storm distribution consistently results in higher runoff volumes and peak flow rates. As such, the SCS Type 2 distribution will be used for the stormwater design and to evaluate the stormwater management controls. According to the City of Ottawa Sewer Design Guidelines, the minor system for local, collector, and rural arterial roads shall be designed to accommodate a 5-year return period. But to be more conservative and similar to some other projects located in the city of Ottawa, the 100-year post-development flow will be limited to a 2-year pre-development flow in this project.

The pre-development contours are shown in Figure 12.

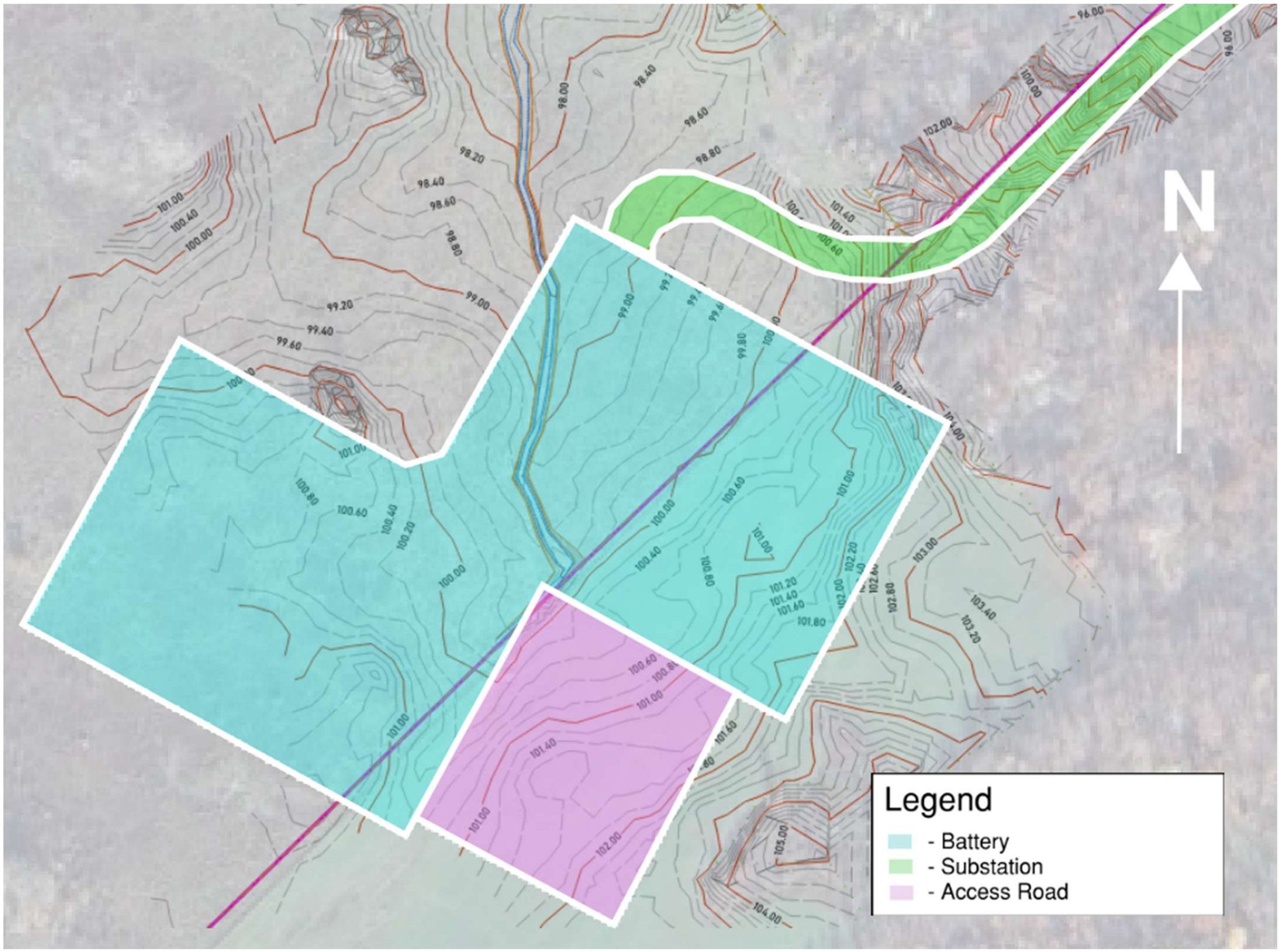


Figure 12: Pre-development contours
(contour lines from survey file: 241451 Fitzroy BESS-MTM9-Rev0)

Table 13: SCS Type 2 storm pre-development flows (for the developed areas)

Site	Return Period	100-Year	50-Year	25-Year	10-Year	5-Year	2-Year
	Duration	m³/s	m³/s	m³/s	m³/s	m³/s	m³/s
BESS Site, including the substation	12-hr	0.244	0.191	0.145	0.095	0.061	0.028
	24-hr	0.330	0.268	0.211	0.139	0.089	0.040

Table 14: Chicago storm pre-development flows (for the developed areas)

Site	Return Period	100-Year	50-Year	25-Year	10-Year	5-Year	2-Year
	Duration	m³/s	m³/s	m³/s	m³/s	m³/s	m³/s
BESS Site, including the substation	3-hr	0.093	0.073	0.056	0.037	0.025	0.011
	6-hr	0.123	0.095	0.073	0.078	0.032	0.015

5.3. Post-development results

The stormwater management modeling results and details of the stormwater management design are presented in the following section.

5.3.1. Proposed pond description

A wet pond is proposed as a stormwater storage facility for this project due to the following advantages:

- The performance of the pond does not depend on soil characteristics;
- The permanent pool minimizes re-suspension;
- The permanent pool minimizes blockage of the outlet;
- Biological removal of pollutants occurs;
- The permanent pool provides extended settling.

The wet pond has a 10m x 20m forebay and 68.5m x 24.5m main pond, measured at the bottom of the pond (i.e., at elevation 95.5 m). The bottom of the forebay and main pond are at 95.8 m and 95.5 m, respectively. A berm separates the forebay and main pond areas. The pond uses

5:1 side slopes. The forebay length-to-width ratio is 2:1, and the overall pond length-to-width ratio is 3.6:1, which aligns with MOE guidelines.

The inlet structure to the pond is a 900 mm HDPE pipe. The invert elevation of this pipe is 97.0 m.

A 100-mm diameter reverse-sloped pipe (modelled as an orifice) and a weir are the outlet structures for the pond. These discharge to a concrete control structure, which has a 600-mm diameter pipe and emergency weir as its outlets.

The reverse sloped pipe has an inlet invert elevation of 96.0m and an outlet invert elevation of 96.8 m. The weir has a width of 1.5 m and invert elevations of 97.90 m. Under normal operating conditions, the 600 mm diameter HDPE pipe routes the pond outflow to the ditch located on the northeast side of the BESS site. Whereas in the emergency scenario, the overflow weir discharges the pond outflow onto that ditch.

The wet pond will be constructed with an impervious geomembrane on the floor and sides, which prevents any seepage from the forebay and the permanent pool.

5.3.2. Pond downstream conditions

The pond outlet structure consists of a concrete box equipped with the primary and emergency weirs, a reverse sloped pipe (which acts as an orifice), and an outlet pipe as described in the Wet Pond – Plan & Sections drawing (7154023-100000-41-D20-0004) to regulate pond outflows. The outlet of the pond control structure is a 600-mm diameter pipe that discharges the stormwater into a long swale that connects the wet pond to the ditch along Marchurst Road.

The storm network was analyzed using a free outfall condition at the end of the swale connecting to the ditch on Marchurst Road. This was modelled to ensure that the whole storm network can meet pre-development flow rates and that any changes to infrastructure downstream of the ditch do not impact the pond’s ability to maintain pre-development flows.

5.3.3. Sub-catchment areas

The BESS site is divided into fifteen sub-catchment areas, based on the proposed finished grading of the site. The sub-catchments are labelled S1 to S15, where S15 is the stormwater pond.

All post-development sub-catchment areas are shown in Figure 13.

As mentioned before, the existing stream is to be redirected to a diversion ditch on the west side of the development area. Based on the Fluvial report (South March Battery Energy Storage

System (BESS) Fluvial Geomorphology Assessment prepared by HATCH 2025), the peak flow rates are 0.35 and 1.03 m3/s for 2 and 100-year rainfall. The proposed vegetated diversion ditch has a 0.5m width at the bottom with a variable depth, and the capacity is adequate to convey the runoff flow coming from the upstream of the watershed.

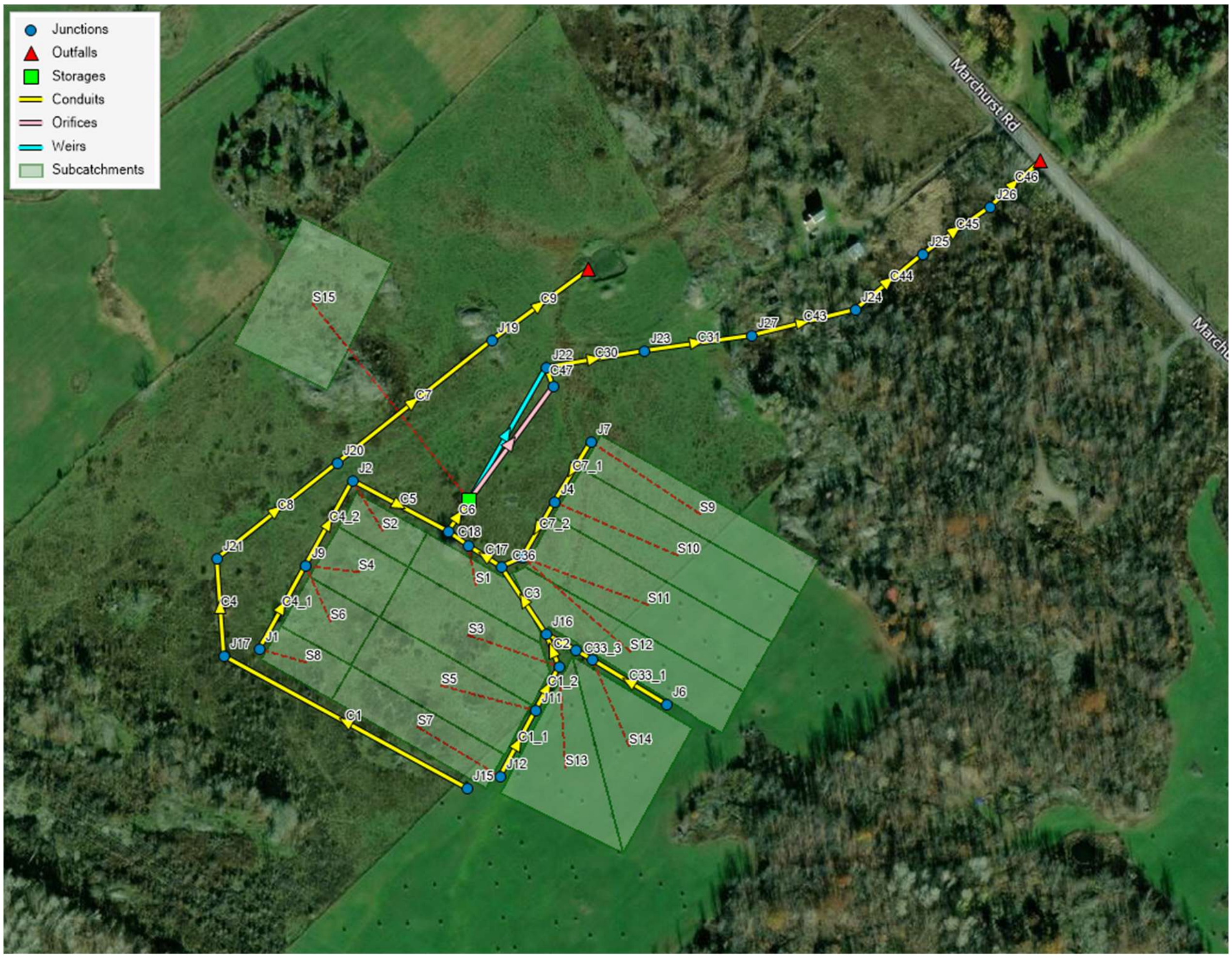


Figure 13: Post-development sub-catchment areas (from PCSWMM)

5.3.4. Wet pond design criteria

The stormwater pond has been designed to meet quantity, quality, and erosion control requirements under the runoff from the BESS site. The design of the wet pond is per MECP (formerly MOE) design guidelines (MOE, 2003) and a summary of the design criteria is provided in Table 15, including the runoff from the BESS site.

Table 15: Wet pond design summary

Parameter	Minimum Criteria (per MECP [formerly MOE] design guidelines)	Design Value
Wet pond water quality storage requirement to meet enhanced Protection Level (80% removal of SS)	287 m^3/ha	560 m^3/ha
Detention Time	24 hours	>24 hours
Length-to-width ratio of the forebay	2:1	2:1
Overall length-to-width	3:1	3.6:1
Side slopes	3:1	5:1
Forebay	Minimum depth of 1 m Maximum 33% area of the total permanent pool	1.0 m depth 21% of the total permanent pool area
Permanent pool depth	Maximum depth of 3 m	1.3 m
Active storage depth	Maximum 1.5 m for water quality/erosion control Maximum 2 m, including quantity control	0.5 m for water quality/erosion control 0.86 m for 100-yr quantity control.
Forebay length	Greater than or equal to the larger of the settling length and dispersion length: 15 m [(1)]	20 m
Freeboard	300 mm	300 mm under normal operating conditions
Inlet	Minimum 450 mm diameter	900 mm diameter
Outlet	Minimum 100 mm diameter	600 mm diameter

1. The settling length and dispersion length are calculated as per “Stormwater Planning & Design Manual” (MOE, 2003) for the erosion control storm and a 10-year storm, respectively.

The size of the pond was verified to meet the following four (4) storage components: the permanent pool, forebay, active storage (quality/erosion control storage), and quantity control storage.

Based on the enhanced protection level of 80% long-term suspended solids removal and percentage of impervious area for the developed site, the MECP (formerly MOE) design manual Table 3.2 (MOE, 2003) requires 287 m3/ha (based on 100% impervious level) for the storage volume, by linear extrapolation. The permanent pond volume is calculated to be 3,128 m3 to meet this requirement. Given the contributing developed areas of 5.28 ha for the BESS site, min. 1515 m3 of storage volume is required, which means the size of the permanent pool meeting the requirements of Table 3.2 (which is shown in Figure 14) for enhanced protection in wet ponds with a 100% impervious level.

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced 80% long-term S.S. removal	Infiltration	25	30	35	40
	Wetlands	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	25	30
	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20
	Wetlands	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

Figure 14: Water quality storage requirements
(Source: Table 3.2 in Stormwater Management Planning and Design Manual MOE, 2003)

The active storage was sized as the larger of the erosion control active storage and the quality control active storage. Quality control requires a storage volume of 40 m^3/ha, whereas erosion control requires a volume capable of providing 24 hours of detention time for a 25 mm 4-hour

Chicago storm. The quality control storage volume is 211 m^3, and the erosion control volume is 2557 m^3.

For quantity control, 24-hour SCS Type 2 storm events were simulated for return periods ranging from 2 to 100 years. The post-development flow rates are compared to the pre-development values to ensure that the post-development quantity is equal to or less than the 2-yr pre-development while maintaining a minimum 300 mm of freeboard to the top of pond bank. To meet quantity control under normal operating conditions, the width of the weir will be 1.5 m to reduce the outflow and meet peak flow requirements. See plan 7154023-100000-41-D20-0004 for more details.

A summary of the results is presented in Table 16 and Table 17.

5.3.5. Post-development flows

In Table 16, the controlled post-development flow rates leaving the wet pond with a free outfall, is presented. The results meet MECP (formally MOE), and City of Ottawa guidelines' quantity control requirements and are less than the 2-year pre-development flow rates of the BESS site.

Table 16: Post-development controlled flows vs pre-development flows

Return Period	100-year post to 2-year pre
SCS Type 2 Duration	m^3/s
24-hr	0.0366/0.0394

5.3.6. Wet pond water elevation and storage volume

Table 17 shows wet pond water elevation and associated active storage volumes. Results are given assuming a free outfall condition downstream of the pond control structure (at the connection point of the swale and the ditch along the Marchurst Road).

Table 17: Maximum water elevation during various storm events (free outfall at downstream of the control structure on Marchurst Rd)

Return Period		100-Year	50-Year	25-Year	10-Year	5-Year	2-Year
SCS Type 2 Duration							
24-hr	Water elevation (m)	97.93	97.88	97.79	97.65	97.51	97.33

Return Period		100-Year	50-Year	25-Year	10-Year	5-Year	2-Year
SCS Type 2 Duration							
	Active storage volume (m^3)	4002	3806	3451	2894	2405	1731
3-hr Chicago	Water elevation (m)	97.56	97.49	97.42	97.32	97.24	97.12
	Active storage volume (m^3)	2555	2313	2059	1716	1434	1025
6-hr Chicago	Water elevation (m)	97.71	97.63	97.55	97.44	97.34	97.20
	Active storage volume (m^3)	3148	2837	2535	2120	1791	1275

6. Spill prevention and response

The BESS substation houses an oil-filled transformer, which poses a risk of potential release of oil to the environment. The spill prevention strategy to manage this risk and meet water quality objectives is developed in accordance with applicable standards, local bylaws, and guidelines for the design of secondary containment systems for substation transformers, including the Sewer Use Bylaw "Bylaw No. 2003-514" (City of Ottawa, 2004), the Ontario Technical Guide to Renewable Energy Approval (REA) under O. Reg. 359/09 of the Environmental Protection Act, and IEEE 980 "Guide for Containment and Control of Oil Spills in Substations". Although this battery energy storage project does not classify as a renewable energy project, the Ontario Technical Guide to Renewable Energy Approval, nonetheless, contains valuable recommendations for containment design of transformer substations which have been considered in the design.

Per Sewer Use Bylaw "Bylaw No. 2003-514" (City of Ottawa, 2004) and the Ontario Technical Guide to Renewable Energy Approval, the maximum allowable concentration of oil and grease is 15 mg/L. The oil-filled substation transformer will have a concrete containment filled with fire quenching stones and a sump pit with oil control system designed to meet the maximum allowable concentration of oil. The sump pit is located adjacent to the containment, connected by a gravity flow pipe to the containment basin at the inlet, and to a nearby stormwater manhole at the outlet.

The Ontario Technical Guide recommends that secondary containment is sized for the transformer oil volume plus the rainfall from the 24-hour 50-year return period storm. IEEE 980 recommends that the secondary containment volume is sized to hold 110% of the oil volume. The governing scenario of these two guidelines will be considered in the design. The clean water from the sump pit will be discharged back to the site stormwater system.

For sizing the sump pit, the following data is considered:

- 24-hour 50-year return period event has a rainfall intensity of 4.3 mm/hr and cumulative rainfall depth of 103.3 mm.

For spill response, staff members should be trained and have any necessary equipment to contain and clean potential spills as per a site emergency response plan. The emergency response plan should also include coordination with local emergency response personnel and define procedures to inform the MOE Spills Action Centre of any reportable spills.

7. Erosion and sediment control

An erosion and sediment control (ESC) plan will ensure sediment-laden runoff does not damage downstream watercourses and receiving waters. The MECP (formerly MOE) design manual (MOE, 2003) requires that no off-site migration of sediment may occur. The ESC plan covers all phases of the project from before construction, during construction, and extend to post-construction. The permanent post-construction erosion control measures are discussed in Section 4.2. In this section, temporary ESC measures prior to and during construction are discussed.

The ESC plan is developed following guidelines based on "Stormwater Management Planning and Design Manual" (MOE, 2003) and the "Regulation Policies" (MVCA, 2024).

The erosion and sediment controls shall be installed prior to any construction activity. The ESC measures put in place are to be monitored and maintained throughout construction until the final grading, erosion control, and drainage systems are in place.

Refer to the drawings 7154023-100000-41-D70-0001 to 0002 for more information on erosion and sediment control.

8. Maintenance and monitoring

To ensure the proposed stormwater management system functions as per design, a maintenance plan should be implemented at the BESS site. Inspection is recommended annually, to identify maintenance needs, as well as after significant storm events to ensure proper functioning of the system.

The following items should be considered in the maintenance plan for the drainage system upstream and downstream of the pond and should be conducted quarterly to annually, or as-needed basis:

- Finished grading: low points and potential ponding areas;
- Manholes and storm pipes: blockages and sediment build up;
- Grassed swales: blockages, state of vegetation, and signs of erosion;
- Culverts: blockages and sediment build up;
- Sump pit: oil and sediment storage capacity (per recommendations of sump pit supplier).

The following items should be considered in the maintenance plan for the wet pond:

- Check the permanent pool elevation 48 hrs after a storm event. If the water level is higher or lower than normal, check for leakages or blockages at the outlet and inlet, respectively;
- Check that the vegetation within the pond area is healthy; revegetation may be required. To be conducted monthly to quarterly;
- Visually inspect for pollutants on the water surface and remove as necessary. Indicators include trash, froth, or oily sheen. Conducted monthly to quarterly or as-needed basis;
- Check pond structures such as forebay berm, orifices, and inlet/outlet pipes. Conducted monthly to quarterly or as-needed basis;
- Usage of herbicides and insecticides should be prohibited, and usage of fertilizer should be limited to reduce nutrient loading downstream of the pond;
- Monitor sediment buildup within the pond annually. Based on the predicted sediment loading of the pond per MOE guidelines, forebay sediment removal should occur once every 8 years or when the forebay volume is filled with sediment, whichever occurs first;
- Sediment removal in the main pool should be conducted every 25 years or when 50% of the main pool volume is filled with sediment, whichever occurs first;
- It is recommended to conduct sediment removal during dry periods to remove the need for a by-pass pipe. Existing vegetation are to be protected and replaced if damaged during

this process. Sediments are to be dried in a designated drying area surrounded by silt fences and disposed of per MOEE Sediment Disposal Guidelines. Effluent samples should be collected at the pond discharge point and be tested to ensure Provincial Water Quality Objectives are met.

9. Recommendations and conclusion

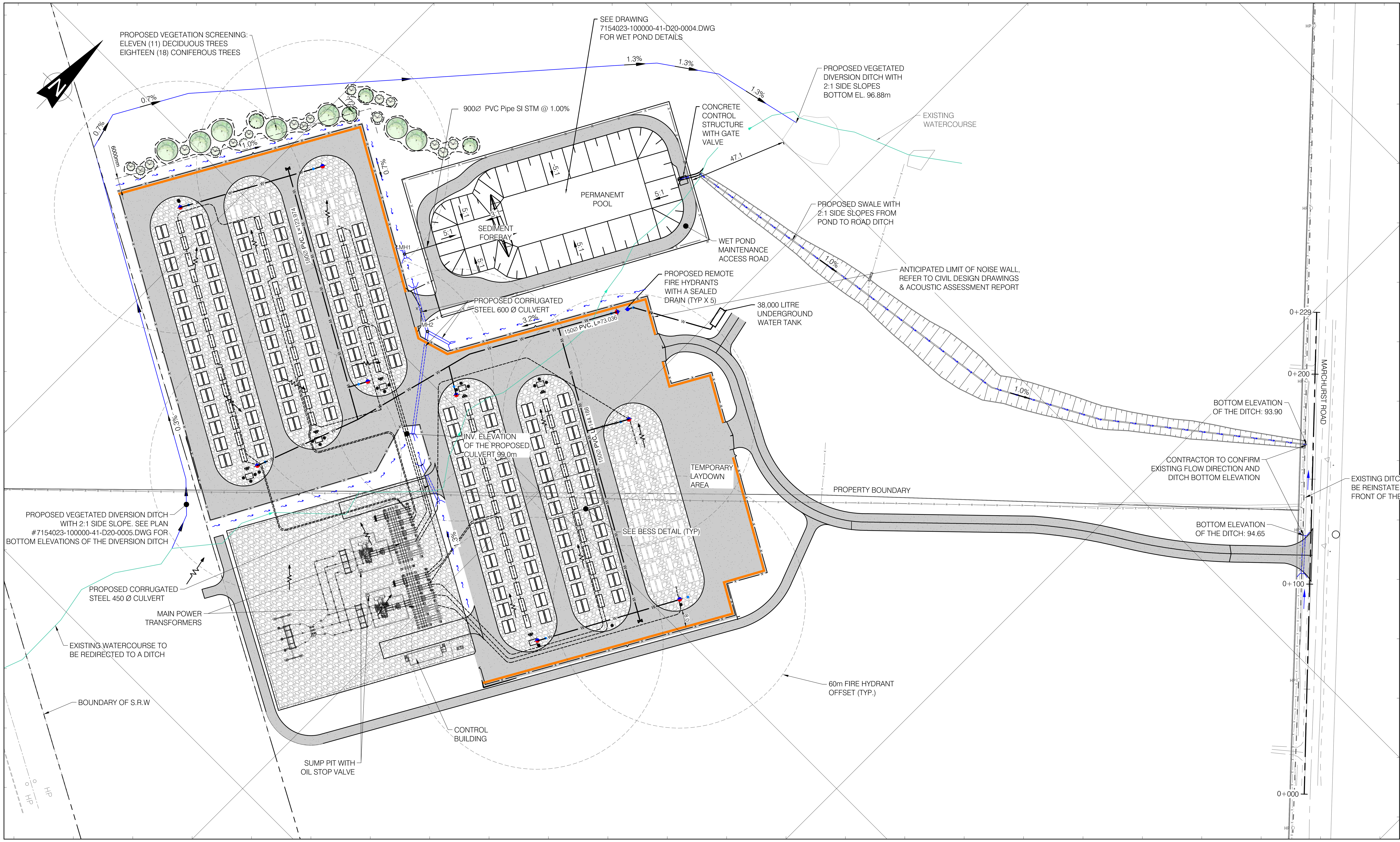
This report presents the stormwater management plan (SWMP) for the South March Battery Energy Storage System (BESS). The following summarizes the SWMP strategy:

- The BESS site surface runoff will be routed via a system of ditches, manholes, and culverts. This system will discharge to a stormwater pond.
- The stormwater detention pond will be utilized as the SWM end-of-pipe control to meet quality, quantity, and erosion control requirements.
- Recommended maintenance procedures have been provided in this report to ensure proper operation of the proposed storm drainage system.
- Spill prevention is another key component of water quality management. The risk of spill from oil-filled transformers will be managed by a concrete containment, discharging by gravity flow to a sump pit.
- Erosion and sediment control during the construction phase will ensure that sediment-laden runoff is managed and the quality of receiving waters is not impaired.

Finally, this report may be subject to change as reviews from the City of Ottawa and Ministry of the Environment, Conservation and Parks are still pending.

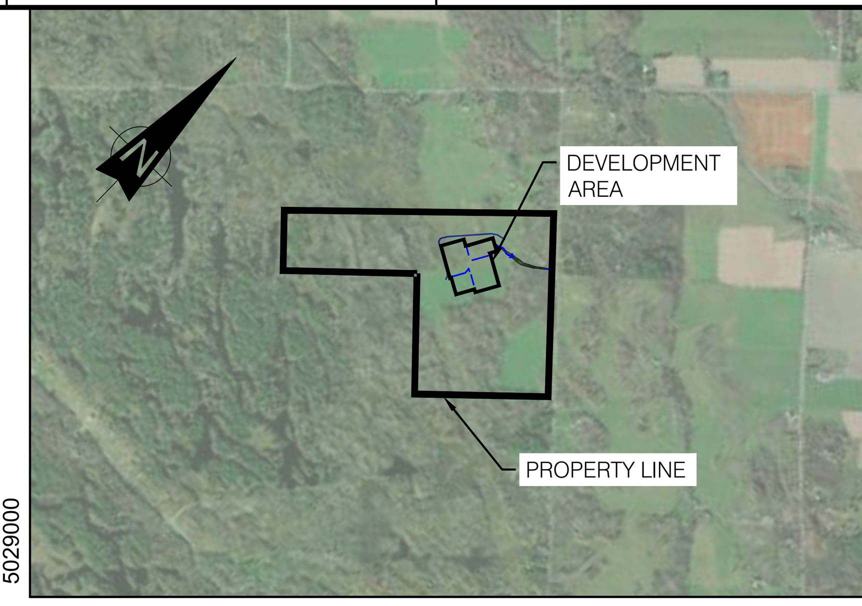
Appendix A: Stormwater Management Plan Drawings

7154023-100000-41-D20-0003



PLAN VIEW

SCALE 1:1000



KEY PLAN

SCALE: N.T.S.

NOTES:

1. PROJECT COORDINATES ARE SET IN NAD83(CSRS) / MTM ZONE 9 - EPSG:2952.
2. COORDINATES ARE IN METERS AND ELEVATIONS ARE METERS.OBSERVED REFERENCE POINTS ARE DERIVED FROM REAL TIME KINEMATIC (RTK) GNSS OBSERVATIONS USING SPECIFIED CONTROL POINTS AND ARE REFERRED TO MTM ZONE 9, (76°30' WEST LONGITUDE) NAD83 (CSRS) (2010).COORDINATES TO URBAN ACCURACY PER SEC. 14(2) OF O.REG. 216/10.
3. SITE SURVEY PROVIDED BY TULLOCK GEOMATCICS INC, ISSUED MARCH 11, 2025, SURVEY FILE #241451.
4. ALL REQUIRED PERMITS MUST BE IN PLACE BEFORE START OF CONSTRUCTION.
5. BATTERY ARRANGEMENT IS PER 7154023-300000-47-D20-0001-02.DWG.
6. INSULATION IS REQUIRED WHERE PIPE COVER IS LESS THAN 1.8m TO SPRINGLINE OF PIPE.
7. ALL STORMWATER PIPES ARE ARMTEC BOSS 2000 HDPE PIPE WITH 320 kPa STIFFNESS, UNLESS OTHERWISE NOTED.
8. GROUNDING GRID NOT SHOWN. REFER TO DRAWING 7154023-402000-47-D50-0001 FOR MORE DETAILS.
9. ALL MANHOLE COVERS TO BE CL-625 ONT LOAD RATED.
10. MINIMUM 300mm VERTICAL CLEARANCE IS REQUIRED AT STORM PIPE CROSSINGS WITH ELECTRICAL UTILITIES AND WATER PIPES.
11. CONTRACTOR TO REVIEW THE GEOTECHNICAL REPORT PROVIDED BY HATCH: "SOUTH MARCH ROAD BATTERY ENERGY STORAGE SYSTEM (BESS), PRELIMINARY GEOTECHNICAL INVESTGATION", PROJECT #H375142-0000-2A0-230-0001, REV. A, DATED FEBRUARY 28, 2025.
12. THE MIN. CAPACITY FOR THE WATER TANK IS 38,000 LITRES BASE ON CITY OF OTTAWA FIRE SERVICES DEPARTMENT ADVISE.
13. THE FIRE NETWORK IS DESIGNED TO PROVIDE AN OPERATING PRESSURE OF 60 PSi UNDER THE CONDITION OF FIRE.

LEGEND:

- GATE VALVE
- PROPOSED CATCHBASIN
- DRAFT FIRE HYDRANT
- REMOTE FIREHYDRANT
- LIGHT STANDARD
- PROPOSED MANHOLE
- CATCH BASIN MANHOLE
- EXISTING HYDRO POLE
- UNDERGROUND UTILITY MARKER
- TERMINAL BOX
- ANCHOR
- BOLLARD
- BLOW OFF VALVE
- VENT
- EXISTING BOREHOLE
- BESS
- MV TRANSFORMER
- BESS (AUGMENTATION)
- MV TRANSFORMER (AUGMENTATION)
- DISTRIBUTION PANELS
- FLOW DIRECTION
- EXISTING FENCE
- PROPOSED FENCE
- PROPOSED NOISE WALL
- STORM PIPE
- WATER LINE
- EXISTING WATERCOURSE
- OFFSET LINE
- EXISTING TRANSMISSION LINE
- PROPERTY LINE
- BURIED TELECOMMUNICATIONS
- BURIED ELECTRIC
- SWALE
- PROPOSED GRAVEL SURFACE AREA
- PROPOSED INSULATING STONE SURFACE AREA
- PROPOSED DIVERSION DITCH
- PROPOSED CULVERT

MANHOLES			
MH/CB	INVERTS	NORTHING	EASTING
MH1	SE: 197.02 NE: 96.90 NW: 198.02	5028634.38	340474.64
MH2	NW: 97.40 E: 97.50 SE: 97.50	5028616.05	340508.38

SCALE 1:1000 — 20 10 0 20 40 60 80 100 m

FOR PERMITTING

DRAWING No.	DESCRIPTION	REV	DESCRIPTION	PREPARED BY	CHECKED BY	DATE
		AC	FOR PERMITTING	E. AMELI	M. SHAHRAKI	2025-06-19
		AB	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-06-06
7154023-402000-47-D20-0001	SOUTH MARCH BESS-250 MW 230kV-34.5 kV SUBSTATION	AA	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-03-03

REFERENCE DRAWINGS — REVISIONS

SEAL:

BBA

CLIENT: Evolugen by Brookfield Renewable

PROJECT: SOUTH MARCH BESS
2555 AND 2625 MARCHURST RD, OTTAWA

TITLE: CIVIL
SITE SERVICING AND FIRE PROTECTION PLAN

PREPARED BY: E. AMELI	DRAFTED BY: J. MUGGERIDGE
CHECKED BY: E. AMELI	APPROVED BY: M. SHAHRAKI
SCALE: 1:1000	DATE: 2025-03-03

DRAWING No.: 7154023-100000-41-D20-0003 — SHEET: 01 — SIZE: A1 — REV.: AC

BY:JAMES, DONNA
PRINTED:2025-06-19 2:27:13 PM

G:\7154\023\40_ING_ENG\41_CIVIL\DESS_DWGS\EN _COURS_IN PROGRESS\7154023-100000-41-D20-0003.DWG

Appendix B: IDF Data

Ontario IDF CURVE LOOKUP

Active coordinate

45° 24' 15" N, 76° 1' 14" W (45.404167,-76.020833)

Retrieved: Tue, 17 Dec 2024 23:57:39 GMT

Location summary

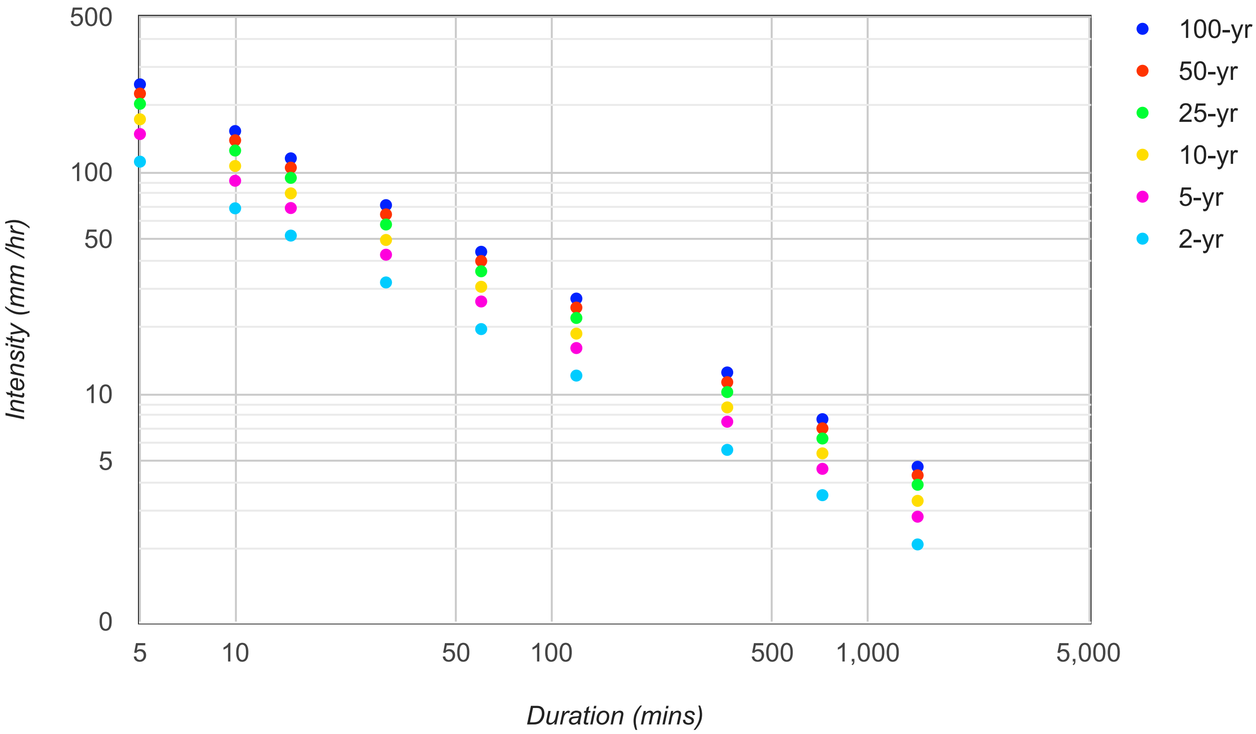
These are the locations in the selection.

IDF Curve: 45° 24' 15" N, 76° 1' 14" W (45.404167,-76.020833)

Results

An IDF curve was found.

Coordinate: 45.404167, -76.020833
IDF curve year: 2010



Coefficient summary

IDF Curve: 45° 24' 15" N, 76° 1' 14" W (45.404167,-76.020833)

Retrieved: Tue, 17 Dec 2024 23:57:39 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	19.6	26.1	30.4	35.7	39.7	43.7
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	111.3	68.6	51.7	31.8	19.6	12.1	5.6	3.5	2.1
5-yr	148.2	91.3	68.8	42.4	26.1	16.1	7.5	4.6	2.8
10-yr	172.7	106.4	80.1	49.4	30.4	18.7	8.7	5.4	3.3
25-yr	202.8	124.9	94.1	58.0	35.7	22.0	10.2	6.3	3.9
50-yr	225.5	138.9	104.6	64.4	39.7	24.5	11.3	7.0	4.3
100-yr	248.2	152.9	115.2	70.9	43.7	26.9	12.5	7.7	4.7

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	9.3	11.4	12.9	15.9	19.6	24.1	33.6	41.4	51.0
5-yr	12.4	15.2	17.2	21.2	26.1	32.2	44.8	55.1	67.9
10-yr	14.4	17.7	20.0	24.7	30.4	37.5	52.1	64.2	79.1
25-yr	16.9	20.8	23.5	29.0	35.7	44.0	61.2	75.4	92.9
50-yr	18.8	23.2	26.2	32.2	39.7	48.9	68.1	83.9	103.3
100-yr	20.7	25.5	28.8	35.5	43.7	53.8	74.9	92.3	113.7

Terms of Use

Appendix C: Stormwater Management Facility Sizing Calculations

		Date	June 19-2025
		By	Andrew Siew
		Appr.	Emmanuel Ameli
Client	Evolugen - South March BESS	Project#	7154023
Subject	Stormwater Pond	Page	

Forebay length Calculation Stormwater Management Planning and Design Manual - Ontario 2003

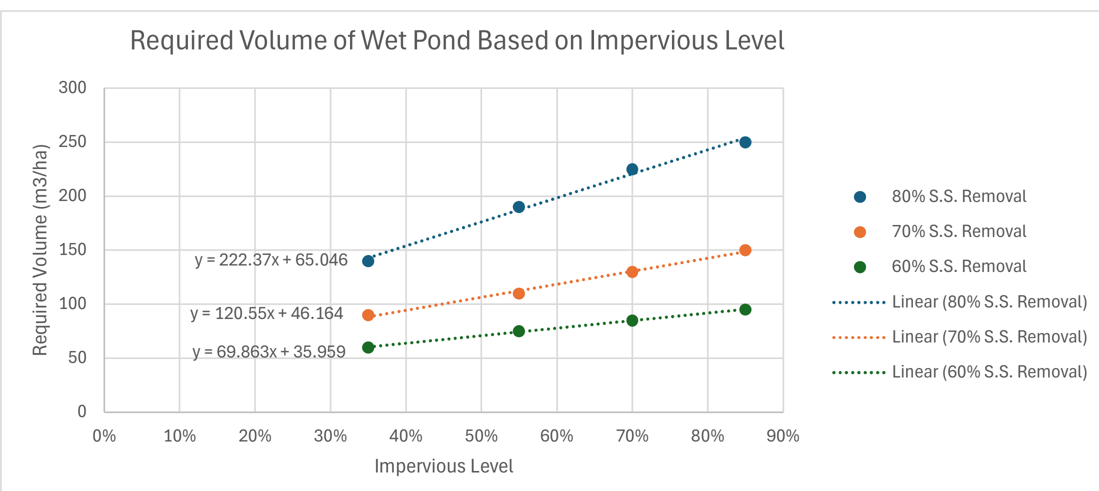
				Source:
	Settling calculation			
r	Length-to-width of forebay	2		Design
Q_p	Peak flow rate during design storm	0.0002	m^3/s	IDF
Vs	Settling velocity	0.0003	m/s	Design manual
Dist	Min Forebay length from settling	1.1547	m	Eqn 4.5
Q	Inlet flowrate	1.22	m^3/s	Design
d	Depth of permanent pool in forebay	1.3	m	Design
V_f	Desired velocity in forebay	0.5	m/s	Design
Dist	Min forebay length from dispersion	15.0154	m	Eqn. 4.6
	Provided forebay length	20	m	OK, Greater than 15.0153846153846m
W	Min width of deep zone (>1m)	2.5	m	Eqn. 4.7
	Provided forebay width	10	m	Ok, greater than 2.5m
	Check average velocity <.15m/s	0.09385		Ok

Required Volume of Permanent Pool Stormwater Management Planning and Design Manual - Ontario 2003

Calculated through interpolation based on 100% impervious material for Enhanced protection level

Data from Table 3.2 in MOE Guidelines

Impervious Level	35%	55%	70%	85%
Required Volume for 80% SS Removal (m3/ha)	140	190	225	250
Required Volume for 70% SS Removal (m3/ha)	90	110	130	150
Required Volume for 60% SS Removal (m3/ha)	60	75	85	95

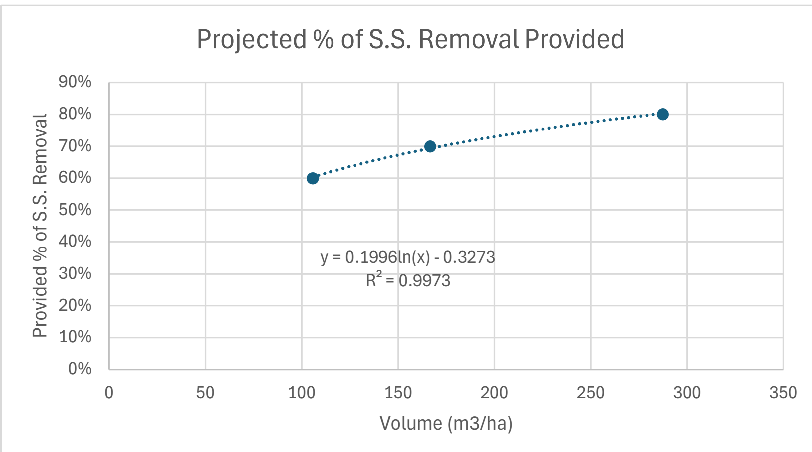


		Date	June 19-2025
		By	Andrew Siew
		Appr.	Emmanuel Ameli
Client	Evolugen - South March BESS	Project#	7154023
Subject	Stormwater Pond	Page	

Vreq/A	Required Volume for 100% Impervious	287.416	m3/ha	
A	Contributing developed area of site	5.1	ha	Design
Vreq	Required Volume for 100% Impervious	1465.82	m3	
V	Provided Volume	3756.0	m3	OK, Greater than 1465.8216m3

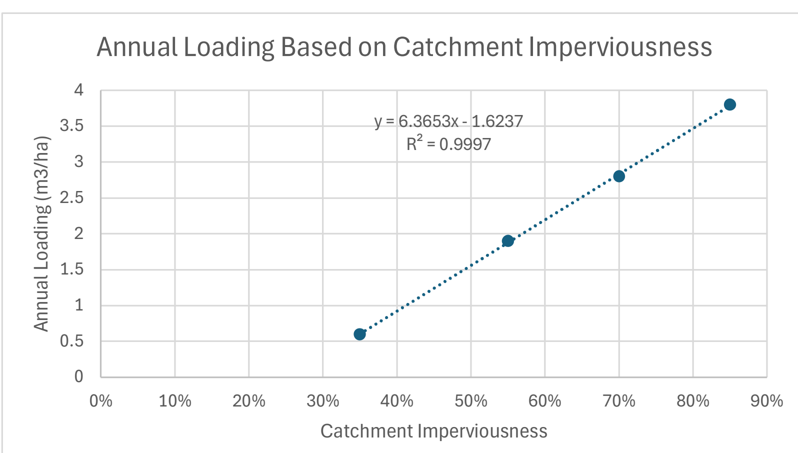
Provided S.S. Removal based on 100% Impervious

% of S.S. Removal	60%	70%	80%	Table 3.2 from MOE Guidelines
Required Volume	105.822	166.71	287.4	



Provided Volume	736.471	m3/ha	Design
Projected % of S.S. Removal Provided	99%		
Target Maintenance Removal Efficiency	75%		Based on "Enhanced Protection" in MOE Guidelines
Target Volume	220.81	m3/ha	

Imperviousness	35%	55%	70%	85%
Annual Loading (m3/ha)	0.6	1.9	2.8	3.8



		Date	June 19-2025
		By	Andrew Siew
		Appr.	Emmanuel Ameli
Client	Evolugen - South March BESS	Project#	7154023
Subject	Stormwater Pond	Page	

Projected Annual Loading (100% Imp)	4.69418	m3/ha	Assuming 99% sediment removal
	23.9403	m3	
Provided Forebay Volume	200.00	m3	Design
Years for forebay to fill	8.3541	years	

Appendix D: PCSWMM Model Results

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
------------------------------------------------------------


*************
Element Count
*************
Number of rain gages ...... 26
Number of subcatchments ... 9
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
                                                               Data       Recording
Name                 Data Source                               Type       Interval
------------------------------------------------------------------------------------
12-hr,100yrSCS       100-Yr-12hr-SCSII                         INTENSITY    5 min.
12-hr.10yrSCS        10-Yr-12hr-SCSII                          INTENSITY    5 min.
12-hr.25yrSCS        25-Yr-12hr-SCSII                          INTENSITY    5 min.
12-hr.2yrSCS         2-Yr-12hr-SCSII                           INTENSITY    5 min.
12-hr.50yrSCS        50-Yr-12hr-SCSII                          INTENSITY    5 min.
12-hr.5yrSCS         5-Yr-12hr-SCSII                           INTENSITY    5 min.
24-hr,100yrSCS       100-Yr-24hr-SCSII                         INTENSITY    5 min.
24-hr,10yrSCS        10-Yr-24hr-SCSII                          INTENSITY    5 min.
24-hr,25yrSCS        25-Yr-24hr-SCSII                          INTENSITY    5 min.
24-hr,2yrSCS         2-Yr-24hr-SCSII                           INTENSITY    5 min.
24-hr,50yrSCS        50-Yr-24hr-SCSII                          INTENSITY    5 min.
24-hr.5yrSCS         5Yr-24hr-SCSII                            INTENSITY    5 min.
25mmChicago          100YR-4HR-CHICAGO                         INTENSITY   10 min.
3-hr,100yrChicago    100YR-3HR-CHICAGO                         INTENSITY   10 min.
3-hr,10yrChicago     10YR-3HR-CHICAGO                          INTENSITY   10 min.
3-hr,25yrChicago     25YR-3HR-CHICAGO                          INTENSITY   10 min.
3-hr,2yrChicago      2YR-3HR-CHICAGO                           INTENSITY   10 min.
3-hr,50yrChicago     50YR-3HR-CHICAGO                          INTENSITY   10 min.
3-hr,5yrChicago      5YR-3HR-CHICAGO                           INTENSITY   10 min.
4-hr,100yrChicago    100YR-4HR-CHICAGO                         INTENSITY   10 min.
6-hr,100yrChicago    100YR-6HR-CHICAGO                         INTENSITY   10 min.
6-hr,10yrChicago     10YR-6HR-CHICAGO                          INTENSITY   10 min.
6-hr,25yrChicago     25YR-6HR-CHICAGO                          INTENSITY   10 min.
6-hr,2yrChicago      2YR-6HR-CHICAGO                           INTENSITY   10 min.
6-hr,50yrChicago     50YR-6HR-CHICAGO                          INTENSITY   10 min.
6-hr,5yrChicago      5YR-6HR-CHICAGO                           INTENSITY   10 min.


********************
Subcatchment Summary
********************
Name                        Area     Width   %Imperv    %Slope Rain Gage            Outlet
----------------------------------------------------------------------------------------------------------------
S11                         0.33     40.00      0.00    0.5000 24-hr,2yrSCS         DITCH
S12                         0.58     40.00      0.00    0.5000 24-hr,2yrSCS         DITCH
S13                         0.59     40.00      0.00    0.5000 24-hr,2yrSCS         DITCH
S14                         0.41     20.00      0.00    0.5000 24-hr,2yrSCS         DITCH
```

```
S15                         0.39     28.00      0.00    0.5000 24-hr,2yrSCS
DITCH
S16                         0.58     40.00      0.00    0.5000 24-hr,2yrSCS
DITCH
S17                         0.57     20.00      0.00    0.5000 24-hr,2yrSCS
DITCH
S18                         1.32    100.00      0.00    0.5000 24-hr,2yrSCS
DITCH
S19                         0.37     60.00      0.00    0.5000 24-hr,2yrSCS
DITCH


************
Node Summary
************
                                                 Invert      Max.    Ponded    External
Name                 Type                         Elev.     Depth      Area    Inflow
-------------------------------------------------------------------------------------
DITCH                OUTFALL                      95.00      0.00       0.0


****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... CURVE_NUMBER
Surcharge Method ......... EXTRAN
Starting Date ............ 01/28/2025 00:00:00
Ending Date .............. 01/31/2025 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:05:00
Dry Time Step ............ 00:05:00


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.259        50.358
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.186        36.118
Surface Runoff ...........         0.068        13.173
Final Storage ............         0.006         1.071
Continuity Error (%) .....        -0.010


**************************        Volume        Volume
Flow Routing Continuity        hectare-m     10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.068         0.677
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.068         0.677
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
```

```
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000


**************************
Subcatchment Runoff Summary
**************************


------------------------------------------------------------------------------------------
----------------------------------------
                          Total      Total      Total      Total     Imperv
                          Perv      Total       Total     Peak  Runoff
                         Precip      Runon       Evap      Infil     Runoff
                         Runoff     Runoff      Runoff   Runoff   Coeff
Subcatchment                 mm         mm         mm         mm         mm
mm          mm    10^6 ltr      CMS
------------------------------------------------------------------------------------------
----------------------------------------
S11                       50.36       0.00       0.00      35.65       0.00
13.67      13.67        0.05     0.00   0.272
S12                       50.36       0.00       0.00      36.10       0.00
13.20      13.20        0.08     0.00   0.262
S13                       50.36       0.00       0.00      36.10       0.00
13.19      13.19        0.08     0.00   0.262
S14                       50.36       0.00       0.00      36.45       0.00
12.81      12.81        0.05     0.00   0.254
S15                       50.36       0.00       0.00      36.05       0.00
13.24      13.24        0.05     0.00   0.263
S16                       50.36       0.00       0.00      36.10       0.00
13.20      13.20        0.08     0.00   0.262
S17                       50.36       0.00       0.00      36.92       0.00
12.32      12.32        0.07     0.00   0.245
S18                       50.36       0.00       0.00      36.01       0.00
13.29      13.29        0.18     0.01   0.264
S19                       50.36       0.00       0.00      35.50       0.00
13.84      13.84        0.05     0.01   0.275


Analysis begun on:  Sun Mar  9 15:13:22 2025
Analysis ended on:  Sun Mar  9 15:13:22 2025
Total elapsed time: < 1 sec
```

****
Element Count
****
Number of rain gages 25
Number of subcatchments ... 15
Number of nodes 31
Number of links 30
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
12-hr,100yrSCS	100-Yr-12hr-SCSII	INTENSITY	5 min.
12-hr,10yrSCS	10-Yr-12hr-SCSII	INTENSITY	5 min.
12-hr,25yrSCS	25-Yr-12hr-SCSII	INTENSITY	5 min.
12-hr,2yrSCS	2-Yr-12hr-SCSII	INTENSITY	5 min.
12-hr,50yrSCS	50-Yr-12hr-SCSII	INTENSITY	5 min.
12-hr,5yrSCS	5-Yr-12hr-SCSII	INTENSITY	5 min.
24-hr,100yrSCS	100-Yr-24hr-SCSII	INTENSITY	5 min.
24-hr,10yrSCS	10-Yr-24hr-SCSII	INTENSITY	5 min.
24-hr,25yrSCS	25-Yr-24hr-SCSII	INTENSITY	5 min.
24-hr,2yrSCS	2-Yr-24hr-SCSII	INTENSITY	5 min.
24-hr,50yrSCS	50-Yr-24hr-SCSII	INTENSITY	5 min.
24-hr,5yrSCS	5Yr-24hr-SCSII	INTENSITY	5 min.
3HR-100YR-CHICAGO	100YR-3HR-CHICAGO	INTENSITY	10 min.
3HR-10YR-CHICAGO	10YR-3HR-CHICAGO	INTENSITY	10 min.
3HR-25YR-CHICAGO	25YR-3HR-CHICAGO	INTENSITY	10 min.
3HR-2YR-CHICAGO	2YR-3HR-CHICAGO	INTENSITY	10 min.
3HR-50YR-CHICAGO	50YR-3HR-CHICAGO	INTENSITY	10 min.
3HR-5YR-CHICAGO	5YR-3HR-CHICAGO	INTENSITY	10 min.
4HR-100YR-CHICAGO	100YR-4HR-CHICAGO	INTENSITY	10 min.
6HR-100YR-CHICAGO	100YR-6HR-CHICAGO	INTENSITY	10 min.
6HR-10YR-CHICAGO	10YR-6HR-CHICAGO	INTENSITY	10 min.
6HR-25YR-CHICAGO	25YR-6HR-CHICAGO	INTENSITY	10 min.
6HR-2YR-CHICAGO	2YR-6HR-CHICAGO	INTENSITY	10 min.
6HR-50YR-CHICAGO	50YR-6HR-CHICAGO	INTENSITY	10 min.
6HR-5YR-CHICAGO	5YR-6HR-CHICAGO	INTENSITY	10 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S1	0.21	40.00	100.00	0.5000	24-hr,100yrSCS	J14
S10	0.58	40.00	100.00	0.5000	24-hr,100yrSCS	J4

S11	0.57	40.00	100.00	0.5000	24-hr,100yrSCS	J10
S12	0.43	100.00	100.00	0.5000	24-hr,100yrSCS	J10
S13	0.43	100.00	0.00	0.5000	24-hr,100yrSCS	J13
S14	0.41	60.00	0.00	0.5000	24-hr,100yrSCS	J5
S15	0.58	45.00	100.00	0.0100	24-hr,100yrSCS	POND
S2	0.12	40.00	100.00	0.5000	24-hr,100yrSCS	J2
S3	0.39	40.00	100.00	0.5000	24-hr,100yrSCS	J13
S4	0.19	40.00	100.00	0.5000	24-hr,100yrSCS	J9
S5	0.40	40.00	100.00	0.5000	24-hr,100yrSCS	J11
S6	0.18	40.00	100.00	0.5000	24-hr,100yrSCS	J9
S7	0.28	25.00	100.00	0.5000	24-hr,100yrSCS	J12
S8	0.13	25.00	100.00	0.5000	24-hr,100yrSCS	J1
S9	0.39	28.00	100.00	0.5000	24-hr,100yrSCS	J7

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	100.20	1.00	0.0	
J10	JUNCTION	98.00	1.00	0.0	
J11	JUNCTION	99.80	1.00	0.0	
J12	JUNCTION	100.50	1.00	0.0	
J13	JUNCTION	99.30	1.00	0.0	
J14	JUNCTION	97.20	2.30	0.0	
J15	JUNCTION	100.65	0.50	0.0	
J16	JUNCTION	99.00	1.00	0.0	
J17	JUNCTION	100.02	0.50	0.0	
J18	JUNCTION	97.50	1.50	0.0	
J19	JUNCTION	98.11	0.50	0.0	
J2	JUNCTION	99.00	1.00	0.0	
J20	JUNCTION	99.07	0.50	0.0	
J21	JUNCTION	99.60	0.50	0.0	
J22	JUNCTION	96.80	2.20	0.0	
J23	JUNCTION	96.40	2.20	0.0	
J24	JUNCTION	95.50	2.00	0.0	
J25	JUNCTION	95.10	2.20	0.0	
J26	JUNCTION	94.70	2.50	0.0	
J27	JUNCTION	96.00	2.20	0.0	
J28	JUNCTION	96.80	2.20	0.0	
J3	JUNCTION	97.00	3.00	0.0	
J4	JUNCTION	98.53	1.00	0.0	
J5	JUNCTION	99.40	1.00	0.0	
J6	JUNCTION	100.80	1.00	0.0	
J7	JUNCTION	98.90	1.00	0.0	
J8	JUNCTION	99.35	1.00	0.0	
J9	JUNCTION	99.60	1.00	0.0	
DITCH	OUTFALL	94.20	1.00	0.0	
OF1	OUTFALL	97.20	0.50	0.0	
POND	STORAGE	95.50	2.50	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J15	J17	CONDUIT	174.9	0.3603	0.0300
C1_1	J12	J11	CONDUIT	47.0	1.4891	0.0300
C1_2	J11	J13	CONDUIT	32.0	1.5649	0.0300
C17	J18	J14	CONDUIT	24.2	1.2377	0.0200
C18	J14	J3	CONDUIT	15.9	1.2557	0.0300
C2	J13	J16	CONDUIT	22.2	1.3487	0.0300
C3	J16	J18	CONDUIT	51.2	2.9286	0.0200
C30	J22	J23	CONDUIT	62.1	0.6439	0.0300
C31	J23	J27	CONDUIT	69.1	0.5786	0.0300
C33_1	J6	J5	CONDUIT	54.4	2.5725	0.0300
C33_3	J5	J8	CONDUIT	12.4	0.4041	0.0200
C33_4	J8	J16	CONDUIT	21.4	1.6332	0.0300
C36	J10	J18	CONDUIT	14.7	3.4050	0.0200
C4	J17	J21	CONDUIT	62.0	0.6773	0.0300
C4_1	J1	J9	CONDUIT	61.1	0.9824	0.0300
C4_2	J9	J2	CONDUIT	61.0	0.9829	0.0300
C43	J27	J24	CONDUIT	67.8	0.7379	0.0300
C44	J24	J25	CONDUIT	55.1	0.7257	0.0300
C45	J25	J26	CONDUIT	51.7	0.7739	0.0300
C46	J26	DITCH	CONDUIT	43.4	1.1527	0.0300
C47	J28	J22	CONDUIT	12.5	0.0024	0.0130
C5	J2	J3	CONDUIT	68.5	2.9223	0.0300
C6	J3	POND	CONDUIT	23.8	1.0518	0.0100
C7	J20	J19	CONDUIT	125.2	0.7667	0.0300
C7_1	J7	J4	CONDUIT	44.5	0.8362	0.0300
C7_2	J4	J10	CONDUIT	40.3	1.3116	0.0300
C8	J21	J20	CONDUIT	96.9	0.5468	0.0300
C9	J19	OF1	CONDUIT	75.3	1.2080	0.0300
Orifice1	POND	J28	ORIFICE			
Weir1	POND	J22	WEIR			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	0.50	0.75	0.27	2.50	1	633.27
C1_1	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	6430.37
C1_2	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	6592.02
C17	CIRCULAR	0.60	0.28	0.15	0.60	1	444.04
C18	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	5904.92
C2	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	6119.84
C3	CIRCULAR	0.60	0.28	0.15	0.60	1	683.04
C30	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	4228.35
C31	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	4008.42
C33_1	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	8451.95
C33_3	CIRCULAR	0.45	0.16	0.11	0.45	1	117.82

C33_4	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	6734.38
C36	CIRCULAR	0.60	0.28	0.15	0.60	1	736.50
C4	TRAPEZOIDAL	0.50	0.75	0.27	2.50	1	868.28
C4_1	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	5223.04
C4_2	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	5224.28
C43	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	4526.59
C44	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	4489.16
C45	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	4635.68
C46	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	5657.65
C47	CIRCULAR	1.00	0.79	0.25	1.00	1	118.32
C5	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	9008.18
C6	CIRCULAR	0.90	0.64	0.23	0.90	1	2413.74
C7	TRAPEZOIDAL	0.50	0.75	0.27	2.50	1	923.75
C7_1	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	4818.69
C7_2	TRAPEZOIDAL	1.00	2.50	0.50	4.50	1	6034.97
C8	TRAPEZOIDAL	0.50	0.75	0.27	2.50	1	780.13
C9	TRAPEZOIDAL	0.50	0.75	0.27	2.50	1	1159.53

****
Analysis Options
****
Flow Units .... LPS
Process Models:
  Rainfall/Runoff .... YES
  RDII .... NO
  Snowmelt .... NO
  Groundwater .... NO
  Flow Routing .... YES
  Ponding Allowed .... YES
  Water Quality .... NO
Infiltration Method ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method .... EXTRAN
Starting Date 01/28/2025 00:00:00
Ending Date 01/31/2025 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:05:00
Dry Time Step 00:05:00
Routing Time Step .... 5.00 sec
Variable Time Step .... YES
Maximum Trials 8
Number of Threads 6
Head Tolerance .... 0.001500 m

**************************	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**************************	---------	-------
Total Precipitation	0.596	112.705
Evaporation Loss	0.000	0.000
Infiltration Loss	0.028	5.362
Surface Runoff	0.559	105.716

```
Final Storage ............       0.010        1.896
Continuity Error (%) .....       -0.238


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.559         5.588
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.426         4.264
Flooding Loss ............         0.017         0.167
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.313         3.130
Final Stored Volume ......         0.429         4.290
Continuity Error (%) .....        -0.020


*************************
Highest Continuity Errors
*************************
Node J17 (-65.49%)


***************************
Time-Step Critical Elements
***************************
Link C6 (3.39%)


********************************
Highest Flow Instability Indexes
********************************
All links are stable.


*********************************
Most Frequent Nonconverging Nodes
*********************************
Node J18 (0.01%)
Node DITCH (0.01%)
Node OF1 (0.01%)


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.60 sec
Average Time Step           :     4.93 sec
Maximum Time Step           :     5.00 sec
% of Time in Steady State   :     0.00
```

Average Iterations per Step : 2.01
% of Steps Not Converging : 0.01
Time Step Frequencies :
5.000 - 3.155 sec : 98.20 %
3.155 - 1.991 sec : 1.77 %
1.991 - 1.256 sec : 0.01 %
1.256 - 0.792 sec : 0.01 %
0.792 - 0.500 sec : 0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff mm	Peak Runoff 10^6 ltr	Runoff Coeff LPS
S1	112.71	0.00	0.00	0.00	111.01	0.00	111.01	0.23	82.89	0.985
S10	112.71	0.00	0.00	0.00	111.00	0.00	111.00	0.64	210.93	0.985
S11	112.71	0.00	0.00	0.00	111.00	0.00	111.00	0.64	209.91	0.985
S12	112.71	0.00	0.00	0.00	111.00	0.00	111.00	0.47	169.70	0.985
S13	112.71	0.00	0.00	34.04	0.00	77.65	77.65	0.33	124.49	0.689
S14	112.71	0.00	0.00	34.12	0.00	77.55	77.55	0.31	108.47	0.688
S15	112.71	0.00	0.00	0.00	110.69	0.00	110.69	0.65	104.62	0.982
S2	112.71	0.00	0.00	0.00	110.96	0.00	110.96	0.14	49.14	0.985
S3	112.71	0.00	0.00	0.00	111.02	0.00	111.02	0.44	149.92	0.985
S4	112.71	0.00	0.00	0.00	111.00	0.00	111.00	0.21	74.13	0.985
S5	112.71	0.00	0.00	0.00	111.02	0.00	111.02	0.45	153.02	0.985
S6	112.71	0.00	0.00	0.00	111.00	0.00	111.00	0.20	73.10	0.985
S7	112.71	0.00	0.00	0.00	111.02	0.00	111.02	0.31	105.27	0.985
S8	112.71	0.00	0.00	0.00	111.01	0.00	111.01	0.14	50.96	0.985
S9	112.71	0.00	0.00	0.00	111.01	0.00	111.01	0.43	142.40	0.985

****
Node Depth Summary
****

Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days	hr:min	Reported Max Depth Meters
J1	JUNCTION	0.00	0.11	100.31	0	11:55	0.11
J10	JUNCTION	0.03	1.00	99.00	0	11:52	1.00
J11	JUNCTION	0.01	0.23	100.03	0	11:55	0.23
J12	JUNCTION	0.01	0.15	100.65	0	11:55	0.15
J13	JUNCTION	0.02	0.47	99.77	0	12:00	0.47
J14	JUNCTION	0.34	0.73	97.93	0	16:48	0.73
J15	JUNCTION	0.00	0.02	100.67	0	00:00	0.01
J16	JUNCTION	0.02	0.77	99.77	0	12:00	0.77
J17	JUNCTION	0.00	0.01	100.03	0	00:10	0.01

J18	JUNCTION	0.16	1.39	98.89	0 12:00	1.39
J19	JUNCTION	0.00	0.01	98.12	0 01:11	0.01
J2	JUNCTION	0.01	0.19	99.19	0 11:56	0.19
J20	JUNCTION	0.00	0.01	99.08	0 00:50	0.01
J21	JUNCTION	0.00	0.01	99.61	0 00:28	0.01
J22	JUNCTION	0.06	0.11	96.91	0 16:49	0.11
J23	JUNCTION	0.07	0.11	96.51	0 16:50	0.11
J24	JUNCTION	0.06	0.10	95.60	0 16:54	0.10
J25	JUNCTION	0.07	0.11	95.21	0 16:55	0.11
J26	JUNCTION	0.05	0.09	94.79	0 16:56	0.09
J27	JUNCTION	0.06	0.10	96.10	0 16:53	0.10
J28	JUNCTION	0.09	0.12	96.92	0 16:49	0.12
J3	JUNCTION	0.50	0.93	97.93	0 16:48	0.93
J4	JUNCTION	0.02	0.50	99.02	0 11:53	0.48
J5	JUNCTION	0.01	0.40	99.80	0 12:00	0.40
J6	JUNCTION	0.00	0.00	100.80	0 00:00	0.00
J7	JUNCTION	0.01	0.20	99.10	0 11:55	0.20
J8	JUNCTION	0.01	0.43	99.78	0 12:00	0.42
J9	JUNCTION	0.01	0.24	99.84	0 11:55	0.24
DITCH	OUTFALL	0.05	0.09	94.29	0 16:56	0.09
OF1	OUTFALL	0.00	0.00	97.20	0 01:11	0.00
POND	STORAGE	1.98	2.43	97.93	0 16:48	2.43

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
J1	JUNCTION	50.96	50.96	0 11:55	0.143	0.143	-0.005
J10	JUNCTION	379.61	826.79	0 11:55	1.11	2.18	0.018
J11	JUNCTION	153.02	256.43	0 11:55	0.447	0.757	-0.027
J12	JUNCTION	105.27	105.27	0 11:55	0.31	0.31	-0.001
J13	JUNCTION	274.41	525.87	0 11:55	0.768	1.53	-0.012
J14	JUNCTION	82.89	945.37	0 11:54	0.233	4.09	-0.021
J15	JUNCTION	0.00	0.00	0 00:00	0	0	-100.000
J16	JUNCTION	0.00	581.34	0 11:54	0	1.84	0.003
J17	JUNCTION	0.00	0.62	0 00:00	0	0.000728	-39.573
J18	JUNCTION	0.00	869.40	0 12:00	0	3.85	0.008
J19	JUNCTION	0.00	0.30	0 01:02	0	0.0012	0.075
J2	JUNCTION	49.14	240.36	0 11:55	0.136	0.691	-0.358
J20	JUNCTION	0.00	0.37	0 00:39	0	0.00121	0.100
J21	JUNCTION	0.00	0.51	0 00:20	0	0.00121	0.019
J22	JUNCTION	0.00	36.65	0 16:48	0	4.27	0.027
J23	JUNCTION	0.00	36.65	0 16:49	0	4.27	0.057
J24	JUNCTION	0.00	36.65	0 16:53	0	4.27	0.047
J25	JUNCTION	0.00	36.65	0 16:54	0	4.27	0.043
J26	JUNCTION	0.00	36.65	0 16:55	0	4.26	0.031
J27	JUNCTION	0.00	36.65	0 16:51	0	4.27	0.052

J28	JUNCTION	0.00	22.00	0	16:47	0	4.01	0.008
J3	JUNCTION	0.00	1181.54	0	11:56	0	4.78	0.193
J4	JUNCTION	210.93	350.21	0	11:55	0.64	1.07	0.015
J5	JUNCTION	108.47	108.47	0	11:55	0.315	0.315	0.003
J6	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
J7	JUNCTION	142.40	142.40	0	11:55	0.43	0.43	-0.086
J8	JUNCTION	0.00	102.01	0	12:02	0	0.315	0.035
J9	JUNCTION	147.23	196.55	0	11:55	0.412	0.555	-0.008
DITCH	OUTFALL	0.00	36.65	0	16:56	0	4.26	0.000
OF1	OUTFALL	0.00	0.23	0	01:11	0	0.0012	0.000
POND	STORAGE	104.62	1253.37	0	11:56	0.645	8.55	0.020

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Meters	Min. Depth Below Rim Meters
J10	JUNCTION	0.18	0.000	0.000
J18	JUNCTION	0.40	0.790	0.110

****
Node Flooding Summary
****

Flooding refers to all water that overflows a node, whether it ponds or not.

Node	Hours Flooded	Maximum Rate LPS	Time of Max Occurrence days hr:min	Total Flood Volume 10^6 ltr	Maximum Ponded Depth Meters
J10	0.18	456.21	0 11:55	0.167	0.000

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 mÂ³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 mÂ³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
POND	5.440	73.3	0.0	0.0	7.130	96.1	0 16:48	88.67

****

Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
DITCH	94.24	17.48	36.65	4.262
OF1	3.65	0.10	0.23	0.001
System	48.95	17.58	36.65	4.264

****
Link Flow Summary
****

Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days	Time of Max Occurrence hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CONDUIT	0.62	0	00:00	0.10	0.00	0.02
C1_1	CONDUIT	104.25	0	11:55	0.63	0.02	0.19
C1_2	CONDUIT	254.31	0	11:55	0.83	0.04	0.34
C17	CONDUIT	869.40	0	12:01	3.31	1.96	0.88
C18	CONDUIT	945.19	0	11:54	1.38	0.16	0.83
C2	CONDUIT	523.07	0	11:55	1.05	0.09	0.62
C3	CONDUIT	524.03	0	12:01	1.85	0.77	1.00
C30	CONDUIT	36.65	0	16:49	0.46	0.01	0.11
C31	CONDUIT	36.65	0	16:51	0.47	0.01	0.11
C33_1	CONDUIT	0.00	0	00:00	0.00	0.00	0.20
C33_3	CONDUIT	102.01	0	12:02	1.48	0.87	0.92
C33_4	CONDUIT	127.35	0	12:04	0.37	0.02	0.60
C36	CONDUIT	506.15	0	12:08	1.79	0.69	1.00
C4	CONDUIT	0.51	0	00:20	0.11	0.00	0.02
C4_1	CONDUIT	49.92	0	11:55	0.34	0.01	0.17
C4_2	CONDUIT	192.88	0	11:55	0.98	0.04	0.21
C43	CONDUIT	36.65	0	16:53	0.51	0.01	0.10
C44	CONDUIT	36.65	0	16:54	0.49	0.01	0.10
C45	CONDUIT	36.65	0	16:55	0.53	0.01	0.10
C46	CONDUIT	36.65	0	16:56	0.60	0.01	0.09
C47	CONDUIT	22.00	0	16:52	0.57	0.19	0.11
C5	CONDUIT	238.35	0	11:56	0.54	0.03	0.48
C6	CONDUIT	1160.86	0	11:56	2.76	0.48	1.00
C7	CONDUIT	0.30	0	01:02	0.10	0.00	0.01
C7_1	CONDUIT	140.71	0	11:55	0.55	0.03	0.35
C7_2	CONDUIT	462.92	0	11:54	0.68	0.08	0.75
C8	CONDUIT	0.37	0	00:39	0.09	0.00	0.02
C9	CONDUIT	0.23	0	01:11	0.10	0.00	0.01
Orifice1	ORIFICE	22.00	0	16:47		1.00	
Weir1	WEIR	14.65	0	16:48		0.03	

****
Flow Classification Summary
****

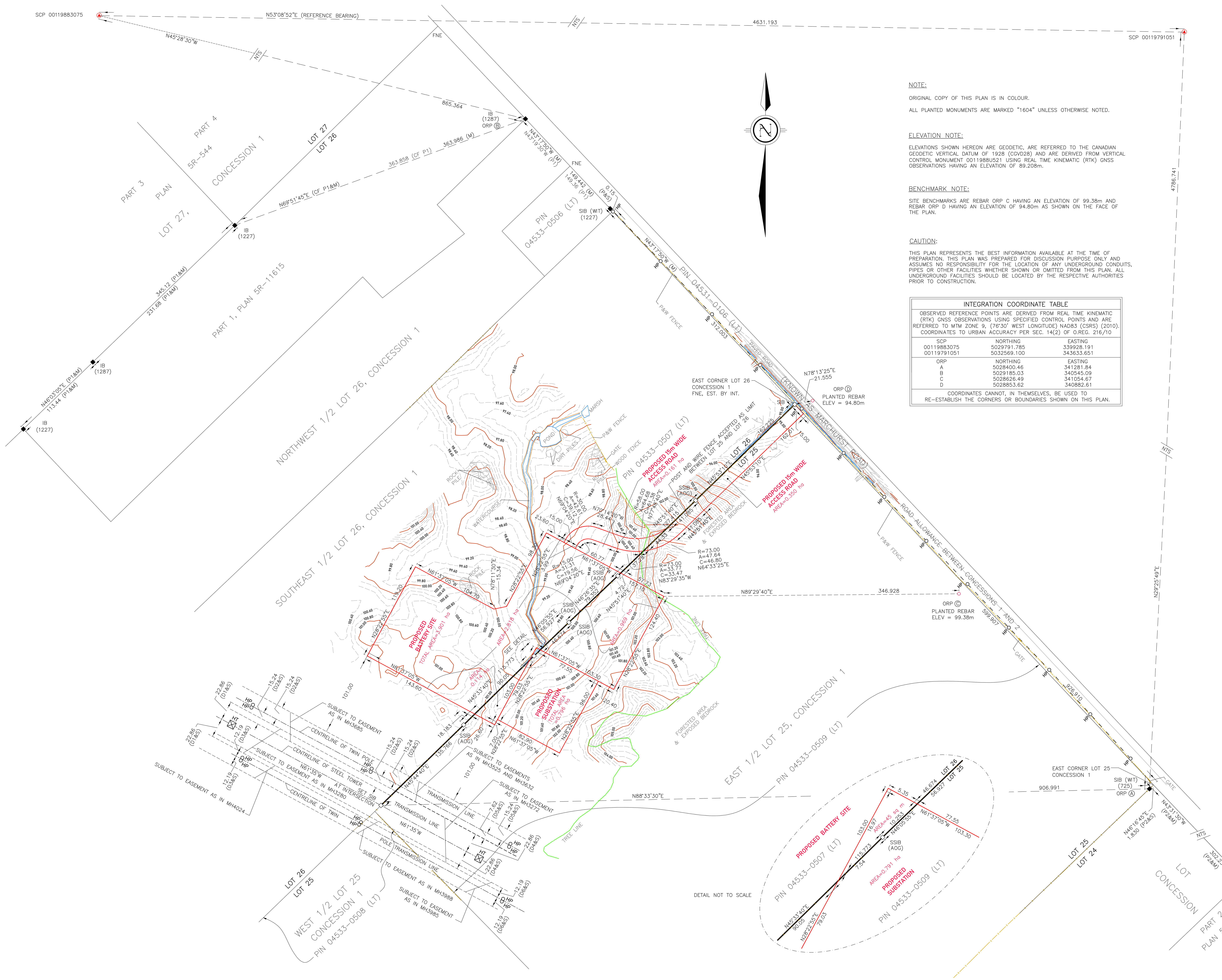
Conduit	Adjusted /Actual Length	Up Dry	Down Dry	Sub Dry	Sup Crit	Up Crit	Down Crit	Norm Crit	Inlet Ltd	Ctrl
		---------- Fraction of Time in Flow Class ----------								
C1	1.00	0.67	0.08	0.00	0.26	0.00	0.00	0.00	1.00	0.00
C1_1	1.00	0.02	0.03	0.00	0.95	0.00	0.00	0.00	0.98	0.00
C1_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.98	0.00
C17	1.00	0.02	0.07	0.00	0.77	0.14	0.00	0.00	0.32	0.00
C18	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.13	0.00
C2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.68	0.00
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.97	0.00
C30	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.95	0.00
C31	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.00	0.00
C33_1	1.00	0.11	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C33_3	1.00	0.11	0.00	0.00	0.67	0.22	0.00	0.00	0.00	0.00
C33_4	1.00	0.02	0.58	0.00	0.40	0.00	0.00	0.00	0.88	0.00
C36	1.00	0.02	0.00	0.00	0.97	0.00	0.00	0.00	0.96	0.00
C4	1.00	0.62	0.05	0.00	0.33	0.00	0.00	0.00	1.00	0.00
C4_1	1.00	0.11	0.16	0.00	0.73	0.00	0.00	0.00	0.84	0.00
C4_2	1.00	0.04	0.08	0.00	0.89	0.00	0.00	0.00	0.01	0.00
C43	1.00	0.04	0.00	0.00	0.96	0.00	0.00	0.00	0.87	0.00
C44	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.94	0.00
C45	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00
C46	1.00	0.05	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00
C47	1.00	0.03	0.00	0.00	0.97	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.02	0.05	0.00	0.93	0.00	0.00	0.00	0.97	0.00
C6	1.00	0.00	0.02	0.00	0.94	0.04	0.00	0.00	0.14	0.00
C7	1.00	0.53	0.03	0.00	0.44	0.00	0.00	0.00	0.98	0.00
C7_1	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.97	0.00
C7_2	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.92	0.00
C8	1.00	0.56	0.06	0.00	0.38	0.00	0.00	0.00	0.99	0.00
C9	1.00	0.54	0.00	0.00	0.46	0.00	0.00	0.00	0.78	0.00

****
Conduit Surcharge Summary
****

Conduit	--------- Hours Full -------- Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C17	0.01	0.40	17.46	0.45	0.01
C3	0.17	0.17	0.40	0.01	0.01
C36	0.33	0.33	0.40	0.01	0.01
C6	9.97	9.97	26.69	0.01	0.01

Analysis begun on: Thu Jun 19 13:47:10 2025
Analysis ended on: Thu Jun 19 13:47:14 2025
Total elapsed time: 00:00:04

Appendix E: Topographic Survey



NOTE:

ORIGINAL COPY OF THIS PLAN IS IN COLOUR.

ALL PLANTED MONUMENTS ARE MARKED "1604" UNLESS OTHERWISE NOTED.

ELEVATION NOTE:

ELEVATIONS SHOWN HEREON ARE GEODETIC, ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928 (CGVD28) AND ARE DERIVED FROM VERTICAL CONTROL MONUMENT 0011988U521 USING REAL TIME KINEMATIC (RTK) GNSS OBSERVATIONS HAVING AN ELEVATION OF 89.208m.

BENCHMARK NOTE:

SITE BENCHMARKS ARE REBAR ORP C HAVING AN ELEVATION OF 99.38m AND REBAR ORP D HAVING AN ELEVATION OF 94.80m AS SHOWN ON THE FACE OF THE PLAN.

CAUTION:

THIS PLAN REPRESENTS THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION. THIS PLAN WAS PREPARED FOR DISCUSSION PURPOSE ONLY AND ASSUMES NO RESPONSIBILITY FOR THE LOCATION OF ANY UNDERGROUND CONDUITS, PIPES OR OTHER FACILITIES WHETHER SHOWN OR OMITTED FROM THIS PLAN. ALL UNDERGROUND FACILITIES SHOULD BE LOCATED BY THE RESPECTIVE AUTHORITIES PRIOR TO CONSTRUCTION.

INTEGRATION COORDINATE TABLE

OBSERVED REFERENCE POINTS ARE DERIVED FROM REAL TIME KINEMATIC (RTK) GNSS OBSERVATIONS USING SPECIFIED CONTROL POINTS AND ARE REFERRED TO MTM ZONE 9, (76°30' WEST LONGITUDE) NAD83 (CSRS) (2010). COORDINATES TO URBAN ACCURACY PER SEC. 14(2) OF O.REG. 216/10

SCP	NORTHING	EASTING
00119883075	5029791.785	339928.191
00119791051	5032569.100	343633.651

ORP	NORTHING	EASTING
A	5028400.46	341281.84
B	5029185.03	340545.09
C	5028626.49	341054.67
D	5028853.62	340882.61

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH THE CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

TOPOGRAPHIC PLAN OF SURVEY OF PART OF THE EAST 1/2 LOT 25 AND PART OF THE SOUTHEAST 1/2 LOT 26 CONCESSION 1 GEOGRAPIC TOWNSHIP OF MARCH CITY OF OTTAWA

TULLOCH GEOMATICS INC.
2025
SCALE 1:2000

20m 0 20 100m

THE INTENDED PLOT SIZE OF THIS PLAN IS 914mm IN WIDTH BY 610mm IN HEIGHT WHEN PLOTTED AT A SCALE OF 1:2000.

METRIC:

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DISTANCE NOTE:

GROUND DISTANCES SHOWN HEREON CAN BE CONVERTED TO MTM GRID BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 0.999906.

BEARING NOTE:

BEARINGS ARE MTM GRID DERIVED FROM REAL TIME KINEMATIC (RTK) GNSS OBSERVATIONS USING SPECIFIED CONTROL POINTS 00119883075 AND 00119791051 ARE REFERRED TO THE CENTRAL MERIDIAN OF MTM ZONE 9 (76°30' WEST LONGITUDE) NAD83 (CSRS) (2010.0).

ROTATION NOTE:

A ROTATION OF 0°20'00" COUNTER CLOCKWISE HAS BEEN APPLIED TO THE ASTRONOMIC BEARINGS OF UNDERLYING PLAN P1 TO ACCOUNT FOR DIFFERENT REFERENCE MERIDIANS.

NO ROTATION HAS BEEN APPLIED TO THE MTM GRID BEARINGS OF UNDERLYING PLAN P2.

LEGEND:

■	DENOTES FOUND MONUMENT
□	DENOTES PLANTED MONUMENT
▲	DENOTES FOUND SPECIFIED CONTROL POINT
○	DENOTES PLANTED REBAR
SIB	DENOTES STANDARD IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
IB	DENOTES IRON BAR
SCP	DENOTES SPECIFIED CONTROL POINT
ORP	DENOTES OBSERVED REFERENCE POINT
PIN	DENOTES PROPERTY IDENTIFICATION NUMBER
M	DENOTES MEASURED
S	DENOTES SET
WIT	DENOTES WITNESS
CF	DENOTES CALCULATED FROM
ELEV	DENOTES ELEVATION
BM	DENOTES BENCHMARK
EST.	DENOTES ESTABLISHED
INT.	DENOTES INTERSECTION
725	DENOTES R.W. ARNETT, O.L.S
1227	DENOTES L.E. ROSS, O.L.S
1287	DENOTES P.G. SMITH OF FARLEY, SMITH AND MURRAY SURVEYING LTD.
1604	DENOTES TULLOCH GEOMATICS INC.
AOG	DENOTES ANNIS O'SULLIVAN VOLLEBEKK LTD., O.L.S.
P	DENOTES PLAN ATTACHED TO INSTRUMENT CT189441, BY L.E. ROSS, DATED DECEMBER 21, 1972
P1	DENOTES PLAN 5R-11615
P2	DENOTES PLAN 4R-25606
D1	DENOTES INSTRUMENT MH3280
D2	DENOTES INSTRUMENT MH3685
D3	DENOTES INSTRUMENT MH4024
D4	DENOTES INSTRUMENT MH3272
D5	DENOTES INSTRUMENT MH3525 & MH3632
D6	DENOTES INSTRUMENT MH3985
NTS	DENOTES NOT TO SCALE

TOPOGRAPHIC LEGEND:

P&W	DENOTES POST AND WIRE
○ HP	DENOTES HYDRO POLE
☒ HT	DENOTES TRANSMISSION LINE TOWER
	DENOTES WOOD OUTLINE
	DENOTES BOTTOM OF DITCH
	DENOTES FENCE LINE
	DENOTES OVERHEAD WIRES
	DENOTES TREE LINE
100.00	DENOTES 1.00m MAJOR CONTOUR LINE
100.40	DENOTES 0.2m MINOR CONTOUR LINE

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT AND THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.

(2) THE SURVEY WAS COMPLETED ON THE 5th DAY OF MARCH, 2025.

MARCH 11, 2025
DATE

THOMAS J. CORTENS
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V-97472.

TULLOCH
TULLOCH GEOMATICS INC.
900 MORRISON DR.
SUITE 208
OTTAWA, ON
K2H 8K7
T. 613 721.1138
TF. 800 797.2997
ottawa@tulloch.ca

DRAWN BY: MAL | FILE: 241451

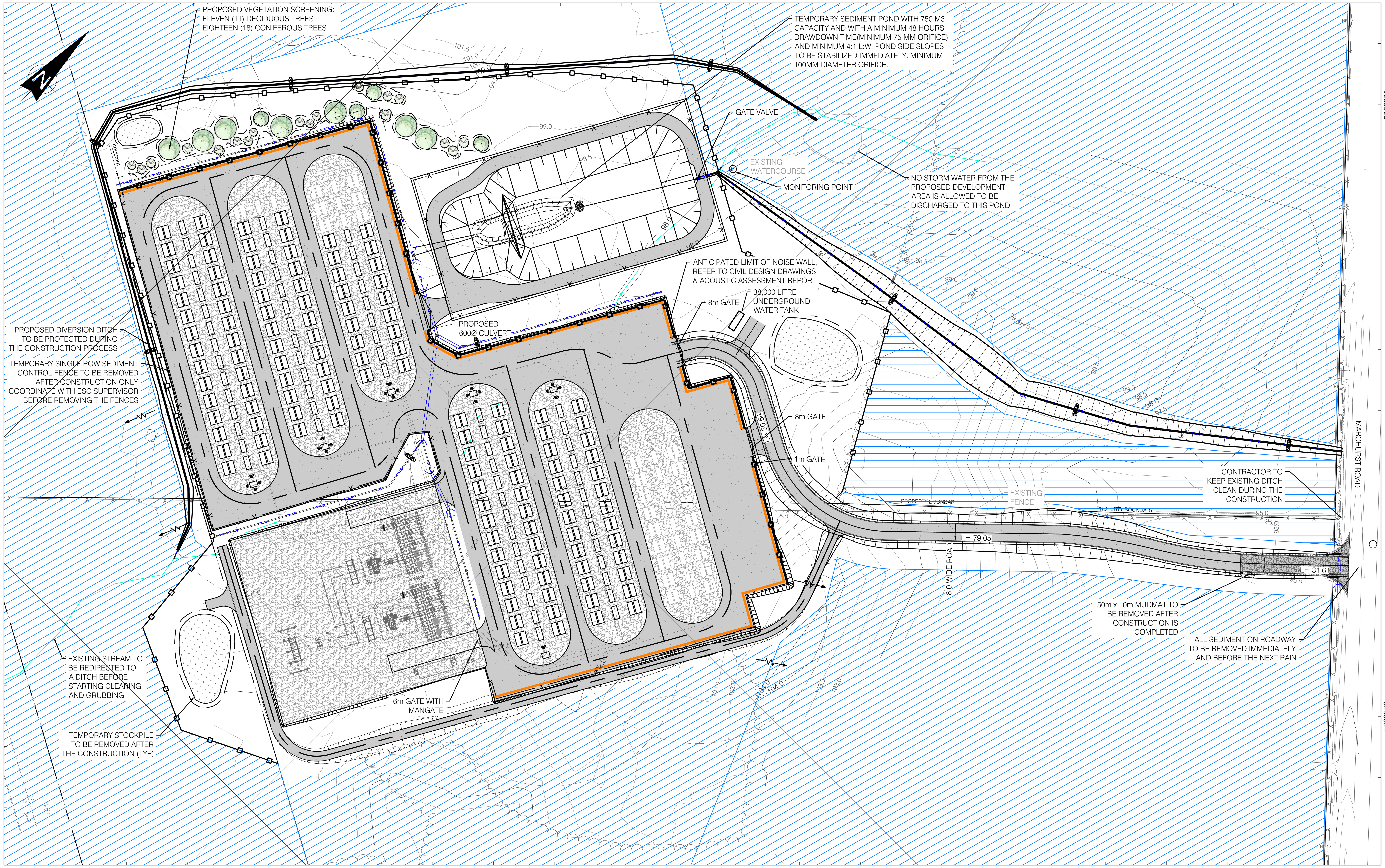
ACAD FILE:P:\2024\241451 EVOLUGEN FITZROY BESS\GEOMATICS\06 PRODUCTION\241451-South March_BESS-MTM9-Rev0.dwg

Appendix F: Reference Reports

The following documents have been included along the submission of this report:

Document code/Author	Document title
Tulloch	Topographic Plan of Survey of Part of the East ½ Lot 25 and Part of the Southeast ½ Lot 26 Concession 1 Geographic Township of March (241451-South March_BESS-MTM9-Rev0), dated March 11, 2025)
Hatch Ltd.	South March BESS Site Geotechnical Investigation - Hydrogeological and Terrain Analysis Study (H375142-0000-2A4-030-0001), dated March 5, 2025
Hatch Ltd.	South March Battery Energy Storage System (BESS) Preliminary Geotechnical Investigation (H375142-0000-2A0-230-0001), dated February 28, 2025
Hatch Ltd.	South March Battery Energy Storage System (BESS) Fluvial Geomorphology Assessment (H375142-0000-2B0-066-0001), dated June 04, 2025

Appendix E: Erosion and Sediment Control Details



PLAN VIEW
SCALE 1:1000

KEY PLAN
SCALE: N.T.S.

SEDIMENT AND EROSION CONTROL NOTES:

1. CONTRACTOR IS RESPONSIBLE TO REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, AND ANY OTHER SUBSTANCE THAT MAY ACCUMULATE IN ANY PART OF THE STORM DRAINAGE SYSTEM, EASEMENT AND RIGHT OF WAY (ROW).
2. THE CONTRACTOR MUST FOLLOW ALL DETAIL AND INSTRUCTION SET OUT IN THE "EROSION AND SEDIMENT CONTROL GUIDE FOR URBAN CONSTRUCTION" PREPARED BY MISSISSIPPI VALLEY CONSERVATION AUTHORITY.
3. ALL MATERIALS AND EQUIPMENT USED FOR THE PURPOSE OF SITE PREPARATION AND PROJECT COMPLETION SHALL BE OPERATED AND STORED IN A MANNER THAT PREVENTS ANY DELETERIOUS SUBSTANCE (i.e. PETROLEUM PRODUCTS DEBRIS) FROM ENTERING ANY WATERCOURSES.
4. STOCKPILES MUST BE PROPERLY PLACED AND PROTECTED ONSITE SO MATERIAL WILL NOT BE ERODED TO OFFSITE AREAS, INCLUDING THE STORM DRAINAGE SYSTEM.
5. STOCKPILE IS DEEMED IN PLACE AFTER THE FIRST PLACEMENT OF SOIL.
6. STOCKPILES IN PLACE FOR LESS THAN 30 DAYS MUST HAVE, AT A MINIMUM, FUNCTIONAL SEDIMENT CONTROL PRACTICES ON THE DOWN-GRADIENT SIDE OF THE PILE THAT WILL CONTAIN SEDIMENT.
7. LONG-TERM STOCKPILES (IN PLACE MORE THAN 30 DAYS) MUST BE STABILIZED WITH AN APPROPRIATE EROSION CONTROL MEASURE (COVER).
8. STOCKPILES MUST NOT EXCEED 6.0m IN HEIGHT, WITH MAXIMUM 2:1 (H:V) SIDE SLOPING. TOPSOIL STOCKPILES MUST BE STABILIZED WITH HYDROSEED, TO THE SATISFACTION OF THE AUTHORITY.
9. PRIOR TO THE COMMENCEMENT OF ANY CLEARING, GRUBBING, EXCAVATION, FILLING OR GRADING WORKS, THE CONTRACTOR SHALL INSTALL ALL TEMPORARY SEDIMENT CONTROL MEASURE (I.E. SILT FENCING, SILT TRAPS) TO THE SATISFACTION OF THE SITE OBSERVER, WITHIN THE WORK ZONE.
10. ALL REASONABLE EFFORTS SHALL BE MADE BY CONTRACTOR TO MITIGATE DRAINAGE IMPACTS, CONFLICTS DUE TO THE PROPOSED WORKS (TEMPORARY AND PERMANENT) OR SEDIMENT RELEASE TO ANY WATERCOURSE. THE CONTRACTOR SHALL UNDERTAKE ALL WORKS IN A MANNER TO COMPLY WITH ALL APPLICABLE LEGISLATION.
11. CONTRACTOR SHALL INSPECT SEDIMENT AND EROSION CONTROL MEASURES ON A WEEKLY BASIS AND ALSO BEFORE, DURING AND IMMEDIATELY FOLLOWING HEAVY RAINFALL EVENTS AND HEAVY SNOW MELT PERIODS. SEDIMENT FENCES AND BUFFER ZONES SHALL BE MAINTAINED IN AN EFFECTIVE WORKING CONDITION AS DIRECTED BY THE ENVIRONMENTAL MONITORS AND ANY OTHER AUTHORITIES HAVING JURISDICTION.
12. WHEN SEDIMENT ACCUMULATES TO HALF THE HEIGHT OF BARRIER OR 0.3 METER, THEN SEDIMENT REMOVAL IS REQUIRED. THE SILT SHALL BE REMOVED FROM THE BARRIER OR A SECOND LINE OF BARRIER INSTALLED. IF SEDIMENT AND EROSION CONTROL MEASURES ARE NOT FUNCTIONING PROPERLY, NO FURTHER WORK IN THE AFFECT AREAS WILL OCCUR UNTIL THE SEDIMENT AND /OR EROSION PROBLEM IS ADDRESSED.
13. SEDIMENT AND EROSION CONTROL MEASURES SHALL BE LEFT IN PLACE UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED, AND IS NO LONGER NECESSARY.
14. SURFACE RUNOFF WITHIN THE BOUNDARIES OF THE SITE SHALL NOT NEGATIVELY IMPACT ANY DOWNSTREAM LAND OR WATERCOURSES.
15. ANY STOCKPILED MATERIAL SHALL BE STORED AND STABILIZED WITHIN THE LIMIT OF WORK SITE/APPROVED WORK AREA AND AWAY FROM ANY WATERCOURSE. ALL MATERIALS AND EQUIPMENT USED FOR THE PURPOSE OF SITE PREPARATION AND CONSTRUCTION SHALL BE OPERATED AND STORED IN A MANNER THAT PREVENTS DELETERIOUS SUBSTANCES FROM ENTERING ANY WATERCOURSE.
16. AVOID CONSTRUCTION DURING HIGH VOLUME RAIN EVENTS (20mm IN 24 HOURS) AND SIGNIFICANT SNOW MELTS/THAWS WHERE POSSIBLE AND RESUME ONCE SOILS HAVE STABILIZED TO AVOID RISK OF EROSION, SOIL COMPACTION OR THE POTENTIAL FOR SEDIMENT RELEASE INTO NEARBY WATERCOURSES. CONSTRUCTION MUD MAT SHOULD BE INSTALLED IF THERE IS EXCESS SOIL AND SEDIMENT FORM VEHICLES LEAVING CONSTRUCTION SITE.
17. SEDIMENT POND SIDE SLOPES TO BE STABILIZED IMMEDIATELY. SEE SEDIMENT POND DETAILS PLAN 7154023-100000-41-D70-0001 SHEET 02.
18. ALL DAMAGED ESC MEASURES WILL BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OR SOONER IF ENVIRONMENTAL RECEPTORS ARE AT IMMINENT AND FORESEEABLE RISK OF ADVERSE IMPACTS.
19. SETBACKS FROM PROPERTY LINE, FORESTED AREA, CULTIVATED AREA, AND RIGHT-OF-WAYS ARE PROVIDED FROM CLIENT'S ENVIRONMENTAL PERMITTING TEAM.
20. THE DEVELOPER/PERSON RESPONSIBLE SHALL ENSURE THAT ALL CONSTRUCTION ACTIVITIES ARE UNDERTAKEN IN A MANNER THAT ENSURE BEST MANAGEMENT PRACTICES ARE IMPLEMENTS TO PREVENT AND CONTAIN ON-SITE, SILT LADEN RUNOFF THAT EXCEEDS 75MG/L TSS OR 65 NTU IN THE EVENT OF SIGNIFICANT RAINFALL & EXCEEDS 25 NTU UNDER NORMAL WEATHER CONDITIONS AS SPECIFIED BY THE BYLAW, FROM ENTERING DOWNSTREAM DRAINAGE INFRASTRUCTURE AND AQUATIC SYSTEM.

CAN-CISEC CERTIFIED INSPECTOR OR EQUIVALENT WILL DO WEEKLY INSPECTION

LEGEND:

- GATE VALVE
- DRAFT FIRE HYDRANT
- REMOTE FIREHYDRANT
- LIGHT STANDARD
- PROPOSED MANHOLE
- CATCH BASIN MANHOLE
- EXISTING HYDRO POLE
- UNDERGROUND UTILITY
- TERMINAL BOX
- ANCHOR
- MONITORING WELL
- BOLLARD
- BLOW OFF VALVE
- VENT
- EXISTING BOREHOLE
- BESS
- MV TRANSFORMER
- BESS (AUGMENTATION)
- MV TRANSFORMER (AUGMENTATION)
- DISTRIBUTION PANELS
- PUMP
- MONITORING POINT
- ROCK CHECK DAM
- EXISTING FENCE
- PROPOSED FENCE
- TEMPORARY SINGLE ROW SILT FENCE
- STORM PIPE
- WATER LINE
- EXISTING WATERCOURSE
- OFFSET LINE
- EXISTING TRANSMISSION LINE
- PROPERTY LINE
- BURIED TELECOMMUNICATIONS
- BURIED ELECTRIC
- SWALE
- PROPOSED GRAVEL SURFACE AREA
- PROPOSED INSULATING STONE SURFACE AREA
- CULTIVATED AREA
- UNDISTURBED AREA
- PROPOSED DIVERSION DITCH
- PROPOSED CULVERT
- MUD MAT

SCALE 1:1000 — 20 10 0 20 40 60 80 100 m

FOR PERMITTING

REV	DESCRIPTION	PREPARED BY	CHECKED BY	DATE
AC	FOR PERMITTING	E. AMELI	M. SHAHRAKI	2025-06-19
AB	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-06-06
AA	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-03-03

DRAWING No.	DESCRIPTION

REFERENCE DRAWINGS
REVISIONS

SEAL: LICENSED PROFESSIONAL ENGINEER — E. AMELI — 100617996 — PROVINCE OF ONTARIO — 2025-06-19

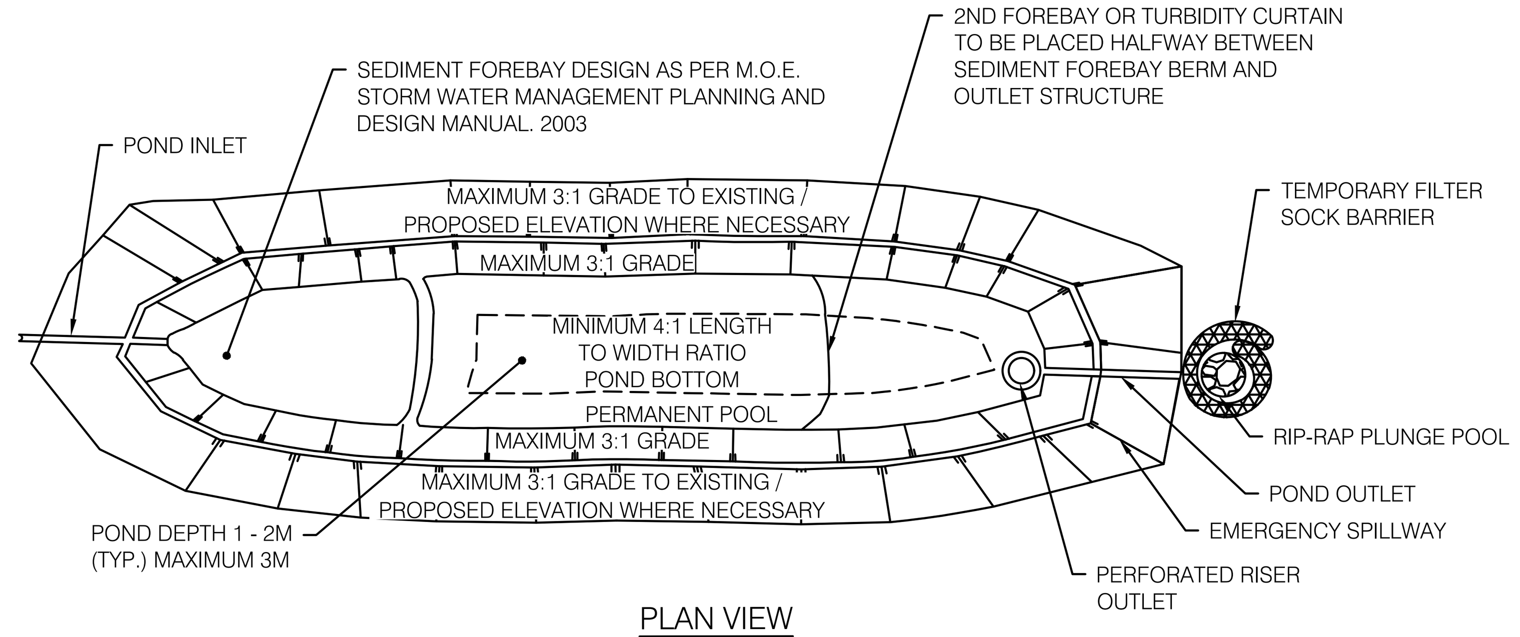
CLIENT: Evolugen by Brookfield Renewable

PROJECT: SOUTH MARCH
2555 AND 2625 MARCHURST RD, OTTAWA

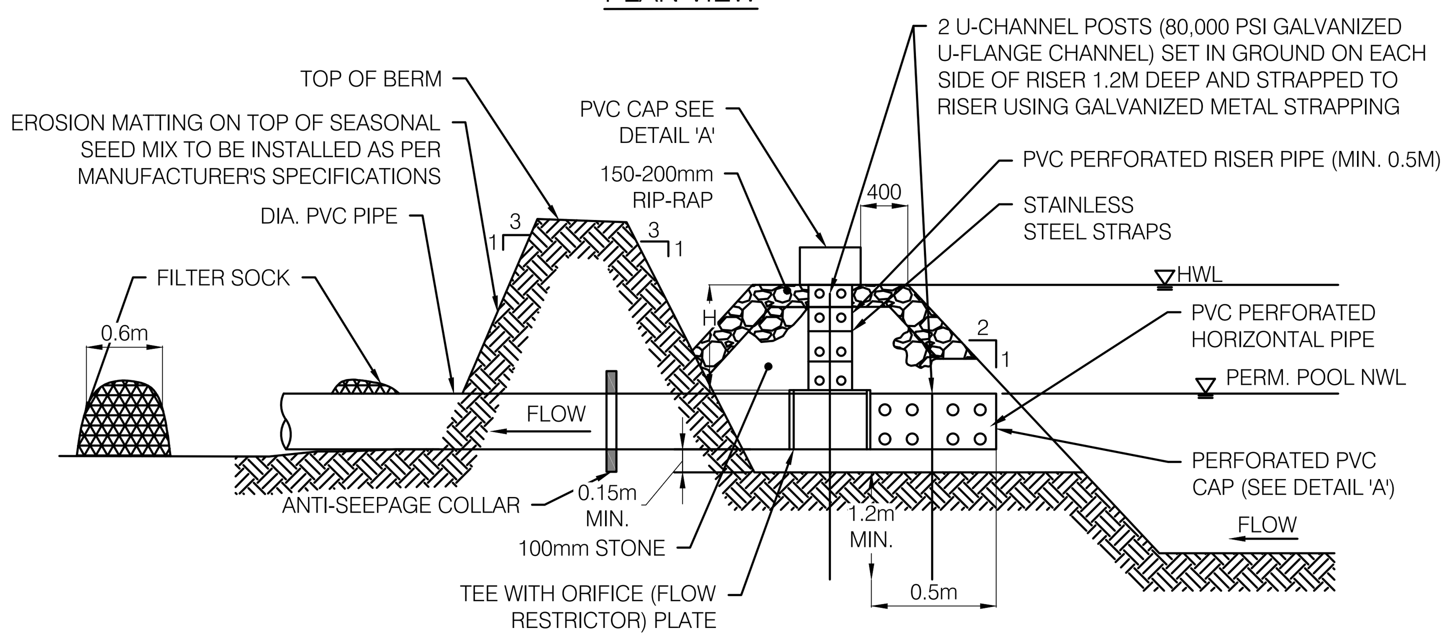
TITLE: CIVIL BESS
EROSION AND SEDIMENT CONTROL

PREPARED BY: E. AMELI	DRAFTED BY: J.MUGGERIDGE
CHECKED BY: E. AMELI	APPROVED BY: M.SHAHRAKI
SCALE: 1:1000	DATE: 2024-03-03

DRAWING No.	SHEET:	SIZE:	REV.
7154023-100000-41-D70-0001	01	A1	AC

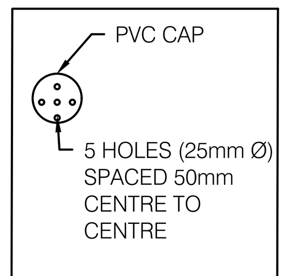


PLAN VIEW

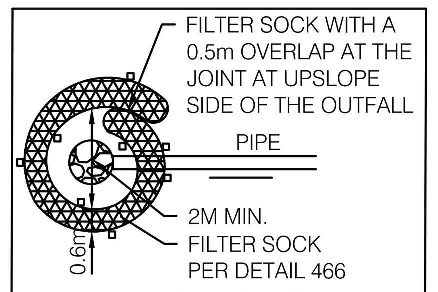


ELEVATION

NOTES:
1. POND SIDE SLOPES TO BE STABILIZED IMMEDIATELY;
2. MINIMUM 48 HOUR DRAWDOWN TIME WITH MINIMUM 75mm DIAMETER ORIFICE;
3. ACTIVE STORAGE VOLUME: SHOULD BE DESIGNED WITH A MINIMUM OF 125m³/HECTARE CONTRIBUTING DRAINAGE AREA WITH A MINIMUM 48 HOUR DRAWDOWN TIME (MINIMUM 75mm DIAMETER ORIFICE) AND MINIMUM 4:1 L:W POND RATIO; AND,
4. PERMANENT POOL VOLUME:
   4.1. MINIMUM 125m³/HECTARE DRAINAGE AREA; OR
   4.2. MINIMUM 185m³/HECTARE DRAINAGE AREA IF L:W RATIO IS LESS THAN 4:1 OR THE DRAWDOWN TIME FOR THE ACTIVE STORAGE IS LESS THAN 48 HOURS.

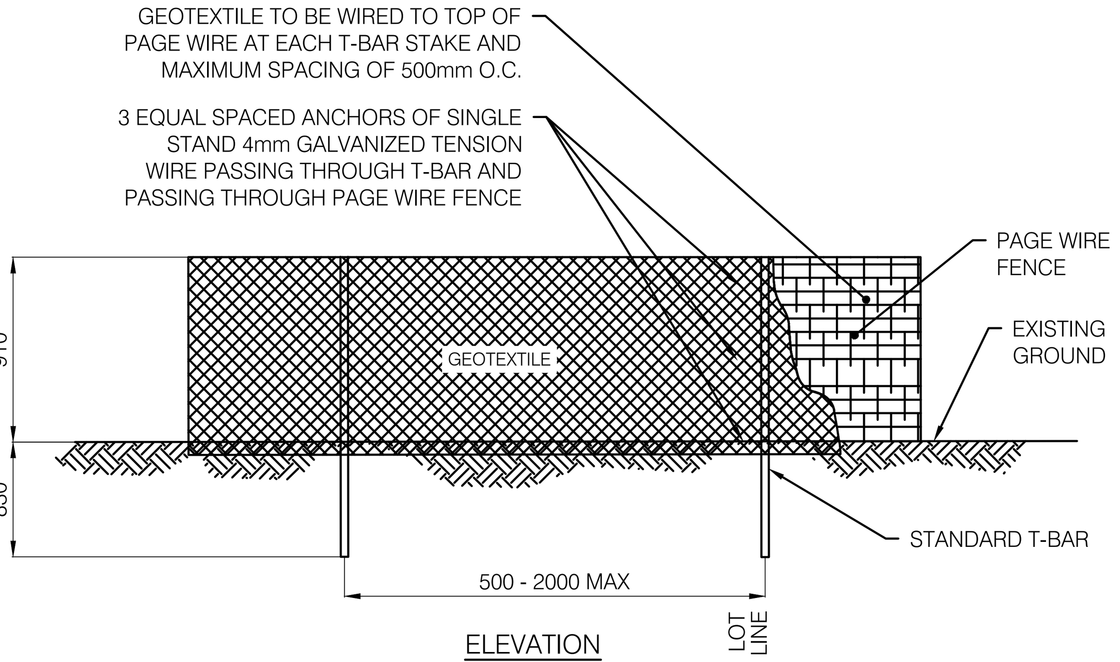


DETAIL 'A'

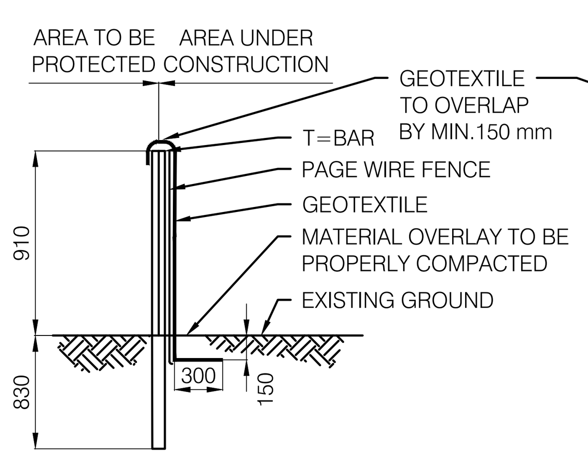


DETAIL 'B' FLOW DISPERSAL DAM

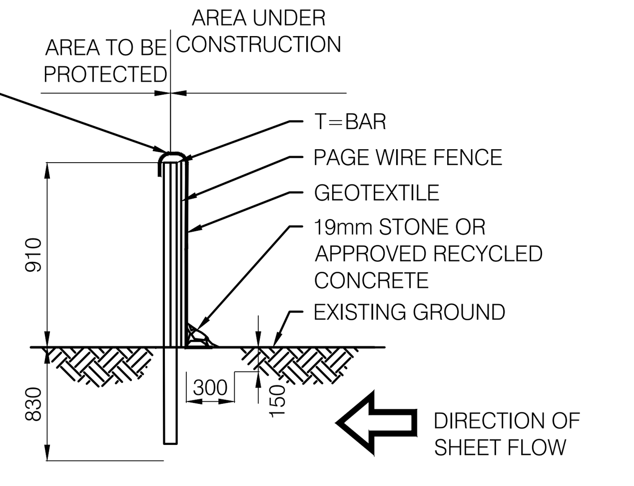
TEMPORARY SEDIMENT CONTROL POND
SCALE: N.T.S.



ELEVATION



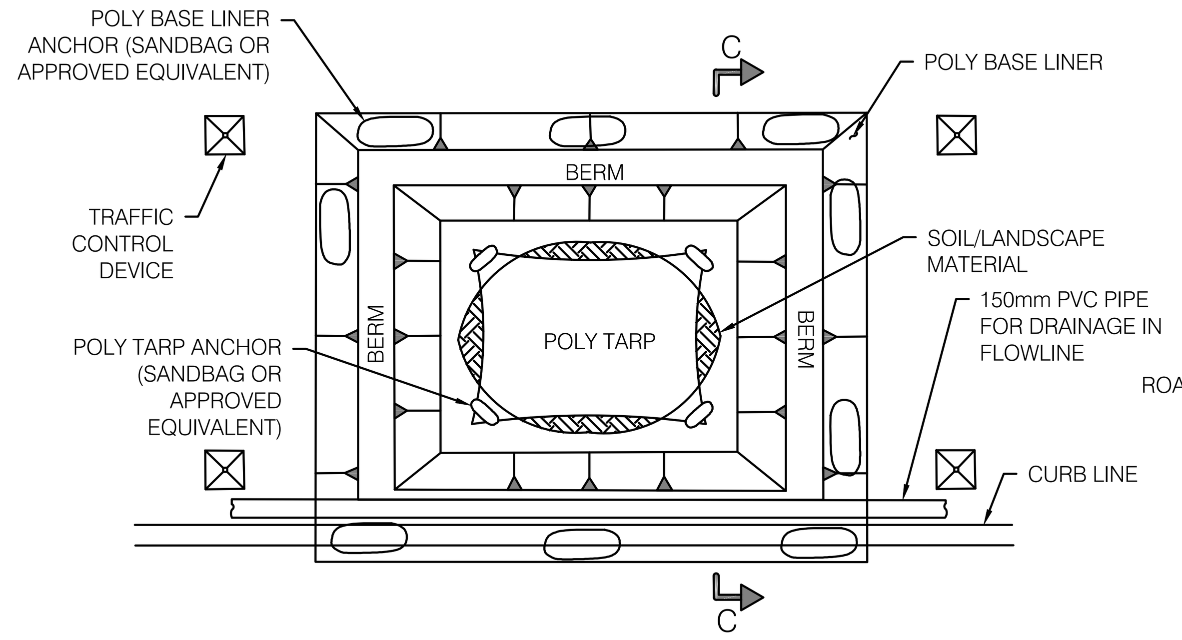
CROSS SECTION



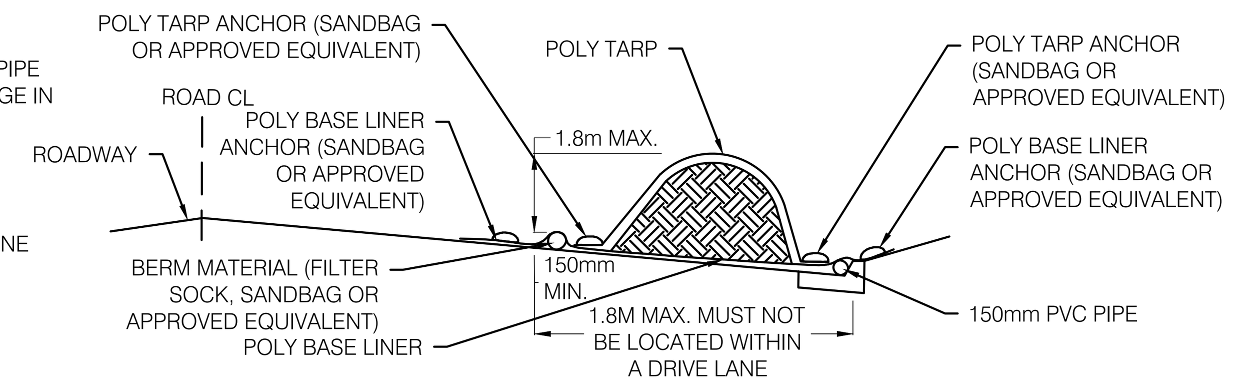
CROSS SECTION
(FROZEN CONDITION)

NOTES:
1. GEOTEXTILE TO HAVE A MINIMUM TEAR RESISTANCE OF 200 N. WATER FLOW THROUGH RATE MINIMUM 4000 L/MIN/M² AND UV STABILITY MIN 70% AT 500H.
2. GEOTEXTILE TO HAVE A HORIZONTAL OVERLAP OF 1000mm AT JOINTS.
3. PAGE WIRE FENCE OR APPROVED EQUIVALENT AS BACKING FOR GEOTEXTILE FILTER FABRIC.
4. GEOTEXTILE TO BE FASTENED TO T-BAR AND PAGE WIRE FENCE VIA METAL ZIP-TIES, 4mm GALVANIZED TENSION WIRE, OR EQUIVALENT.
5. MIN. 1.5m OFFSET FOR DOUBLE ROW SEDIMENT CONTROL FENCE.

TEMPORARY SINGLE ROW SEDIMENT CONTROL FENCE
SCALE: N.T.S.



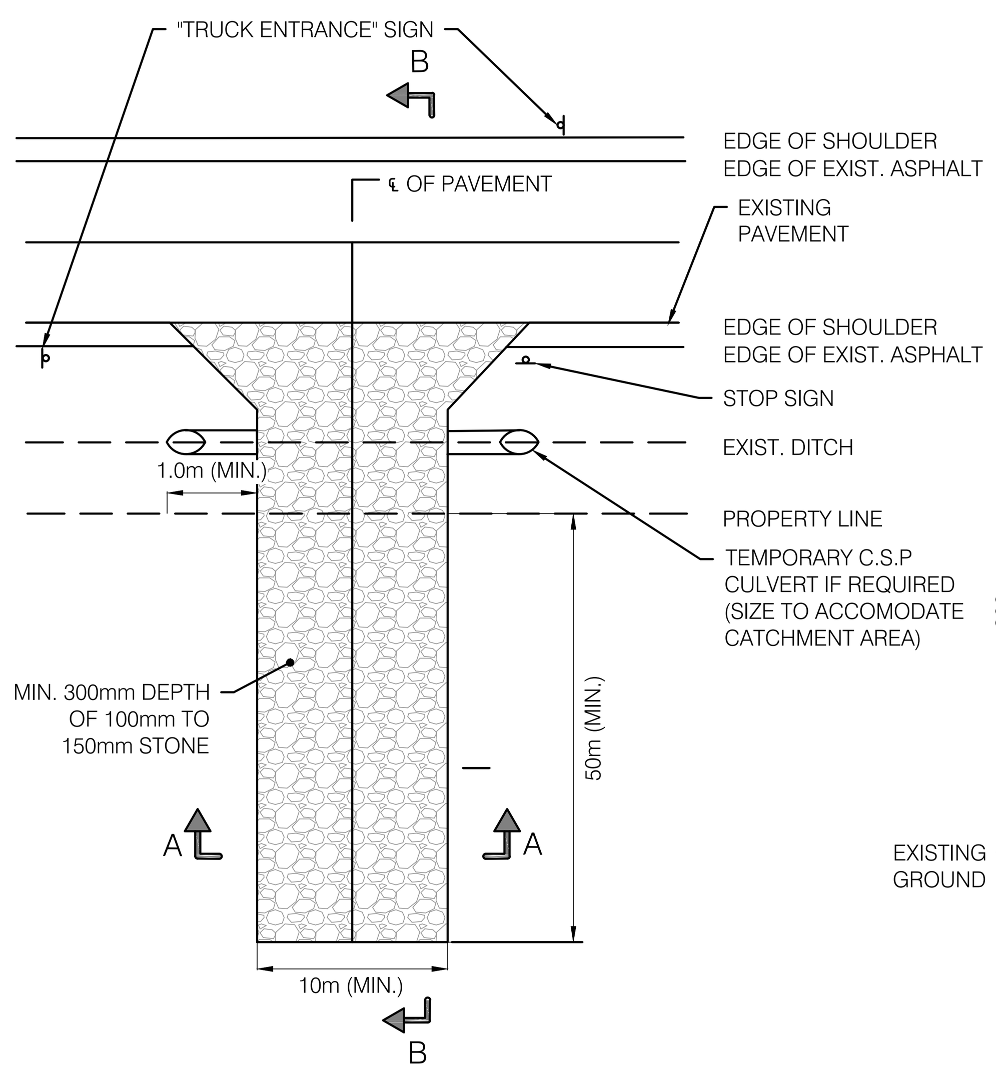
PLAN VIEW



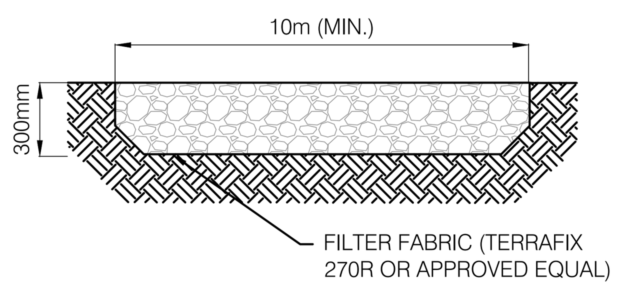
CROSS SECTION C-C MATERIALS STAGING IN ROADWAY

NOTES:
1. SEE PLAN VIEW FOR
   - LOCATION OF MATERIAL STAGING AREA(S).
   - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE CITY.
2. FEATURE MUST BE INSTALLED PRIOR TO EXCAVATION, EARTHWORK OR DELIVERY OF MATERIALS.
3. MATERIALS MUST BE STATIONED ON THE POLY BASE LINER. ANY INCIDENTAL MATERIALS DEPOSITED ON PAVED SECTION OR ALONG CURB LINE MUST BE CLEANED UP PROMPTLY.
4. POLY BASE LINER AND TARP COVER SHOULD BE OF SIGNIFICANT THICKNESS TO PREVENT DAMAGE OR LOSS OF INTEGRITY.
5. FEATURE IS NOT INTENDED FOR USE WITH WET MATERIAL THAT WILL BE DRAINING AND/OR SPREADING OUT ON THE POLY LINER OR FOR DEMOLITION MATERIALS.

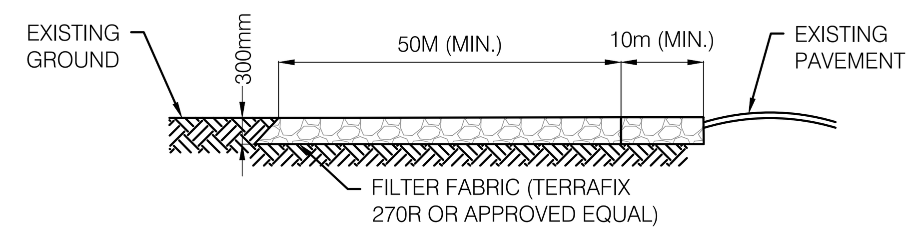
TEMPORARY STOCKPILE WITH TARP
SCALE: N.T.S.



PLAN VIEW

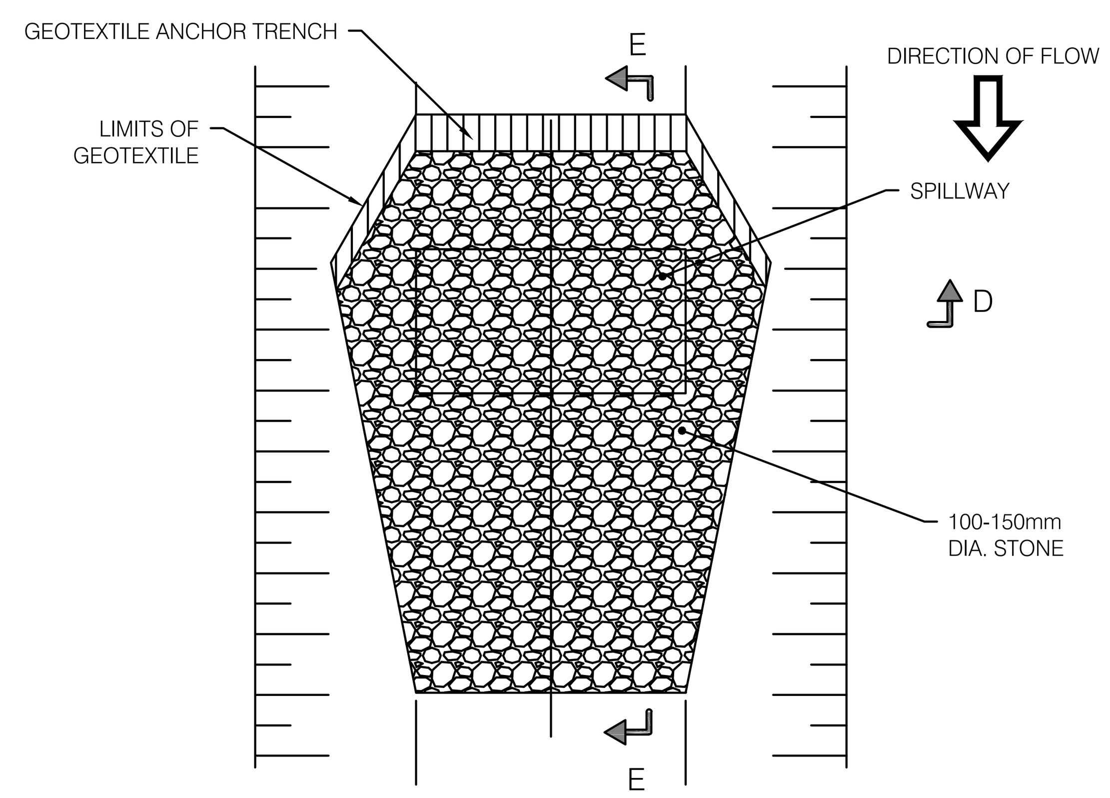


SECTION A-A

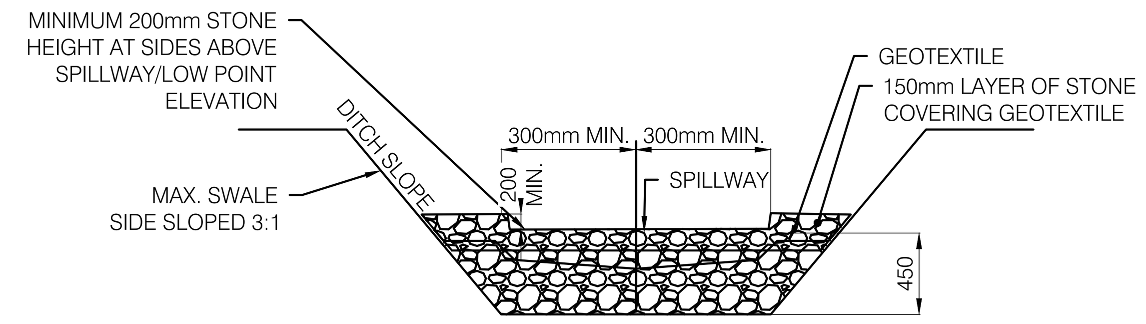


SECTION B-B SIDE ELEVATION

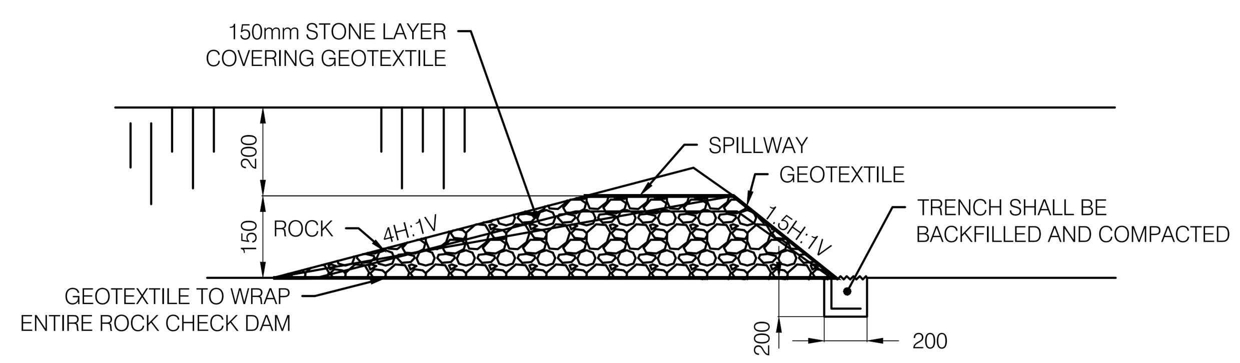
MUD MAT FOR TEMPORARY CONSTRUCTION ACCESS DETAIL
SCALE: N.T.S.



PLAN VIEW



SECTION D-D



SECTION E-E

NOTES:
1. ALL STONE AND GEOTEXTILE TO BE REMOVED AFTER THE CONSTRUCTION PROCESS.
2. COLLECTED SEDIMENT MUST BE REMOVED AND SWALE REBUILT WITH CLEANED STONE AND NEW GEOTEXTILE ONCE SEDIMENT REACHES HALFWAY TO THE LOW POINT OF THE SPILLWAY.

TEMPORARY ROCK CHECK DAM FLAT BOTTOM SWALE
SCALE: N.T.S.

FOR PERMITTING

DRAWING No.	DESCRIPTION	REV	DESCRIPTION	PREPARED BY	CHECKED BY	DATE
		AC	FOR PERMITTING	E. AMELI	M. SHAHRAKI	2025-06-19
		AB	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-06-06
7154024-300000-47-D20-0001-02	TRAIL BESS - 150 MW - 230 kV - 34.5 kV SUBSTATION	AA	FOR COMMENTS	E. AMELI	M. SHAHRAKI	2025-03-03

REFERENCE DRAWINGS | REVISIONS

SEAL:
LICENSED PROFESSIONAL ENGINEER
E. AMELI
100617996
PROVINCE OF ONTARIO
2025-06-19

CLIENT:
Evolugen by Brookfield Renewable

PROJECT: SOUTH MARCH BESS
2555 AND 2625 MARCHURST RD, OTTAWA

TITLE: CIVIL
EROSION AND SEDIMENT CONTROL
DETAILS

DESIGNED BY: E.AMELI	DRAFTED BY: S. PARK
PREPARED BY: E.AMELI	CHECKED BY: M.SHAHRAKI
SCALE: AS SHOWN	DATE: 2025-02-27

DRAWING No.	SHEET:	SIZE:	REV.
7154023-100000-41-D70-0002	01	A1	AC

BY:JAMES, DONNA
PRINTED:2025-06-19 2:17:04 PM