FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

MOUNT HOPE WEST

RESIDENTIAL SUBDIVISION

UNITED HOLDINGS INC.

TOWN OF CALEDON

Project: 2024-5476 **February 2026**

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1.0 INTRODUCTION

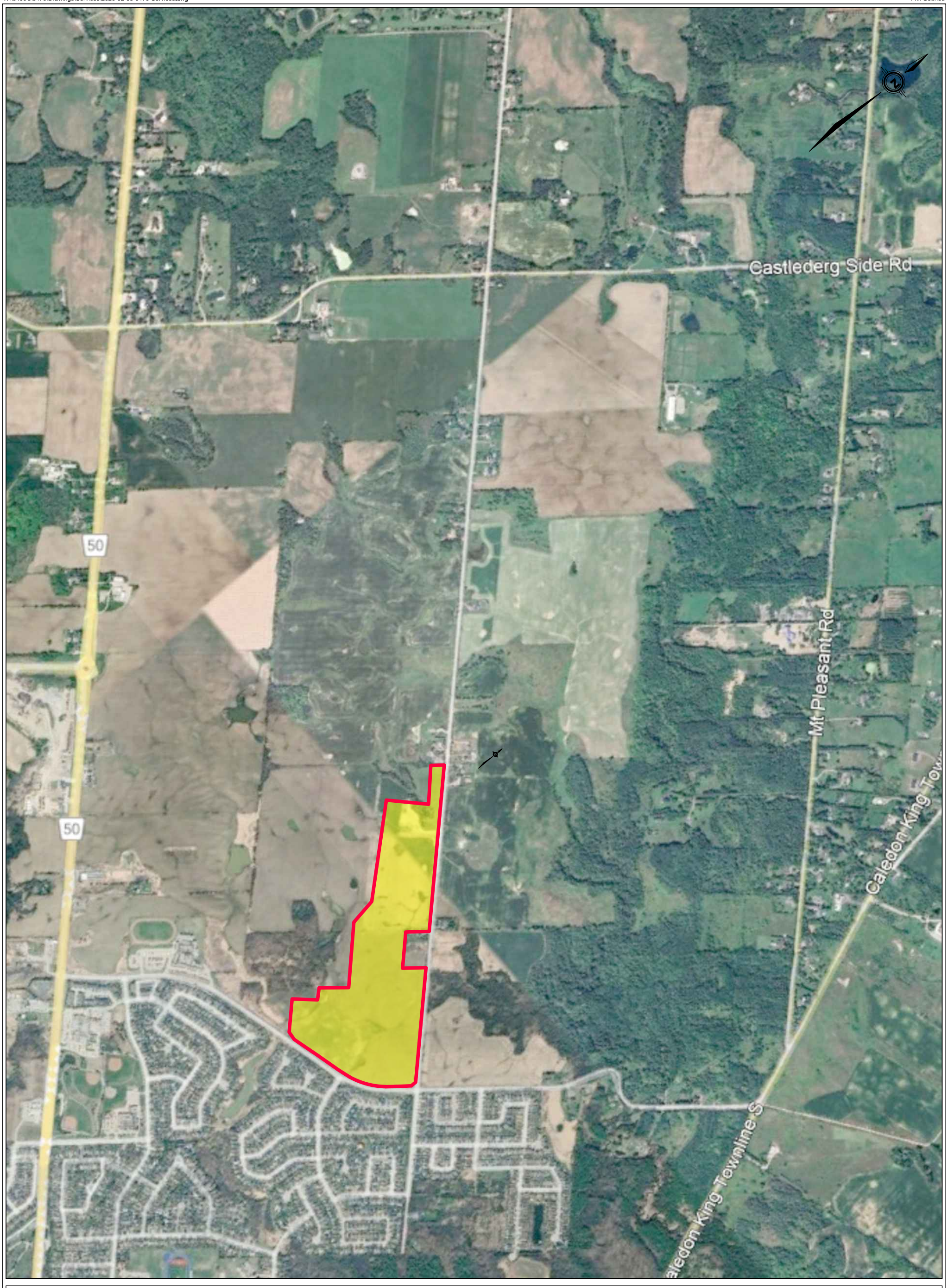
This Functional Servicing and Stormwater Management Report is provided in support of a proposed residential subdivision located in the Town of Caledon. The objective of this report is to provide a servicing plan for the 31.98 ha property referred to as “Mount Hope West”, located west of Mount Hope Road, North of Columbia Way as a northerly extension of the existing Bolton community. The subject site is registered as part of Lot 5, Concession 4, W.H.S., Town of Caledon within the Regional Municipality of Peel. Please refer to **Figure 1.1** for the location plan.

This document will summarize the proposed municipal servicing scheme in regards to potable water, sanitary flows, and stormwater management. The following sections provide information regarding the proposed services for the subject development while ensuring compatibility with the existing infrastructure and previous planning resolutions.

1.1 Reference Reports and Studies

The following studies were utilized in the preparation of this report.

- "*Development Standards Manual Ver 5.0*", by the Town of Caledon, 2019
- *"Stormwater Planning and Design Manual (SWMP)"*, by Ministry of the Environment (MOE), March 2003.
- *"Stormwater Management Criteria"*, by Toronto and Region Conservation Authority, August 2012.
- *"Low Impact Development Stormwater Management Planning and Design Guide"*, Version 1.0, Prepared by Toronto Region and Conservation Authority (TRCA) and Credit Valley Conservation, 2010.
- "*Public Works Stormwater Design Criteria and Procedural Manual*", June 2019, by the Region of Peel.
- "*Water & Wastewater Master Plan for the Lake-Based System, Volume 3 & Volume 4*", June 2020, by GM Blueplan for the Region of Peel.
- "*Public Works Design, Specifications & Procedures Manual, Linear Infrastructure, Watermain Design Criteria*", June 2010, by the Region of Peel.
- *"Linear Wastewater Standards",* March 2023, by the Region of Peel.
- "*Water Supply for Public Fire Protection*", 2020, by the Fire Underwriters Survey.
- *"Source Protection Information Atlas"*, 2023, by the Ontario Ministry of the Environment, Conservation and Parks (MECP)
- "*A Geotechnical Investigation for Proposed Residential Development Northwest of Mount Hope Road and Columbia Way, Town of Caledon*", By Soil Engineers Ltd., December 2023
- "*Stormwater Management Guideline*", By Credit Valley Conservation, July 2022
- "*Erosion and Sediment Control Guideline*", By Sustainable Technologies for TRCA, 2019
- *"Mount Hope Subdivision Temporary Water Booster Pumping Station Design Basis Report"*, By DLW Engineering Services Limited., January 2026
- *"Mount Hope Road Temporary Sewage Pumping Station and Forcemain Design Basis Report"*, By DLW Engineering Services Limited., January 2026



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LEGEND

SUBJECT AREA

FIGURE 1.1
LOCATION PLAN

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

2.0 DEVELOPMENT PLAN

The ultimate proposed development covers 31.98 ha and will include 100 detached houses, 328 semi-detached units, and 170 townhouse units. The draft plan of subdivision, prepared by KLM Planning Partners Inc. and dated December 1, 2025, is provided in **Appendix A** for reference. **Figure 2.1** illustrates the proposed development plan.

Table 2-1: Ultimate Population Estimate

Dwelling Type	Population Density	Units	Estimated Population
Single Family/Semi-detached	4.2	428	1,798
Townhouses	3.4	170	578
Future Residential	70 (pp/ha)	0.66	46
Commercial Block	50 (pp/ha)	2.65 ha	133
Total	-	-	2,555

Phase 1 of the development will include 84 detached houses, 160 semi-detached units, and 56 townhouse units.

Table 2-2: Phase 1 Population Estimate

Dwelling Type	Population Density	Units	Estimated Population
Single Family/Semi-detached	4.2	244	1,025
Townhouses	3.4	56	191
Commercial Block	50 (pp/ha)	2.65 ha	133
Total	-	-	1,349

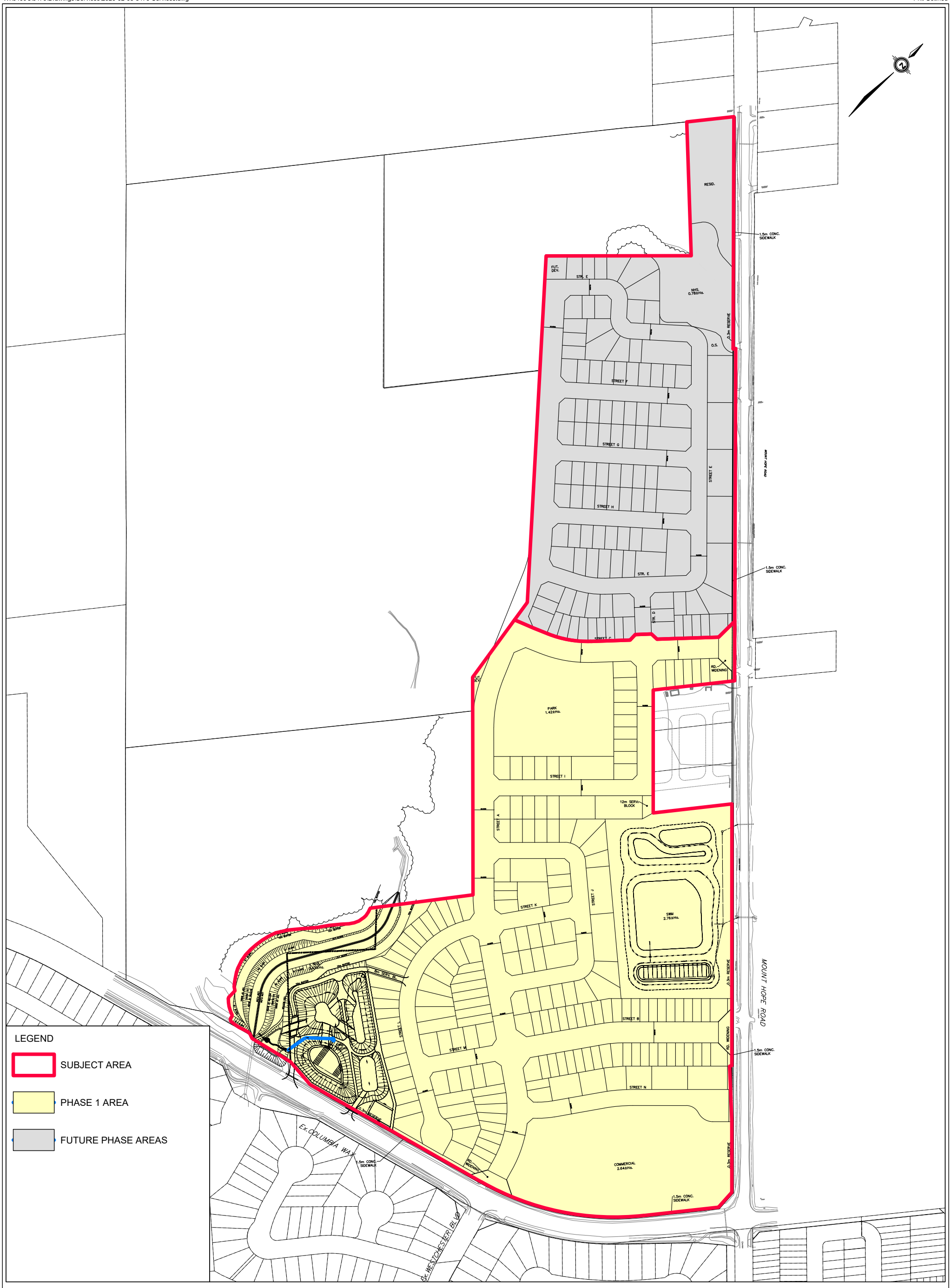

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FIGURE 2.1
PROPOSED
DEVELOPMENT PLAN

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

3.0 WATER SUPPLY SERVICING

This section describes how the proposed water distribution plan is able to adequately supply potable drinking water for the proposed development. The closest pressure zone to the site is Pressure Zone 6 (PZ6). However, the subject site is expected to connect to Pressure Zone 7 (PZ7), further details are provided in **Section 3.4**. A hydrant test has been requested and will be submitted once received.

3.1 Existing Water Supply Servicing

The existing watermain infrastructure around the subject site consists of the following:

- 300 mm PVC distribution main on Columbia Way (PZ6)
- 300 mm PVC distribution main on Mount Hope Road, South of Columbia Way (PZ6)

The following water supply infrastructure is expected to be within the vicinity of the subject site at the time of construction, refer to **Section 3.3**:

- Municipal watermain along Mount Hope Road, south of Columbia Way
- Watermain along Columbia Way

3.2 Water Supply Servicing Design Criteria

The water servicing system was designed in accordance with the Region of Peel Public Works Watermain Design Criteria (June 2010) and are summarized as the following:

Table 3-1: Typical Water Demand Criteria

Population Type	Unit	Avg. Consumption Rate	Max Day Factor	Peak Hour Factor
Residential	L/Capita * day	280	2.0	3.0
ICI	L/Employee * day	300	1.4	3.0

*ICI = Industrial, Commercial or Institutional

Table 3-2: Potential short term water demand criteria for new development

Population Type	Unit	Avg. Consumption Rate	Max Day Factor	Peak Hour Factor
Residential	L/Capita * day	409	2.0	3.0
ICI	L/Employee * day	300	1.4	3.0

*ICI = Industrial, Commercial or Institutional

Pressure:

- Minimum pressure for Maximum Day and Fire Flow demand of 140 kPa (20 psi);
- Minimum pressure for Peak Hour Demand of 275 kPa (40 psi);
- Maximum pressure for Maximum Day and Fire Flow demand of 690 kPa (100 psi);

Fire protection Demand:

- Fire flow demands for the proposed development have been estimated based on FUS methods with preliminary building layout information.
- As additional design details become available, it is recommended that fire flow requirements be reassessed using the FUS methodology. The final design should accommodate the ultimate requirements to effectively support the proposed servicing needs.

3.3 Bolton Water and Wastewater Feasibility Study – Water Supply

The Region of Peel has previously completed a feasibility study for the Bolton community area to review the best approaches for urban boundary expansion. This study evaluated different expansion options for the Bolton settlement area which includes the project location, assessing how each area would be serviced. Excerpts from the feasibility study is provided in **Appendix A**.

According to the feasibility study's findings, the subject property lands are outside the elevation range of Pressure Zone 6 in Bolton's existing water distribution infrastructure. As a result, the development of the subject site will require the establishment of a new Pressure Zone 7 within Bolton.

A new Zone 7 booster pumping station has been identified at King Street and Coleraine Drive. Additionally,

floating storage will be provided via an elevated tank to support flow equalization, fire demands, and emergency storage. The proposed elevated tank, which will service the site, is located adjacent to Queen Street North. As per the latest information from the Bolton Water and Wastewater Class Environmental Assessment, the water supply infrastructure around the subject site is to start in 2027 and be complete in 2029, refer to **Appendix A** for excerpts from Public Information Centre #3 by Peel Region. Refer to **Figure 3.2** for the future water supply servicing.

For a figure illustrating the ultimate Bolton North Hill water distribution plan, refer to **Appendix A**.

3.4 Phase 1 – Temporary Booster Pumping Station

The Region of Peel has determined that its existing water supply provides adequate pressures for fire flow scenarios, however the system cannot maintain adequate pressures during Peak Hour Demand (PHD) conditions. Pressures at key intersections, such as Columbia Way at Mount Hope Road and Columbia Way at Kingsview Drive, are anticipated to fall below the minimum level of service standard of 276 kPa (40 psi).

As a result, a temporary Booster Pumping Station (BPS) is required to boost domestic pressures to meet MECP and Region of Peel guidelines (maintaining 40-100 psi) during these PHD periods. The facility is designated as temporary, intended only to operate until the Region's permanent infrastructure upgrades are completed (as per **Section 3.3**). Please note that the BPS will service 300 units plus a commercial equivalent population of 133 for phase 1 of development. The resulting total service population for phase 1 would be 1,349, which corresponds to the PHD of 13.6 L/s based on the consumption rate of 290 Lpcd. The station is not required to process fire flows. During a fire event, the BPS is designed to automatically bypass the pumps via a check valve, utilizing the Region's residual pressure which is sufficient for fire protection. At the current stage of the project, two locations for the BPS are proposed, i.e., near the west SWM pond and the cul-de-sac. The suction end of the BPS will be connected to the proposed 400 mm water supply main at Columbia Way, whereas, the discharge side will be connected to the Solmar's water distribution network line near the cul-de-sac at the site entrance. The number of connections to operate phase 1 will be determined in the future via modeling in coordination with the city. Please refer to the report by DLW Engineering Services Limited provided in **Appendix A**.

3.5 Proposed Water Supply Servicing Plan

A network of watermains is proposed to service the units within the subject site, which will then connect to the future watermain along Mount Hope Road at Street 'B' and Street 'G'. A watermain connection on Street 'A' and Columbia Way will also be made to complete the looping. The future transmission mains

along Mount Hope Road and Columbia Way will be sized in coordination with the Region of Peel at a later stage. The transmission mains along Mount Hope Road, Emil Kolb Parkway, and Columbia Way will be 400 mm to 600 mm in diameter. Refer to **Figure 2.1** for details. A summary of the ultimate water supply demands is presented in **Table 3-3,** and phase 1 demands are presented in **Table 3-4**. For supporting calculations, refer to **Appendix B**. Please note that pressures within the watermains will be verified via hydrant tests once the infrastructure is constructed.

Table 3-3: Ultimate Water Supply Servicing Demands

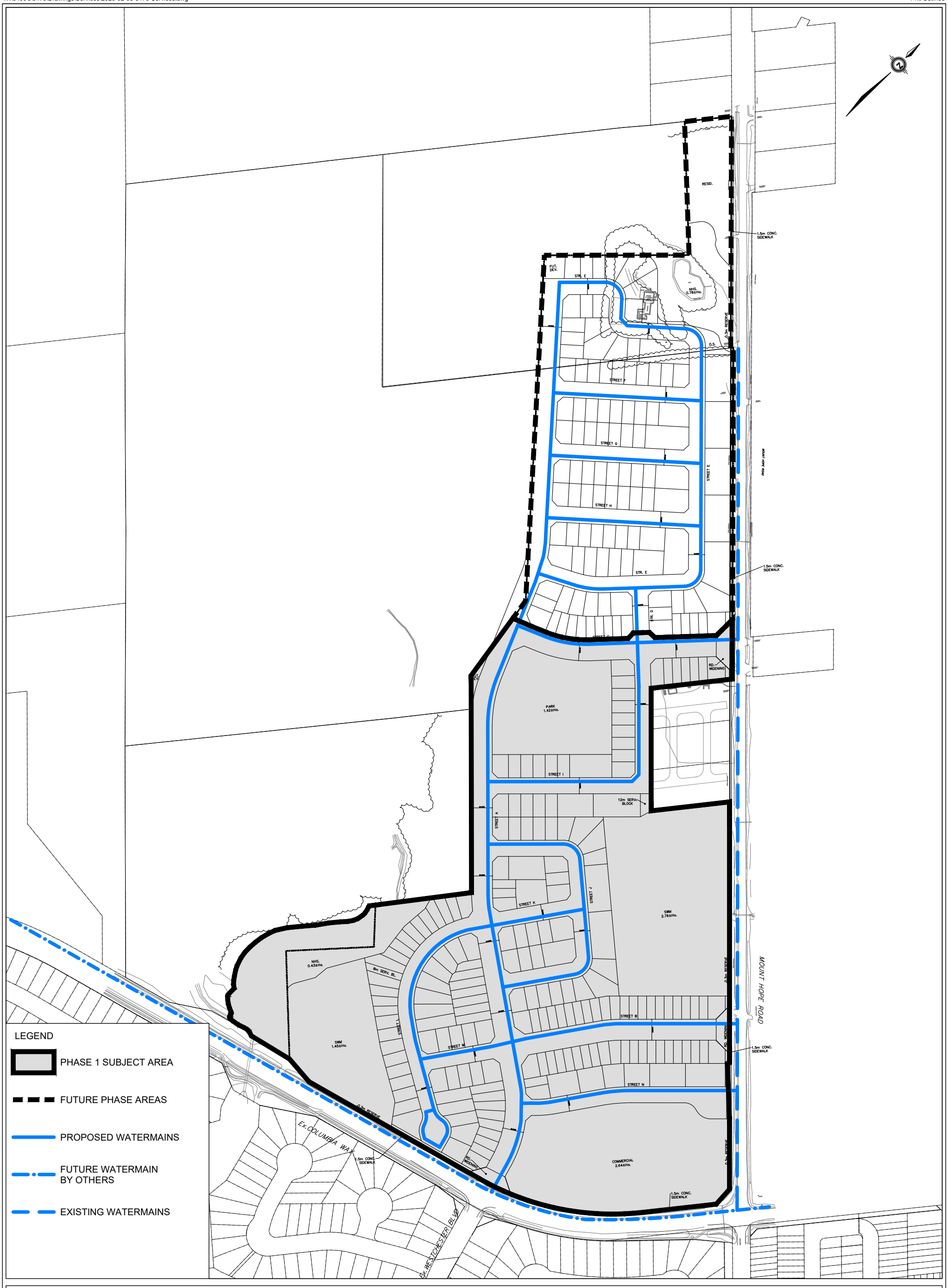
Expected Population	Average Demand (L/s)	Peak Hour Demand (L/s)	Maximum Day Demand (L/s)	Fire Flow (L/s)	Max Demand + Fire Flow (L/s)
2,555	8.57	25.71	17.14	267	284.14

Table 3-4: Phase 1 Water Supply Servicing Demands

Expected Population	Average Demand (L/s)	Peak Hour Demand (L/s)	Maximum Day Demand (L/s)	Fire Flow (L/s)	Max Demand + Fire Flow (L/s)
1,349	4.52	13.58	9.10	267	276.10

The fire flow requirements for the townhouse units have been calculated in accordance with the latest Fire Underwriters Survey (FUS) 2020 guidelines, as these unit types are expected to have the highest flow requirement. In the absence of detailed architectural information, several conservative assumptions were made. The dwellings were assumed to be constructed of wooden materials, and an exposure factor of 60% was applied.

This exposure factor was based on the assumption that two sides of each townhouse block have a separation of 0 to 3 metres from adjacent units, one side has a separation of 20.1 to 30 metres, and one side has a separation of greater than 30 metres. The gross floor area was estimated at 1568 m², representing the combined area of an entire row of eight townhouse units and two stories. The fire hazard of the contents was assumed to be “limited combustible.” It was further assumed that the units are not equipped with sprinkler systems and that no firewalls will be incorporated. A fire flow requirement of 300 L/s was calculated. Detailed fire flow calculations are provided in **Appendix B**.



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LEGEND
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FIGURE 3.1
PROPOSED
WATER SUPPLY SERVICING

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

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- SUBJECT SITE
- WATER SERVICING SOLUTION
- ELEVATED WATER TANK
- SERVICES CORRIDOR

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FIGURE 3.2
WATER SUPPLY SERVICING
NEW GROWTH

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

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4.0 SANITARY SERVICING

The following sections demonstrate that the municipal sanitary servicing plan can adequately service the proposed development.

4.1 Existing Sanitary Servicing

According to Volume 4 of the Region of Peel- 2020 Water and Wastewater Master Plan the subject property is located within the Region of Peel, East Sewershed serviced by the East Trunk System. The area is serviced by the Airport Road trunk, a 600 mm-1350 mm sewer running south along Airport Road, converging with the East Brampton twinned trunk sewers and ultimately discharging to the G.E. Booth Wastewater Treatment Plant (WWT).

The following sanitary sewers are in the vicinity of the project site:

- 250 mm PVC sanitary sewer on Mount Hope Road, South of Columbia Way
- 300 mm PVC sanitary sewer on Westchester Boulevard, South of Columbia Way

4.2 Sanitary Design Criteria

The proposed sanitary servicing of the subject site will be designed in accordance with Region of Peel design criteria for sanitary sewers. These criteria, where applicable to the proposed development, are summarized below.

- Equivalent population density of 3.4 persons per unit for townhouses;
- Equivalent population density of 2.7 persons per unit for apartments
- Unit sewage flow of 290 L/capita/day;
- For residential areas, the peak sanitary flow factor is based on the Harmon formula
- (M = 1 + 14/(4 + P0.5)), where P is population in thousands;
- Infiltration allowance to be 0.26 L/ha/s for all types of land use;
- For residential areas, minimum pipe size shall be 200 mm in diameter;
- Maximum velocity shall not be greater than 3 m/s with the pipe flowing full, and minimum velocity shall not be less than 0.75 m/s at actual flow.

4.3 Bolton Water and Wastewater Feasibility Study – Sanitary Servicing

As previously noted, the future servicing of the subject lands was considered in the Bolton Water and Wastewater Feasibility Study. The ultimate sanitary servicing strategy, as proposed for the Bolton North Hill Landowners Group, involves directing flows from the subject lands to a proposed sanitary system on

Emil Kolb Parkway, which will ultimately connect to the proposed trunk sewer on Humber Station Road.

From there, flows will be pumped through twin 450 mm diameter forcemains to a 525 mm diameter trunk sewer, which will flow west by gravity along King Street before discharging into a 1200 mm diameter trunk sewer flowing south along Humber Station Road. The sanitary sewers directing the subject lands to the proposed sanitary system on Emil Kolb Parkway are expected to start in 2027 and be completed in 2029, refer to **Appendix A** for timelines presented in the latest Public Information Centre #3 by Peel Region. Refer to **Figure 4.2** for the future sanitary servicing.

For a figure illustrating the Bolton North Hill sanitary servicing plan, refer to **Appendix A**.

4.4 Phase 1 – Temporary Sewage Pumping Station and Forcemain

The development is situated upstream of the existing Bolton Sewage Pumping Station (SPS). Modeling for 300 units conducted by the Region of Peel has identified capacity constraints at the Bolton SPS and within the downstream sanitary collection system. It was observed that the equivalent flow rate of 19.09 L/s causes the existing system to surcharge in multiple areas and suggests attenuating the flow on-site by adding equalization volumes at the SPS site. Hence, it seems reasonable to attenuate the phase 1 Peak Wet Weather Flow (PWWF) minus 15 L/s (suggested by the region) at the SPS site to prevent basement flooding. However, the SPS components, such as the wet well and pumps, would be sized for the PWWF, but can operate at low flows using the Variable Frequency Drive (VFDs).

A temporary SPS is proposed to service phase 1 of the Mount Hope Subdivision development. The facility will be located west of Mount Hope Road (refer to **Figure 4.1**) and will discharge via a forcemain to the existing sanitary sewer manhole at the intersection of Columbia Way and Westchester Boulevard. Without the temporary SPS, the PWWF generated by the development would exceed the available capacity, creating a risk of basement flooding in the existing system. Therefore, a temporary SPS with on-site flow equalization will be provided to restrict discharge rates to the allowable limit of 15 L/s while storing excess volume during peak events.

The station is classified as a Type I facility under Region of Peel guidelines. It is designed as a temporary solution (3-6 years service life) utilizing a pre-engineered fiberglass reinforced plastic wet well and valve chamber to facilitate future decommissioning. The station will operate with one duty pump and one standby pump, each rated for the maximum discharge of 20.63 L/s. Due to the proximity of residential units, the station includes an active odor control unit rated for 12 air changes per hour. Continuous

operation is ensured by a 25-kW permanent diesel standby generator.

4.5 Proposed Sanitary Servicing Plan

The proposed lots will be serviced by sewers running along internal roadways. It is proposed to construct a sanitary sewer along Mount Hope Road, extending toward Emil Kolb Parkway, to allow sewage to discharge to Humber Station Road. The final design of the internal sanitary sewers will be confirmed during the detailed design stage. Once the temporary SPS for phase 1 is decommissioned, sanitary flows going to the SPS can be directly connected to the sanitary sewer along Mount Hope Road. Please refer to **Figure 4.1** for the proposed sanitary servicing scheme and **Appendix F** for the engineering drawings. **Table 4-1** presents the ultimate sanitary servicing demands, while **Table 4-2** presents phase 1 sanitary servicing demands. Supporting calculations can be found in **Appendix C**.

Table 4-1: Ultimate Sanitary Servicing Demands

Area (ha)	Expected Population	Average Flow (L/s)	Harmon's Peaking Factor (L/s)	Peak Flow (L/s)	Infiltration (L/s)	Total Flow (L/s)
30.77	2,555	8.58	3.50	30.02	8.00	38.02

Table 4-2: Phase 1 Sanitary Servicing Demands

Area (ha)	Expected Population	Average Flow (L/s)	Harmon's Peaking Factor (L/s)	Peak Flow (L/s)	Infiltration (L/s)	Total Flow (L/s)
14.65	1,349	4.53	3.71	16.81	3.81	20.62

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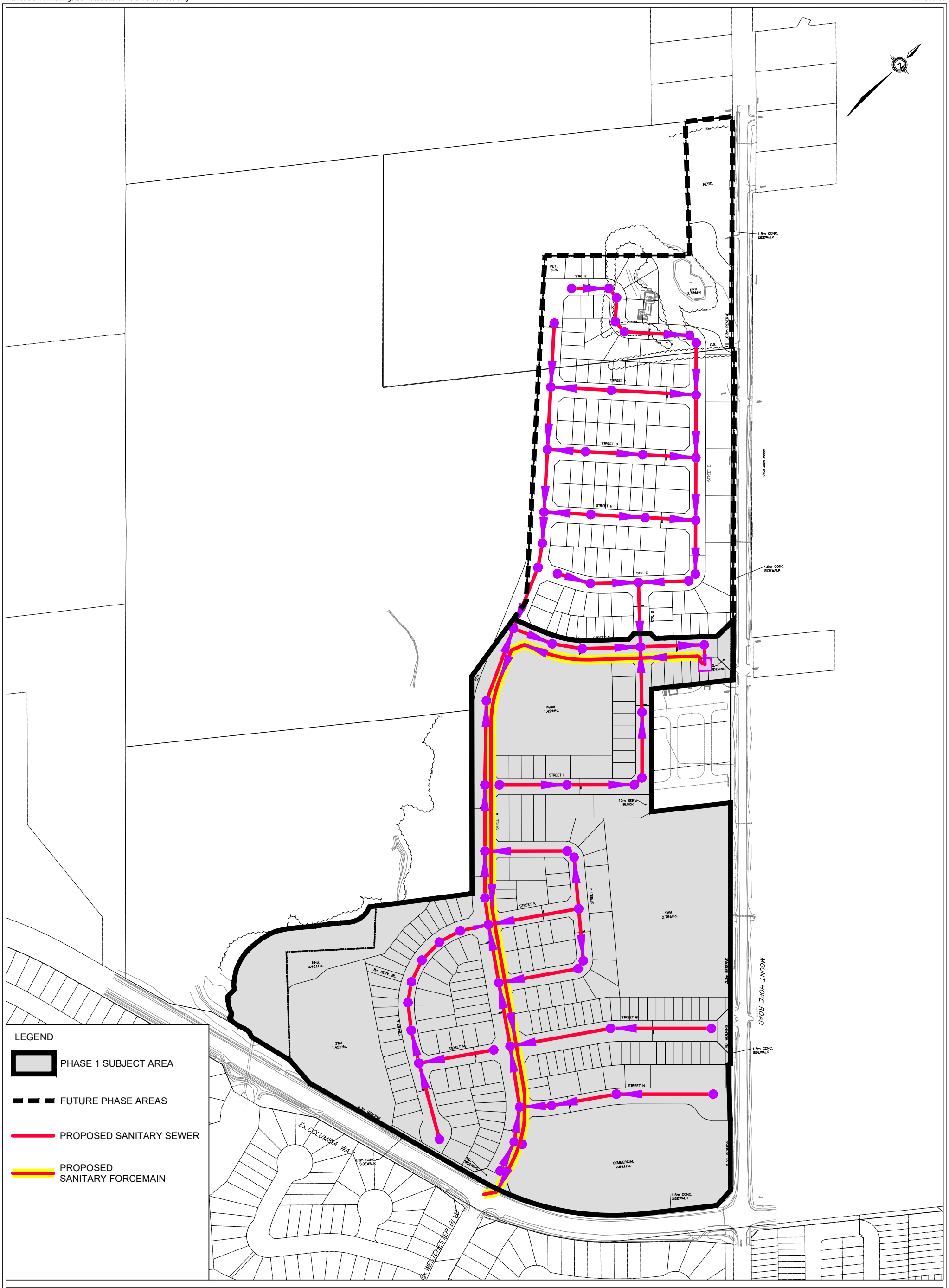

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LEGEND
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FIGURE 4.1
PROPOSED
SANITARY SERVICING

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

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- FORCEMAIN SERVICING SOLUTION
- SANITARY PUMPING STATION
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FIGURE 4.2
SANITARY SERVICING
NEW GROWTH

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

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5.0 STORMWATER MANAGEMENT

The following sections provide details on the Stormwater Management (SWM) plan for the proposed site and is in accordance with applicable provincial guidelines, municipal and conservation authority criteria.

5.1 Existing Site Conditions

The site fronts Columbia Way, west of Mount Hope Road. In existing conditions, the site consists of primarily farm land. The site is located within the Humber River watershed and drains towards the main branch of the Humber River. In existing conditions, the topography reveals that the site drains mostly towards the east roadside ditches then through a tributary stream of the Humber River. There are some existing culverts along Mount Hope Road crossing west to east to facilitate the drainage of the subject site. A small area of the existing land drains south towards another tributary stream of the Humber River which drains south of Columbia Way. The existing drainage layout of the site is depicted in **Figure 5.1**. A hydrogeological investigation conducted by Soil Engineers Ltd. revealed low permeability soils characterized as silty clay to silty clay till. In addition, the subject site generally has high shallow groundwater levels with elevations ranging from 255 to 263 masl while the original ground elevation range from 259 to 263 masl. The groundwater monitoring program is currently ongoing and the hydrogeological report will be updated upon completion of the 2-year long-term groundwater and wetland monitoring program. These reports are attached for reference in **Appendix A**.

Under existing conditions, several culverts located around the perimeter of the site facilitate stormwater drainage. The capacities of these culverts and the current flow rates directed toward them are summarized in **Table 5-1** below, the locations of these culverts can be found on **Figure 5.1**.

Table 5-1: Existing External Culvert Summary

Culvert	Diameter (mm)	Slope	Drainage Area (ha)	Culvert Capacity (m^3/s)	Pre-development Peak Flow (m^3/s) [Regional Storm]
1	2200	1.34%	10.18	1.33	1.01
2	1000	2.56%	7.81	1.14	0.92
3	600	3.39%	3.40	0.47	0.46
4	600	0.58%	6.41	0.10	0.80
5	450	0.97%	0.71	0.15	0.07
6	450	1.07%	0.15	0.16	0.02

5.2 Stormwater Management Criteria

As per the Town of Caledon's Design Criteria and the Toronto and Region Conversation Authority's Stormwater Management Criteria, the following guidelines will be used in the design of the site's stormwater management system:

Major and Minor System

- Storm sewers shall be designed to convey the 10-year return frequency storm without any surcharges;
- The Storm sewers shall be designed as per the Town of Caledon's IDF curve rainfall intensities with a minimum time of concentration of 10 minutes;
- The minimum pipe diameter for storm sewers is 300mmØ;
- Maximum full-bore velocity shall not be greater than 4 m/s, and minimum velocity shall not be less than 0.75 m/s.
- The major system shall be designed to convey the 100-year storm event;
- The maximum flow depth shall be the lesser of 10 cm above the crown of the road or the water level up to the ROW.
- Runoff coefficients shall be determined based on land use as follows:
    - Parks & Open Space 0.30
    - Single Family Residential 0.65
    - Semi-detached Residential 0.70

- Townhouse or Rowhouse 0.75
- Apartments or Hi-Rise Residential 0.90

Quantity Control:

- Per the Town of Caledon and TRCA Stormwater Design Guidelines, quantity control is to be provided for the 2-to-100-year design storms to the appropriate Watershed Flood Control Criteria required by the Toronto and Region Conservation Authority (TRCA). Peak target flows are determined using the Humber River Sub-Basin 10 Equations summarized in **Table 5-2**.

Table 5-2 Humber River Unit Flow Equations

Return Period	Sub-Basin 36 Equations
2 Year	Q=3.142-0.233*ln(A)
5 Year	Q=5.557-0.427*ln(A)
10 Year	Q=7.443-0.578*ln(A)
25 Year	Q=9.838-0.757*ln(A)
50 Year	Q=11.920-0.921*ln(A)
100 Year	Q=14.140-1.096*ln(A)

- Design Storms: Four storm distributions were examined to analyze the volume of runoff to be controlled. The 6-Hour AES and the 12-Hour AES as provided by the TRCA, and the 4-Hour Chicago storm created with the Town of Caledon IDF curve, and the regional storm.
    - Regional storm quantity control will be managed by the East Pond. The target peak flow for the regional storm is based on the pre-development regional storm flow to be further restricted by the capacity of the culvert.
    - The West Pond is also proposed to attenuate the Regional storm as a best efforts solution as coordinated with the TRCA.

Quality Control

- Per the Town of Caledon and TRCA stormwater design criteria, quality control shall provide Level 1 Enhanced treatment through the long-term removal of 80% Total Suspended Solids (TSS)

controlling the 90th percentile runoff event.

Erosion Control

- Per the Town of Caledon and TRCA stormwater design criteria, erosion control is to be provided via detention of the 25 mm-48 hr event.

Water Balance

- Requirement to meet pre-development water balance to the greatest extent feasible. Per the Source Protection Information Atlas (MECP) the site is not in a wellhead protection area (WHPA). Refer to **Section 5.7** for the water balance discussion.

CLI-ECA Requirements

- Developments within the Town are required to comply with CLI-ECA requirements. The CLI ECA mandates controlling at least 27mm through retention methods (such as infiltration and reuse) as much as possible, followed by filtration for the remaining amount. Conventional water quality control measures are permitted only after maximizing retention and filtration.

Site Plan (Commercial Block)

- **Erosion Control** – Retention of 5 mm rainfall event on-site;
- **Water Balance** – Maintain pre-development recharge conditions as part of the overall site;

Park Block

- Convey 0.13 ha to the Clean Water Collectors and discharge to Wetland 11.

5.3 Downstream Assessment

A downstream analysis has been conducted to determine any hydraulic impacts of the proposed project on downstream water surface elevations. To complete the downstream analysis, impacts of the proposed development footprint are determined through hydrological modelling in VO. The VO model provides peak flows that are applied to a HEC-RAS model to simulate the impacts to the water surface elevation of downstream water courses. In coordination with TRCA it was justified that the West Pond will not require regional controls, but the East Pond does. Refer to the *Downstream Analysis Report* by Schaeffer's to be provided under a separate cover.

5.4 Proposed SWM Plan

The following sections outline the proposed stormwater management solutions to be implemented on the subject site, ensuring compliance with the applicable stormwater management criteria detailed in **Section 5.2**. Stormwater will be managed using a dual drainage system. The minor system, consisting of sewers, will be designed to capture and convey flows from a 10-year storm event, while the major system, comprising overland flow routes, will handle any excess flows beyond the capacity of the minor system. Foundation Drain Collectors (FDC) will be utilized to remove groundwater and infiltrated stormwater around deeper basements, refer to FDC locations on **Figure 5.4**. Clean Water Collectors (CWC) will be utilized to feed existing wetlands west of the site from runoff of roofs and rear yard areas, shown on **Figure 5.4** and **5.6**.

Two wet ponds are proposed on-site to address quantity control, quality control, and erosion control for their respective drainage areas. The subject site is graded to maintain the existing topographic divide between the southwest and east directions. Please note that there is a portion of the subject site that drains southeast of Columbia Way, if required, the commercial block can establish a release rate and drain southeast instead of to the West Pond.

Since unitary flow rates were used to establish the post-development allowable release rates, the uncontrolled rear yard areas were not included in the post-development Visual OTTHYMO (VO) models. However, these uncontrolled areas were subtracted from the pre-development drainage areas used to calculate the allowable release rates.

The water balance criteria will be achieved through lot-level Best Management Practices (BMPs), such as infiltration trenches, topsoil amendment, and roof downspout disconnections.

The CLI-ECA volume control requirement will first be met through retention achieved by the lot-level BMPs. Any remaining CLI-ECA volume that cannot be met through retention will be addressed using proposed filter beds within the SWM ponds. SWM pond filter beds are proposed because of the underlying silty clay and high groundwater levels which restrict the areas within the site that can be used to infiltrate stormwater.

For a visual representation of the proposed storm servicing and drainage plan, refer to **Figure 5.2** and **Figure 5.3**.

5.5 West Pond

The West Pond is proposed to have a drainage area of 11.52 ha. The overall runoff coefficient for the West Pond drainage area is calculated to be 0.77 (81% impervious). The pond discharges to a watercourse to the west and eventually to a tributary of the Humber River.

5.5.1 West Pond Quantity Control

The TRCA requires that 2-year to 100-year post-development peak flows be controlled to target flow rates based on the unit flow relationship. Additionally, attenuation will also be provided for the regional storm event, to the greatest extent possible. Please note that it has been demonstrated in the downstream analysis that post-development flows do not have adverse impacts, and that a 2-100 year quantity control strategy is reasonable due to the small drainage area to the pond. However, as coordinated with the TRCA, a best-efforts solution is pursued to attenuate the regional storm to the greatest extent feasible.

5.5.1.1 West Pond Allowable Release Rates

Target release rates for the West Pond have been established based on the Humber River Sub-Basin 10 equations and a pre-development drainage area of 9.67 ha. Refer to **Table 5-3** below for a summary of the West Pond allowable release rates and **Figure 5.1** for the existing drainage plan.

Table 5-3: West Pond Allowable Release Rates Summary

Return Period	Unit Flow (L/s/ha)	Release Rate (m^3/s)
2 Year	2.61	0.025
5 Year	4.59	0.044
10 Year	6.13	0.059
25 Year	8.12	0.079
50 Year	9.83	0.095
100 Year	11.65	0.113
Regional*	N/A	1.152

* The regional control release rate is based on the pre-development regional runoff flow directed the outlet location

5.5.1.2 West Pond SWM Storage Requirements

In order to meet the allowable release rates, the requirement storage volumes for the 2–100-year storm

events were estimated using VO. The required storage volumes for the design storms (6/12 Hour AES and 4 Hour Chicago) are presented in the **Table 5-4** below. Detailed VO model outputs are attached in **Appendix D**.

Table 5-4: West Pond Active Storage Requirements Summary

Return Period	Release Rate (m^3/s)	Required Storage (m^3) [6 Hour AES]	Required Storage (m^3) [12 Hour AES]	Required Storage (m^3) [4 Hour Chicago]
2 Year	0.025	3,145	3,564	3,040
5 Year	0.044	4,270	4,671	4,557
10 Year	0.059	5,015	5,384	5,434
25 Year	0.079	5,942	6,260	6,706
50 Year	0.095	6,632	6,897	7,569
100 Year	0.113	7,307	7,518	8,517
Regional	[1.454]	13,147 [10,989]		

Please note that although 13,147 m^3 of storage is required to match the pre-development regional release rate, due to the geometry of the West Pond, only 11,000 m^3 of storage can be provided. Therefore, best efforts have been made to attenuate the regional release as much as possible. It is found that with 11,000 m^3 of storage, the regional release rate could be reduced to 1.45 m^3/s from 1.69 m^3/s (14% decrease). Additionally, further attenuation can be achieved if on-site storage for the commercial block is provided. Please refer to calculations in **Appendix D**.

5.5.2 West Pond Quality Control

The West Pond's water quality storage standards were established in compliance with the MECP SWMPD Manual's Enhanced Protection (80% long-term S.S. removal) criteria published in March 2003. **Table 5-5** provides an overview of the permanent pool volumes that are required and provided. Refer to **Appendix D** for detailed calculations.

Table 5-5: West Pond Permanent Pool Summary

West Pond Quality Control Parameter	Value
Type of Facility	Wet Pond
Level of Protection	Enhanced
Drainage Area	11.52 ha
Weighted Imperviousness	81%
Total Storage Volume Requirement	243 m^3/ha
Min. Extended Detention Storage Volume Requirement	40 m^3/ha
Permanent Pool Requirement	203 m^3/ha
Required Permanent Pool Storage Volume	2,342 m^3
Provided Permanent Pool Storage Volume	3,380 m^3

5.5.3 West Pond Erosion Control

Erosion control will be achieved by detaining the 25 mm rainfall event for 48 hours in the West Pond. The required volume to meet the erosion control criterion was calculated to be 2,189 m^3, with a release rate of 0.019 m^3/s, as summarized in **Table 5-6** below. Flow attenuation will be managed within the West Pond using control structures, the specifics of which will be finalized during the detailed design stage.

Table 5-6: West Pond Erosion Control Summary

Erosion Control Parameter	Value
Drainage Area	11.52 ha
Required Storage Volume	2,189 m^3
Average Detention Time	48 hours
Average Release Rate	0.013 m^3/s
Peak Release Rate (1.5 x Average)	0.019 m^3/s

5.5.4 West Pond Emergency Spillway

If the control systems fail to function as intended, stormwater can safely exit the facility through an emergency spillway integrated into the West Pond. The emergency spillway is located at the 100-year water elevation of 258.70 m and has a width of 19 m. During the peak flow scenario of the 4-hour Chicago 100-year storm event, a flow of 5.15 m^3/s must be released. The proposed spillway is capable of handling a flow of 5.23 m^3/s with a water head of 0.30 m. If the water level in the pond exceeds the 100-year water elevation, excess flows will be carried out of the pond toward the designated outlet location. For detailed calculations, refer to **Appendix D**.

5.5.5 West Pond Sediment Forebay

The function of the sediment forebay is to facilitate maintenance and improve pollutant removal by trapping larger particles from stormwater runoff near the inlet of the pond. The sizing of the sediment forebay is based on the settling length and dispersion length calculations provided in the MECP SWMPD Manual (March 2003). The forebay length should be greater than or equal to the larger of the settling and dispersion lengths.

The West Pond proposed forebay length is approximately 50 m long, which is greater than the required length of 16 m. A detailed forebay sizing calculation is provided in **Appendix D**.

5.5.6 West Pond Volume Control

To help meet the 27 mm volume control requirement mandated by the CLI-ECA, a filter bed is proposed within the West Pond to filter runoff from its drainage area. Refer to **Table 5-7** below for a summary of the volume control requirements and the provided filter bed values. For more detailed calculations, see

Appendix D. The footprint area and specific details of the filter bed will be finalized during the detailed design stage. A summary of the total site CLI-ECA requirements can be found in **Section 5.8**.

Table 5-7: West Pond Volume Control Summary

Volume Control Parameter	Value
Drainage Area	11.52 ha
Imperviousness	81%
Required Runoff Volume to Be Treated	11.52 ha x 0.81 x 27 mm x 10 = 2,519 m^3
Depth of Filter	0.80 m
Filter Bed Material Percolation Rate	45 mm/hr
Drawdown Time	48 hours
Required Filter Bed Area	848 m^2
Provided Filter Bed Area	1000 m^2

5.5.7 West Pond Sediment Drying Area

The West Pond design includes a sediment drying area, providing a designated space for sediment to dry before being transported off-site. This area has been designed in compliance with the MECP 2003 SWMPD Manual. The sediment drying area will be located above the permanent pool water level and will accommodate sediment accumulation for a period of 10 years. For a summary of the West Pond sediment drying area details, refer to **Table 5-8** below. Detailed calculations can be found in **Appendix D**.

Table 5-8: West Pond Sediment Drying Area Summary

Sediment Drying Area Parameter	Value
Drainage Area	11.52 ha
Imperviousness	81%
Annual Loading	3.5 m^3/ha
Sediment Drying Area Requirement	525 m^2
Provided Sediment Drying Area	650 m^2

5.6 East Pond

The East Pond is proposed to have a drainage area of 18.55 ha. The overall runoff coefficient for the East Pond drainage area is calculated to be 0.70 (72% impervious). The East Pond discharges to culverts #2 and #3, which cross to the east and ultimately convey flow to a tributary of the Humber River. It is proposed that the outflows from the pond be split between culverts #2 and #3 in a manner that reflects pre-development conditions. Further details on the control structure will be provided during the detailed design stage.

5.6.1 East Pond Quantity Control

The TRCA requires that post-development peak flows for the 2-year to 100-year storms be controlled to target flow rates based on the unit flow relationship. Additionally, based on the results of the downstream analysis, regional storm controls are proposed for the East Pond. The allowable release rate in the regional storm event was further restricted to the maximum capacity of culvert #2.

5.6.1.1 East Pond Allowable Release Rates

2–100 year storm event target release rates for the East Pond have been established based on the Humber River Sub-Basin 10 equations and a pre-development drainage area of 18.89 ha. The regional storm target release rate was established based on the maximum capacity of culvert #2, please refer to **Table 5-1** above and calculations in **Appendix D**. Refer to **Table 5-9** below for a summary of the west pond allowable release rates.

Table 5-9: East Pond Allowable Release Rates Summary

Return Period	Unit Flow (L/s/ha)	Release Rate (m^3/s)
2 Year	2.46	0.046
5 Year	4.30	0.081
10 Year	5.74	0.109
25 Year	7.61	0.144
50 Year	9.21	0.174
100 Year	10.92	0.206
Regional*	N/A	0.920

*The regional control release rate is based on the pre-development regional runoff flow directed towards Culvert #2.

5.6.1.2 East Pond SWM Storage Requirements

In order to meet the allowable release rates, the requirement storage volumes for the 2–100-year and regional storm events were estimated using Visual OTTHYMO (VO). The required storage volumes for the design storms (6 Hour AES, 12 Hour AES, 4-hour Chicago and Hazel) are presented in the **Table 5-10** below. Detailed VO model outputs are attached in **Appendix D**.

Table 5-10: East Pond Active Storage Requirements Summary

Return Period	Release Rate (m^3/s)	Required Storage (m^3) [6 Hour AES]	Required Storage (m^3) [12 Hour AES]	Required Storage (m^3) [4 Hour Chicago]
2 Year	0.046	4,646	5,271	4,469
5 Year	0.081	6,365	6,945	6,786
10 Year	0.109	7,506	8,030	8,139
25 Year	0.144	8,946	9,370	10,148
50 Year	0.174	10,019	10,349	11,507
100 Year	0.206	11,073	11,328	13,006
Regional	0.920	27,163		

5.6.2 East Pond Quality Control

The East Pond's water quality storage standards were established in compliance with the MECP SWMPD Manual's Enhanced Protection (80% long-term S.S. removal) criteria published in March 2003. **Table 5-11** provides an overview of the permanent pool volumes that are required and provided. Refer to **Appendix D** for detailed calculations.

Table 5-11: East Pond Permanent Pool Summary

West Pond Quality Control Parameter	Value
Type of Facility	Wet Pond
Level of Protection	Enhanced
Drainage Area	18.55 ha
Weighted Imperviousness	72%
Total Storage Volume Requirement	228 m^3/ha
Min. Extended Detention Storage Volume Requirement	40 m^3/ha
Permanent Pool Requirement	188 m^3/ha
Required Permanent Pool Storage Volume	3,494 m^3
Provided Permanent Pool Storage Volume	12,605 m^3

5.6.3 East Pond Erosion Control

Erosion control will be achieved by detaining the 25 mm rainfall event for 48 hours in the East Pond. The required volume to meet the erosion control criterion was calculated to be 3,246 m^3, with a release rate of 0.028 m^3/s, as summarized in **Table 5-12** below. Flow attenuation will be managed within the East Pond using control structures, the specifics of which will be finalized during the detailed design stage.

Table 5-12: East Pond Erosion Control Summary

Erosion Control Parameter	Value
Drainage Area	18.55 ha
Required Storage Volume	3,246 m^3
Average Detention Time	48 hours
Average Release Rate	0.019 m^3/s
Peak Release Rate (1.5 x Average)	0.028 m^3/s

5.6.4 East Pond Emergency Spillway

If the control systems fail to function as intended, stormwater can safely exit the facility through an emergency spillway integrated into the East Pond. The emergency spillway is located at the Regional water elevation of 259.60 m and has a width of 15 m. During the peak flow scenario of the 4-hour Chicago 100-year storm event, a flow of 7.09 m^3/s must be released. The proposed spillway is capable of handling a flow of 7.16 m^3/s with a water head of 0.40 m. If the water level in the pond exceeds the Regional water elevation, excess flows will be carried out of the pond toward the designated outlet location. For detailed calculations, refer to **Appendix D**.

5.6.5 East Pond Sediment Forebay

The function of the sediment forebay is to facilitate maintenance and improve pollutant removal by trapping larger particles from stormwater runoff near the inlet of the pond. The sizing of the sediment forebay is based on the settling length and dispersion length calculations provided in the MECP SWMPD Manual (March 2003). The forebay length should be greater than or equal to the larger of the settling and dispersion lengths.

The East Pond proposed forebay length is approximately 70 m long, which is greater than the required length of 34 m. A detailed forebay sizing calculation is provided in **Appendix D**.

5.6.6 East Pond Volume Control

To help meet the 27 mm volume control requirement mandated by the CLI-ECA, a filter bed is proposed within the East Pond to filter runoff from its drainage area. Refer to **Table 5-13** below for a summary of the volume control requirements and the provided filter bed values. For more detailed calculations, see

Appendix D. The footprint area and specific details of the filter bed will be finalized during the detailed design stage. A summary of the total site CLI-ECA requirements can be found in **Section 5.8**.

Table 5-13: East Pond Volume Control Summary

Volume Control Parameter	Value
Drainage Area	18.55 ha
Imperviousness	72%
Required Runoff Volume to Be Treated	3,606 m^3
Depth of Filter	0.80 m
Filter Bed Material Percolation Rate	45 mm/hr
Drawdown Time	48 hours
Required Filter Bed Area	1,214 m^2
Provided Filter Bed Area	1,500 m^2

5.6.7 East Pond Sediment Drying Area

The East Pond design includes a sediment drying area, providing a designated space for sediment to dry before being transported off-site. This area has been designed in compliance with the MECP 2003 SWMPD Manual. The sediment drying area will be located above the permanent pool water level and will accommodate sediment accumulation for a period of 10 years. For a summary of the East Pond sediment drying area details, refer to **Table 5-14** below. Detailed calculations can be found in **Appendix D**.

Table 5-14: East Pond Sediment Drying Area Summary

Sediment Drying Area Parameter	Value
Drainage Area	18.55 ha
Imperviousness	72%
Annual Loading	2.96 m^3/ha
Sediment Drying Area Requirement	1000 m^2
Provided Sediment Drying Area	1000 m^2

5.7 Northeast Site Plan

5.7.1 Northeast Quantity Control

The Northeast site plan is proposed to have uncontrolled drainage. Refer to **Section 5.3** which will further discuss how uncontrolled drainage from the site plan does not negatively impact the downstream hydraulics.

5.7.2 Northeast Quality Control

Quality control for the Northeast site plan will be managed through a Jellyfish unit (or approved equivalent) to provide 80% TSS removal, refer to a sizing report of the proposed Jellyfish unit in **Appendix D**.

5.7.3 Northeast Erosion Control

Erosion control will be achieved for the Northeast site plan via 5 mm on-site retention. The retention volume target is 27 m^3 (0.66 ha x 0.80 x 5 mm x 10). The details of the on-site retention will be finalized at the Site Plan Application stage.

5.8 Water Balance

The subject site is not located within the Well Head Protection Area (WHPA). Due to the tight nature of the soils, and high groundwater table, best efforts to match the pre-development annual infiltration volume should be done in the post-development condition.

A site water balance analysis was completed and provided in **Appendix D**. Based on the analysis, the pre-development site conditions have a runoff of 50,832 m^3/year, infiltration of 41,590 m^3/year, and

evapotranspiration of 182,606 m^3/year.

In the post-development conditions (without mitigation), average annual volumes for runoff are 180,884 m^3/year, infiltration of 14,091 m^3/year, and evapotranspiration of 80,053 m^3/year. This suggests an average annual infiltration deficit of 27,499 m^3/year.

In order to mitigate the estimated infiltration deficit, proposed mitigation methods include 5 mm on-site retention from the commercial block, as well as, infiltration trenches in the rear yard of residential lots for additional runoff reduction.

Infiltration trenches in rear year of lots as shown on **Figure 5.3** are proposed to infiltrate clean runoff from roof areas and rear yards. For the lots with infiltration trenches, half of the roofs and rear yards will be conveyed to the infiltration trenches. Given that silty clay is present in underlying soils, a conservative design infiltration rate of 15 mm/hour was assumed with a calculated drawdown time of 72 hours (893 m^3 / (15 mm/hr/2.5) x 2234 m^2 [infiltration system area]). Please note that a total of 1489 m of trench length is proposed within the site. Each trench will be 1.5 m wide and 1.0 m deep.

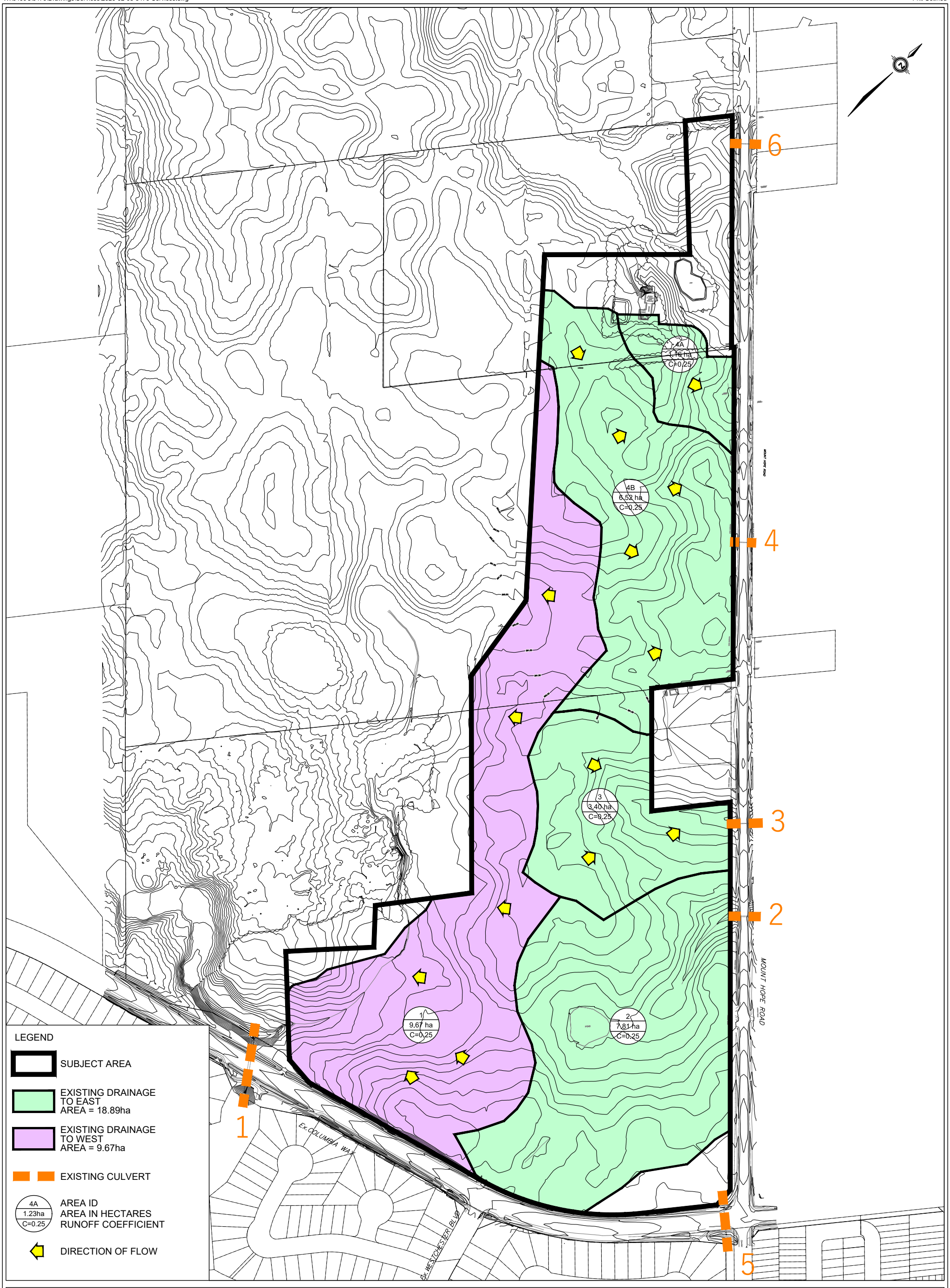
The post-development conditions with the proposed subject site mitigation methods will produce 153,286 m^3/year of surface runoff, 41,689 m^3/year of infiltration, and 80,053 m^3/year of evapotranspiration. The infiltration volume provided from the site plans and infiltration trenches satisfies the pre to post infiltration deficit. **Table 5-15** below summarizes the water balance calculations.

Refer to **Appendix D** for detailed water balance calculations.

Table 5-15: Water Balance Summary

Water Balance Parameter	Pre-Development	Post-Development	Change (Pre to Post)	Post-Development with Mitigation	Change (Pre to Post with Mitigation)
Inputs (m^3/year)					
Precipitation	275,028	275,028	0	275,028	0
Total Inputs	275,028	275,028	0	275,028	0
Outputs (m^3/year)					
Precipitation Surplus	92,422	194,975	+102,553	194,975	+102,553

Water Balance Parameter	Pre-Development	Post-Development	Change (Pre to Post)	Post-Development with Mitigation	Change (Pre to Post with Mitigation)
Net Surplus	92,422	194,975	+102,553	194,975	+102,553
Total Evapotranspiration	182,606	80,053	-102,553	80,053	-102,553
Total Infiltration	41,590	14,091	-27,499	41,689	+99
Total Runoff	50,832	180,884	+130,052	153,286	+102,454
Total Outputs	275,028	275,028	0	275,028	0



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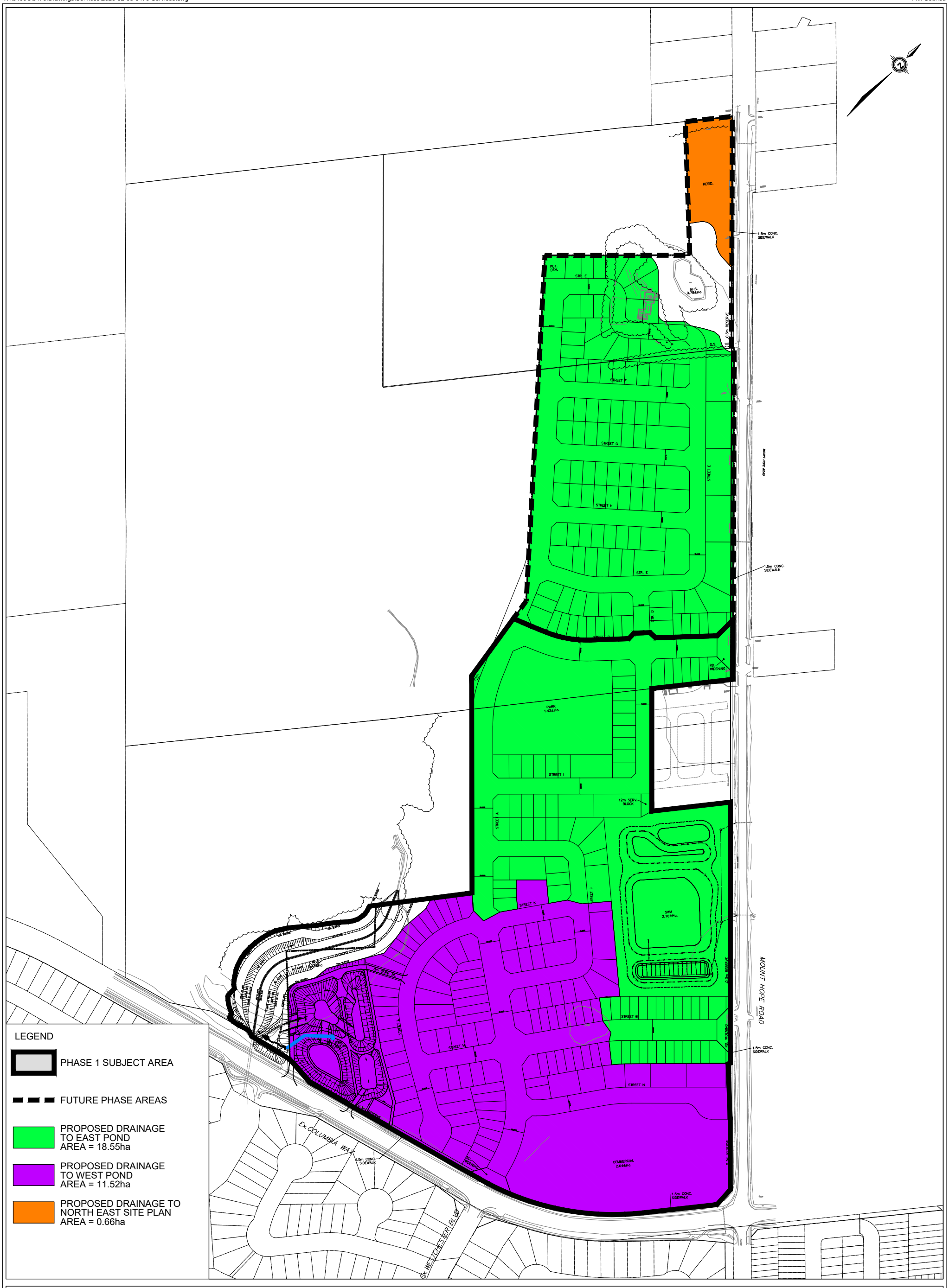
LEGEND
(AS SHOWN ABOVE)

FIGURE 5.1
EXISTING
STORM DRAINAGE PLAN

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

Phil Gotfried



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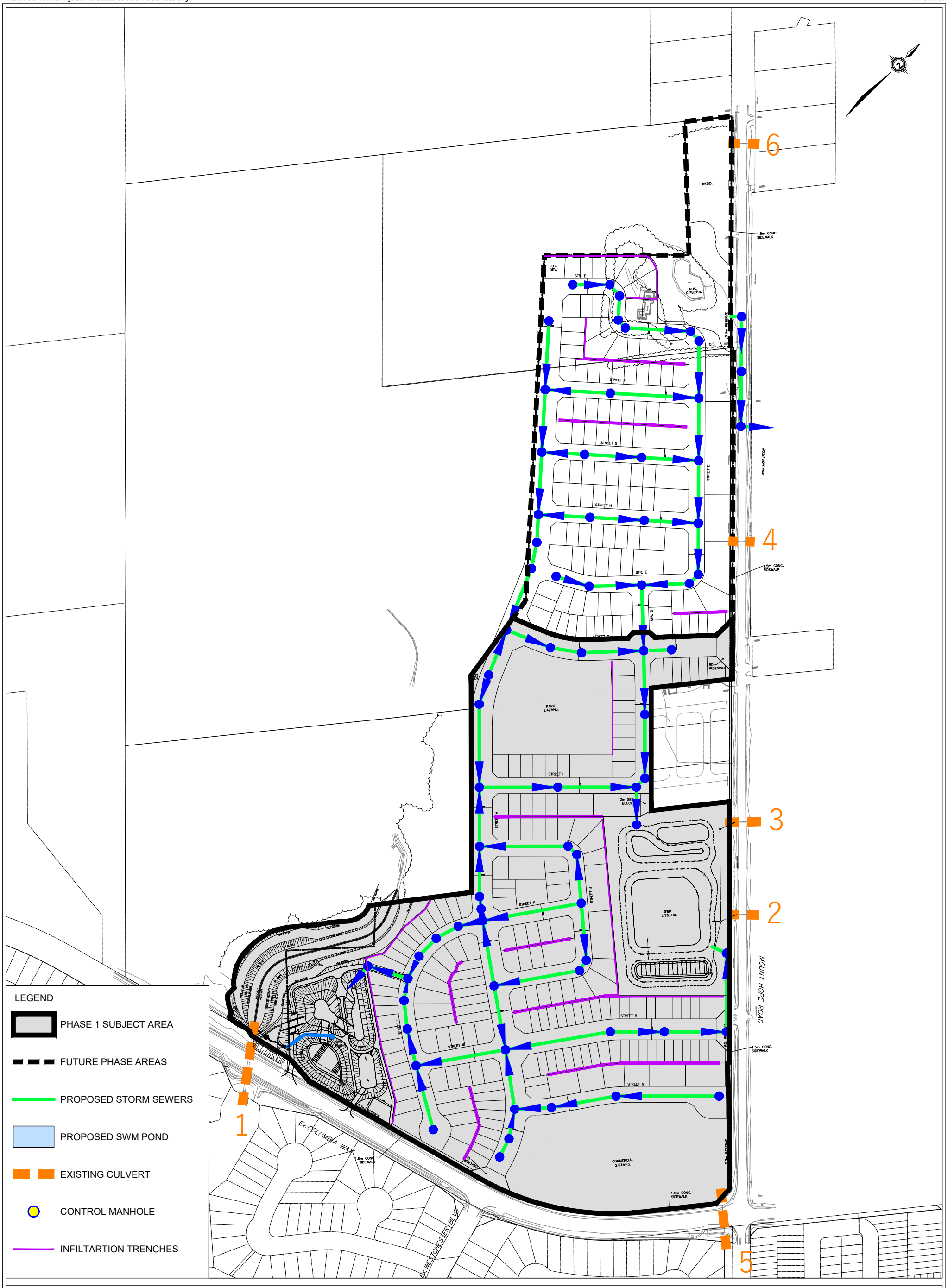
LEGEND
(AS SHOWN ABOVE)

FIGURE 5.2
PROPOSED
STORM DRAINAGE PLAN

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

Phil Gotfried



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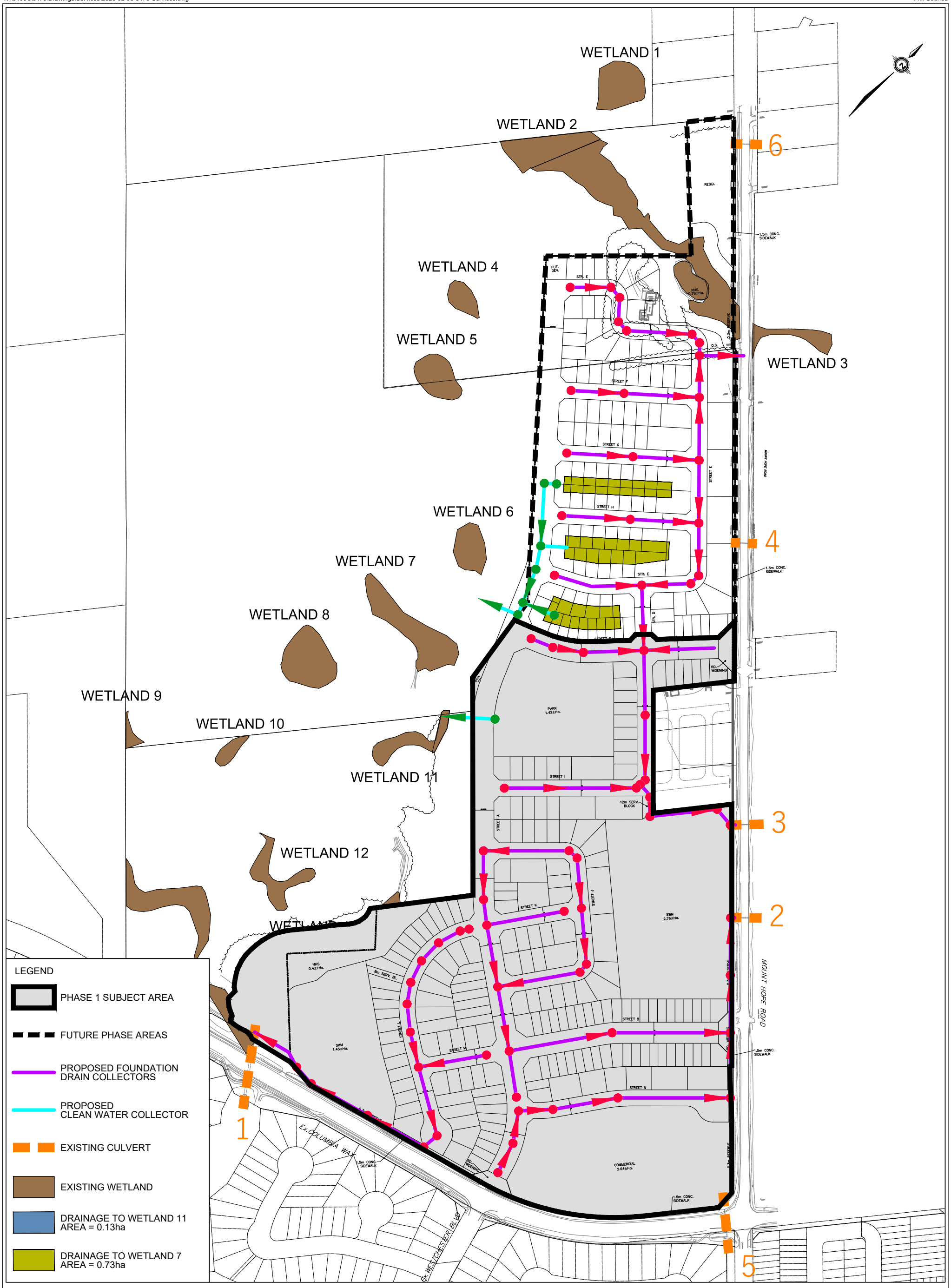
LEGEND
(AS SHOWN ABOVE)

FIGURE 5.3
PROPOSED
STORM SERVICING

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

Phil Gotfried



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LEGEND
(AS SHOWN ABOVE)

FIGURE 5.4
PROPOSED
FOUNDATION DRAIN COLLECTORS

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

WT1
1.23ha

WT2
6.95ha

WT3
3.02ha

WT4
2.07ha

WT5
2.57ha

WT6
0.62ha

WT7
16.68ha

WT8
4.16ha

WT9
0.76ha

WT10
0.28ha

WT11
2.16ha

WT12
0.57ha

WT13
140.91ha

WT14
1.12ha

WT15
3.17ha

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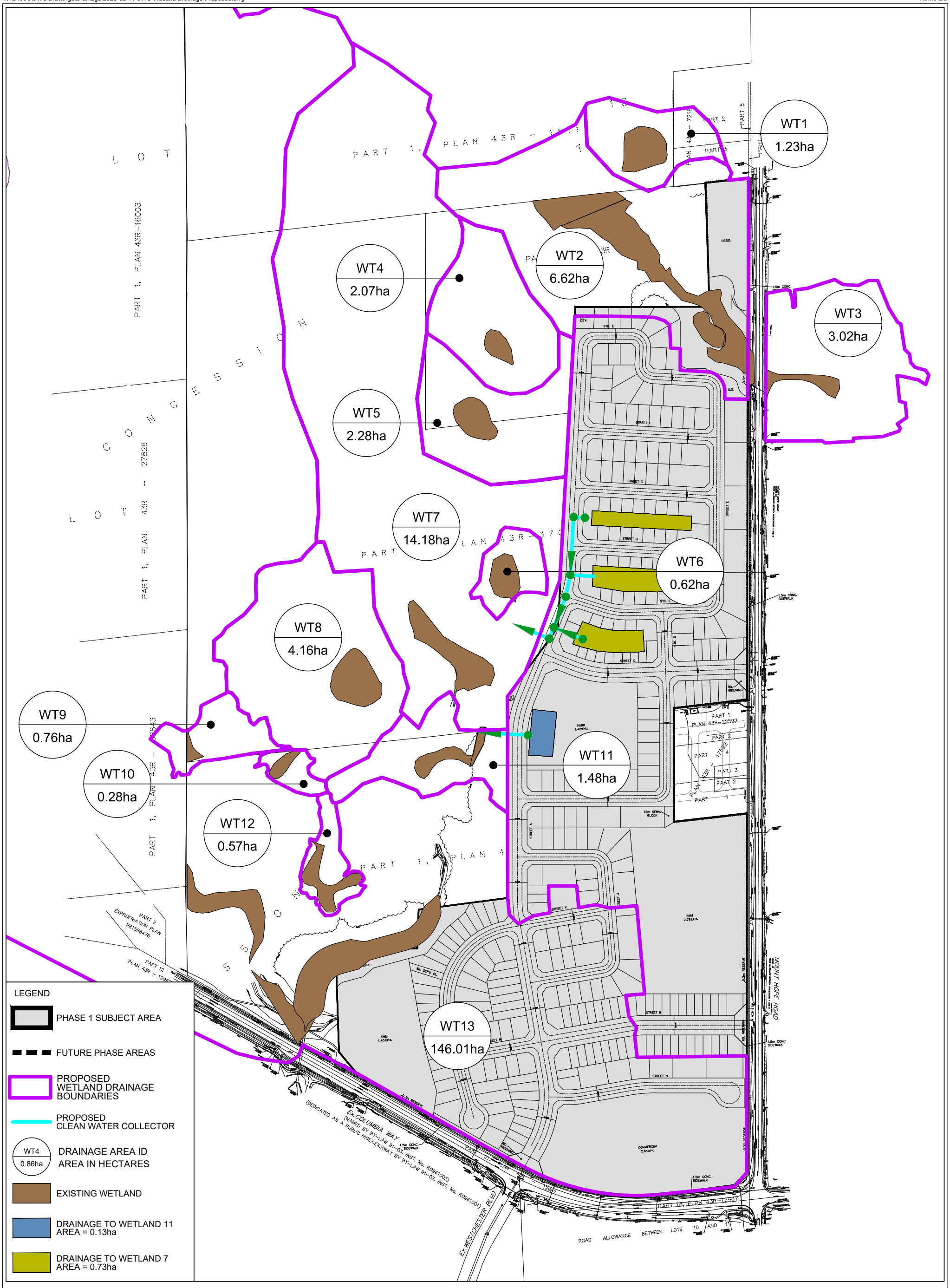
LEGEND

- SUBJECT AREA
- EXISTING WETLAND DRAINAGE BOUNDARIES
- WT4 / 0.86ha — DRAINAGE AREA ID, AREA IN HECTARES
- EXISTING WETLAND

FIGURE 5.5
EXISTING
WETLAND DRAINAGE PLAN

2024-5476	FEBRUARY 2026	SCALE: N.T.S.



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LEGEND

(AS SHOWN ABOVE)

FIGURE 5.6
PROPOSED
WETLAND DRAINAGE PLAN

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

5.9 CLI-ECA Requirements

The new CLI-ECA program includes a 27 mm retention requirement for stormwater management, which can be achieved through a hierarchical approach to provide flexibility in the implementation of measures to meet the runoff volume target. The runoff volume control target hierarchy has the following order:

- Control hierarchy priority 1 (Retention),
- Control hierarchy priority 2 (LID filtration), and
- Control hierarchy priority 3 (Conventional Treatment).

The subject site has underlying silty clay and high groundwater levels which restrict the areas within the site that can be used to infiltrate stormwater for retention, infiltration trenches and site plan retention targets were implemented where feasible. A total of 5 mm retention has been provided throughout the subject site via infiltration trenches and site plan retention.

To meet the remainder of the CLI-ECA requirements for 27 mm of runoff volume control per storm event, a filter bed is installed within the two SWM ponds to treat the 27 mm storm event, refer to **Sections 5.4.5 and 5.5.5**. Additionally, compliance with the water balance infiltration requirements outlined in **Section 5.7** provides retention credit toward the 27 mm goal. Detailed volume control calculations can be found in **Appendix D**. Refer to **Table 5-16** below for a summary of the CLI-ECA requirements.

Table 5-16 Summary of CLI-ECA Requirements

Overall Volume Control Parameter	Value
Total Controlled Drainage Area*	30.70 ha
Imperviousness	77%
Required Volume Control	**6,383 m^3**
West Pond Filter Bed Treatment Volume	2,519 m^3
East Pond Filter Bed Treatment Volume	3,606 m^3
Infiltration Trenches Volume Control	893 m^3
Site Plan Infiltration Volume Control	133 m^3
Total Provided Volume Control	**7,151 m^3**

*Total Site Area Minus NHS Areas and Uncontrolled Areas

5.10 Thermal Mitigation

The groundwater monitoring program preliminary results infer that groundwater replenishes WT-15, which provides a source of cool filtered water into two tributaries of the Humber River. The region's scoped subwatershed study notes the roles this plays in supporting downstream fish habitats. If this hydrologic connection is disrupted, thermal impacts to Cold Creek are anticipated.

Storm runoff from the subject site will be directed to two SWM ponds, SWM Ponds West and East. To protect the downstream fish habitats, the SWM ponds have been designed to offer adequate thermal mitigation to lower the outflow of temperatures to 15°C. To lessen the thermal effects, two (2) strategies are adopted:

- The first step Is runoff infiltration through the rear-lot infiltration trenches, which allows runoff to cool off while avoiding direct discharge to a watercourse.
- The second method involves using an end-of-pipe filter bed system to obtain the required cooling before releasing it to the watercourse. Both SWM ponds have a filter bed before the pond outlet.

The filter beds are designed to convey erosion control (25 mm) storm flows. Excess runoff from any major storms is designed to overflow and naturally discharge into the receiving watercourse. The filter beds will be wrapped with a geotextile fabric. Additionally, perforated pipes lead out of the filter bed and will be designed to fully convey the inflow from the Hickenbottom orifice. **Tables 5-17** and **5-18** below provides summaries of filter bed parameters and **Appendix D** contains detailed calculations.

Table 5-17: West Pond Filter Bed Cooling Parameters

Design Variables	Value
Flow rate through bed	0.019 m^3/s
Provided Area	960 m^2
Depth of bed	0.8 m
Inlet Temperature	30°C
Outlet Temperature	15°C
Safety Factor	204

Table 5-18: East Pond Filter Bed Cooling Parameters

Design Variables	Value
Flow rate through bed	0.028 m^3/s
Provided Area	1480 m^2
Depth of bed	0.8 m
Inlet Temperature	30°C
Outlet Temperature	15°C
Safety Factor	152

5.11 Erosion and Sediment Control Plan

In order to mitigate the effects of construction on site, a comprehensive ESC strategy following the *Erosion and Sediment Control Guideline for Urban Construction* by Sustainable Technologies has been prepared for the project.

Erosion Control Measures

- **Phasing:** It is advantageous to reduce the limit of construction during the topsoil stripping phase in order to limit areas with soil exposure.
- **Stabilization:** Grading for construction generally requires the removal of topsoil immediately. If piled or stored on site, it must be stabilized immediately. It is also recommended that areas left u-worked for longer than 30 days be stabilized. Possible measures are as follows:
    - Mechanical Seeding/Hydroseeding
    - Terra Seeding
    - Growth Media Blankets
- **Cut-off Swales:** To be designed as per ESC guidelines and stabilized accordingly.

Sediment Control Measures (refer to SC drawings in submission package)

- **Siltation control perimeter fencing**
    - Double Silt Fence with Straw Bales
    - Siltation Control Fence
- **Cut-off Swales**: To be designed as per ESC guidelines and stabilized accordingly.
- **Flow distributors**: Silt Socks have been proposed as they provide ponding opportunities and energy dissipation, helping to slow down flow velocity and promote sediment settling in swales.
- **Sediment Traps:** Have been sized in accordance with ESC guidelines.
- **Temporary Sediment Ponds**: Shall be sized as per MECP Quality control guidelines. A design drawdown time of 48 hours is required.

5.12 Feature-Based Water Balance

A feature-based water balance (FBWB) analysis was conducted for the wetlands to assess the impact of the proposed development on the wetlands. A total of fifteen (15) wetlands were identified within the subject site and the adjacent 120m, and a Wetland Risk Assessment was completed. Of the fifteen (15) wetlands, two (2) of them (WT14 and WT15) are proposed to be completely removed and therefore excluded from the analysis. An additional eight (8) wetlands (WT1, WT3, WT4, WT6, WT8, WT9, WT10, and WT12) have catchments located entirely outside the limits of the proposed development, and therefore have also been excluded from the analysis as they remain unimpacted by the development. The remaining five (5) wetlands (WT2, WT5, WT7, WT11, and WT13) are within the catchment area impacted by the development. However, due to the small hydrologic change caused by the proposed development, it is determined that the risk is classified as “Low”. As such, a single event analysis has been used to determine a SWM strategy to feed the wetland. The catchment areas of the wetlands under the pre-development and post-development conditions are summarized in **Table 5-19** below. Please see **Figure 5.5** for the pre-development wetland drainage areas and **Figure 5.6** for the post-development area change to the wetlands.

Table 5-19: Wetland Drainage Area Pre vs. Post Development Comparison

Wetland ID No.	Pre-development Catchment (ha)	Post-development Catchment (ha)	Change in Catchment Size
WT2	8.18	7.85	-4.03%
WT5	4.64	4.35	-6.25%
WT7	21.95	19.88	-9.43%
WT11	28.27	25.66	-9.23%
WT13	170.79	173.28	1.46%

An AxC comparison presented in **Table 5-20** below shows the change in the drainage condition to the wetlands between pre-condition and post-condition. It can be seen that the runoff to WT2, WT5, and WT13 increased, and the runoff to WT7 and WT11 decreased under post-development conditions. Please note that due to the layout of the ROW and its proximity to the west boundary of the subject site, using uncontrolled drainage from rear yards to feed the wetlands is not feasible. Therefore, Clean Water Collectors (CWCs) are proposed to feed the wetlands using runoff from the roofs and grassed areas of private lots. Please refer to **Figures 5.4** and **5.6** for a visual representation of the CWCs.

Table 5-20: Wetland Area x Runoff Coefficient Pre vs. Post development comparison

Wetland ID No.	Pre-development			Post-development			Comparison (%)
	Total Contributing Area (ha)	Runoff Coefficient C	A x C	Total Contributing Area (ha)	Runoff Coefficient C	A x C	
WT2	8.18	0.25	2.05	7.85	0.30	2.34	14%
WT5	4.64	0.25	1.16	4.35	0.25	1.09	-6%
WT7	21.95	0.25	5.49	19.88	0.27	5.28	-4%
WT11	28.27	0.25	7.07	25.66	0.26	6.73	-5%
WT13	170.79	0.25	42.70	173.28	0.29	49.57	16%

The TRCA water balance tool was used to determine the annual precipitation, evapotranspiration, recharge, and runoff. The TRCA water balance tool indicated that the infiltration factor was equivalent to 0.68. Considering the underlying soil is silty clay, the infiltration factor was revised to 0.45 in pre-development conditions. The difference in runoff in post-development conditions compared to pre-

development conditions for each wetland is shown in **Table 5-21** below. It can be seen that, for WT2, WT5, WT7, and WT11, the drainage change to the wetland is less than 10%, which is considered to be within a reasonable range. For wetland WT13, the runoff conveyed to it increased by 17%. However, since the risk level of the wetland is assessed to be Low, it is considered that there will be no significant issue caused by the increase of the runoff. The full FBWB analysis is provided in **Appendix D**.

Table 5-21: Wetland Runoff Pre vs. Post Development Comparison

Wetland ID No.	Pre-development Runoff (m^3/year)	Post-Development Runoff (m^3/year)	Runoff Post Development / Pre-Development (%)
WT2	12,995	13,764	106%
WT5	7,376	6,914	94%
WT7	34,887	33,102	95%
WT11	44,939	42,290	94%
WT13	271,474	317,281	117%

5.12.1 Natural features east of Mount Hope Road

Under existing conditions, a mitigation headwater drainage feature feeds into a natural drainage feature located east of Mount Hope Road, downstream of culvert #3. Environmental and ecological investigations have identified important ecological functions that must be preserved within this drainage feature. To support this, it is proposed that the outflows from the East Pond be split to better replicate pre-development flow patterns to downstream features within the subject site. Under existing conditions, a portion of the site drained toward culvert #3. A similar split in flow can be incorporated into the detailed design of the East SWM Pond to reflect these existing conditions.

6.0 CLOSING REMARKS

This Functional Servicing Report has been prepared to demonstrate the conformance of the proposed storm, sanitary, and water supply servicing concept for the subject residential development with the Region of Peel, TRCA, and Town of Caledon Design Standards.

Water Supply Servicing

- The proposed development will be serviced by Pressure Zone 7 to ensure adequate water supply and pressure.
- 300 mm watermains along Mount Hope Road North will provide connectivity to the municipal system.

Sanitary Servicing

- Sanitary flows will be directed through internal sewers along the proposed road network.
- The ultimate servicing strategy will utilize the new proposed trunk sewer on Humber Station Road.

Storm Servicing

- Stormwater will be managed through a dual-drainage system, with minor flows conveyed via sewers and major flows through overland routes.
- Two SWM ponds, West Pond and East Pond, will be implemented to provide water quality, erosion, quantity control, and volume control through filtration.
- The development meets the 27 mm retention requirement through infiltration trenches, filter beds in the SWM ponds, and site plan retention measures.

We trust that you will find this material satisfactory, and we are looking forward to receiving your comments soon. Should you have any questions or comments, please do not hesitate to contact us.

SCHAEFFER & ASSOCIATES LTD.

Howie Liu, B.Eng.
Water Resources Analyst

Sadh Katukurunde, P.Eng.
Junior Associate

Appendix A

Background Information

Draft Plan

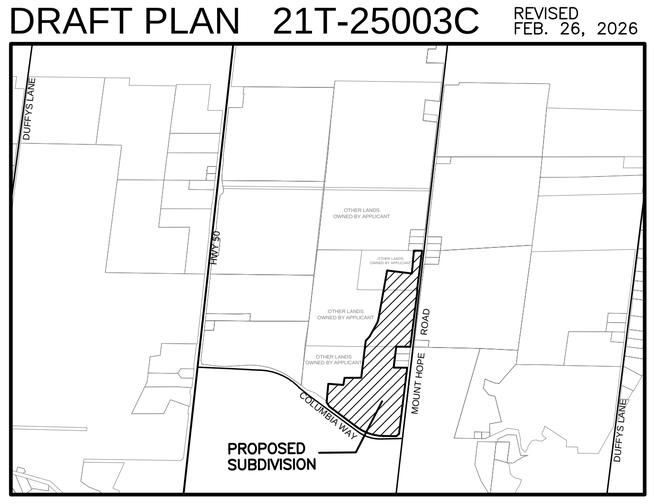
DRAFT PLAN OF SUBDIVISION

PART OF LOTS 11 AND 12, CONCESSION 7

(GEOGRAPHIC TOWNSHIP OF ALBION)

TOWN OF CALEDON, REGIONAL MUNICIPALITY OF PEEL

DRAFT PLAN 21T-25003C REVISED FEB. 26, 2026



KEY PLAN

SECTION 51, PLANNING ACT, ADDITIONAL INFORMATION

A. AS SHOWN ON DRAFT PLAN
B. AS SHOWN ON DRAFT PLAN
C. AS SHOWN ON DRAFT PLAN
D. SEE SCHEDULE OF LAND USE
E. AS SHOWN ON DRAFT PLAN
F. AS SHOWN ON DRAFT PLAN
G. AS SHOWN ON DRAFT PLAN
H. MUNICIPAL PIPED WATER AVAILABLE AT TIME OF DEVELOPMENT
I. CLAY–LOAM
J. AS SHOWN ON DRAFT PLAN
K. SANITARY AND STORM SEWERS, GARBAGE COLLECTION, FIRE PROTECTION
L. AS SHOWN ON DRAFT PLAN

SCHEDULE OF LAND USE

TOTAL AREA OF LAND TO BE SUBDIVIDED=32.067±Ha (79.240±Acs)

	LOTS	BLOCKS	UNITS	±Ha.	±Acs.
SINGLE DETACHED DWELLINGS					
▲ LOTS 89–97, 101–105, 114–120, 172–174, 181–225, 232–240, 260–274, and 288–294	100		100	3.047	7.529
MIN. LOT FRONTAGE = 9.8m MIN AREA = 250.0m2					
SEMI–DETACHED DWELLINGS					
● LOTS 1–15, 17–37, 40–54, 57–71, 75–80, 82–88, 98–100, 106–108, 121–129, 131–141, 144–152, 155–165, 168–171, 176–178, 180, 241–259, and 275–287	165		330	7.038	17.392
MIN. LOT FRONTAGE = 13.7m MIN AREA = 350.0m2					
TOWNHOUSE DWELLINGS					
BLOCKS 16, 38, 39, 55, 56, 72–74, 81, 109–113, 130, 142, 143, 153, 154, 166, 167, 175, 179, and 226–231		29	171	3.183	7.865
MIN. FRONTAGE PER UNIT = 6.0m					
RESIDENTIAL BLOCK					
BLOCK 295		1	40–120*	0.655	1.619
SUBTOTAL	265	30	641–721*	13.923	34.405
BLOCK 296 – COMMERCIAL		1		2.641	6.526
BLOCK 297 – PARK		1		1.419	3.506
BLOCKS 298 and 299 – STORM WATER MANAGEMENT		2		4.207	10.396
BLOCKS 300 and 301 – SERVICING BLOCK		2		0.060	0.148
BLOCK 302 – OTHER LANDS OWNED BY APPLICANT		2		0.031	0.077
BLOCK 303 – FUTURE DEVELOPMENT		2		0.061	0.150
BLOCKS 304–308 – ROAD BUFFER		5		0.091	0.225
BLOCKS 309 and 310 – NATURAL HERITAGE SYSTEM		2		1.212	2.995
BLOCK 311 – OPEN SPACE		1		0.067	0.166
BLOCKS 312–314 – ROAD WIDENING		3		0.286	0.707
BLOCKS 315–319 – 0.3m RESERVE		5		0.047	0.116
STREETS				8.022	19.823
23.5m WIDE STREET TOTAL LENGTH=1475±m. AREA=3.466±Ha.					
18.0m WIDE STREET TOTAL LENGTH=2531±m. AREA=4.556±Ha.					
TOTAL LENGTH=4.006±m. AREA=8.022Ha.					
TOTAL	265	54	641–721*	32.067	79.240

*SUBJECT TO FINAL CALCULATION.

ELEVATIONS RELATED TO CANADIAN GEODETIC DATUM.

0.3m RESERVES EXAGGERATED FOR VISUAL CLARITY.

DAYLIGHT TRIANGLE LAND DEDICATION:

- LOCAL ROAD TO LOCAL ROAD: 5m BY 5m
- LOCAL ROAD TO COLLECTOR ROAD: 6m BY 6m
- COLLECTOR ROAD TO COLLECTOR ROAD: 10m BY 10m
- COLLECTOR ROAD TO MOUNT HOPE: 15m BY 15m
- COLLECTOR ROAD TO COLUMBIA WAY: 15m BY 15m

OWNERS' CERTIFICATE

WE AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE TOWN OF CALEDON FOR APPROVAL.

OWNER:

UNITED HOLDINGS INC.

122 ROMINA DRIVE
CONCORD, ONTARIO
L4K 4Z7

BENEDETTO MAROTTA A.S.O.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE: FEBRUARY 17, 2026

C. P. EDWARD OLS

KLM PLANNING

PROJECT No. P-3638
SCALE 1:2000 FEBRUARY 26, 2026
(3638DES17) X-REF: (3638MAS1 & 3638TOPO1)
DWG. No. - 26:2

64 JARDIN DRIVE - UNIT 1B, CONCORD ONTARIO L4K 3P3
TEL: (905)669-4055 - DRAWN BY: B.T. - CHECKED BY: B.M.

Bolton Water and Wastewater Feasibility Study

Region of Peel

Bolton Water and Wastewater Feasibility Study

Prepared by:

GM BluePlan Engineering Ltd.

GMBP Project No. 722010

February 2023

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Appendix B: Stakeholder Engagement

Appendix C: Project Cost Estimates

List of Acronyms

Acronym	Description
2020 Master Plan (MP)	2020 Water and Wastewater Master Plan
ADWF	Average Dry Weather Flow
BRES	Bolton Residential Expansion Study
DC	Development Charge
ESA	Environmentally Sensitive Area
GM BluePlan	GM BluePlan Engineering Limited
I/I	Inflow and Infiltration
LOS	Level of Service
Class EA	Municipal Class Environmental Assessment
MDD	Maximum Day Demand
OMB	Ontario Municipal Board
OCWA	Ontario Clean Water Agency
PDWF	Peak Dry Weather Flow
PZ	Pressure Zone
PRV	Pressure Reducing Valve
Region	Region of Peel
ROPA	Regional Official Plan Amendment
SGU	Small Geographic Unit
SAR	Species at Risk
TWL	Top Water Level
TRCA	Toronto and Region Conservation Authority
WRRF	Water Resource Recovery Facilities

1 STUDY INTRODUCTION

1.1 Study Background

The Region of Peel continues to be one of the fastest growing Regions in Canada, with expanding population and employment within the City of Brampton, the City of Mississauga and the Town of Caledon. The Region's projected population and employment growth to 2041 was reviewed in the 2020 Water and Wastewater Master Plan for the Lake-Based Systems and a comprehensive list of capital projects were developed to support growth throughout the Region.

Further population and employment growth targets to 2051 has been established by the province with additional development proposed within both the intensification and greenfield growth areas in Peel. Greenfield growth pressures from 2021 to 2051 will continue to the north, extending into the northern corners of Brampton and into many areas of South Caledon including Bolton. There is already significant development occurring in Caledon with water and wastewater infrastructure continually being planned, designed, and constructed to support this growth.

Through ongoing Master Plans, stand alone servicing strategies, Class Environmental Assessments and feasibility studies, the Region has continued its proactive approach to water and wastewater servicing and has maintained high standards for levels of service. The following studies have led to the current Bolton Water and Wastewater Capacity Improvements study (additional information on the relevant studies is provided in **Section 3**):

- **June 2014** - Bolton Residential Expansion Study (BRES): Tow of Caledon led study that recommended water and wastewater servicing solutions to meet existing and future (2041) needs within Bolton.
- **June 2020** - Water and Wastewater Master Plan for the Lake-Based Systems: Region of Peel led study that recommended high level water and wastewater servicing solutions within the Region of Peel Lake-based systems, including Bolton, to support growth forecasts to 2041.
- **October 2020** – BRES: Region of Peel led study that recommended water and wastewater servicing solutions for the expanded settlement boundary of the Bolton Rural Service Centre submitted by the Town of Caledon through the BRES Regional Official Plan Amendment (ROPA) application.
- **November 2020** - Approved Region of Peel Official Plan Amendment 30 (ROPA30) for the Bolton Residential Expansion Area: The purpose of this Amendment was to establish an expansion to the Bolton Rural Service Centre, and identify areas assessed in the BRES. ROPA30 proposed increased growth to the Bolton settlement areas (245 ha) to accommodate short-term growth within those areas. ROPA30 was subject to several appeals. After extensive negotiations the parties reached a settlement, and a written decision was provided on April 30, 2021.

Although previous studies have made recommendations for water and wastewater infrastructure in the Bolton service area, the infrastructure needs, location, size, alignments, and timing/phasing were preliminary. Additionally, there is a strong desire by the development community to develop several different areas as soon as feasible; with many of these areas requiring significant investments in new infrastructure. As such, the Region of Peel (Region) retained GM BluePlan Engineering Limited (GM BluePlan) to complete the Bolton Water and Wastewater Capacity Improvements Study which consists of a Feasibility Study followed by a Schedule C Municipal Class Environmental Assessment (Class EA).

The Feasibility Study's objective is to fully investigate potential servicing alternatives and develop optimal water and wastewater servicing solutions to meet both short-term and long-term growth, while prioritizing solutions that align with long-term servicing versus interim objectives. The study identified water and wastewater infrastructure needs to support the additional lands (ROPA30) identified in the Local Planning Appeal Tribunal (LPAT) decision on April 2021, that were not included in the 2020 Master Plan. The LPAT decision resulted in a total of 245 hectares of developable lands to accommodate additional residential and employment population in the Bolton Residential Expansion Settlement Area. Portions of Option 1, Option 3, and Rounding Out Area B lands were added to the settlement boundary in addition to the Option 6 and Triangle Lands that were previously added (collectively known as ROPA30 lands).

The feasibility study has considered the future growth in the Settlement Area Boundary Expansion (SABE), or the "2051 New Urban Area", of the Peel 2051 Municipal Comprehensive Review and new Region of Peel Official Plan; however, the scope of the servicing study was limited to the ROPA30 lands as the detailed servicing needs for the SABE lands will be covered by the next Master Plan update. The Bolton Municipal Class EA is anticipated to be completed in 2024.

This report focuses on the Feasibility Study which has developed, evaluated, and selected water and wastewater servicing concepts for Bolton. The Feasibility Study will support early phasing opportunities, move forward exempt projects (formerly classified as Schedule A or A+) and will be used as the foundation for the Class EA study for any identified Schedule B and/or Schedule C projects.

1.2 Study and Servicing Area

1.2.1 Study Area

The Bolton study area is located in Caledon, within the Region of Peel. The study area is generally bounded by Albion-Vaughan Road to the east, about 100 meters south of Countryside Drive to the south, west of Centreville Creek Road to the west and about 100 meters north of Castlederg Street to the north. The study area falls within Ward 4 and a portion within Ward 5 (west and north) and Ward 10 (south). The majority of the study area is located within the West Humber watershed, and its various stream corridors which fall under the jurisdiction of the Toronto and Region Conservation Authority (TRCA). The study area is considerably larger than the service area (provided in **Section 1.2.2** below) to ensure all possible servicing solutions were assessed.

1.2.2 Service Area

The servicing area is deemed by the municipality as lands designated and approved for urban growth including the designated Bolton Rural Service Centre and the approved BRES area. Rural Service Centres are developed on full municipal water and wastewater services and provide a mix of land uses including residential, employment, commercial, recreational, institutional and community services. The focus of the Feasibility Study and subsequent Class EA will be on servicing strategies for the service area generally located east of the West Humber River and north of Mayfield Road.

The study and service areas are provided in **Figure 1-1**.

Region of Peel
working with you

Bolton Water and Wastewater Feasibility Study

Study Area Boundary
Regional 2051 Urban Boundary
ROPA 30 Expansion Area
Bolton Rural Service Centre

General Features
GTA West Corridor (Technically Preferred)
Rail
Waterbody and Watercourses
Wooded Area
Municipal Boundary

Study Area

BluePlan ENGINEERING

Figure 1-1
February, 2023
722010-G-001
Projection EPSG:26917

2 STUDY AREA CONDITIONS

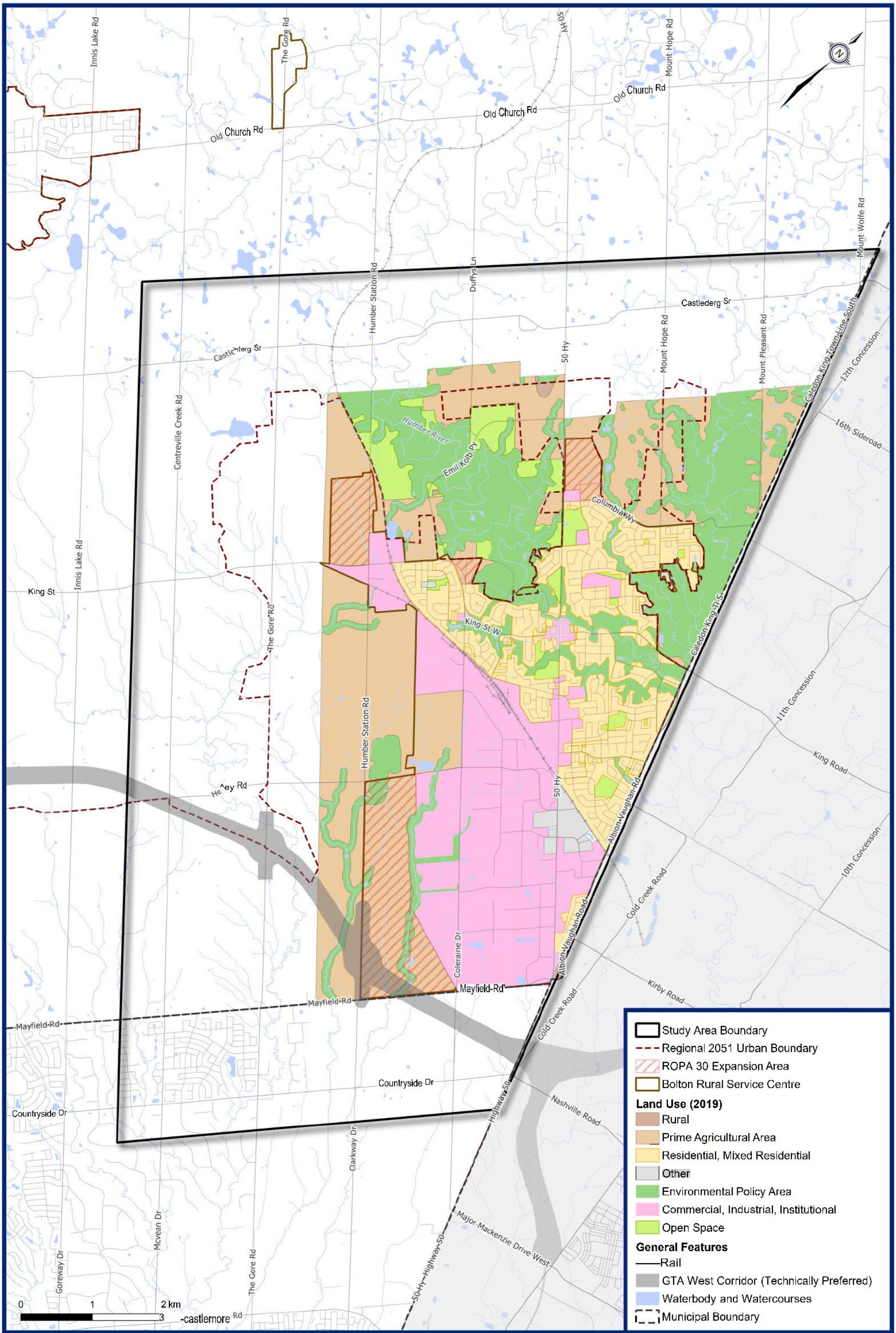
2.1 Existing Land Use

The study area includes various land uses. The northern section of the study area (north of the railway) includes mainly mixed density residential, agricultural, and open space/environmental policy areas, with some institutional and commercial. The southern section of the study area (south of the railway) includes mainly industrial and agricultural, with some commercial and environmental policy areas. **Figure 2-1** provides a map of the land uses within the study area.

2.2 Existing Natural Environment

The study area contains the Greenbelt Plan Area (Protected Countryside Area), Niagara Escarpment Plan and Oak Ridges Moraines Plan (Natural Linkage and Countryside Area) designated areas to the north. Much of the study area is located within the West Humber Watershed within the TRCA jurisdiction and includes various stream corridors.

The study area contains natural heritage features, including Areas of Natural and Scientific Interest (ANSI), Environmentally Sensitive Areas (ESA), wooded areas, and core natural lands and linkages. The study area includes large, forested blocks and riparian corridors, as well as an extensive array of natural habitats that support numerous Species at Risk (SAR). **Figure 2-2** provides a map of the existing natural features within the study area.



Region of Peel working with you

Existing Land Use

Bolton Water and Wastewater Feasibility Study

BluePlan Engineering

Figure 2-1
January, 2023
722010-G-001
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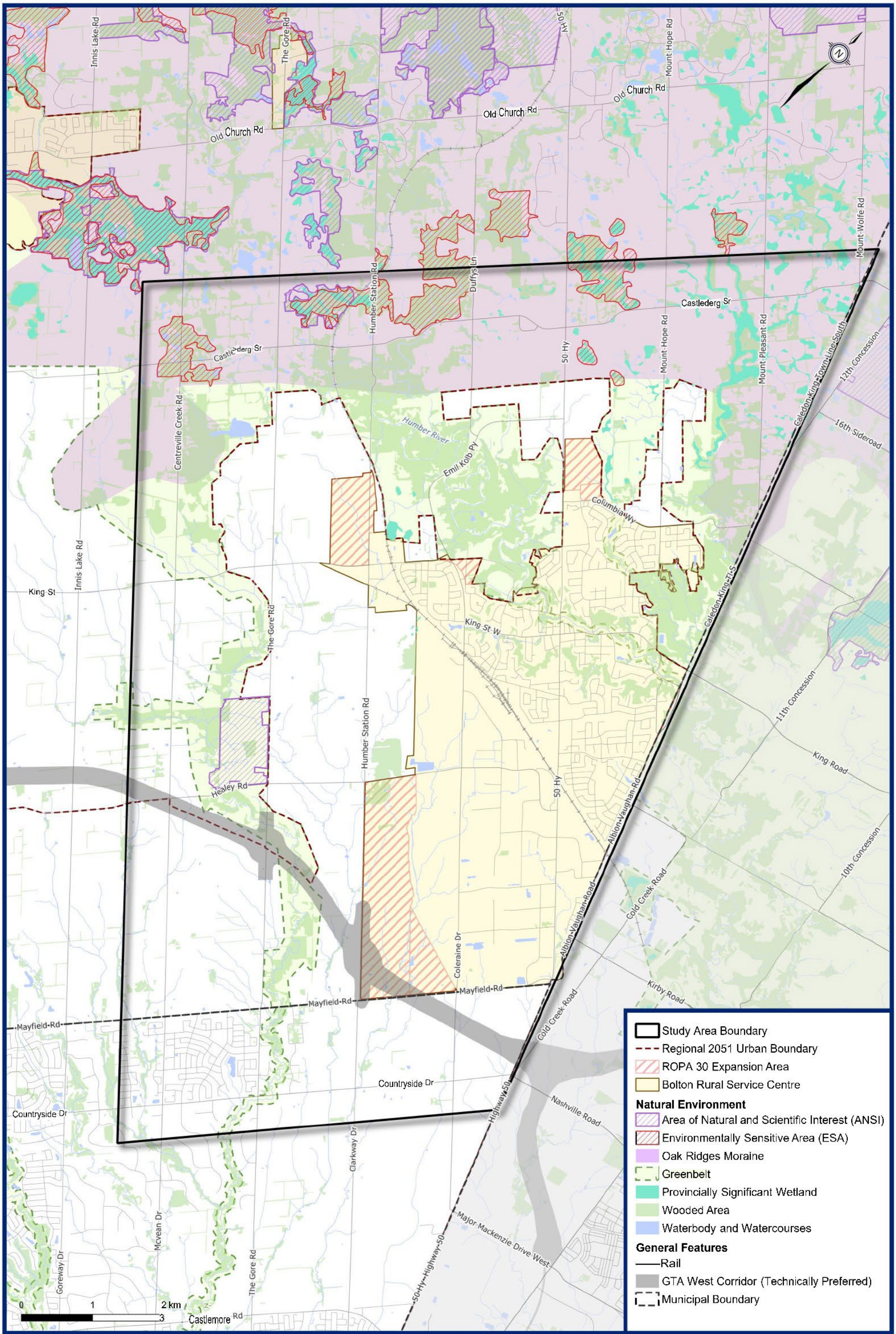


Region of Peel working with you

Existing Natural Environment

Bolton Water and Wastewater Feasibility Study

BluePlan Engineering

Figure 2-2
January, 2023
722010-G-001
Projection EPSG:26917

2.3 Existing Water Infrastructure

2.3.1 Regional Water System

The Region of Peel's lake-based water system services the City of Mississauga, the City of Brampton, and parts of the Town of Caledon and York Region. Water is supplied from Lake Ontario by two large water treatment plants, A.P. Kennedy Water Treatment Plant and Lorne Park Water Treatment Plant, which are operated by the Ontario Clean Water Agency (OCWA) on behalf of the Region. Water is then conveyed by the transmission and distribution systems across the Region.

The transmission system consists of two (2) water treatment plants, transmission mains, water pumping stations, reservoirs, and elevated tanks. Due to the width of the Region's lake-based service area, the transmission system is divided into three (3) main trunk systems: West, Central, and East. The transmission system provides direct supply to the local water distribution system which consists of the watermains extending down to the water service level for each customer. Combined, all the components of the transmission and distribution systems deliver water to users through seven pressure zones separated by approximately 100-foot intervals of elevation.

The Region of Peel also maintains four (4) municipal groundwater systems servicing rural communities in the Town of Caledon. Bolton is serviced through the Region's lake-based water transmission system, specifically through the East Trunk System.

2.3.2 Bolton Water System

The lake-based water system currently supplies water to the "Bolton Rural Service Centre" lands, primarily by the Arthur P. Kennedy Water Treatment Plant. Water is pumped through the Central and Eastern Transmission system via a series of trunk transmission mains and water pumping stations (Hanlan Water Pumping Station, Beckett Sproule Water Pumping Station, Airport Water Pumping Station, and Tullamore Water Pumping Station) to service pressure zones 5 and 6 in Bolton. The Tullamore Pumping Station pumps water via a 750 mm diameter pressure zone 6 transmission main on Mayfield Road and Coleraine Drive to the Bolton Elevated Tanks.

Lower elevation area pressure zones 5B and 6A are supported by pressure reducing valves (PRV) from pressure zone 6. Pressure zone 5B is also supported by the Bolton Standpipes. The Bolton North Hill Water Pumping Station and Bolton Water Pumping Station are not typically operated but can draw some flow from the pressure zone 5B standpipes back to the pressure zone 6 system, if necessary.

Future potential settlement expansion lands north and west of Bolton are situated between the serviceable range of the existing pressure zone 6 and the future pressure zone 7. The existing areas in the northernmost part of Bolton currently experience low pressures and would benefit by being promoted to pressure zone 7. Currently, there is no pressure zone 7 infrastructure in Bolton, and the extension of pressure zone 6 watermains would result in very low pressures to the subject lands as well as a reduction in existing pressures in Bolton's North Hill community.

Table 2-1 provides a list of the existing Bolton storage facilities and **Table 2-2** provides a list of the existing Bolton pumping station facilities.

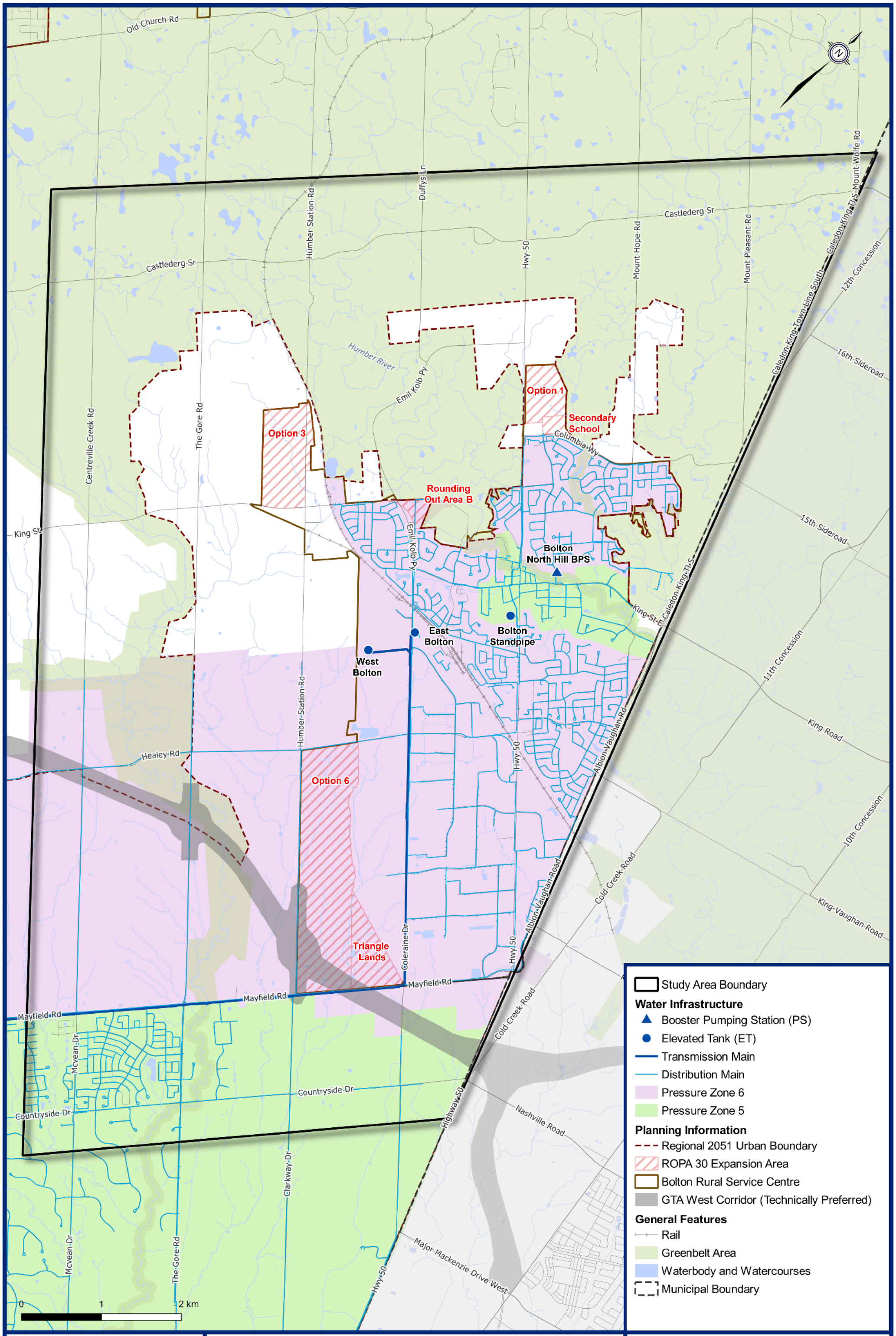
Table 2-1: Bolton Water Storage Facilities

Facility Name	Pressure Zone (PZ)	Top Water Level (TWL) (m)	Capacity (ML)
Bolton Elevated Tank	PZ6	297.2	4.5
Bolton Standpipes	PZ5	273.8	5.0
West Bolton Elevated Tank	PZ6	297.2	9.1

Table 2-2: Bolton Water Pumping Station Facilities

Facility Name	Pressure Zone (PZ)	No. Pumps	Firm Capacity (ML/d)
Bolton North Hill Water Pumping Station	PZ5B to PZ6B	3	9
South Water Pumping Station (at Standpipes)	PZ5B to PZ6B	3	7
Tullamore Water Pumping Station	PZ6	4	40

Figure 2-3 provides a map of the existing water infrastructure within the Bolton service area.



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Existing Water Infrastructure

Bolton Water and Wastewater Feasibility Study

BluePlan Engineering

Figure 2-3
April, 2023
722010-W-001
Projection EPSG:26917

2.4 Existing Wastewater Infrastructure

2.4.1 Regional Wastewater System

The Region of Peel operates and maintains a lake-based wastewater system servicing the City of Mississauga, the City of Brampton, and parts of the Town of Caledon. The system consists of two (2) water resource recovery facilities (WRRF), 31 sewage pumping stations and three (3) main trunk sewer systems: McVean, East, and West. These systems convey flows through a network of pumping stations, forcemains, trunk, and local gravity sewers, to two (2) WRRF, G.E. Booth WRRF and the Clarkson WRRF, for final treatment and discharge to Lake Ontario.

The McVean trunk system connects to the East trunk system via the McVean sewage pumping station that discharges flow to the East Brampton wastewater trunk sewers. The East and West trunk sewer systems service areas are roughly divided by the watershed boundary between the Etobicoke Creek and the Credit River. The two (2) systems are connected via the west-to-east wastewater trunk sewer, which can be used to divert some flows from the west trunk system to the east trunk system at Highway 407.

Both trunk systems provide direct conveyance for the local wastewater collection system which consists of the sewers extending up to the wastewater service lines for each user.

2.4.2 Bolton Wastewater System

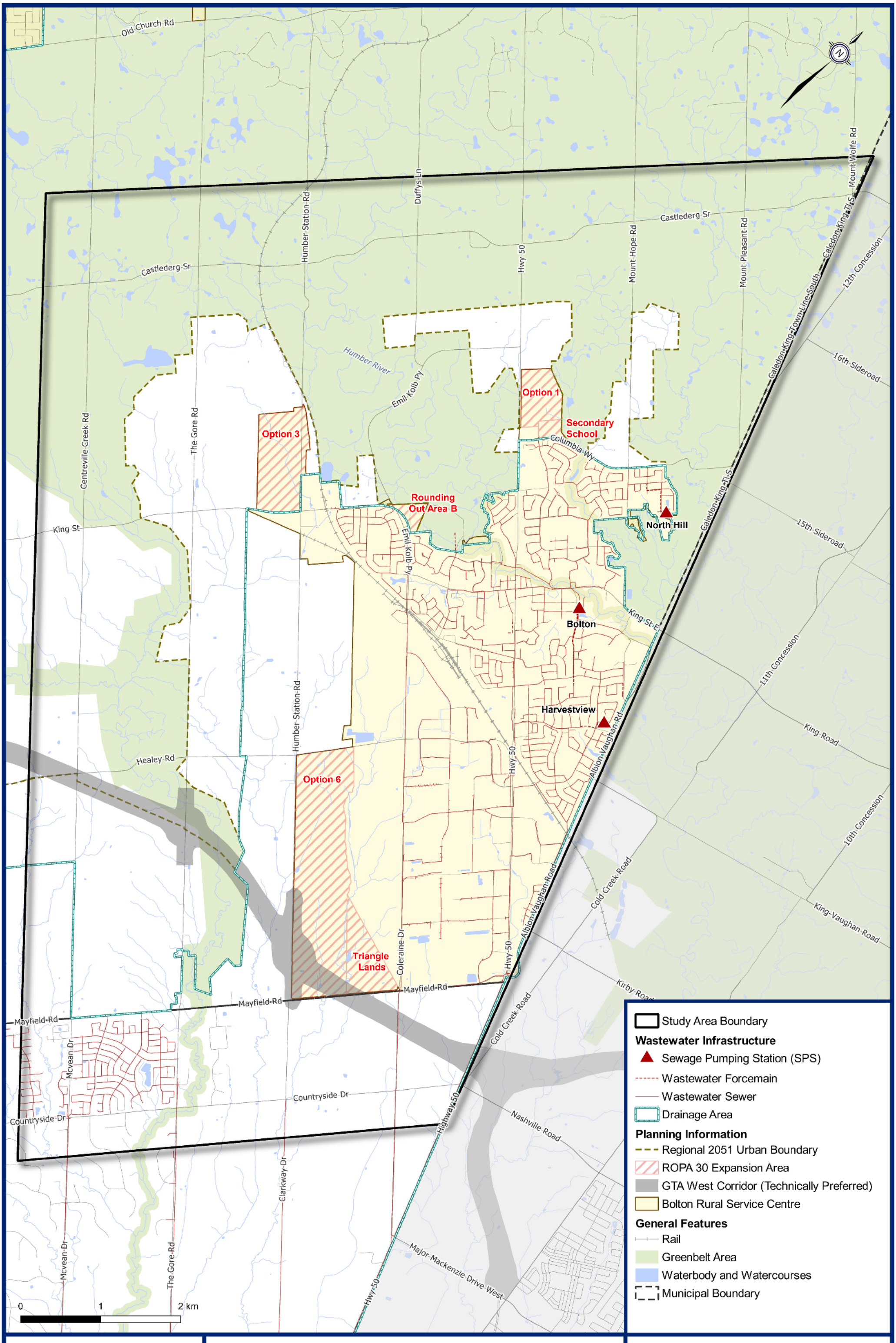
Wastewater flows are collected through local sewers and conveyed south via two (2) main trunk sewers on Coleraine Drive and Albion-Vaughan Road. North Bolton and the low-lying area in central Bolton are serviced by the Bolton Sewage Pumping Station (the largest sewage pumping station in the area) and is then pumped to a discharge point near the junction of Strawberry Hill Court and Allan Drive. The pumped flow and additional flow south of the sewage pumping station, as well as the north, west and south Bolton areas (drained by gravity), are then conveyed down Highway 50 and McEwan Drive, eventually connecting to the Coleraine Drive Trunk Sewer. There is a flow split between the Coleraine Drive and Albion Vaughan Road trunk sewer catchments. The Coleraine Trunk Sewer currently conveys the majority of Bolton's wastewater flows to the lake-based system. Ultimately, all wastewater flows generated in Bolton outlet downstream to the McVean Sewage Pumping Station and down through the east trunk system to the G.E. Booth WRRF.

Table 2-3 below provides a list of the existing Bolton sewage pumping station facilities.

Table 2-3: Bolton Sewage Pumping Station Facilities

Facility Name	No. Pumps	Capacity (L/s)	Planned Upgrades
Bolton Sewage Pumping Station	3	380 (rated) 325 (measured)	- 569 L/s with a 1 to 2-hour emergency storage - Relocation of the 3 existing forcemains
Bolton North Hill Sewage Pumping Station	2	26 (rated) 22 (measured)	- 30 L/s with a 2-hour emergency storage

Harvestview Sewage Pumping Station is planned to be decommissioned in the Fall 2023/Winter 2024 and therefore it will not be considered in this study. Current flows at the station will be diverted to the Albion-Vaughan Road trunk sewer. **Figure 2-4** provides a map of the existing wastewater infrastructure within the Bolton service area.



Region of Peel working with you

Existing Wastewater Infrastructure

Bolton Water and Wastewater Feasibility Study

BluePlan Engineering

Figure 2-4
April, 2023
722010-WW-001
Projection EPSG:26917

2.5 Bolton Service Area Growth

Growth is the key driver for the Feasibility Study and subsequent Class EA study. The Region of Peel population and employment targets to 2051 have been established by the province with additional development proposed within both the intensification and greenfield growth areas in Peel. In addition, the recent approval of the ROPA30 areas has proposed increased growth to the Bolton settlement areas (245 ha) to accommodate short term growth within those areas.

Table 2-4 and **Figure 2-5** provide the projected population and employment growth for the Bolton service area. **Figure 2-6** provides a map of the projected total growth for the Bolton service area.

Table 2-4: Projected Residential Population and Employment for Bolton Service Area

Forecast	2021	2041	2051	Buildout
Residential	31,540	73,780	111,460	122,480
Employment	19,580	36,360	46,470	49,370
Total	51,120	110,140	157,930	171,850

Rounded to the closest 10.
Source: Region of Peel Small Geographic Unity (SGUs) September 23, 2021

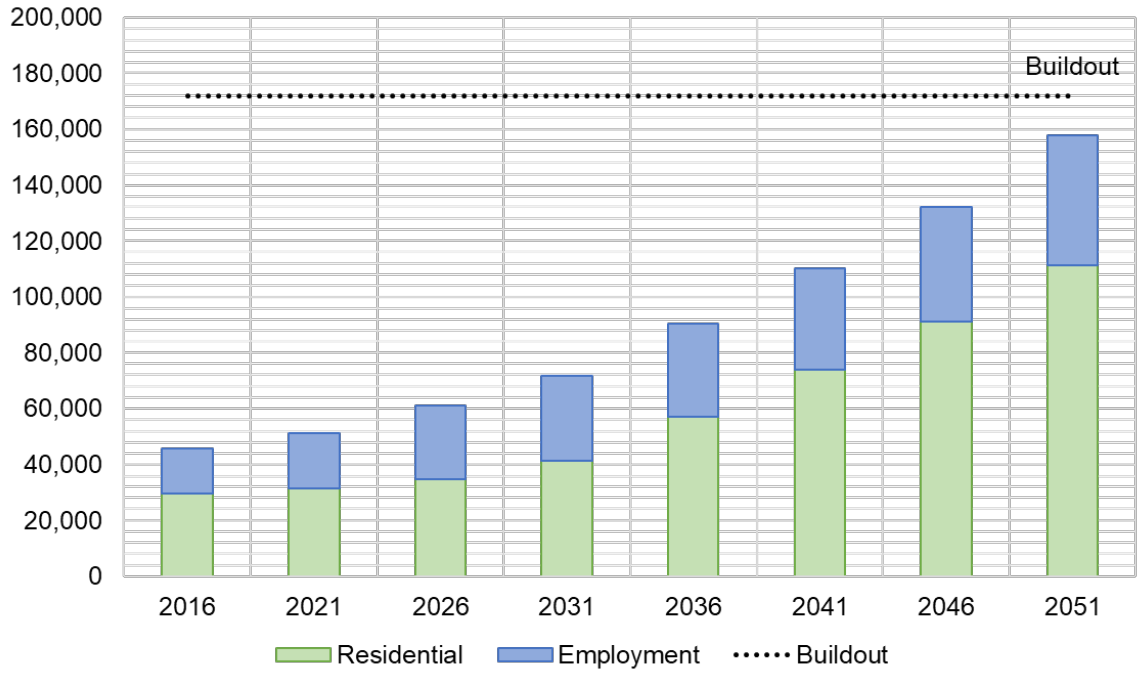
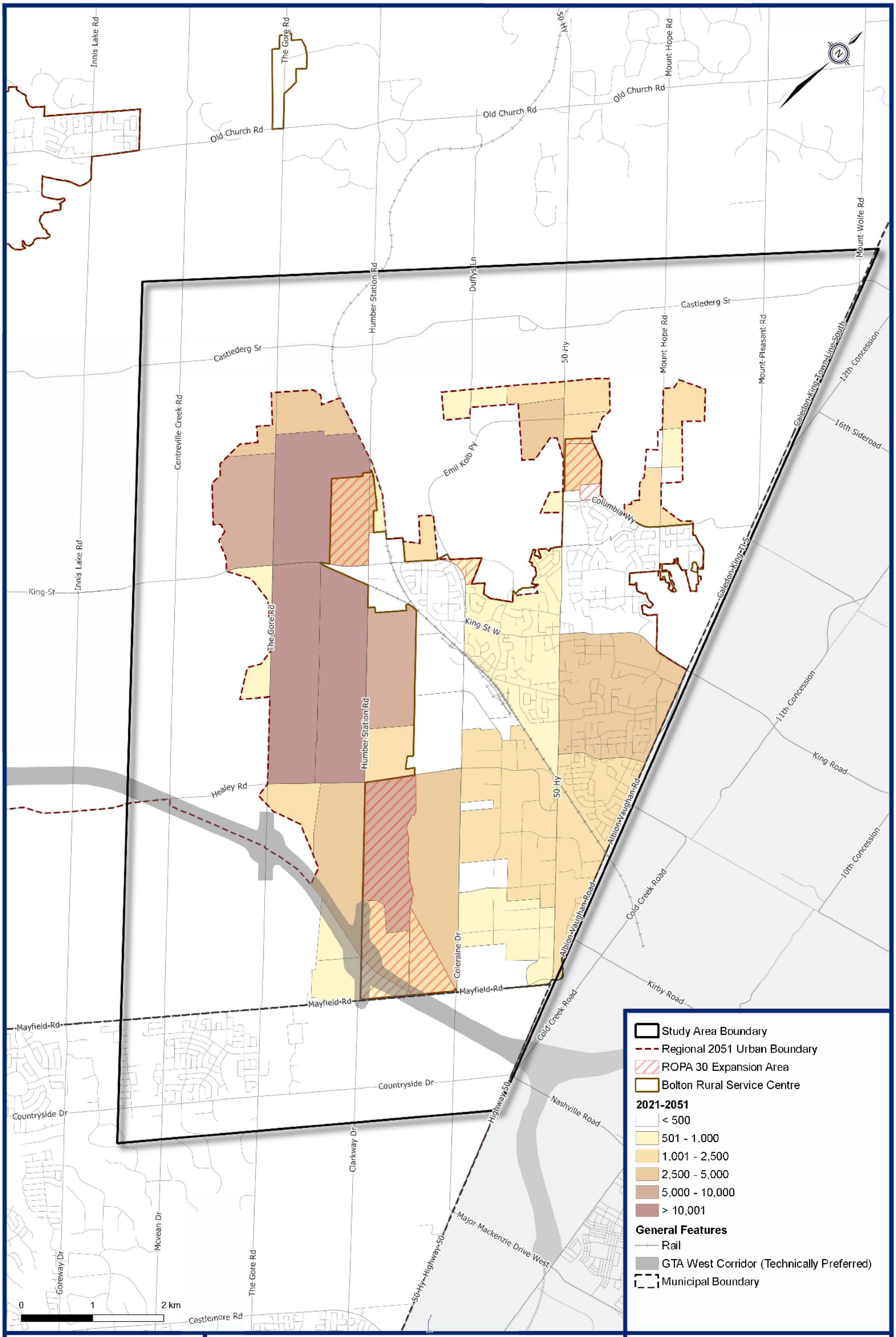


Figure 2-5: Projected Residential Population and Employment for Bolton Service Area



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Service Area Projected Total Growth (2021-2051)

Bolton Water and Wastewater Feasibility Study

BluePlan

Figure 2-6
January 2023
722010-G-001
Projection EPSG 26917

3 RELEVANT INFRASTRUCTURE STUDIES

3.1 Region of Peel Water and Wastewater Master Plan (2020)

The Water and Wastewater Master Plan for the Lake-Based Systems is a study intended to address the increasing demands on the Region's water and wastewater infrastructure. The 2020 Master Plan provided a review, evaluation, and development of water and wastewater servicing strategies for all servicing needs within the lake-based systems in the cities of Mississauga and Brampton and parts of the Town of Caledon. The 2020 Master Plan did not examine the groundwater-based systems or communal wastewater systems in Caledon as they are addressed separately by the Region. The preferred water and wastewater servicing strategies were developed to ensure that:

- Extension of the existing lake-based water and wastewater system is aligned with existing regional and local planning policies.
- Use of the existing water and wastewater system and facilities is maximized and used as the backbone for new infrastructure to meet the planned 2041 needs.
- Strategic oversizing of infrastructure, where justified, is planned to support growth beyond 2041.
- The Master Plan recommendations were developed by, and provided feedback to, the Region's Growth Management Strategy through an integrated process.

Based on the preferred water and wastewater servicing strategy, a detailed capital program was established to support the servicing needs of existing and future growth of the Region of Peel lake-based system to 2041.

The 2020 Master Plan was completed in June 2020 and included the Council approved ROPA30 Option 6 and Triangle Lands. The Master Plan did not include water and wastewater infrastructure projects to service Options 1, 2 and 3 lands as these were not approved by Regional Council as part of ROPA30 at the time.

3.2 Region of Peel Block Inflow and Infiltration Program – Bolton Block 35 (2020)

The Region of Peel has implemented a Block Inflow and Infiltration (I/I) Program which involves a multi-step approach to finding, categorizing, and solving I/I issues in the 40 sewersheds or "blocks" within the Region's wastewater system. The Region also has an ongoing wastewater flow monitoring program to collect data that is readily available for analysis. The first step involves analysis of the flow data to isolate I/I sources and then identify strategies to stop inflow and infiltration from entering the wastewater system. This can include downspout disconnections and cross-connection remediation (e.g., catchbasins, floor drains, sump pumps, etc.). The second step involves the acceptance of the I/I balance and assessment of the condition of the wastewater system to identify the best solution alternative. This process includes a Class EA, Preliminary Design, Detailed Design and Construction phases.

Block 35 is located within the Bolton study area. Flow monitor data was analyzed in 2020 and recommendations were made for field investigations. This balance of I/I after completing the reduction work was considered in the Feasibility Study and will be a consideration in the next step of the study, the Class EA.

3.3 Region of Peel Bolton Residential Expansion (2020)

The Region of Peel initiated a planning process to assess the Bolton Residential Expansion Study (BRES) Regional Official Plan Amendment (ROPA) application submitted by the Town of Caledon to expand the settlement boundary of the Bolton Rural Service Centre. The planning process resulted in Regional staff recommending to Regional Council

a ROPA to expand the settlement boundary of the Bolton Rural Service Centre to complete the implementation of the 2031 Growth Plan targets for Bolton.

The aim of this study was to review the existing and proposed water and wastewater systems to confirm whether there was sufficient capacity to satisfy the growth demands of the proposed Bolton Residential Expansion. The intent was also to present the detailed servicing analysis and evaluation of the proposed urban expansion undertaken as part of this study including:

- Establishing water and wastewater servicing requirements
- Identifying servicing alternatives if applicable
- Evaluating the water and wastewater servicing alternatives
- Identifying servicing strategies for each option including Rounding out areas and/or Triangle lands

Option 5 scored the highest in the evaluation. This option included:

- Water
    - New (Z6) 400 mm feedermain from the proposed 600 mm watermain on Coleraine/Holland to Option 5 distribution (1.3 km)
    - New (Z6) 300 mm watermain from the proposed 600 mm on Holland extension, north to Option 5 distribution (0.35 km)
- Wastewater
    - New 450 mm gravity sewer on Humber Station from Healey to Option 5 (0.6 km)
    - New 450 mm gravity sewer on Humber Station from Healey to Mayfield (3.1 km)

The Option 5 water and wastewater servicing strategies are presented in **Figure 3-1** and **Figure 3-2**, respectively, from the Bolton Residential Expansion Water and Wastewater Servicing Analysis 2020 Update Report.

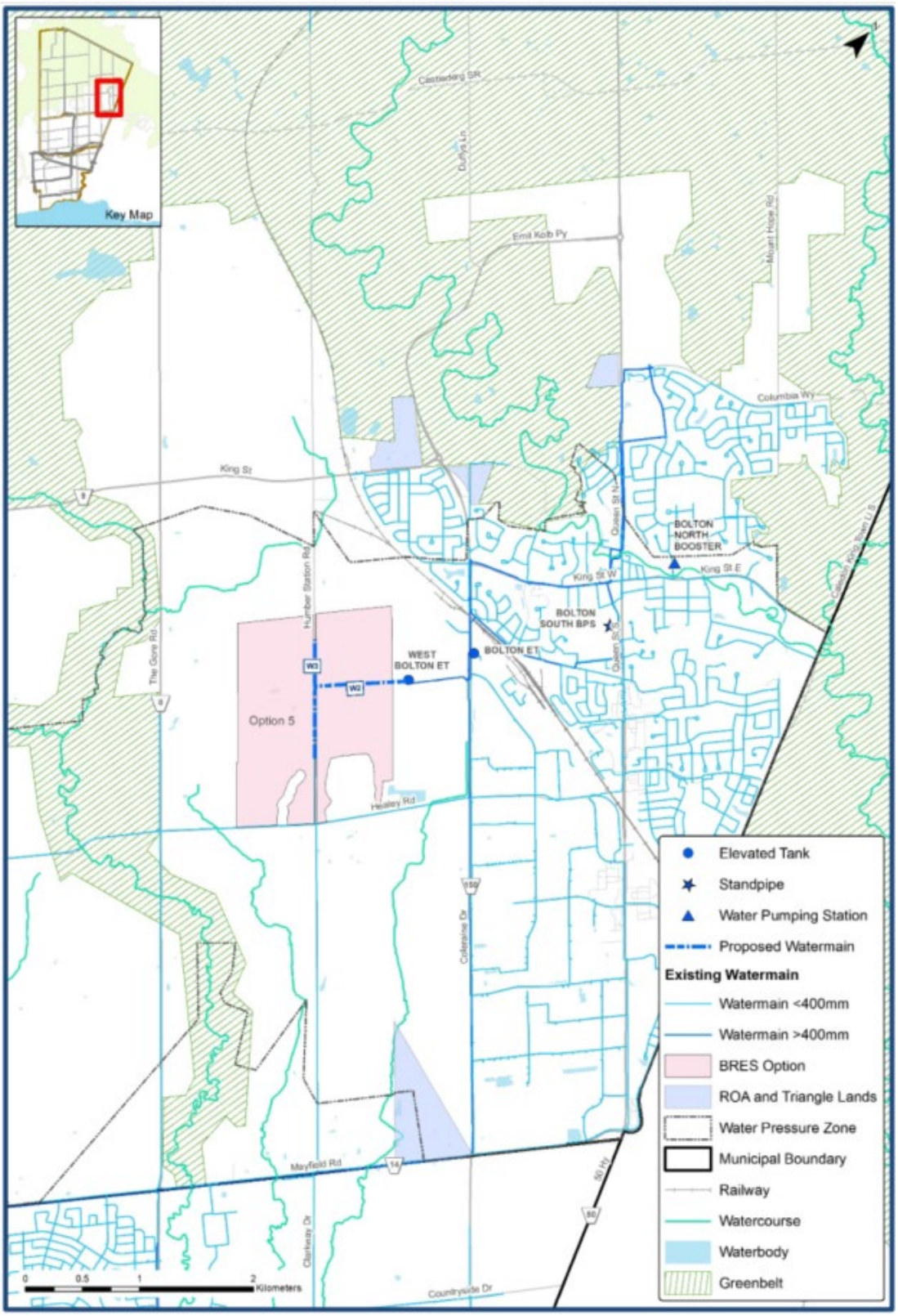


Figure 3-1: Water Servicing Option 5 (Bolton Residential Expansion, 2020 Update)

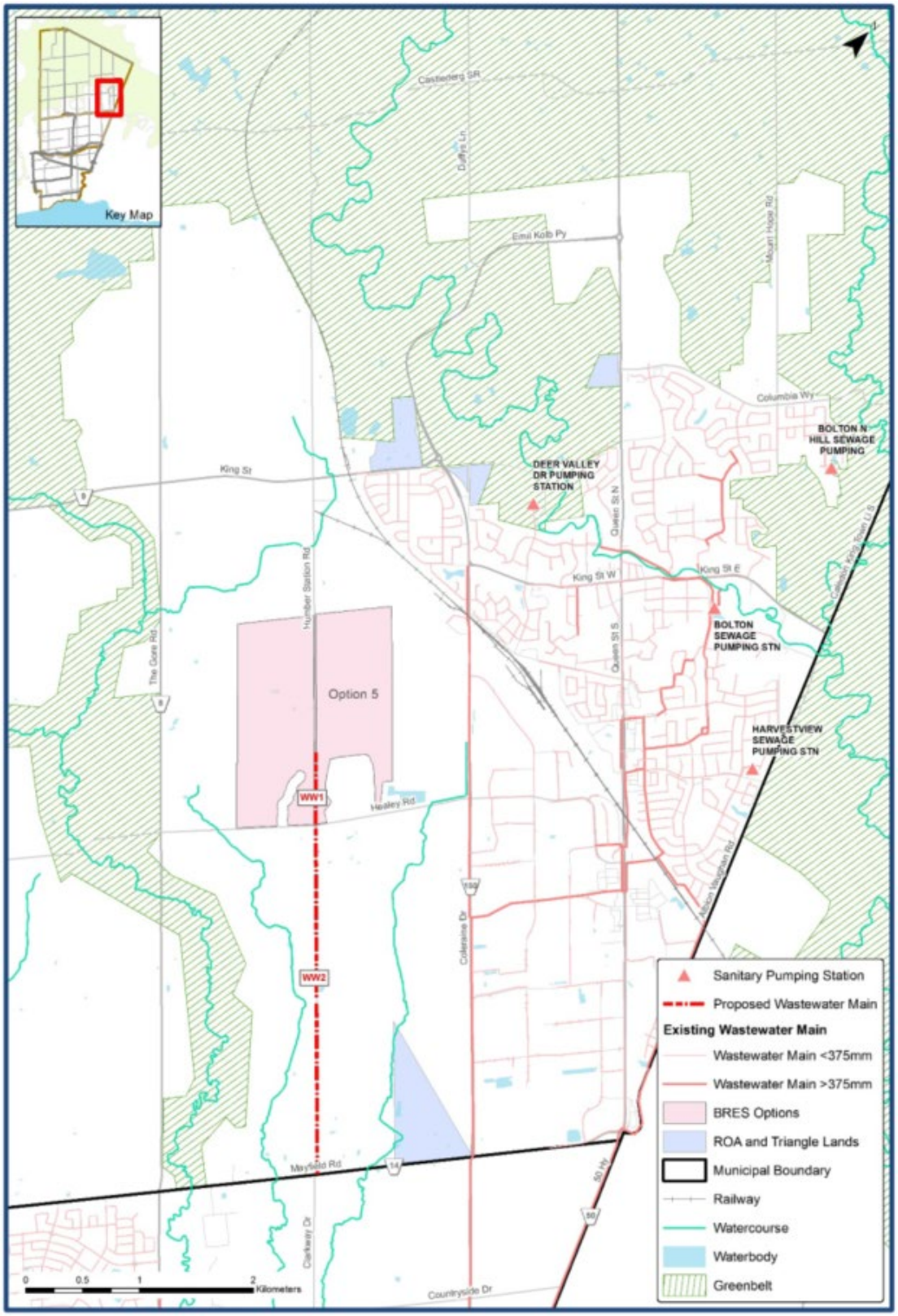


Figure 3-2: Wastewater Servicing Option 5 (Bolton Residential Expansion, 2020 Update)

3.4 Town of Caledon Bolton Queen Street Corridor Study (2019)

The Queen Street Corridor, centered in the village of Bolton, is a 10 km long area along Regional Road 50 and Queen Street (between Emil Kolb Parkway to Mayfield Road), and Regional Road 9 and King Street (between Coleraine Drive to the Humber Valley Trail). The project was delivered in three (3) separate phases.

- Phase 1: Focused on initiating the Bolton Queen Street East Corridor Study
- Phase 2: Scenario development and design refinement
- Phase 3: Refined design selection and presentation

A key objective of the Bolton Queen Street Corridor Study was to identify land use and design opportunities along the study area that could be developed within Bolton and accommodate changing demands for growth into 2041. The general findings of the overall study area established the importance of Queen Street becoming a much-improved corridor that supports economic development, active transportation, future transit improvements, housing options, celebrating cultural heritage, and creating community vibrancy.

Upon completion of the study, the primary recommendation was to conduct a Class EA of the downtown section of the Queen Street Corridor. The overall corridor would change dramatically therefore an EA would need to recognize a wider scoped project. It was recommended that the Class EA contain functional engineering and design, streetscape design options, engagement strategies, parking study of the downtown area, climate change analysis, servicing plan, bridge assessment and hydrological study and cost estimates.

3.5 Town of Caledon Bolton Special Policy Area Study (2017)

The Bolton Special Policy Area (SPA) Study was undertaken by the Town of Caledon in partnership with TRCA. This study conducted the requisite studies to update the SPA policies and a planning justification for those lands that may be added or removed from the SPA. The study guided the Town to reduce the health and safety risks resulting from flooding.

This report was amended in 2017 to update the policies pertaining to the Bolton SPA, to reflect recent flood plain mapping and reduce health and safety risks resulting from potential flooding within the Bolton Core, while allowing for development and/or redevelopment to proceed where appropriate mitigation measures have been applied.

3.6 Town of Caledon Bolton Transportation Master Plan (2015)

The Bolton Transportation Master Plan was developed in a collaborative effort between the Town of Caledon and Region of Peel. The study followed a comprehensive and consultative master planning approach consistent with the Class EA process. It identified transportation deficiencies and road network issues, while supporting municipal planning goals. Short-term road improvements recommended for implementation are listed below:

1. New Road Construction (0-2 Lanes) for Emil Kolb Parkway from King Street to Highway 50
2. Narrowing (4-2 Lanes) Queen Street (Highway 50) from South of King Street to Hickman Street
3. Extending (0-2 lanes) Simpson Road from Mayfield Road to George Bolton Parkway
4. Widening (2-4 lanes) Mayfield Road
5. Widening (2-4 lanes) Coleraine Drive from Albion Vaughn Road to Gore Road
6. New Road Construction (0-6 lanes) for Arterial Corridor A2 from Mayfield Road to Highway 50

Road improvements recommended for the 2031 horizon year are listed below:

1. Widening (2-4 lanes) Albion Vaughn Road from Mayfield Road to King Street
2. Widening (5-7 lanes) Highway 50 from Mayfield Road to Castlemore Road
3. Widening (4-6 lanes) Mayfield Road from Humber station Road to Airport Road
4. Extending (0-2 lanes) George Bolton Parkway Extension from Highway 50 to Industrial Road
5. New Road Construction (0-2 lanes) for King Street Realignment from King Street to Emil Kolb Parkway
6. New Road construction for Highway 427 from Highway 427 to GTA west corridor
7. New Road Construction for GTA West Corridor
8. New Road Construction for GTA West Corridor/ Highway 427 Extension Interchange
9. New Road Construction for GTA West Corridor/ Coleraine Drive Interchange

3.7 Town of Caledon Bolton Residential Expansion Study (2014)

The Bolton Residential Expansion Study (BRES) was initiated in 2012 to determine where to accommodate the 2031 population projected for Bolton. The goal of the study was to:

- Evaluate and select an area for residential development
- Ensure the study fulfills the requirements of the Planning Act and all provincial directions
- Provide the public with opportunities to provide input

The Region of Peel Official Plan Amendment (ROPA24) was introduced to bring the Region's Official Plan into conformity with recent updates to provincial planning policies. The growth management component of ROPA24 was approved in 2012 by the Ontario Municipal Board (OMB) with 2031 forecasts for the Town of Caledon and introducing a minimum greenfield density target of 42 residents and jobs per hectare.

Bolton was identified as a Rural Service Center in the Region's Official Plan, these centers are developed on full municipal water and sewer services and provide a range of residential, employment, commercial, recreational, and institutional and community services. The expansion of the current Bolton Rural Service Center boundary was a key component of Caledon's growth management strategy of directing majority of growth in the Town of Caledon to the rural settlements of Bolton, Caledon East, and Mayfield West. This expansion will accommodate approximately 11,100 people and 3,600 jobs and comprises approximately 245 hectares of developable lands.

The BRES identified six options for the areas of expansion and three options for smaller, rounding out areas for a settlement area expansion for Bolton. Option 3, at the northwest corner of Humber Station Road and King Street, and the Rounding Out Areas were the Town's preference for the settlement area expansion. The Town then applied for a ROPA on this basis. When considering the Town's application for an amendment to the ROPA, the Agency chose Option 6 and an area known as the Triangle Lands located at the south end of Bolton. These lands then became ROPA30, subsequently appealed to the LPAT.

The Town's endorsements of these lands and their subsequent submission of a ROPA application to the Region was based on the position that the Option 3 lands excel for the following reasons.

- It has potential for the development of a broader mix of residential forms that would integrate well with public transit.
- It is a more logical and contiguous growth area as it enhances growth potential for areas to the west of Bolton making efficient use of land, infrastructure, and public services.

- Provides strategic advantages by providing opportunities to service existing industrial lands and possible growth in the vicinity.
- It has the benefit of using available capacity of existing roadway in the short-term resulting in less disruption of the community as new settlement develops.
- It offers lower costs and less complexity in meeting infrastructure improvement requirements.

4 FUTURE SERVICING CONSIDERATIONS

Since the completion of the Region's 2020 Water and Wastewater Master Plan for the Lake-Based Systems, an expansion of the Bolton Rural Service Centre was established through ROPA30. In addition, the Region of Peel new Official Plan was prepared in accordance with the population and employment forecasts in Schedule 3 of the provincial planning document "A Place to Grow" and provides growth projections for the Region to 2051. Based on the 2051 growth forecast and the lands identified in ROPA30, the following sections identify key opportunities and constraints for future water and wastewater servicing within the Bolton service area.

4.1 Water Servicing Opportunities and Constraints

The BRES area is situated between the serviceable range of the existing pressure zone 6 and the future pressure zone 7. Development within growth areas north of Columbian Way would trigger a new pressure zone 7, as there are already low pressures experienced in Bolton's North Hill. A water service study was developed under the BRES study, last updated by the Region in late 2020.

An average day per capita rate of 270 L/cap was applied to the projected population to establish average day demands (ADD). A max peaking factor of 1.8 was applied to establish the maximum day demands (MDD). The MDD water demands for the Bolton pressure zones are summarized in **Table 4-1**.

Table 4-1: Summary of Future Water Demands

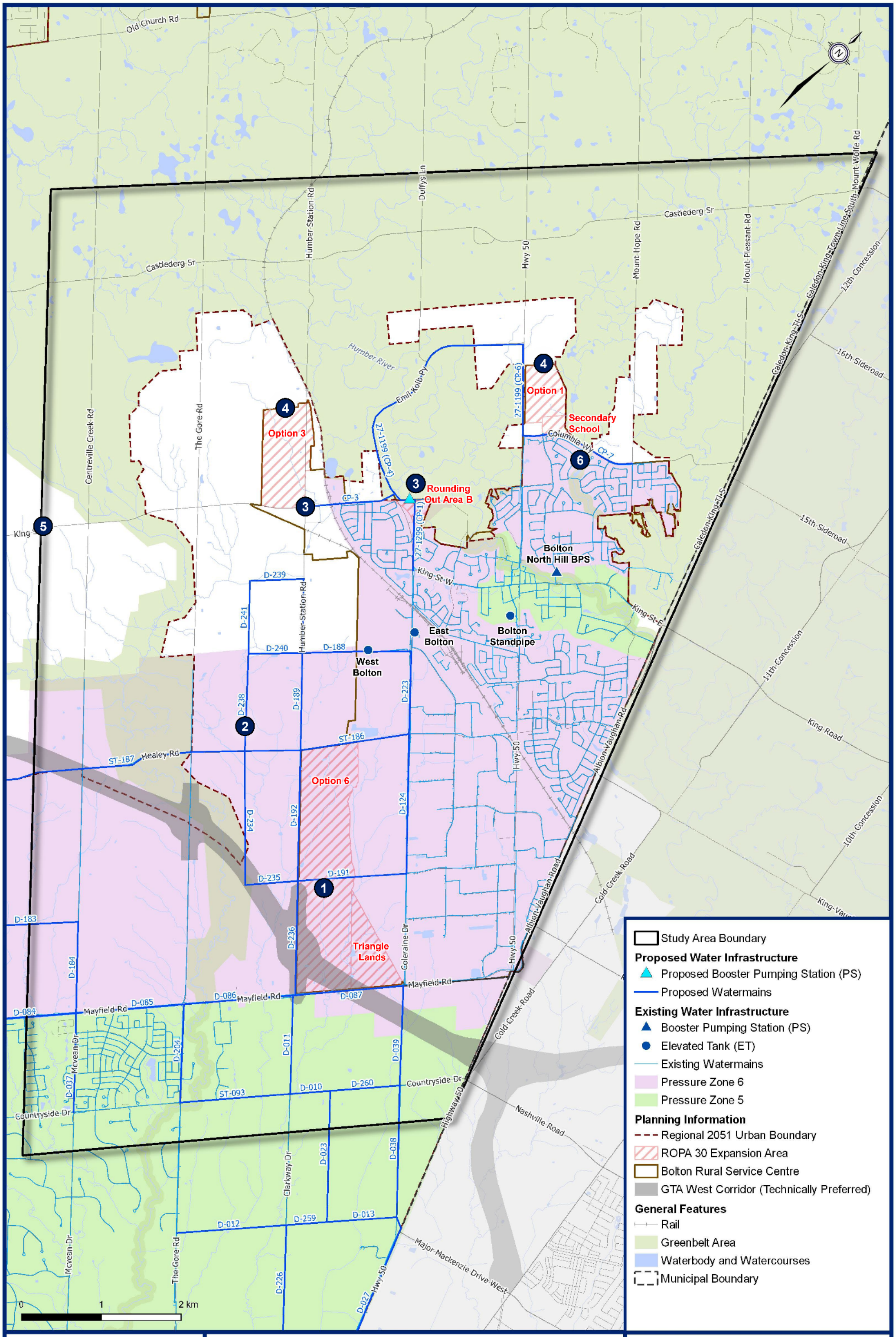
Growth Area	2051 MDD (ML/D)	Buildout MDD (ML/D)
Pressure Zone 7B	11.5	12
Pressure Zone 7E (Bolton Only)	16.5	20
Pressure Zone 6B	15	16
Pressure Zone 6E (Bolton Only)	20	21

*Note: "Bolton Only" refers to the area east of West Humber River

The following are the water servicing opportunities and constraints for the Bolton service area. **Figure 4-1** provides the location of the opportunities and constraints listed below.

1. Option 6 lands are a future growth area. Water servicing was partially covered through planned Master Plan projects. Most recent 2051 projections extend servicing needs well beyond ROPA30 areas.
2. Currently, there is no storage facility planned in pressure zone 6 east (existing 6B elevated tanks in West Bolton). All additional storage would be pumped from two facilities (future Sandhill pressure zone 5 reservoir and pressure zone 6 and 7 water pumping station and the existing Tullamore Zone 4 reservoir and pressure zone 5 and 6 water pumping station). Over the long-term, there may be operational challenges operating large Zone 6 area with minimal floating storage. There is an opportunity to investigate a dedicated pressure zone 6 east storage.
3. There is an opportunity to include an interim water pumping station solution to support growth in pressure zone 7B prior to implementation of a long-term solution.

4. There is an opportunity to extend servicing for new pressure zone 7. Pumping and potential storage needs are required, depending on the extents of the new service area, level of risk and operational considerations.
5. There is a potential need of pressure zone 5 east storage to help support growth in both pressure zone 6 and 7 and to reduce dependency on the Tullamore Pumping Station and Reservoir.
6. There is low pressure in the northern areas of the existing pressure zone 6.



Region of Peel working with you

Water Servicing Opportunities and Constraints

Bolton Water and Wastewater Feasibility Study

BluePlan Engineering

Figure 4-1
May, 2023
722010-W-001
Projection EPSG:26917

4.2 Wastewater Servicing Opportunities and Constraints

There are three main trunk sewers that will service existing and future growth areas in Bolton:

- Coleraine Drive
- Albion Vaughan Road
- Humber Station Road / Clarkway Drive (proposed new trunk sewer)

Table 4-2 provides a summary of additional Average Dry Weather Flow (ADWF) and Peak Dry Weather Flow (PDWF) based on the 2051 population and employment forecasts. The ADWF for collection system is the total of residential and employment ADWF as follows:

- Residential: 290 L/person/day
- Employment: 270 L/employee/day

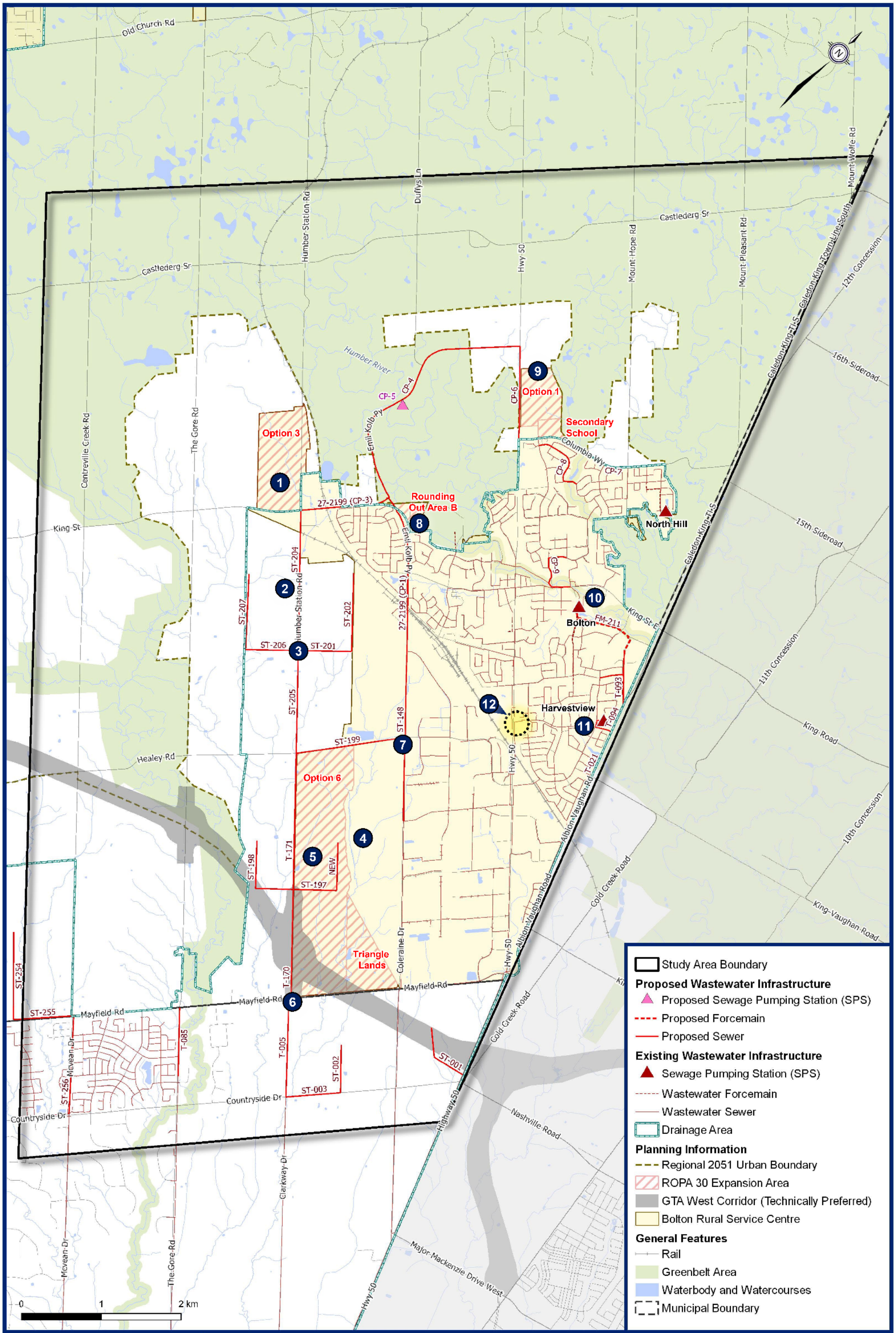
Table 4-2: Summary of Future Wastewater Flows

Service Area	ADWF (2051) (L/s)	PDWF (2051) (L/s)	ADWF (Buildout) (L/s)	PDWF (Buildout) (L/s)
Bolton (East of West Humber River)	519	1,039	565	1,131

The following are the wastewater servicing opportunities and constraints for the Bolton service area. **Figure 4-2** provides the location of the opportunities and constraints listed below.

1. For Option 1 lands, there is potential to integrate with servicing growth beyond the current approved servicing boundaries in ROPA30.
2. There is an opportunity to extend planned master plan infrastructure to service projected growth to 2051 north of King Street.
3. Future flow splits. There is an opportunity for real time controls to balance flows between proposed Humber Station Road trunk sewer and existing Coleraine Drive trunk sewer.
4. Direct servicing to existing shallow sewers on Coleraine Drive may be challenging for larger development sites due to ground elevations. A detailed review is required during the Bolton Water and Wastewater Capacity Improvement Class EA to ensure feasibility of connections and strategy.
5. There are new identified growth areas without existing adjacent or nearby wastewater infrastructure.
6. There is an opportunity to add a flow split for post-period growth at Clarkway Drive and Mayfield Road.
7. There are capacity constraints within Coleraine Drive sewer to service future growth in the catchment area.
8. There is an opportunity to extend servicing from existing adjacent and planned infrastructure.
9. An extension of servicing is required with an opportunity for strategic oversizing and/or integration with future growth in other areas.
10. There is an opportunity to better understand flows into Bolton Sewage Pumping Station prior to planned upgrades. There is also an opportunity to divert flows away from Coleraine Drive sewer and utilize capacity of the existing/extension of Albion-Vaughan trunk sewer.
11. Decommissioning of Harvestview Sewage Pumping Station in Fall 2022. Flows are to be diverted to the extended Albion-Vaughan trunk sewer.

12. Flow Split. There is an opportunity for real time controls to balance flows between Coleraine Drive and Albion-Vaughan sewers.



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Wastewater Servicing Opportunities and Constraints

Bolton Water and Wastewater Feasibility Study

BluePlan

Figure 4-2
May, 2023
722010-WW-001
Projection EPSG:26917

5 SERVICING CONCEPT DEVELOPMENT AND EVALUATION

Water and wastewater servicing strategies were developed to meet interim growth and 2051 growth within the servicing area including the new ROPA30 lands. These servicing strategies were identified based on high-level technical analyses that considered the servicing area's existing and planned infrastructure, short- and long-term growth projections, approved ROPA30 lands, recommendations from past studies, as well as discussions with Region of Peel and Town of Caledon staff.

The water and wastewater servicing **concepts** focused on infrastructure needs within the short-term (next 5 years) and long-term (to 2051) timelines. Short-term servicing requirements focused on the approved ROPA30 lands, whereas the long-term requirements were based on the alignment of the strategies recommended in the 2020 Water and Wastewater Master Plan (2041 projections) as well as the preliminary 2051 strategies. Throughout the evaluation process, the hydraulic models were reviewed to identify and confirm servicing requirements. In addition, meetings were held with key stakeholders (Town of Caledon and Region of Peel) to understand development pressures, existing issues, constraints, and agreement on future servicing needs.

The concepts were developed and evaluated through the following steps, as seen in **Figure 5-1** below:

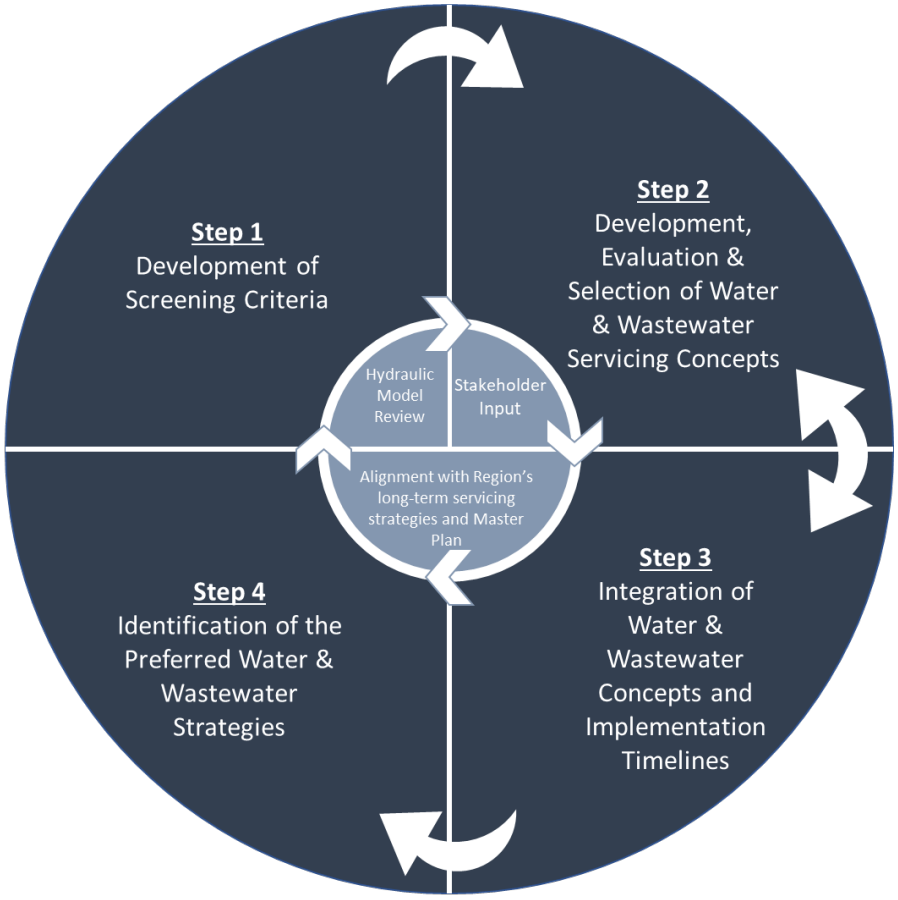


Figure 5-1: Servicing Strategy Development & Evaluation Process

1. Development of screening criteria
2. Development, evaluation and selection of water and wastewater servicing **concepts**:
    - Identification of localized servicing areas
    - Identification of short-term and long-term requirements for each servicing area
    - Development and evaluation of short-term servicing **concept** alternatives
    - Selection of the preferred short-term servicing **concepts**
3. Integration of water and wastewater concepts and implementation timeline
4. Identification of the preferred water and wastewater **strategies**

Steps 2 and Step 3 were completed in tandem as both steps impacted the results of the evaluation and selection of the preferred short-term servicing concepts, however, Step 4 was reviewed again once the preferred short-term concepts were selected.

The following sections detail the above evaluation process.

5.1 Hydraulic Model Review

The purpose of hydraulic model review was to ensure the available water and wastewater models were sufficient for use in the Bolton Water and Wastewater Feasibility Study. Newly calibrated models from the Region were used in combination with the existing 2020 Water and Wastewater Master model.

As part of the Feasibility Study, the following review was completed on both the recently received model and the 2020 Master Plan model:

- Engineering validation to check any errors in the network and model loading.
- Comparison of the model networks to the latest ePAL (External Peel Asset Locator) data to ensure the baseline model was up to date.
- Validation of the network to ensure the flows are representative of current flow conditions using the latest monitoring data.

More details on the water and wastewater model review and analysis are provided in **Appendix A**.

5.2 Stakeholder Input

During the feasibility study, the project team met with the broad Region of Peel team and Town of Caledon to provide project updates, review the servicing concept alternatives, evaluation, and selection of the preferred concepts, and receive feedback to support the study. **Table 5-1** provides a summary of the meetings for this study.

Table 5-1: Feasibility Study Stakeholder Meetings

Stakeholder	Date	Meeting Description
Town of Caledon	August 15, 2022	Meeting to discuss growth and development within the Community of Bolton and present the servicing concept alternatives
Town of Caledon	December 1, 2022	Meeting to discuss the evaluation and selection of the preferred servicing concepts

Town of Caledon meeting packages are provided in **Appendix B**.

5.3 Development of Screening Criteria

High-level screening criteria were developed to support the development and the evaluation of the servicing concept alternatives. The following high-level criteria were used:

- Ability of short-term concept to align with or support the broader Master Plan level strategy
- Maximize the use existing road right of way and/or Region easements
- Good opportunities for trenchless construction and availability for tunnel shaft sites
- Avoidance or mitigation of conflicts with existing infrastructure
- Avoidance or mitigation of significant impacts to residents/businesses and/or traffic disruption
- Ability of the water and wastewater short-term/long term concepts servicing implementation timeline to align within each servicing area (e.g., cannot service residents in an area without both water and wastewater servicing in place at the same time).

5.4 Water Servicing Concepts

5.4.1 Identification of Servicing Areas

Two service areas were identified for short-term and long-term water servicing needs:

- Pressure zone 7B & 7E: to service ROPA30 Option 1 and 3 Lands. These two new pressure zones were considered as one area.
- Pressure zone 6 to service ROPA30 Option 6 Lands, Triangle Lands, and Chickadee Lands

5.4.2 Identification of Short-term and Long-term Requirements

Each service area was reviewed to identify infrastructure needs for both short-term and long-term growth projections. The recommendations made in the 2020 Water and Wastewater Master Plan, Post 2041 Analysis and previous BRES studies, among others; informed the identification of the preliminary long-term requirements. **Table 5-2** provides the list of short and long-term infrastructure requirements for each of the water servicing areas.

Table 5-2: Water Short-Term and Long-Term Infrastructure Requirements by Service Area

Water Servicing Area	Short-term Infrastructure Requirements	Long-term Infrastructure Requirements
Pressure Zone 7B and 7E	• New Pressure Zone 7B Water Pumping Station • New Pressure Zone 7E Water Pumping Station	• New Pressure Zone 7B Storage • New Pressure Zone 7B Feedermains • New Pressure Zone 7E Storage • New Pressure Zone 7E Feedermains
Pressure Zone 6	• New Pressure Zone 6 Feedermains	• New Pressure Zone 6 Water Pumping Station • New Pressure Zone 6 Storage • New Pressure Zone 6 Feedermains

5.4.3 Development, Evaluation and Selection of Short-term Servicing Concept Alternatives

Based on the short-term requirements and the screening criteria, alternative servicing concepts were developed and evaluated to identify the preferred servicing concept for each servicing area.

The alternatives for each water servicing concept were screened against the high-level criteria to select the best overall alternative, considering both short-term and long-term needs.

5.4.3.1 Option 1 and 3 Lands (Pressure Zone 7B and 7E)

Table 5-3 provides the water servicing concept alternatives for pressure zone 7B and 7E. **Figure 5-2** and **Figure 5-3** provides a map of Concept 1 and Concept 2, respectively.

Table 5-3: Pressure Zone 7B Water Servicing Concept Alternatives

Concept No.	Concept Description	Key Screening	Screening Results
1	Two (2) Water Pumping Stations • One (1) to service Pressure Zone 7B • One (1) to service Pressure Zone 7E	**Schedule B Class EA may be required** ✓ Improved resiliency with second station servicing 7B ✓ More flexibility for early phasing (independent construction – can build both water pumping stations prior to building the long-term feedermain); however, feedermain is ultimately required to service long-term ✓ Opportunity to service both Option 1 and 3 lands in short-term. × Does not align as well with/support the broader Master Plan level strategy × Increased long-term maintenance/operations requirements (two water pumping stations) × Increased environmental impacts compared to Concept 2 - two water pumping stations vs. single water pumping station (increased land use, greenhouse gas emissions) × Increased community/traffic impacts (two properties required) × Increased jurisdictional impacts (two properties required) × Short-term costs may be lower compared to Concept 2; however long-term costs may be higher compared to Concept 2 (two vs. one water pumping station)	**Screened out**
2	One (1) Water Pumping Station and one (1) feedermain	**Schedule B Class EA may be required** ✓ Efficiency in selecting the water pumping station site and feedermain location concurrently ✓ Better aligns with/supports the broader Master Plan level strategy ✓ Decreased long-term maintenance/operations requirements (only one water pumping station) ✓ Decreased environmental impacts compared to Concept 1 - one water pumping station has more efficiencies (decreased land use, greenhouse gas emissions) ✓ Decreased community/traffic impacts (only one property required) ✓ Decreased jurisdictional impacts (only one property required) × Reduced resiliency with only one water pumping station servicing Pressure Zone 7B and part of Pressure Zone 7E × Short-term costs may be higher compared to Concept 1; however long-term costs may be lower compared to Concept 1 (one vs. two water pumping station)	**Carried Forward** Better aligns with/ supports the broader Master Plan level strategy compared to Concept 1

Concept No.	Concept Description	Key Screening	Screening Results
		× Less flexibility for early phasing (need both the water pumping station and feedermain to service in short-term); however, feedermain is required to service long-term × Water pumping station only services local Option 3 lands in short-term; requires long-term feedermain to service Option 1 lands (single water pumping station and feedermain to 7B)	

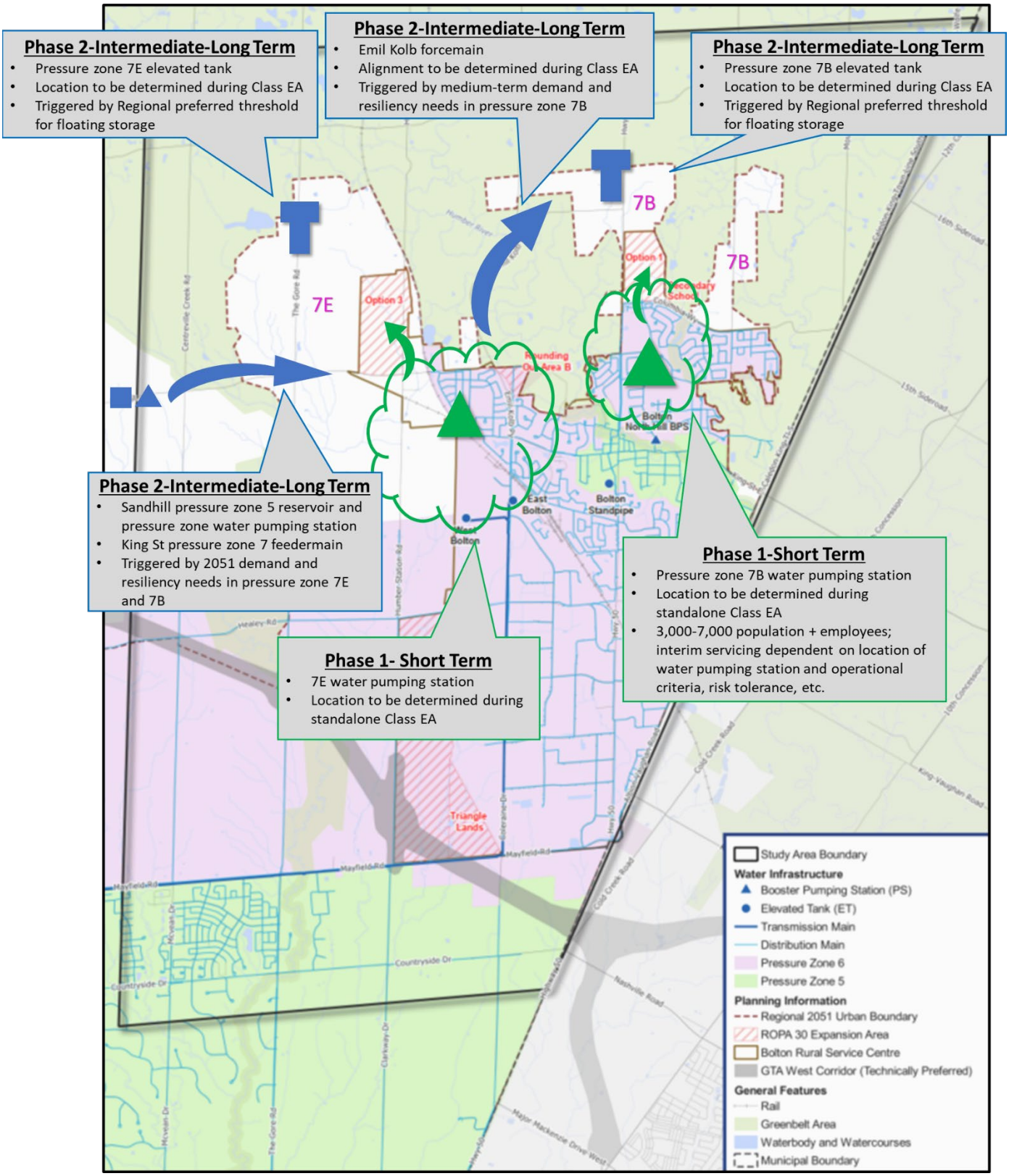


Figure 5-2: Option 1 and 3 Lands – Water Servicing Short-term Concept 1

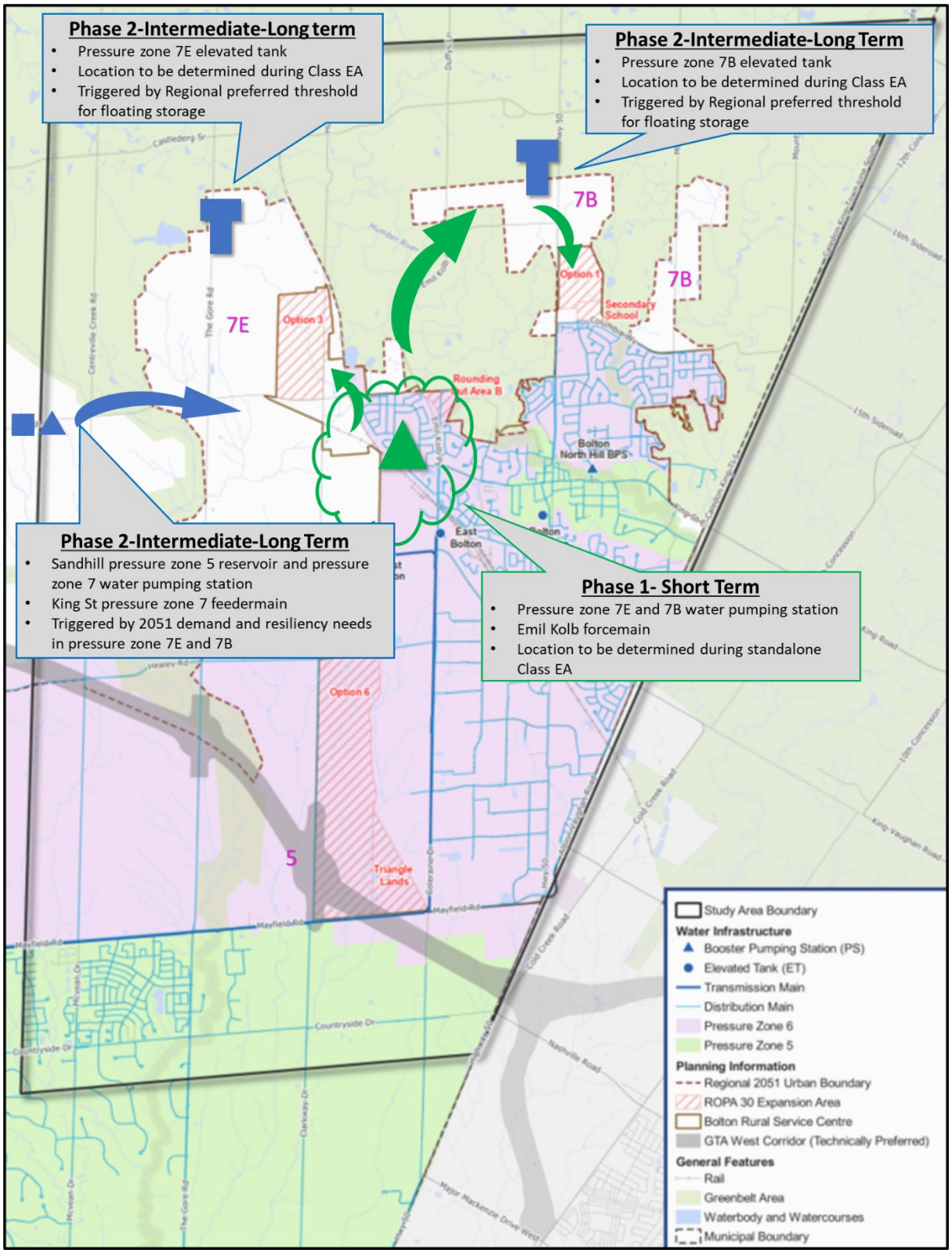


Figure 5-3: Option 1 and 3 Lands – Water Servicing Short-term Concept 2

5.4.3.2 Option 6 Lands (Pressure Zone 6)

To meet short-term needs, one alternative for Pressure Zone 6 servicing area was identified. **Table 5-4** provides the water servicing concept alternative for Pressure Zone 6. **Figure 5-4** provides a map of Concept 1.

Table 5-4: Pressure Zone 6 Water Servicing Concept Alternative

Concept No.	Concept Description	Key Screening	Screening Results
1	New feedermains along the road right of way	Depending on the type of crossings and tunnel depth (if required), may be exempt from the Class EA process (no additional EA study costs)	**Carried Forward**

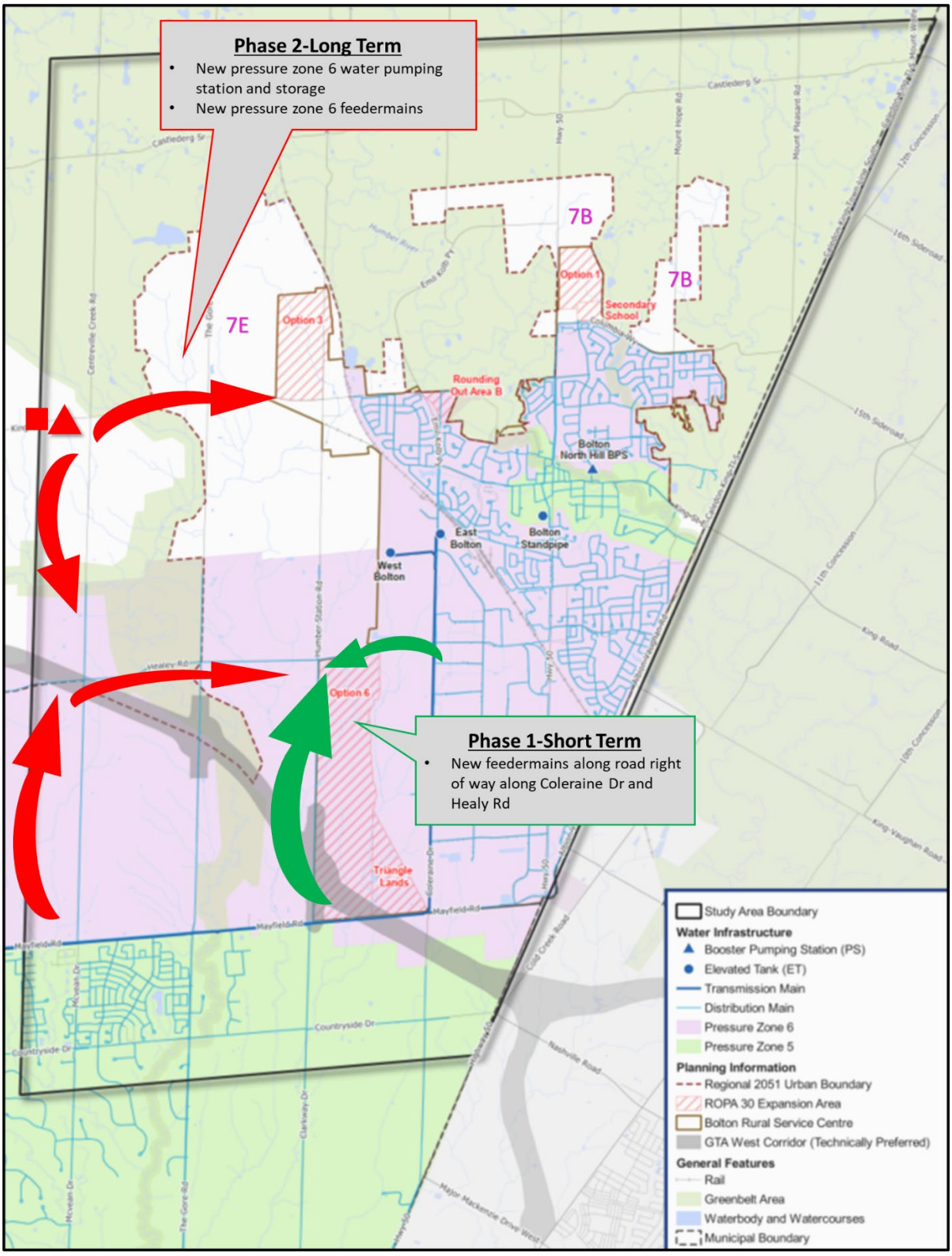


Figure 5-4: Option 6 Lands – Water Servicing Short-term Concept

5.5 Wastewater Servicing Concepts

5.5.1 Identification of Servicing Areas

Four service areas were identified for short-term and long-term wastewater servicing needs:

- Option 1 Lands – North of Columbia Way
- Option 3 Lands – North of King Road
- Chickadee Development Lands
- Option 6 Lands and Triangle Lands

5.5.2 Identification of Short-term and Long-term Requirements

Through a desktop model analysis, each service area was reviewed to identify infrastructure needs for both short-term and long-term growth projections. The recommendations made in the 2020 Water and Wastewater Master Plan, Peel Post 2041 Analysis and previous Bolton Residential Expansion Studies, among others; informed the identification of the preliminary long-term requirements. **Table 5-5** provides the list of short and long-term infrastructure requirements for each of the wastewater servicing areas.

Table 5-5: Wastewater Short-Term and Long-Term Infrastructure Requirements by Service Area

Wastewater Servicing Area	Short-term Infrastructure Requirements	Long-term Infrastructure Requirements
Option 1 Lands	• Extension of servicing via upgrades to existing sewers or new infrastructure and servicing strategy	• Extension of servicing via further upgrades to existing sewers and upgrades to Bolton sewage pumping station; and/or new Emil Kolb sewage pumping station and forcemain
Option 3 Lands	• Extension of servicing to Option 3 Lands	• Extension of servicing to all approved lands North of King Street
Chickadee Development Lands	• Extension of servicing	• Extension of servicing
Option 6 Lands & Triangle Lands	• Extension of servicing	• Extension of servicing

5.5.3 Development, Evaluation and Selection of Servicing Concept Alternatives

Based on the short-term requirements and screening criteria, alternative servicing concepts were developed and evaluated to identify the preferred wastewater servicing concept for each servicing area.

The alternatives for each wastewater servicing concept were screened against high-level criteria to select the best overall alternative, considering both short-term and long-term needs.

5.5.3.1 Option 1 Lands

Table 5-6 provides the wastewater servicing concept alternatives for Option 1 lands. **Figure 5-5** to **Figure 5-8** provides maps of Concept 1 to Concept 4, respectively.

Table 5-6: Option 1 Lands Wastewater Servicing Concept Alternatives

Concept No.	Concept Description	Key Screening	Screening Results
1	Gravity to existing Bolton Sewage Pumping Station via existing / upgraded sewers	**Exempt Project** ✓ Use of existing Bolton Sewage Pumping Station ✓ Increased phasing flexibility; Phase 1 includes upgrading existing sewers (capacity issues with existing infrastructure) which can potentially service early phase of growth sooner, Phase 2 requires further upgrades of local sewers and Bolton Sewage Pumping Station × Triggers additional upgrades to existing infrastructure × Existing Bolton Sewage Pumping Station is within floodplain; increased flows to Bolton Sewage Pumping Station may result in increased flooding potential. Any upgrades to the pumping station would likely be within floodplain. × Short-term implementation schedule does not align with short-term water servicing implementation schedule × Increased construction challenges including constrained road right of way, construction between two houses at Maidstone Court and Humber River crossing × Potential need for property acquisition for Bolton Sewage Pumping Station upgrades × Potential environmental crossings (trails connecting subdivisions, Humber River crossing); however, majority of built-up area × Upgrades to existing sewers within local neighbourhoods; significant community disruption (residents, traffic) × Leads to a commitment to long-term Bolton Sewage Pumping Station strategy	**Screened out**
2	Gravity to existing Bolton Sewage Pumping Station via new Queen Street sewer	**Exempt Project** ✓ Use of existing Bolton Sewage Pumping Station ✓ Wide road right of way has potential to decrease construction challenges × Existing Bolton Sewage Pumping Station is within floodplain; increased flows to Bolton Sewage Pumping Station may result in increased flooding potential. Any	**Screened out**

Concept No.	Concept Description	Key Screening	Screening Results
		upgrades to the pumping station would likely be within floodplain × No phasing flexibility; require full alignment to service Option 1 lands × Triggers additional upgrades to existing infrastructure × Does not align with preliminary long-term wastewater strategy × Potential need for property acquisition for Bolton Sewage Pumping Station upgrades × Potential natural environment impacts for construction along Humber River × Highly trafficked road; significant community disruption (businesses, traffic)	
3	Gravity to new Emil Kolb Sewage Pumping Station and Forcemain	**Schedule B Class EA may be required** ✓ Better aligns with/supports the broader Master Plan level strategy and water servicing implementation schedule ✓ Decrease in community impacts; majority of construction will be within rural area away from existing businesses/residents × Increased property easements and acquisition requirements; new Sewage Pumping Station × Triggers Coleraine Drive upgrades or diversion to new Humber Station Drive Sewer × Increased timeline for implementation × Increase in potential natural environment impacts; majority of construction will be within rural areas within natural area and will include environmental crossings	**Carried Forward** Better aligns with/ supports the broader Master Plan level strategy and water servicing implementation schedule
4	Gravity to existing Bolton Sewage Pumping Station via Queen Street or existing / upgraded sewers	**Exempt Project** ✓ Use of existing Bolton Sewage Pumping Station × Does not align as well with/supports the broader Master Plan level strategy and water servicing implementation schedule × Existing Bolton Sewage Pumping Station is within floodplain; increased flows to Bolton Sewage Pumping Station may result in increased flooding potential. Any upgrades to the Sewage Pumping Station would likely be within floodplain × Requires upgrades to existing infrastructure upstream of Bolton Sewage Pumping Station and a new sewer	**Screened out**

Concept No.	Concept Description	Key Screening	Screening Results
		along Queen Street during the short-term. However, this concept will still require the new infrastructure along Emil Kolb Parkway during the medium term, which would trigger a Schedule B Class EA	

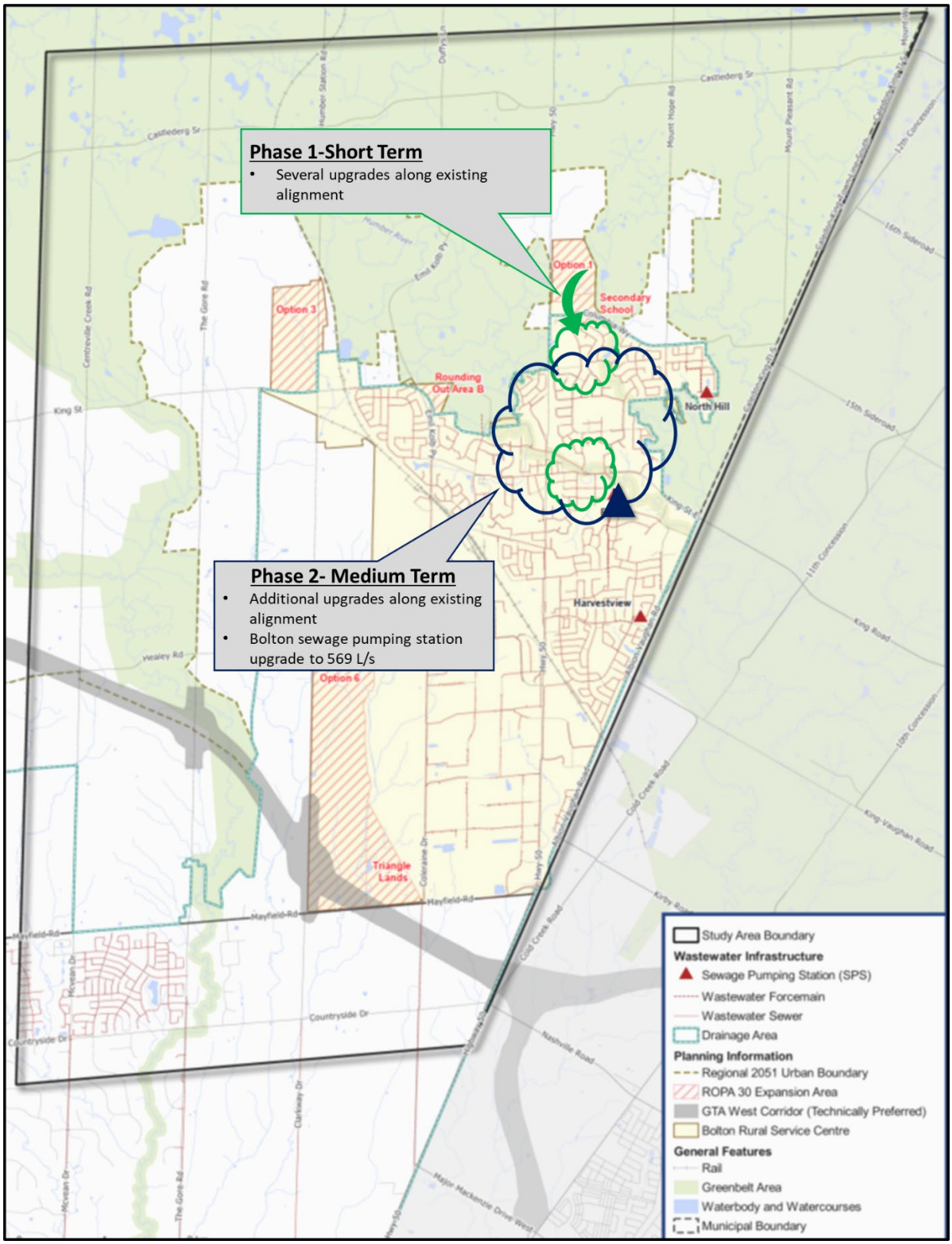


Figure 5-5: Option 1 Lands – Wastewater Servicing Short-term Concept 1

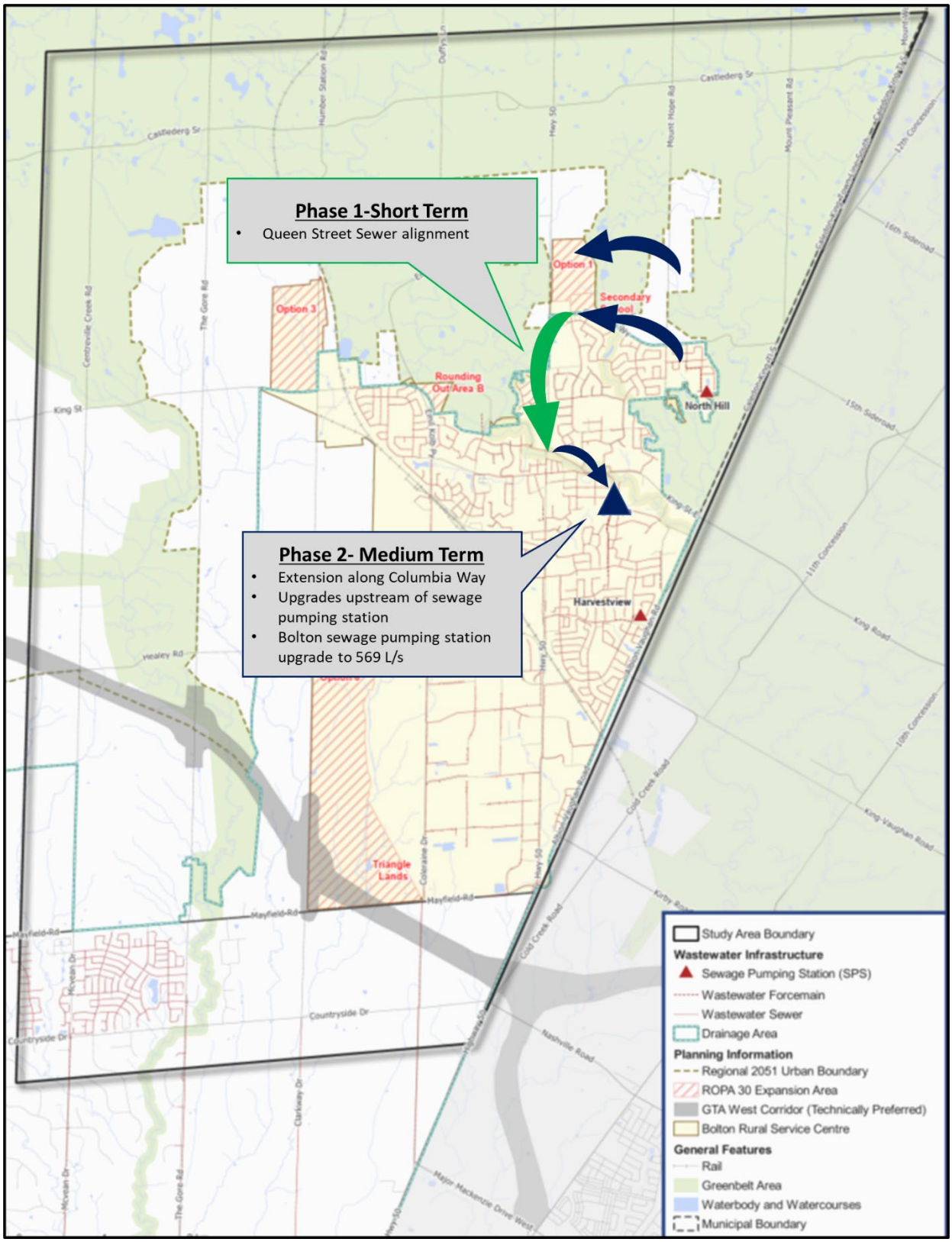


Figure 5-6: Option 1 Lands – Wastewater Servicing Short-term Concept 2

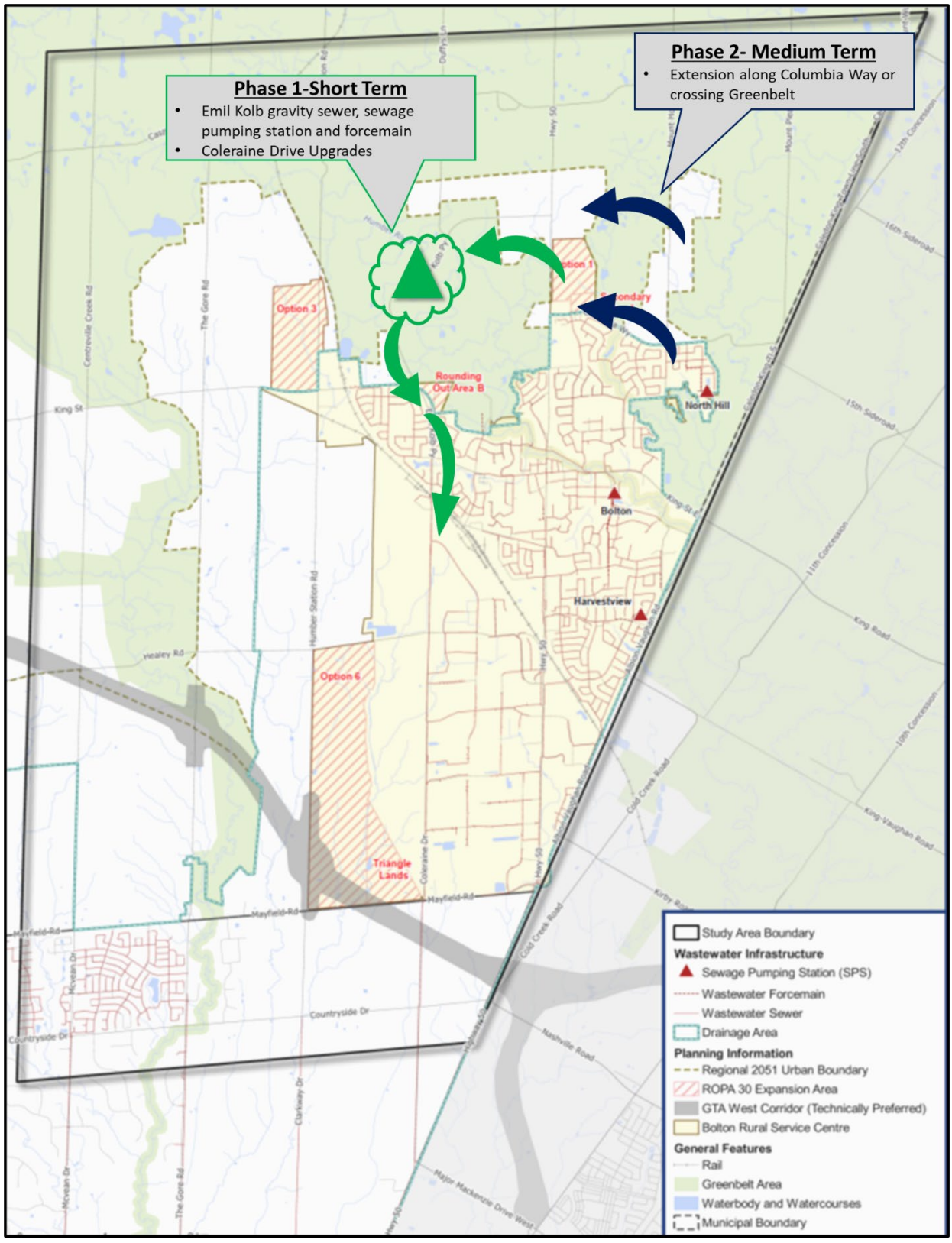


Figure 5-7: Option 1 Lands – Wastewater Servicing Short-term Concept 3

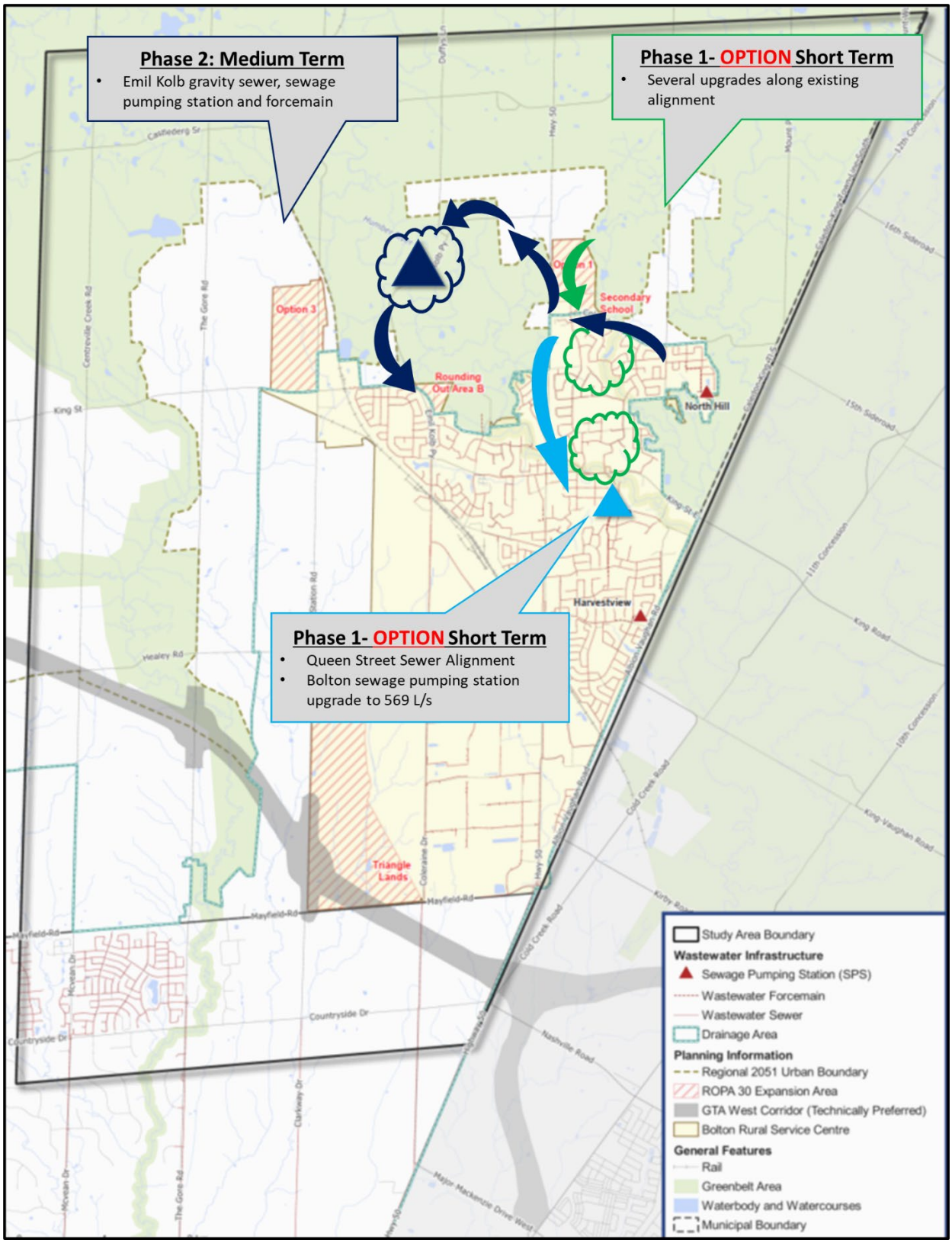


Figure 5-8: Option 1 Lands – Wastewater Servicing Short-term Concept 4

5.5.3.2 Option 3 Lands

Table 5-7 provides the wastewater servicing concept alternatives for Option 3 lands. **Figure 5-9** to **Figure 5-11** provides a map of Concept 1 to Concept 3, respectively.

Table 5-7: Option 3 Lands Water Servicing Concept Alternative

Concept No.	Concept Description	Key Screening	Screening Results
1	Gravity to Humber Station Road	**Schedule B Class EA may be required** ✓ Aligns with/supports the broader Master Plan level strategy. ✓ Decreased impacts to community/traffic; Humber Station Road is fully within rural area × Increased environmental crossing to Humber Station Road × Requires complete Humber Station sewer to service any growth × Humber Station Sewer may need to be deep at King Street in order to support western extent of Option 3 Lands	**Screened Out**
2	Gravity to Coleraine Drive	**Exempt Project** ✓ Aligns with/supports the broader Master Plan level strategy, while providing short-term servicing to Chickadee development (Humber Station Road requires a Schedule B therefore this route has a longer implementation timeline) ✓ Enables short-term servicing of Option 3 lands prior to complete Humber Station sewer × Increased impacts to community/traffic; Colerain Drive is within urban area with adjacent businesses	**Carried Forward** Aligns with long-term gravity sewer to Humber Station Road, while providing short-term servicing to Chickadee/Option 3 lands
3	Gravity to Gore Road	**Exempt Project** ✓ Can better support growth in western areas of Option 3 Lands × Sewer lies on western edge of growth areas × Duplication/twinning of Humber Station sewer × Farthest servicing option from existing wastewater infrastructure	**Screened Out**

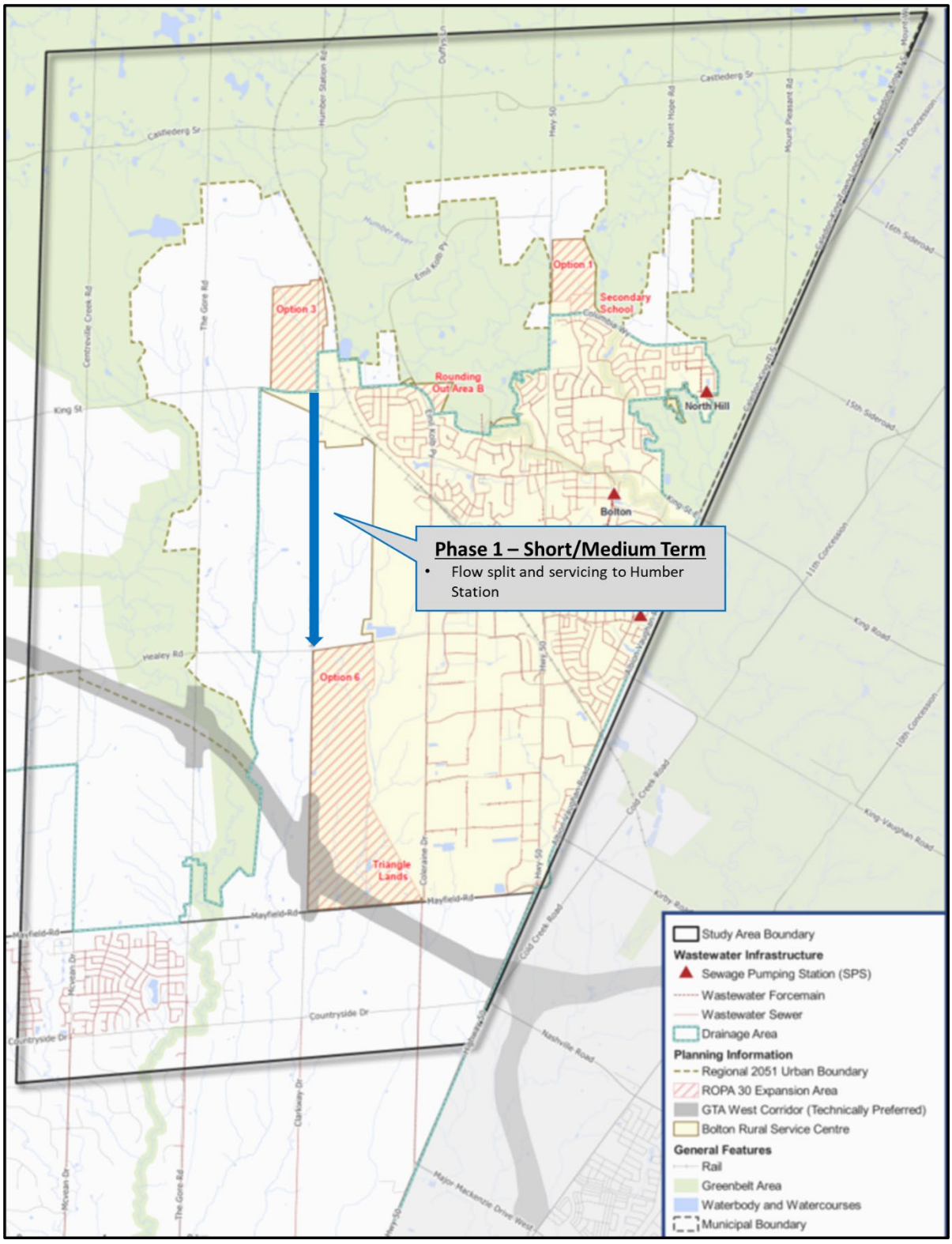


Figure 5-9: Option 3 Lands – Wastewater Servicing Short-term Concept 1

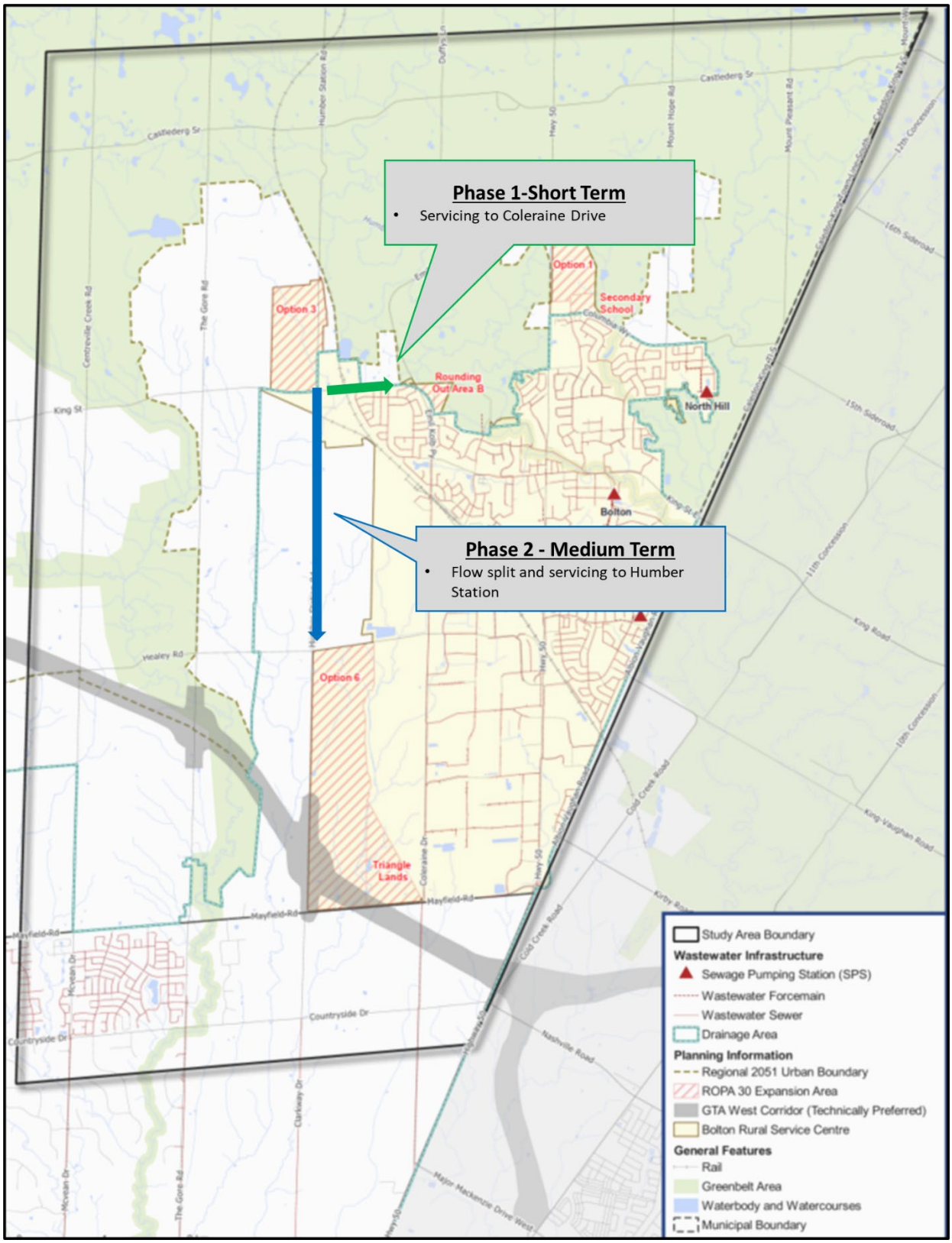


Figure 5-10: Option 3 Lands – Wastewater Servicing Short-term Concept 2

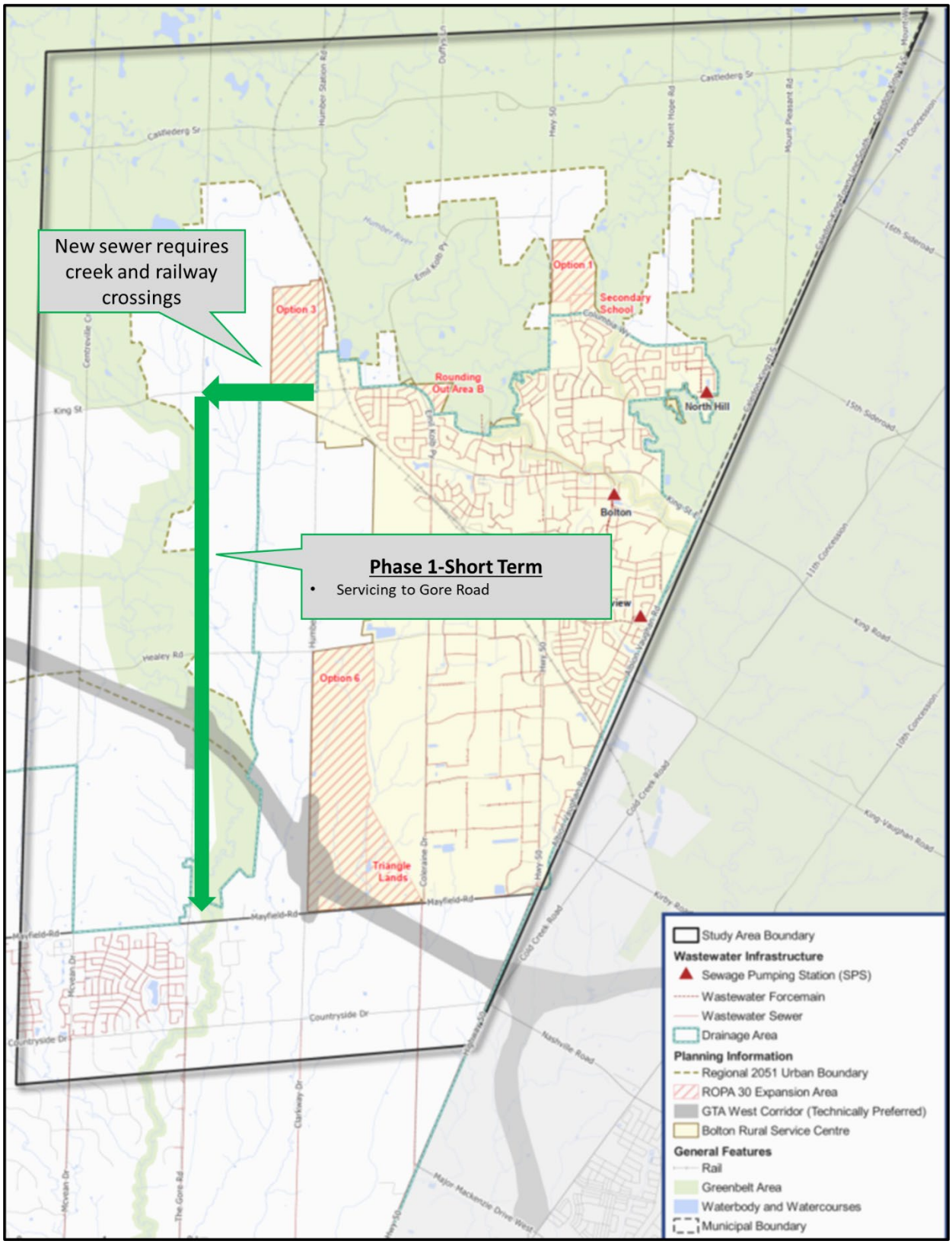


Figure 5-11: Option 3 Lands – Wastewater Servicing Short-term Concept 3

5.5.3.3 Chickadee Lands

To meet short-term needs, one alternative for the Chickadee Lands servicing area was identified. **Table 5-8** provides the wastewater servicing concept alternatives for Chickadee lands. **Figure 5-12** provides a map of the Chickadee Lands Concept.

Table 5-8: Chickadee Lands Wastewater Servicing Concept Alternatives

Concept No.	Concept Description	Key Screening Results	Screening Results
1	Gravity to Coleraine Drive	Depending on the type of crossings and tunnel depth, may be exempt from the Class EA process (no additional EA study costs)	**Carried Forward**

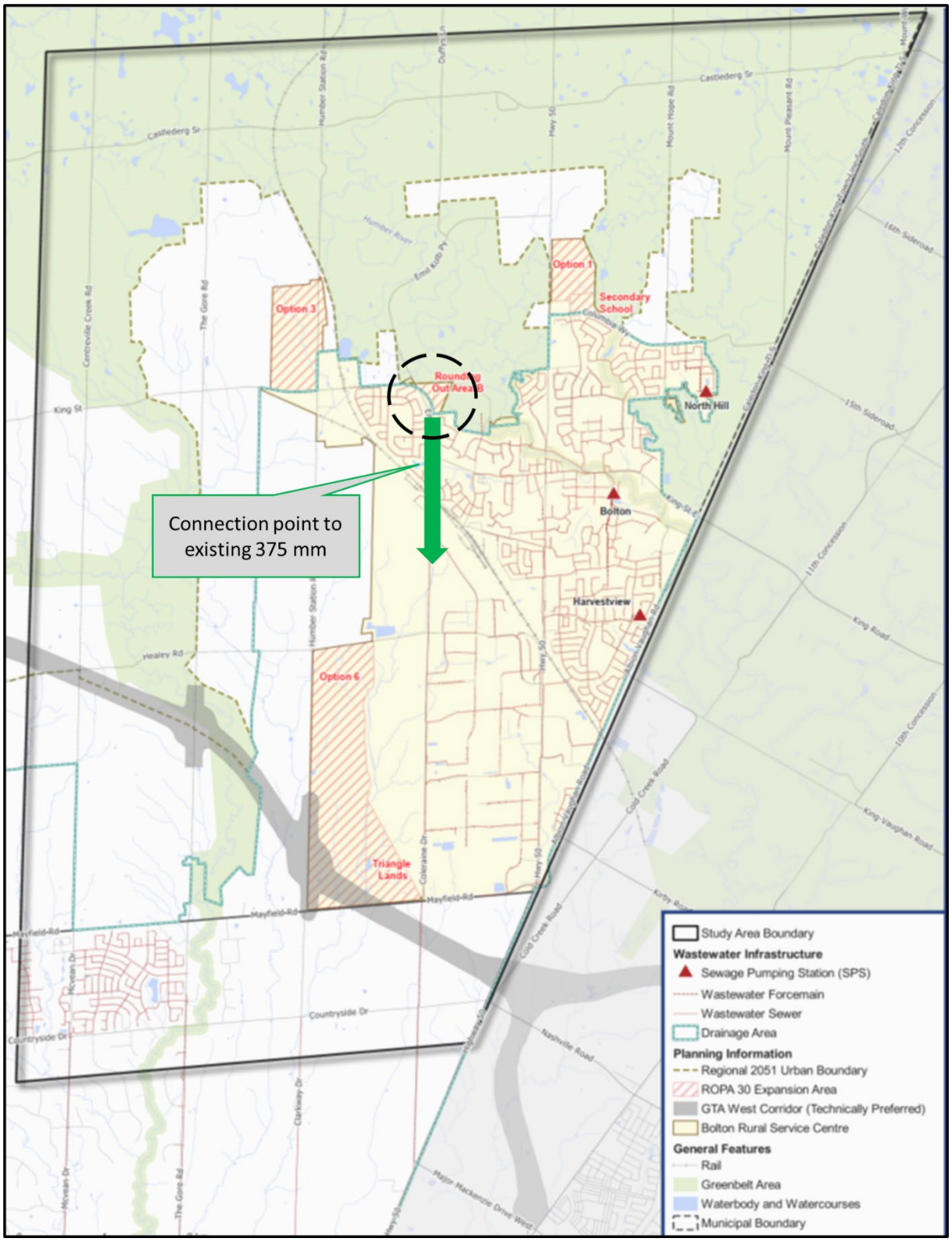


Figure 5-12: Chickadee Lands – Wastewater Servicing Short-term Concept

5.5.3.4 Option 6 and Triangle Lands

To meet short-term needs, one alternative for the Option 6 and Triangle Lands servicing area was identified. **Table 5-9** provides the wastewater servicing concept alternatives for Option 6 and Triangle Lands. **Figure 5-13** provides a map of the Option 6 and Triangle Lands Concept.

Table 5-9: Option 6/Triangle Lands Wastewater Servicing Concept Alternatives

Concept No.	Concept Description	Key Screening	Screening Results
1	Gravity servicing via new Humber Station Road trunk sewer and new Healey Road sewer	Depending on the type of crossings and tunnel depth, may be exempt from the Class EA process (no additional EA study costs)	**Carried Forward**

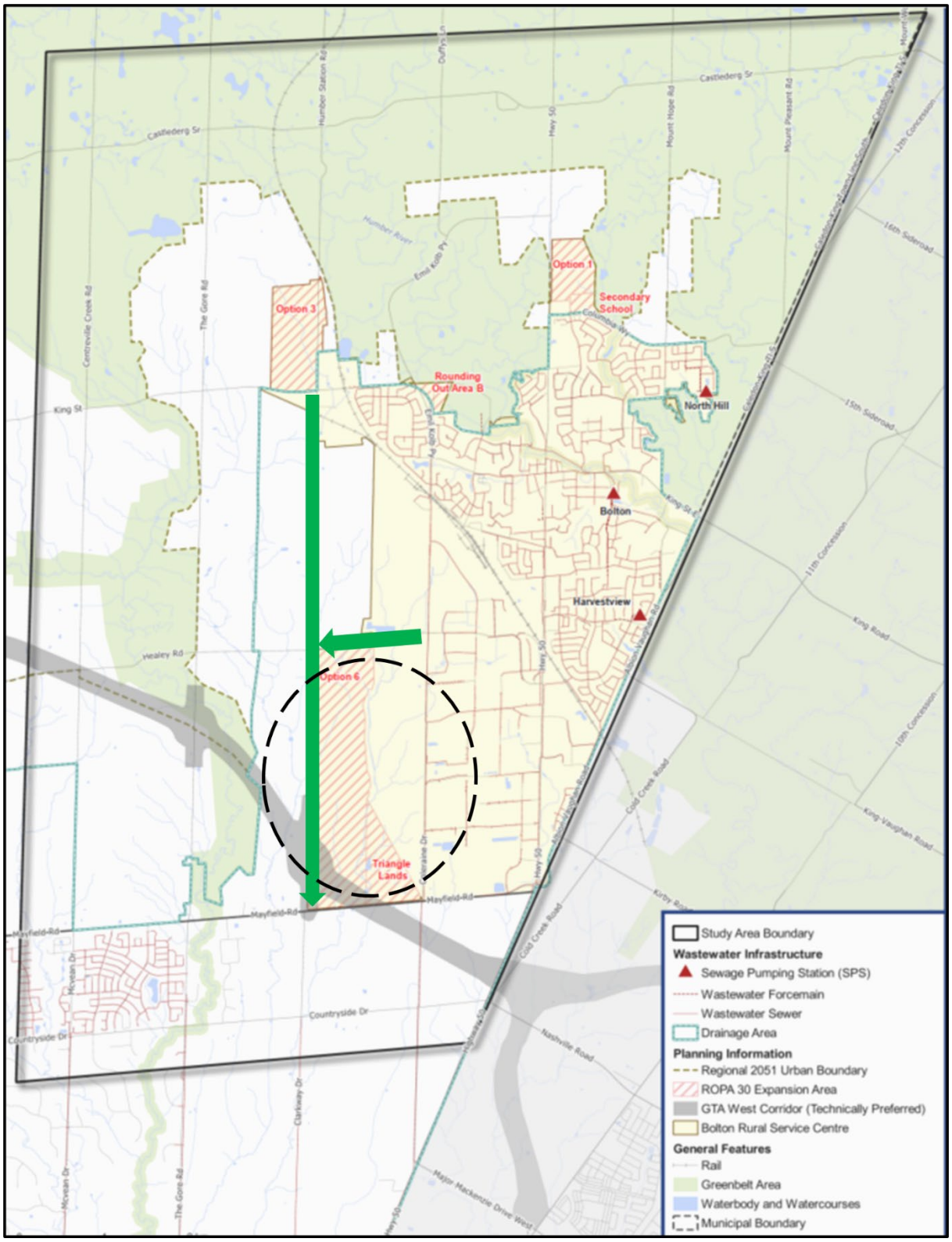


Figure 5-13: Option 6 and Triangle Lands – Wastewater Servicing Short-term Concept

5.6 Integration of Concepts and Implementation Timeline

An important consideration in the evaluation process was the timeline of each water and wastewater short-term concept's servicing implementation. Development is a trigger for accelerating implementation of water and wastewater servicing within an area, however both water and wastewater infrastructure are required to be in service concurrently for occupancy to occur. Each area was reviewed to estimate the timeline of implementation for both the water and wastewater upgrades.

In addition, to meet Region's long-term objectives and optimize the value of new infrastructure, water and wastewater short-term concepts that better aligned with preliminary long-term concepts were preferred.

5.6.1 Option 1 Lands

Table 5-10 provides a summary of the conceptual implementation timeline for all water and wastewater short-term concept alternatives within Option 1 Lands. Conceptual timelines were used for comparison purposes of the short-term water and wastewater concepts. Timing is subject to change based on duration/outcome of the Class EA, detailed design, construction, and approval of funds.

Wastewater upgrades can occur relatively quickly (Concept 1, 2 and 4) to service minimal growth in the short-term with local sewer upgrades. However, water servicing for this area may trigger a Schedule B Class EA for the associated infrastructure required to create a brand-new pressure zone 7 and would push out development occupancy dates. The fastest way to service this area by water is likely Concept 1 which would build the dedicated pressure zone 7B water pumping station near the pressure zone 7B service area. This could likely be implemented slightly faster than Concept 2, which would require the construction of a feedermain along Emil Kolb Parkway. Both Concepts, however, may require Schedule B Class EAs. In summary, providing expedited wastewater servicing doesn't provide any benefit, since water servicing may require a Class EA study and more significant construction. Additionally, the preference of the Region is to construct a single pressure zone 7 water pumping station (Concept 2) as opposed to two pressure zone 7 water pumping stations (Concept 1).

For this reason, Water Concept 2 and Wastewater Concept 3 were selected:

- The route for the water and wastewater long-term concepts is Emil Kolb Parkway; the preferred concepts both follow this route.
- Wastewater Concept 3 avoids unnecessary infrastructure in other areas.
- The long-term concept for water may require a Schedule B Class EA and the infrastructure (e.g., elevated tank) will not be in service in the short-term. Therefore, a short-term concept for wastewater is unnecessary.

Table 5-10: Option 1 Lands Implementation Timeline

Option 1 Lands		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Water Servicing											
Concept 1	*Short Term* - Two BPS (7B BPS)	EA	EA/Design	Design /Const	Const	3,000 - 7,000					
	Long Term - Elevated Tank (7B ET)	EA	EA	EA	Design	Design	Design	Const	Const	16,000	*ET Timing dependent on Ops and Pace of Growth*
	Long Term - Emil Kolb Feedermain	EA	EA	EA	Design	Design	Const				
Concept 2	*Short Term* - Single 7E/B BPS and Emil Kolb Feedermain	EA	EA/Design	Design/Const	Const	~5,000					
	Long Term - Elevated Tank		EA	EA	Design	Design	Design	Const	Const	16,000	*ET Timing dependent on Ops and Pace of Growth*
Wastewater Servicing											
Concept 1	*Short Term* - Local Upgrades	EA/Design	Const	2,000		*Continuous local upgrades from Columbia Way to Bolton SPS required to meet 2051*					
	Medium Term - Additional Local Upgrades		EA	Design	Const	5,000					
	Long Term - Additional Local Upgrades		EA	Design	Design	Design	Const	16,000			
	Long Term - Bolton SPS Upgrade			EA	Design	Design	Const				
Concept 2	*Short Term* - Queen St Upgrade - Columbia to Humber River *Potential EA required depending on extents of upgrades, depth, tunelling, land needs*	*EA/Design	Const	2,000							
	Medium Term - Humber River Sewer Twinning	*Potential to accelerate*	EA	EA	Design	Const		16,000			
	Long Term - Bolton SPS Upgrade			EA	Design	Design	Const				
Concept 3	*Short Term* - Emil Kolb Sewer/SPS/FM	EA	EA/Design	Design/Const	Const	16,000					
Concept 4	*Short Term* - Queen St Upgrade - Columbia to Humber River	*EA/Design/Const	2,000								
	Long Term - Emil Kolb Sewer /SPS/FM	EA	EA/Design	Design/Const	Const	16,000					

**Potential EA required depending on extents of upgrades, depth, tunelling, land needs*

*#,### - **Approximate** Estimated total # Pop+Jobs Serviced within Option 1 Lands*

5.6.2 Option 3 Lands

Table 5-11 provides a summary of the estimated implementation timeline for all water and wastewater short-term concept alternatives within Option 3 Lands. All water servicing concept alternatives may require a Schedule B Class EA. Conceptual timelines were used for comparison purposes of the short-term water and wastewater concepts. Timing is subject to change based on duration/outcome of Class EA, detailed design, construction, and approval of funds.

Water Concept 1 and Wastewater Concept 2 were selected:

- The water servicing Concept 1 better aligns with the broader Master Plan level strategy for Option 3 lands.
- The Humber Station gravity sewer is required in the long-term and will require some time to be constructed up to this area. However, the Option 3 lands and the Chickadee lands can be serviced in the short-term (no Schedule B Class EA required) via new gravity sewers to Coleraine Drive.

Table 5-11: Option 3 Lands Implementation Timeline

Option 3 Lands		2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Water Servicing											
Concept 1	*Short Term* - Single 7E BPS or 7E&7B BPS	EA	EA/Design	Design/Const	Const	TBD					
	Long Term - Elevated Tank (7E ET)	EA	EA	EA/Design	Design	Const	Const	TBD	*ET Timing dependent on Ops and Pace of Growth*		
	Long Term - Sandhill Res and Zone 7 PS				EA	EA	EA/Design	Design	Const	Const	TBD
Wastewater Servicing											
Concept 1	*Short Term* - Gravity to Humber Station	Design	Design	Const	Const	Ph1/Ph2					
	Medium Term - Flow split and servicing to Humber Station			Design	Const	Flow Split					
Concept 2	Short Term - Gravity to Coleraine	Design	Const	Ph 1							
	Medium Term - Flow split and servicing to Humber Station		Design	Design	Const	Const	Ph 2				

*#,### - **Approximate** Estimated total # Pop+Jobs Serviced within Option 3 Lands*

5.6.3 Options 6 Lands

Table 5-12 provides a summary of the estimated implementation timeline for all water and wastewater short-term concepts within Option 6 Lands. Conceptual timelines were used for comparison purposes of the short-term water and wastewater concepts. Timing is subject to change based on duration/outcome of Class EA, detailed design, construction, and approval of funds.

There were limited alternatives available for this servicing area since the servicing is considered to be straight forward with future infrastructure located along road right of ways. Water Concept 1 and Wastewater Concept 1 do not require a Schedule B Class EA and can move forward to detailed design.

Table 5-12: Option 6 Lands Implementation Timeline

Option 6 Lands		2023	2024	2025	2026	2027	2028	2029	2030	2029	2030
Water Servicing											
Concept 1	*Short Term* - New feedermains along road right of way	Design	Const	Option 6							
Wastewater Servicing											
Concept 1	*Short Term* - Gravity servicing via new Humber Station Rd trunk sewer and new Healey Rd sewer	Design	Const	Option 6							

*#,### - **Approximate** Estimated total # Pop+Jobs Serviced within Option 6 Lands*

5.7 Identification of the Preferred Water & Wastewater Strategies

Through the evaluation process and multiple workshops with the Region of Peel and feedback from the Town of Caledon, the preferred water and wastewater concepts were selected.

Detailed water and wastewater strategies were identified based on the preferred concepts. Each project's potential construction impacts were assessed to identify if projects may be exempt from the Schedule B Class EA process.

- If projects were recommended along existing road right of ways (no property requirements) and minimal impacts to the natural and socio-cultural environment, then the project may be exempt from the Schedule B Class EA process. The project could move forward to detailed design stage.
- If the project required property easements and/or could have moderate to significant impacts to the natural and socio-cultural environment, then the project may require a Schedule B Class EA. These projects should still be considered conceptual as they may be located on future road alignments and will be dependent on the Class EA evaluation process for the selection of the location of the alignment and/or sites prior to moving to detailed design.
- **Table 5-13** and

Table 5-14 provides the list of water and wastewater projects and associated next steps. Each project has been categorized below depending on their funding, servicing area and timeline.

- **Development Charge (DC) Funded**: These projects have been identified in the 2020 Water and Wastewater Master Plan (MP) (includes Master Plan Project ID) and have Region Council approved funding (DC funded).
- **ROPA30**: These projects service the ROPA30 lands and are pending Regional Council funding approval (not DC funded). They may be development driven and may be exempt from the Class EA process (project schedule and Class EA exemptions/requirements will be further assessed at the onset of the Class EA study).
- **ROPA30 (EA Study Required)**: These projects service the ROPA30 lands and are pending Regional Council funding approval (not DC funded). They may require a Class EA (project schedule and Class EA exemptions/requirements will be further assessed at the onset of the Class EA study).
- **Long-term Needs**: These projects have not been identified in the 2020 Water and Wastewater Master Plan (MP) (no Master Plan Project ID) and therefore are pending Regional Council funding approval (not DC funded). They will be included in the planned 2025 Water and Wastewater Master Plan (MP) Update.

Figure 5-14 and **Figure 5-15** provide maps of the preferred water and wastewater servicing project locations.

Table 5-13: Preferred Water Servicing Projects

ID	Project Description	2020 Master Plan ID	Project Category
W01	New Z6E & Z7E Pumping Station (Sandhill)	N/A	Long-term needs
W02	New Z5 Storage	N/A	Long-term needs
W03	Z6 600-mm sub-transmission main on Healy Road from Humber Station Road to Coleraine Drive	W-ST-186	DC funded
W04	Z6 400-mm watermain on Humber Station Road from future street north of Mayfield Road (potential George Bolton extension) to Healey Road	W-D-192	DC funded

ID	Project Description	2020 Master Plan ID	Project Category
W05	Z6 400-mm watermain on Humber Station Road from Mayfield Road to 1450m northerly to potential George Bolton extension	W-D-236	DC funded
W06	Z6 400-mm watermain on a future street north of Mayfield Road (potential George Bolton extension) from Humber Station Road to Coleraine Drive	W-D-191	DC funded
W07	Z6 750-mm sub-transmission main on Innis Lake Road from the Tullamore Pumping Station to Healey Road	W-ST-185	DC funded
W08	Z6 600-mm sub-transmission main on Healy Road from Innis Lake Road to Humber Station Road	W-ST-187	DC funded
W09	Z6 400-mm watermain on a future street north of Healey Road from West Bolton Elevated Tank to Humber Station Road	W-D-188	DC funded
W10	Z6 400-mm watermain on Humber Station Road from Healey Road to a future street northerly	W-D-189	DC funded
W11	Z6 400-mm watermain on Humber Station Road from a future street north of Healey Road to approximately 1200m northerly	W-D-190	DC funded
W12	Z6 400-mm watermain on a future street from Healy Road to approximately 1680m southerly, east of Humber Station Road	W-D-234	DC funded
W13	Z6 400-mm watermain on a future street from Humber Station Road to 660m westerly	W-D-235	DC funded
W14	Z6 400-mm watermain on a future street from Healey Road to 1220m northerly, west of Humber Station Road	W-D-238	DC funded
W15	Z6 400-mm watermain on a future street from Humber Station Road to 680m westerly, south of King Street	W-D-239	DC funded
W16	Z6 400-mm watermain on a future street from Humber Station Road to 680m westerly	W-D-240	DC funded
W17	Z6 400-mm watermain on a future street from future street north of Healey Road to 910m northerly, west of Humber Station Road	W-D-241	DC funded
W18	New Z7E Storage (East Caledon Elevated Tank)	N/A	Long-term needs
W19	New Z7E/7B Water Pumping Station (Chickadee)	N/A	ROPA30 (EA study required)
W20	Z7E watermain along King Street from Sandhill to Humber Station Road	N/A	Long-term needs
W21	Z7E watermain along King Street from Chickadee Lane to Humber Station Road	N/A	ROPA30
W22	Z5E 1200-mm transmission main from Tullamore to Sandhill	N/A	Long-term needs
W23	Z7 watermain from King Street to Z7E Storage	N/A	Long-term needs
W24	Z6 sub-transmission main from Z7 BPS to existing 1050-mm stub	N/A	ROPA30

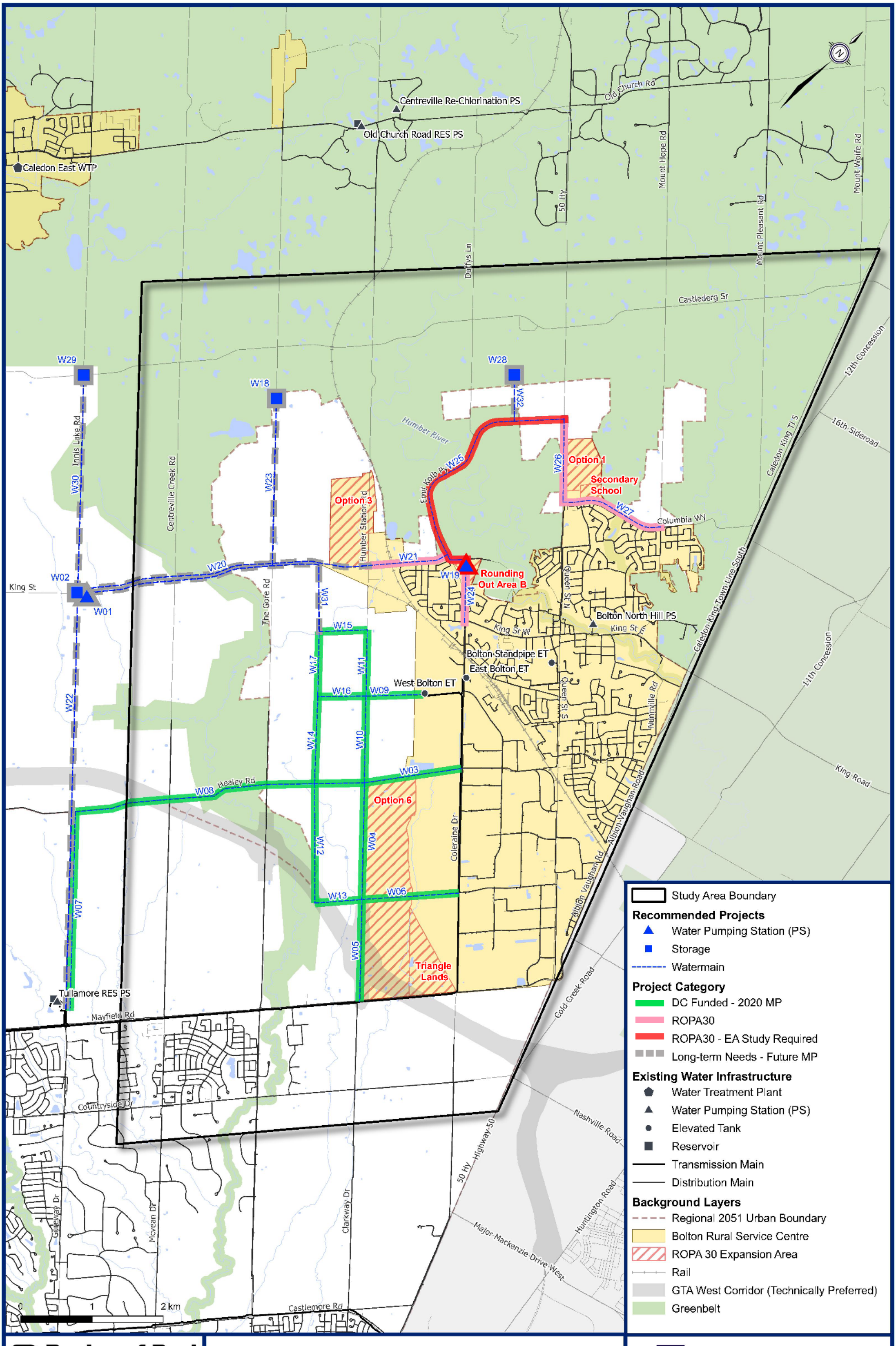
ID	Project Description	2020 Master Plan ID	Project Category
W25	Z7 watermain along Emil Kolb Parkway from King Street to Hwy 50	N/A	ROPA30 (EA study required)
W26	Z7 watermain along Highway 50 / Queen Street from Emil Kolb Parkway to Columbia Way	N/A	ROPA30
W27	Z7 watermain along Columbia Way from Highway 50 to Mount Hope Road	N/A	ROPA30
W28	New Z7B Storage	N/A	Long-term needs
W29	New Z6 Storage	N/A	Long-term needs
W30	Z6 750-mm watermain from Sandhill to South Albion Storage	N/A	Long-term needs
W31	Z6 600-mm watermain from Sandhill to Zone 6 distribution network	N/A	Long-term needs
W32	Z7 water main from Emil Kolb Parkway to Z7B Storage	N/A	Long-term needs

Table 5-14: Preferred Wastewater Servicing Projects

Project ID	Project Description	Master Plan ID	Project Category
WW01	750-mm sanitary sewer on Clarkway Drive from Countryside Drive to Mayfield Road	WW-T-005	DC funded
WW02	750-mm sanitary trunk sewer on Humber Station Road from Mayfield Road to 1600m northerly	WW-T-170	DC funded
WW03	750-mm sanitary trunk Sewer on Humber Station Road from Healey Road to 1500m southerly	WW-T-171	DC funded
WW04*	450-mm sanitary sewer on Healey Road from Coleraine Drive to Humber Station Road	WW-ST-199	DC funded
WW05*	450-mm sanitary sewer on a future street from Humber Station Road to 750m north-westerly	WW-ST-198	DC funded
WW06*	450-mm sanitary sewer on a future street from Humber Station Road to 960m north easterly	WW-ST-197	DC funded
WW07	375-mm sanitary sewer on Mayfield Road from Coleraine Drive to Humber Street Road	N/A	ROPA30
WW08	525-mm sanitary sewer on Emil Kolb from King Street to existing 450mm south of Harvest Moon Drive.	N/A	ROPA30
WW09*	525-mm sanitary sewer on Humber Station Road from Healey Road to King Street	WW-ST-204	DC funded
WW10*	450-mm sanitary sewer on a future street from Humber Station Road to 670m westerly	WW-ST-206	DC funded
WW11*	375-mm sanitary sewer on a future street from a future street 890m north of Healey Road to 800m northerly	WW-ST-207	DC funded
WW12*	375-mm sanitary sewer on a future street from a future street east of Humber Station Road to 780m northerly	WW-ST-202	DC funded

Project ID	Project Description	Master Plan ID	Project Category
WW13*	450-mm sanitary sewer on a future street from Humber Station Road to 690m easterly, north of Healey Road	WW-ST-201	DC funded
WW14	525-mm sanitary sewer on King Street from Humber Station Road to Emil Kolb Parkway	N/A	ROPA30
WW15	New Humber sewage pump station (SPS)	N/A	ROPA30 (EA study required)
WW16	300-mm twin sanitary forcemains from Humber SPS to King Street	N/A	ROPA30 (EA study required)
WW17	525-mm sanitary sewer on Emil Kolb Parkway from Highway 50 to Humber SPS	N/A	ROPA30 (EA study required)
WW18	525-mm sanitary sewer on Highway 50 from Columbia Way to Emil Kolb Parkway	N/A	ROPA30 (EA study required)
WW19	375-mm sanitary sewer on Columbia Way from Mount Hope Road to Highway 50	N/A	ROPA30
WW20	525-mm sanitary sewer on King Street from Emil Kolb Parkway to Humber Station Road	N/A	Long-term needs
WW21	525-mm sanitary sewer on King Street from Humber Station to future street to the West	N/A	Long-term needs
WW22	Sanitary sewer on the Gore Road from north of King St to Mayfield	N/A	Long-term needs
WW23	750-mm sanitary sewer on The Gore Road from Mayfield Road to just north of Countryside Drive	WW-T-085	DC funded

*Indicate project has been modified from the Master Plan alignment.



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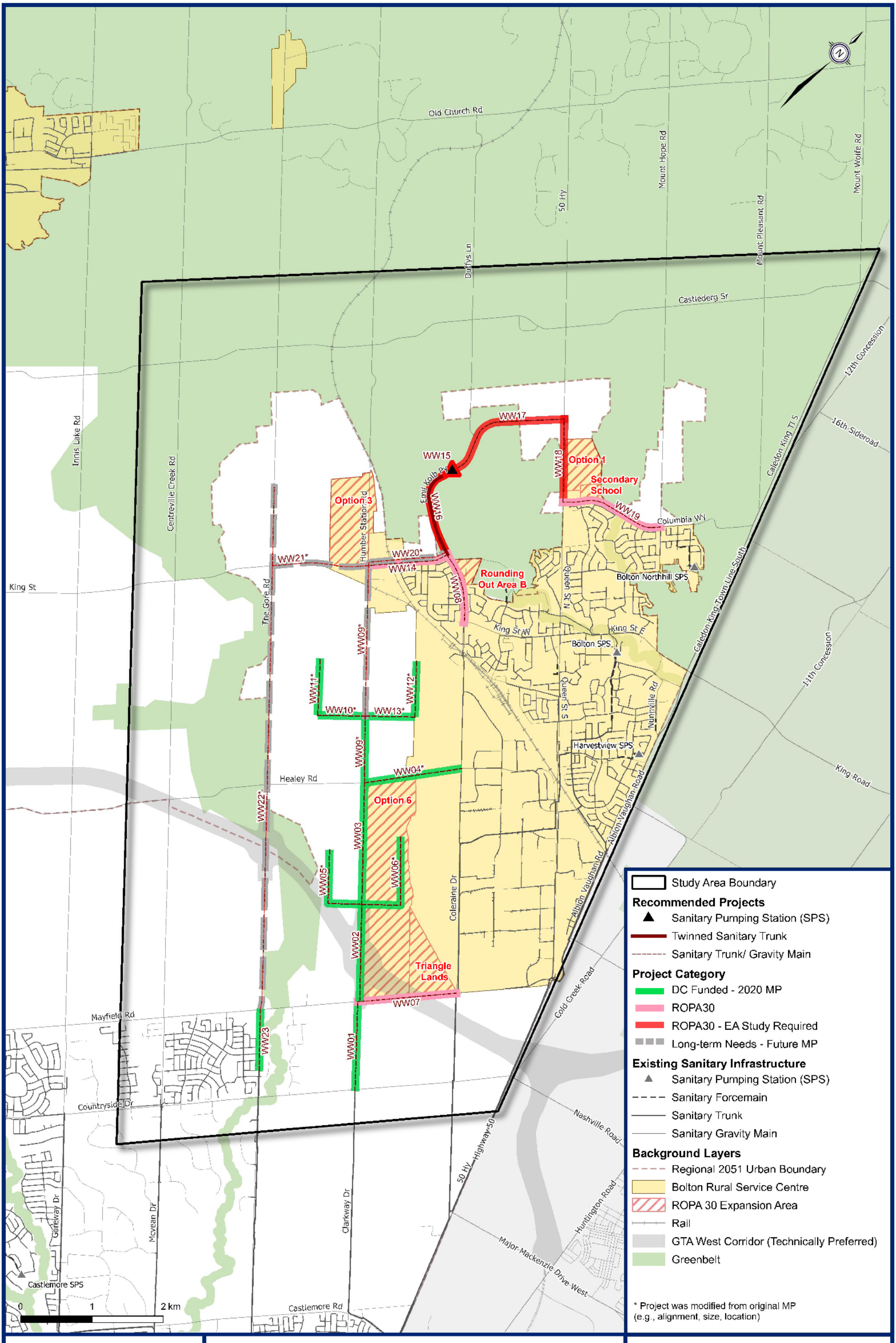
Preliminary Recommended Water Project Categories

Bolton Water and Wastewater Feasibility Study

BluePlan

Figure 5-14
June, 2023
722010-W-004
Projection EPSG:26917



Region of Peel
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Preliminary Recommended Wastewater Project Categories

Bolton Water and Wastewater Feasibility Study

BluePlan Engineering

Figure 5-15
June, 2023
722010-WW-004
Projection EPSG:26917

5.8 Conceptual Cost Estimates

The conceptual cost estimates for the preferred Water and Wastewater Concepts are reported at the Master Plan level (Class 5 and Class 4 estimates) and follow a similar methodology as the 2020 Water and Wastewater Master Plan based on an overall project unit cost approach. Project costs are generated from unit rates with added contingencies. In the preparation of the project costing, the Region has also considered other factors including the rate of inflation and a high-level review of recent Region project costing. Projects categorized as "long-term needs" have been costed, however, they will be evaluated in more detail during the planned 2025 Water and Wastewater Master Plan.

The cost estimate approach used a classification system to categorize cost estimates. These classes represent different phases of planning and design resulting in different methods of estimation and levels of accuracy. For the purpose of this Feasibility Study, the cost estimates follow a **Class 5 Estimate** for newly proposed capital projects and a **Class 4 Estimate** for projects previously estimated in the 2020 Water and Wastewater Master Plan for the Lake-Based Systems.

The Class 5 Estimate Costing Methodology is a high-level cost estimate with a long-term project horizon for Master Plans, Infrastructure Plans and Capital Budgeting and is used at an early stage in absence of better information. It is a desktop level analysis based on similar projects and engineers informed approximation formed on limited available information. The estimation methods involved in a Class 5 estimate include experience and judgement, historical values, "rules of thumb", factor estimating based on similar projects and other basic calculations. Class 5 Estimates typically have an accuracy range of +/-40% - +/-70%.

The Class 4 cost estimate is similar to the Class 5 Estimate but is more useful for planning purposes in preparation for project pre-design and is included in the Capital Projects List. It is an approximate method of estimating using inclusive "all in" unit rates, typically based on intensive research of historic data. Class 4 Estimates typically have an accuracy range of +/-20% - +/-40%.

The total estimated costs for the recommended water and wastewater projects are approximately $502.4 million and $190.4 million, respectively. Costing details for each individual project can be found in **Appendix C**.

6 NEXT STEPS

The feasibility study has identified recommended water and wastewater short-term and long-term servicing projects to service Bolton. The water and wastewater projects that are exempt from the Class EA process can move forward to detailed design. The water and wastewater projects that may require a Schedule B Class EA will require further review through the Class EA assessment. The Class EA will develop, evaluate, and select the preferred routes/sites for the identified Schedule B projects prior to moving forward to detailed design.

Public Information Centre #3 (PIC)

Bolton Water and Wastewater Capacity Improvements

Schedule ‘C’ Class Environmental Assessment

Public Information Centre (PIC) No. 3

December 12, 2024

BluePlan ENGINEERING
A GEI Company

GEI Consultants

Region of Peel
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Public Information Centre (PIC) No. 3

Region of Peel
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Key Dates

December 12, 2024

PIC No. 3 materials posted to project website (access via link below):

https://www.peelregion.ca/public-works/environmental-assessments/caledon/bolton.asp

December 12, 2024, to January 31, 2025

If you have any questions or wish to provide your input, please contact the Region of Peel Project Manager at **Italia.Ponce@peelregion.ca**

March 2025

Responses to questions and comments related to PIC No. 3 posted to project website.

Public Information Centre (PIC) Objectives

- **Inform the public and stakeholders of the study's project steps, schedule, and progress to date.**
- **Outline the evaluation of the design options and alternatives.**
- **Present details of the proposed shaft location options and preliminary preferred design for all study components.**
- **Provide an opportunity for public and stakeholders to ask questions and provide input.**

This is the third and final PIC for this study.

Stay Engaged!

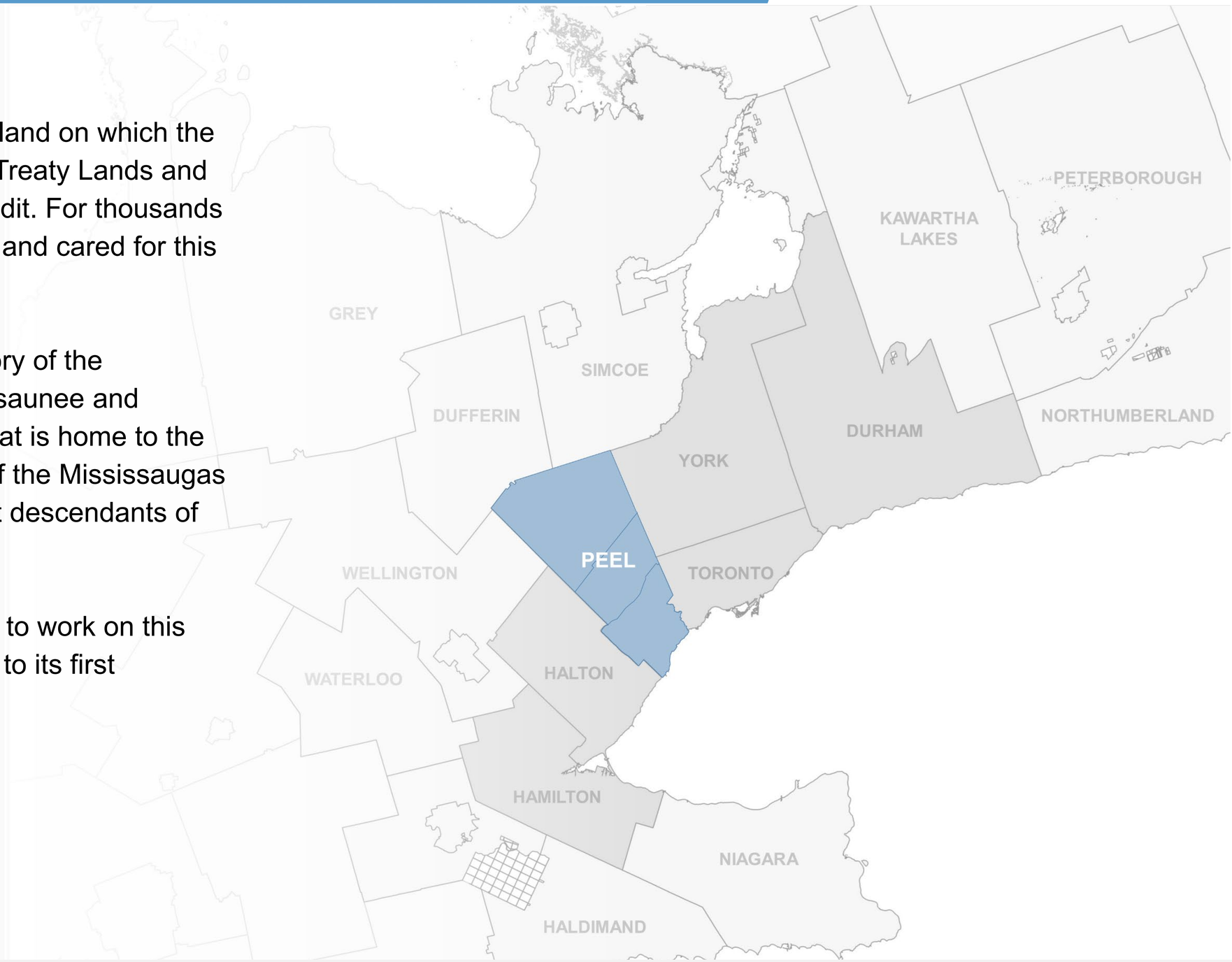
The Region welcomes your comments to provide input into the Class EA study. Input received will be taken into consideration as the study progresses. At the end of the study, the Environmental Study Report (ESR) will be available for a 45-day public review period after which the project will be filed, and the Class EA comment period will conclude.

Land Acknowledgement

We would like to acknowledge that the land on which the Region of Peel operates, is part of the Treaty Lands and Territory of the Mississaugas of the Credit. For thousands of years, Indigenous peoples inhabited and cared for this land and continue to do so today.

In particular we acknowledge the territory of the Anishinabek, Huron-Wendat, Haudenosaunee and Ojibway/Chippewa peoples; the land that is home to the Metis; and most recently, the territory of the Mississaugas of the Credit First Nation who are direct descendants of the Mississaugas of the Credit.

We are grateful to have the opportunity to work on this land, and by doing so, give our respect to its first inhabitants.



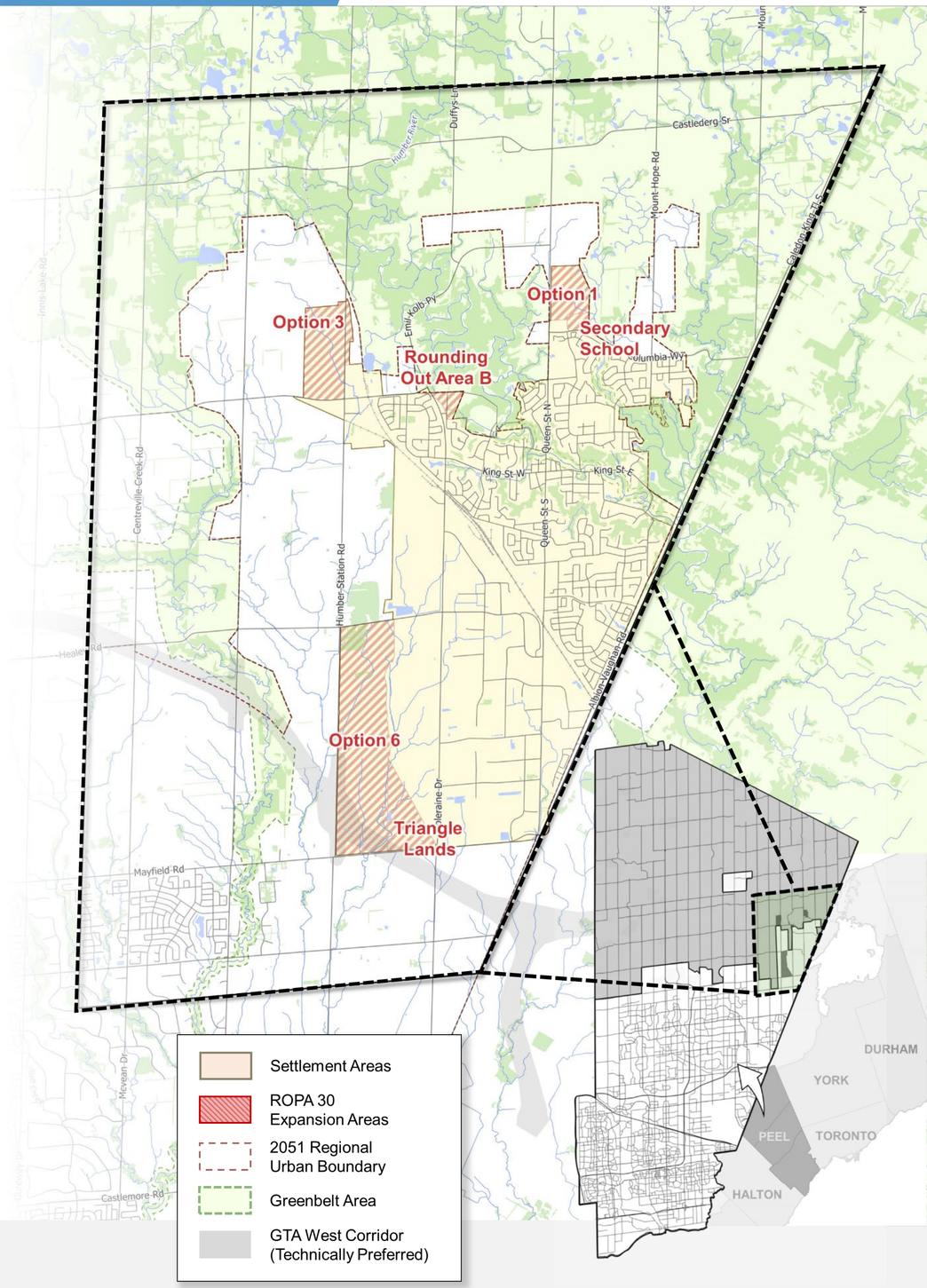
Background and Study Objectives

The Region of Peel completed a **Water and Wastewater Master Servicing Plan Update (2020)** which identified the need to construct new water and wastewater linear distribution and collection pipes and pumping facilities to service future planned population growth in the community of Bolton.

The **Bolton Water and Wastewater Capacity Improvements Schedule 'C' Class Environmental Assessment (EA)** will develop, evaluate, and identify the optimal water and wastewater servicing solutions through the Class EA process to meet existing needs and growth.

Key Strategic Goals:

1. Satisfy the Schedule 'C' Municipal Class Environmental Assessment Process.
2. Effectively engage with Indigenous Communities.
3. Consult with Stakeholders, Agencies, and the Public.
4. Ensure a balanced and informed decision-making process.
5. Review previous study recommendations and provide an integrated servicing solution that supports previously planned servicing strategies and concurrent design and construction.
6. Consider unique opportunities and challenges for water and wastewater servicing.
7. Solutions are required to provide continued servicing to the existing community.
8. Ensure that the solution supports a long-term holistic servicing strategy.
9. Protect the environment.

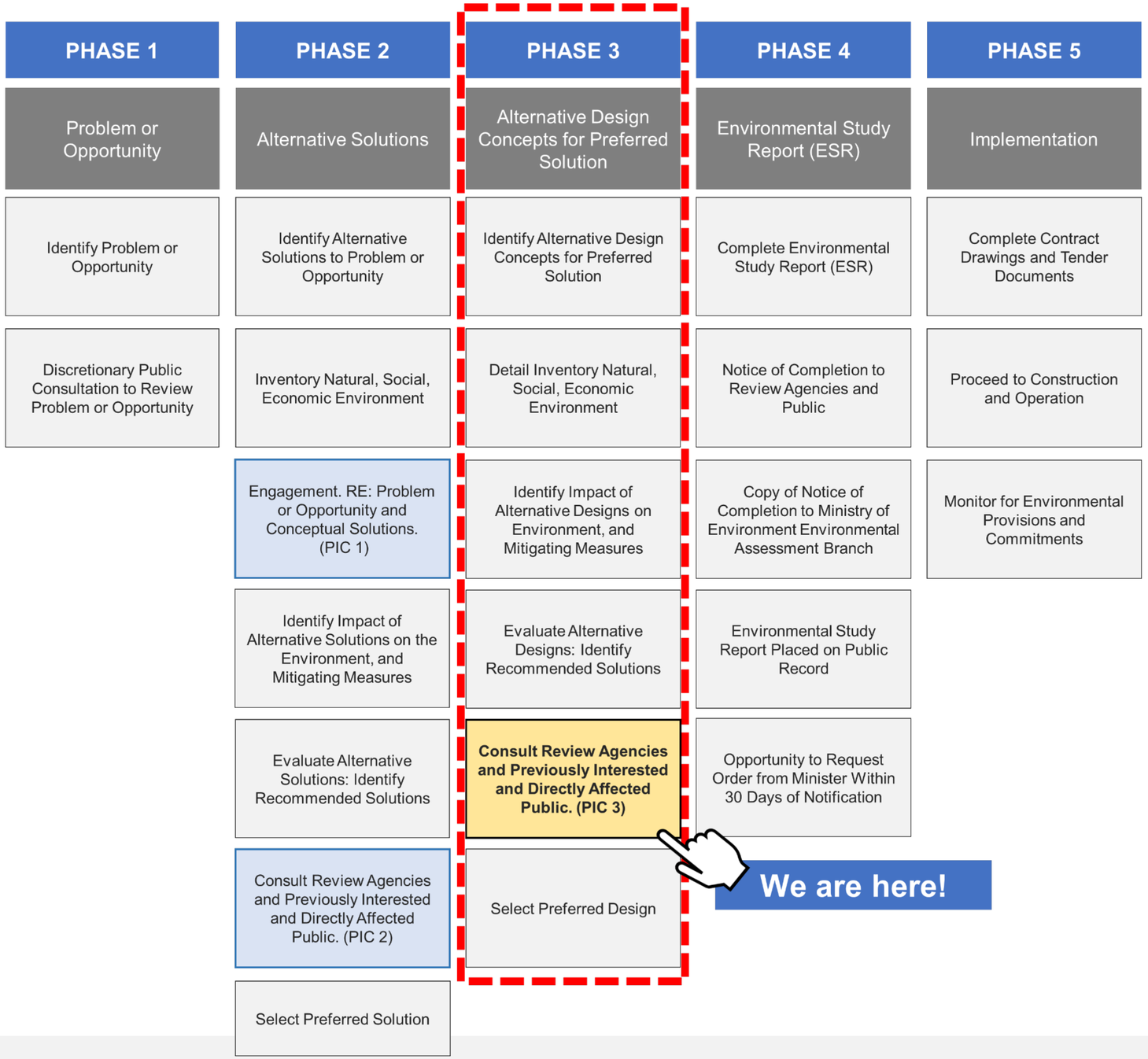


How is the study being conducted?

Municipal Class Environmental Assessment Process

Region of Peel working with you

The **Bolton Water and Wastewater Capacity Improvements Study** is being undertaken as a Schedule ‘C‘ Class Environmental Assessment (EA), satisfying Phases 1 to 4 of the Municipal Class Environmental Assessment (MCEA) process (October 2000, as amended in 2007, 2011, 2015, 2023 and 2024).



What is this study about?

Bolton Class EA Study Overview

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working with you

The **Bolton Water and Wastewater Capacity Improvements Schedule 'C' Class Environmental Assessment (EA)** builds off the Feasibility Study–recently completed by the Region and covered under the ongoing 2025 Master Plan–that outlines conceptual projects to support additional development proposed within both the intensification and greenfield growth areas in the community of Bolton.

The study will fulfill the Class EA requirements for a specific set of projects but also follows a Master Plan approach that considers and ensures integration with the long-term servicing strategy for the broader service area and long-term planning horizon.

This Class EA study investigates alternative water and wastewater strategies for the Bolton area and has two (2) key components:

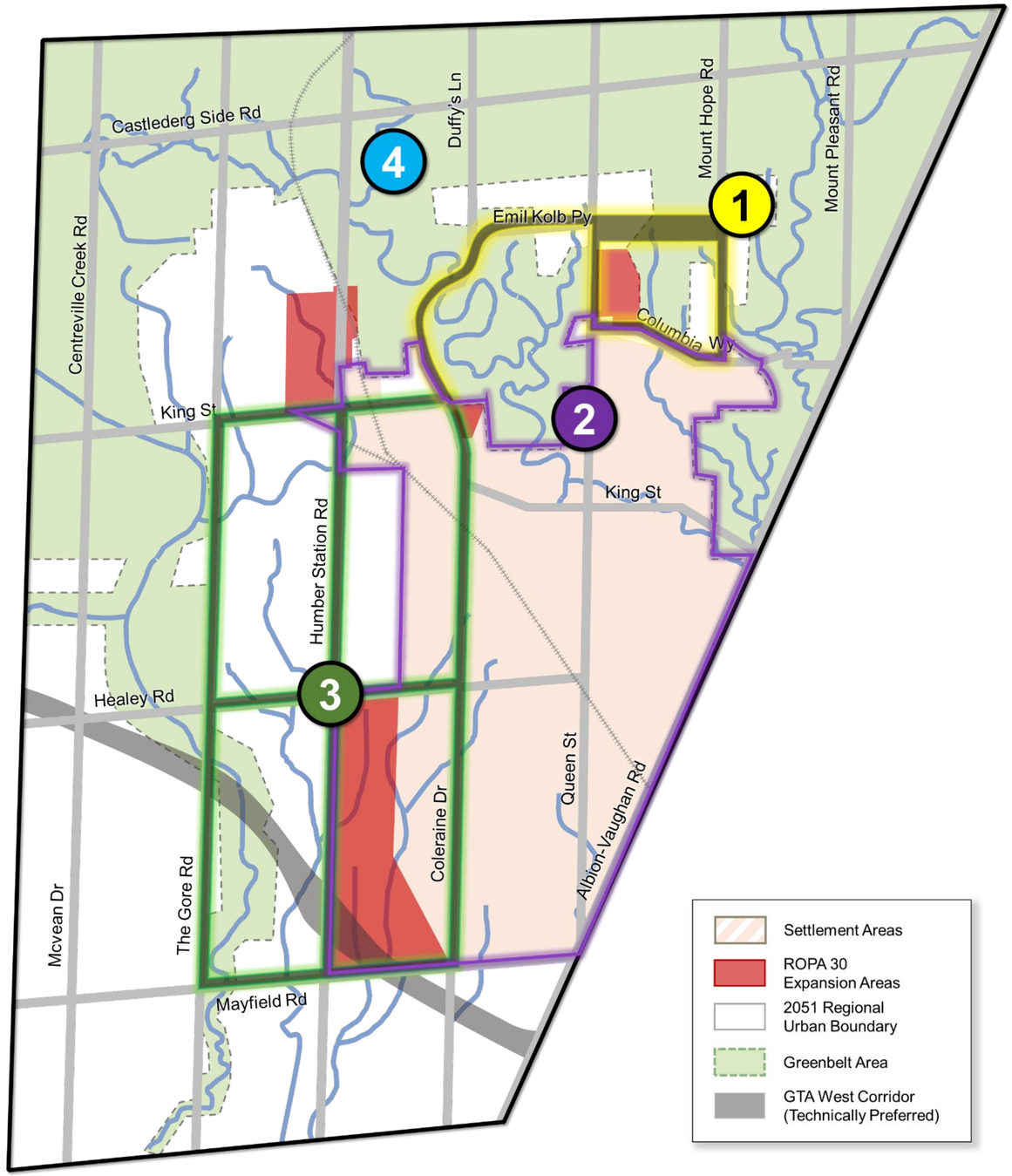
Focus Area 1 – New Sanitary Pumping Station, forcemains, gravity sanitary sewers and watermains to service new growth.

Focus Area 2 – Optimization of the existing service areas including Inflow and Infiltration (I&I) reduction, new Bolton SPS sanitary forcemain, and water pressure zone optimization.

The Class EA strategy recommended through this study must be integrated with projects that have previously fulfilled study requirements and are currently under design or construction and future projects requiring further study outside of this Class EA but are integral to the overall Bolton servicing strategy.

Area 3 – Projects previously fulfilled and under design include New Zone 7 Water Booster Pumping Station and watermains and new gravity sanitary sewers.

Area 4 – Future water storage facilities and transmission requiring study fulfilment outside of this Class EA.



Water and Wastewater Servicing Strategy

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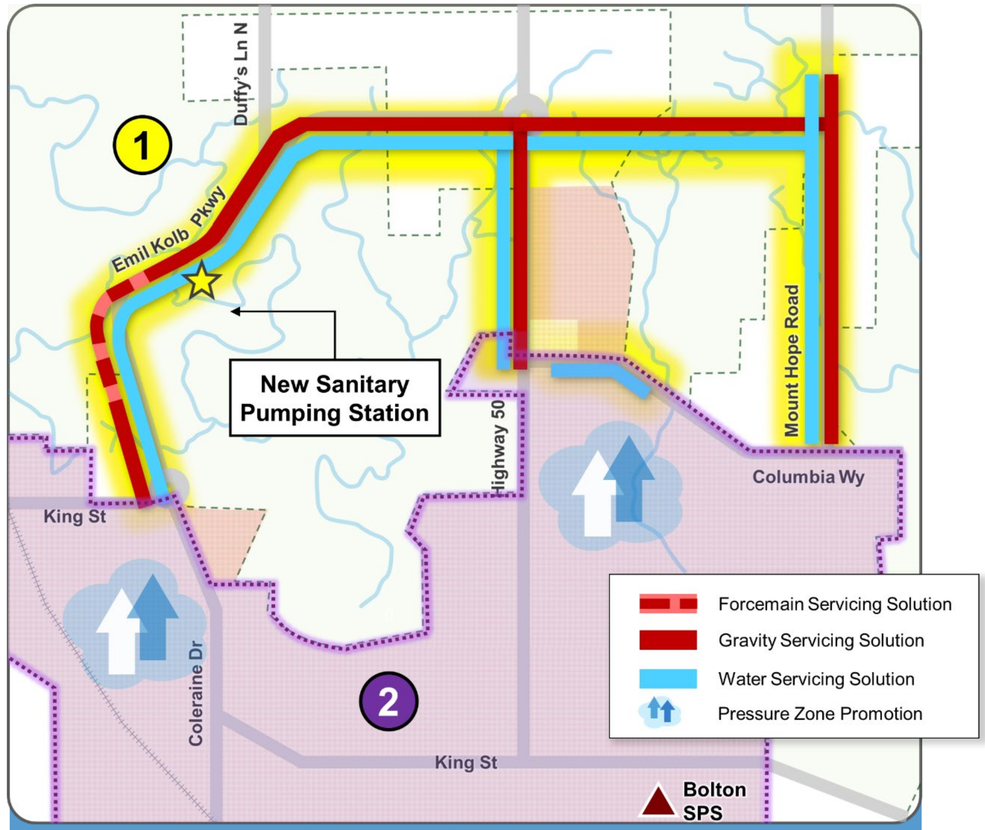
What's included in the strategy?

Focus Area 1 Servicing New Growth

- New watermain on Emil Kolb Parkway, Highway 50, Mount Hope Road, along new infrastructure corridor and new section of watermain on Columbia Way to connect to the existing and future Pressure Zone 7 system.
- New Sanitary Pumping Station (SPS) and access road north-east of the Humber River adjacent to the Emil Kolb Parkway.
- New deep gravity sanitary sewer on Emil Kolb Parkway from Highway 50 / Emil Kolb Parkway intersection to the new SPS.
- New gravity sanitary sewers on Highway 50, Mount Hope Road and along new infrastructure corridor to connect to the Emil Kolb Parkway sewer.
- New sanitary forcemain extending from the new SPS south along Emil Kolb Parkway to King Street.

Focus Area 2 Optimizing Existing System

- New sanitary forcemain from Bolton SPS along Old King Road to existing trunk sewer on Nunnville Road ultimately conveying flow to Albion Vaughan Trunk Sewer.
- Maintain the existing sanitary forcemain system on Strawberry Hill Court.
- Pressure Zone 6 areas promoted to new Pressure Zone 7 to optimize level of service.



Servicing Strategy Rationale

- Emil Kolb Parkway deep gravity sanitary sewer and watermain supports broader regional servicing solutions to support growth to 2051.
- Looped watermain construction provides security of supply and resiliency in the new Pressure Zone 7 water system.

Phase 3 Alternative Design Concept Evaluation

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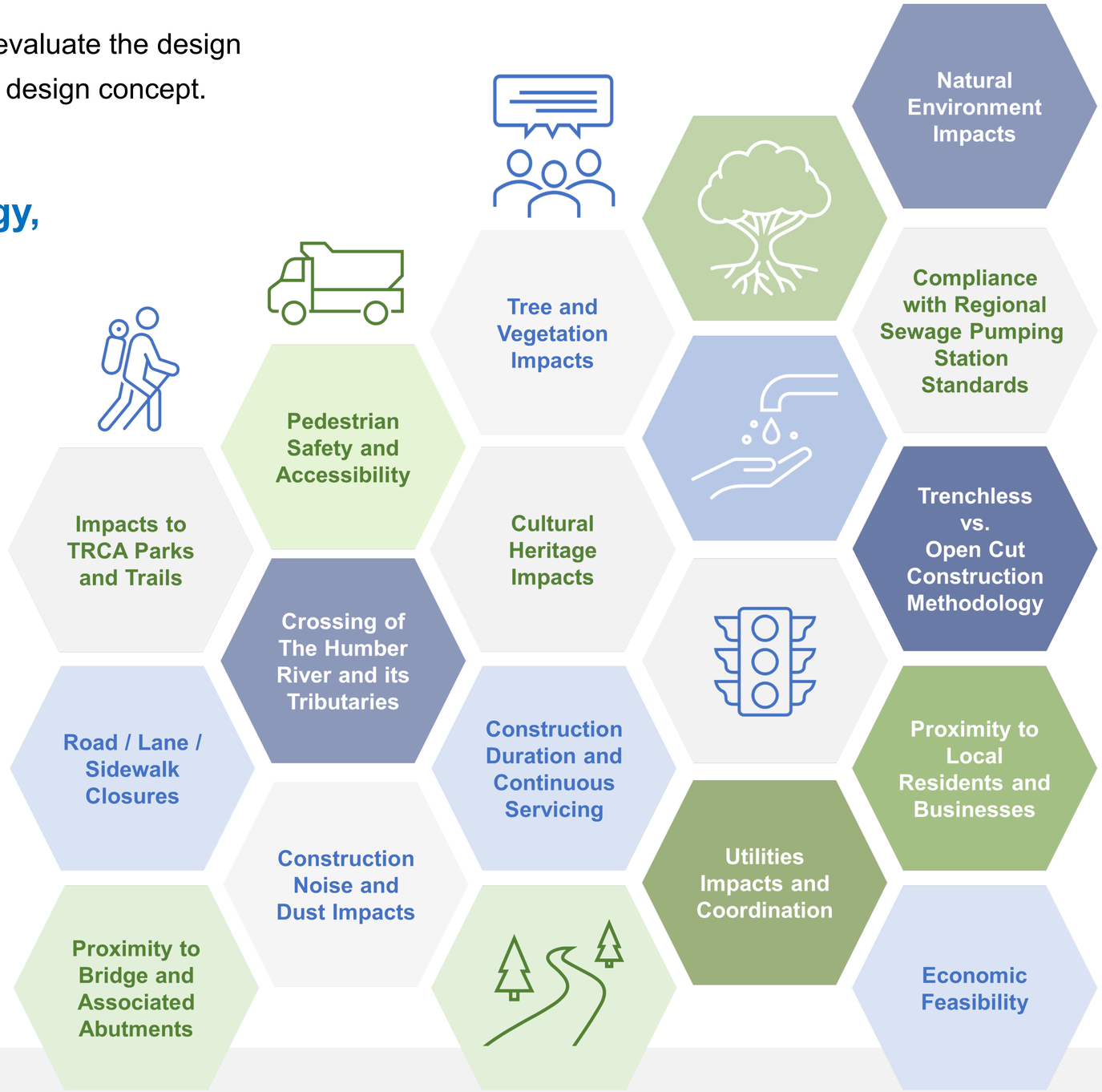
We are currently undertaking Phase 3 of the study to review and evaluate the design concept alternatives to select the preferred water and wastewater design concept.

The objective of Phase 3 is to determine what infrastructure is required to deliver the strategy, where it will be constructed and how.

Phase 3 includes:

- Preparation of detailed inventory
- Identification of design concept alternatives
- Evaluation of design concept alternatives using comprehensive evaluation criteria
- Selection of preliminary preferred conceptual design and technologies
- Identification of impacts and mitigation measures
- Public Information Centre (PIC) No. 3
- Confirmation of preferred conceptual design and technologies

Given the complexity and potentially sensitive nature of this study, meaningful consultation and two-way communication with stakeholders was maintained to provide information, listen to, address issues and concerns and inform the decision-making process.



Which field investigations have been completed?

Site Investigation Results

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Following the selection of the preferred servicing strategy in Phase 2 of the Class EA process, further site-specific reviews and investigations were undertaken to inform the evaluation of the design concept alternatives and to identify mitigation measures, including:

Cultural Heritage Registered Properties

Potential Redside Dace Habitat

Humber River Bridge Crossing at Emil Kolb Pkwy

Archaeological

Purpose: to determine where there are sites of archaeological significance within the study area which may impact the construction of the servicing solution. Main objective is to avoid areas of significance.

- Stage 1 and Stage 2 Archaeological Assessment completed.
- **Result: Areas of potential archaeological importance have been identified and will be considered in the selection of the preferred infrastructure alignment.**

Cultural Heritage

Purpose: to assess any potential impacts to cultural heritage resources and identify mitigation measures for the preferred solution.

- Cultural Heritage Screening completed. Cultural Heritage Preliminary Impact Assessment completed.
- **Result: Properties, landscapes and other cultural heritage resources have been identified within the study area. No indirect or direct impacts that cannot be mitigated.**

Natural Environment

Purpose: to document the existing natural environment features within the study area and identify any potential impacts and mitigation measures for the preferred solution.

- Desktop Natural Environment Assessment and site-specific field investigations completed.
- **Result: No significant environmental constraints that cannot be mitigated. Additional surveys including headwater drainage feature assessment and wetland delineation verification to be completed. Suitable bat habitat trees identified at SPS site. Potential tree removal at SPS site, however no Species at Risk identified. Compensation and replanting program to be confirmed during detailed design as per the Town's Tree Preservation Standards. Mitigation measures to be confirmed during detailed design to support permitting, approvals and construction timing.**

Which field investigations have been completed?

Site Investigation Results

Region of Peel
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Sanitary Pumping Station Access Along Emil Kolb Pkwy

Agricultural Lands East of Highway 50

Traffic Investigations

Purpose: identify traffic impacts likely to arise during and post-construction period and assess measures to mitigate/address any issues or concerns.

- Traffic Impact Assessment in progress.
- **Result: No lane reductions are anticipated during construction, however there may be lane closure and replacement within road right of way to facilitate construction.**
- **Appropriate signage and safety measures will be implemented during construction to accommodate vehicle, pedestrian and cycle traffic.**

Environmental Site Assessment

Purpose: to identify potential environmental risks associated with the sites and determine if further investigations or remediation is needed.

- Phase One Environmental Site Assessment completed as part of site reviews.
- **Result: Further investigations required to support implementation.**

Agricultural

Purpose: to document the existing agricultural features within the study area and identify any potential impacts and mitigation measures for the preferred solution.

- Baseline Agricultural Impact Assessment in progress.
- **Result: Results will be considered in the selection of the preferred infrastructure alignment.**

Geotechnical and Hydrogeological

Purpose: to establish the existing groundwater, soil and rock conditions, assess the potential impacts to groundwater and surface water resources and identify the necessary mitigation measures along the preliminary preferred route.

- Desktop Geotechnical and Hydrogeological Assessment completed.
- **Result: Suitable hydrogeological conditions for shaft site and tunnel construction; dewatering consideration required. Commitment to further hydrogeological and geotechnical investigations during detailed design.**

During detailed design, further site-specific studies may be identified with the respective mitigation measures.

Considering Construction Methodology Benefits and Impacts

Region of Peel
working with you

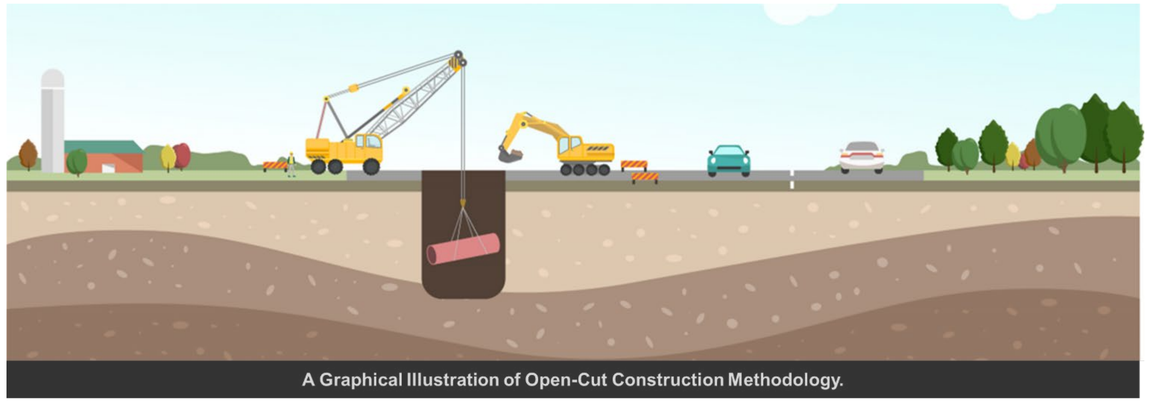
A key consideration in the evaluation and selection of the preliminary preferred design concept is the construction methodology for each section of the watermain, gravity sanitary sewer, and sanitary forcemain alignments.

When evaluating servicing solutions for the **Bolton Water and Wastewater Capacity Improvements Study**, the following construction methodologies were considered:

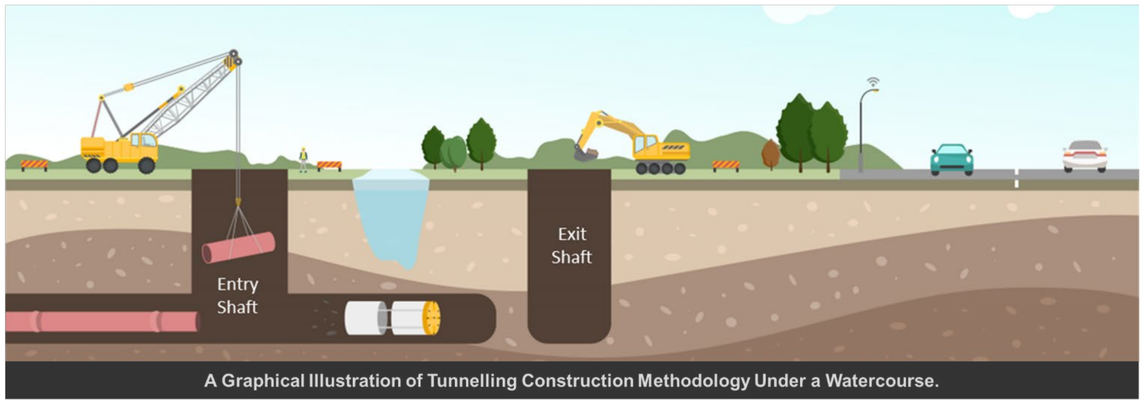
Open-Cut Construction involves digging a trench to facilitate the installation of linear infrastructure (e.g., watermains). Because construction occurs on the surface over a stretch of time, open cut construction has the potential to increase traffic, socio/economic and environmental impacts.

Trenchless (Tunnelled) Construction involves digging shafts and using special equipment to tunnel underground between shafts. It is less intrusive than open cutting minimizing traffic disruptions, impacts to local residents and businesses and can avoid environmental features such as watercourses by going underneath them. The surface works for tunnelled construction are the entry and exit shafts located between tunnel drive lengths that could vary between 0.2 km and 2.1 km apart depending on the technology used.

Suspended Construction involves hanging linear infrastructure from existing or new bridge structures. This methodology requires linear infrastructure to be exposed and hung from a bridge that is crossing an environmental or constraint area. This methodology can avoid the need for trenchless construction to cross the feature.



A Graphical Illustration of Open-Cut Construction Methodology.



A Graphical Illustration of Tunnelling Construction Methodology Under a Watercourse.

A Graphical Illustration of Suspended Construction Methodology from a Bridge.

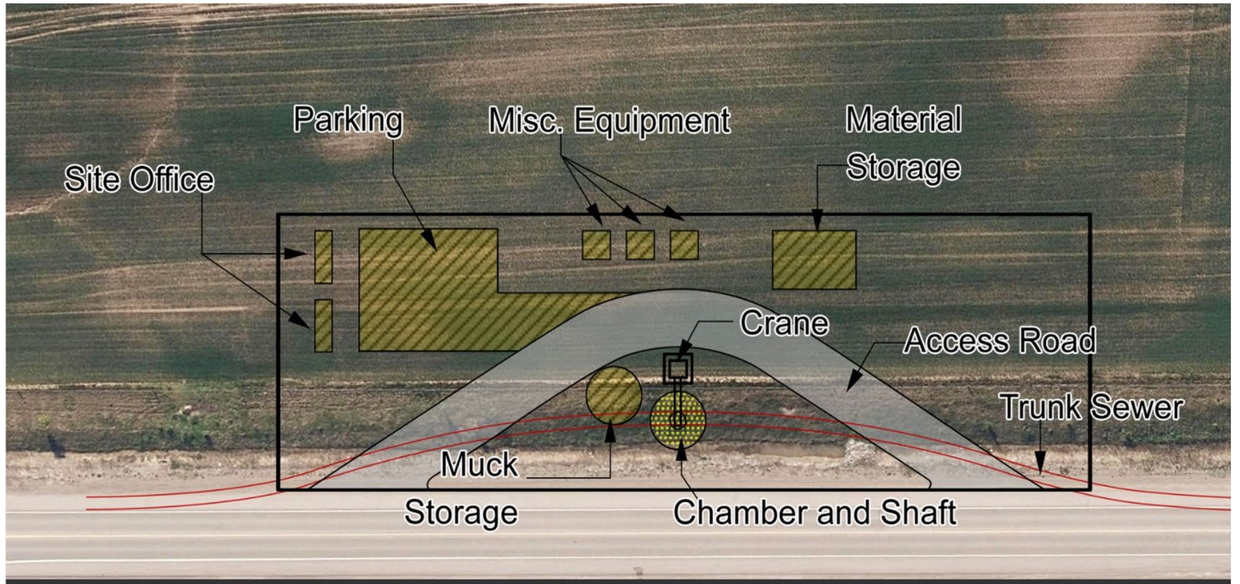
Considering Construction Methodology Benefits and Impacts

Trenchless Installation (tunnelling) requires both an entry and exit shaft(s) located between tunnel drive lengths to support the construction of the watermain and gravity sanitary sewer.

What does a Tunnel Shaft Compound Look Like?

Each tunnel shaft compound site will require a staging area where construction equipment can be stored, and excavated material can be brought to the surface and hauled away. The layouts of each compound will be optimized for safeguarding natural environmental features, underground utilities, and other mitigation measures as per design needs. **Once tunnelling is complete, the staging area will be restored to its previous condition, if not, better.**

Inside of a Tunnel Shaft.



A Schematic of a Typical Shaft Compound Layout in Rural Setting.

How was the preliminary preferred design concept selected?

Bolton Class EA – Focus Area 1

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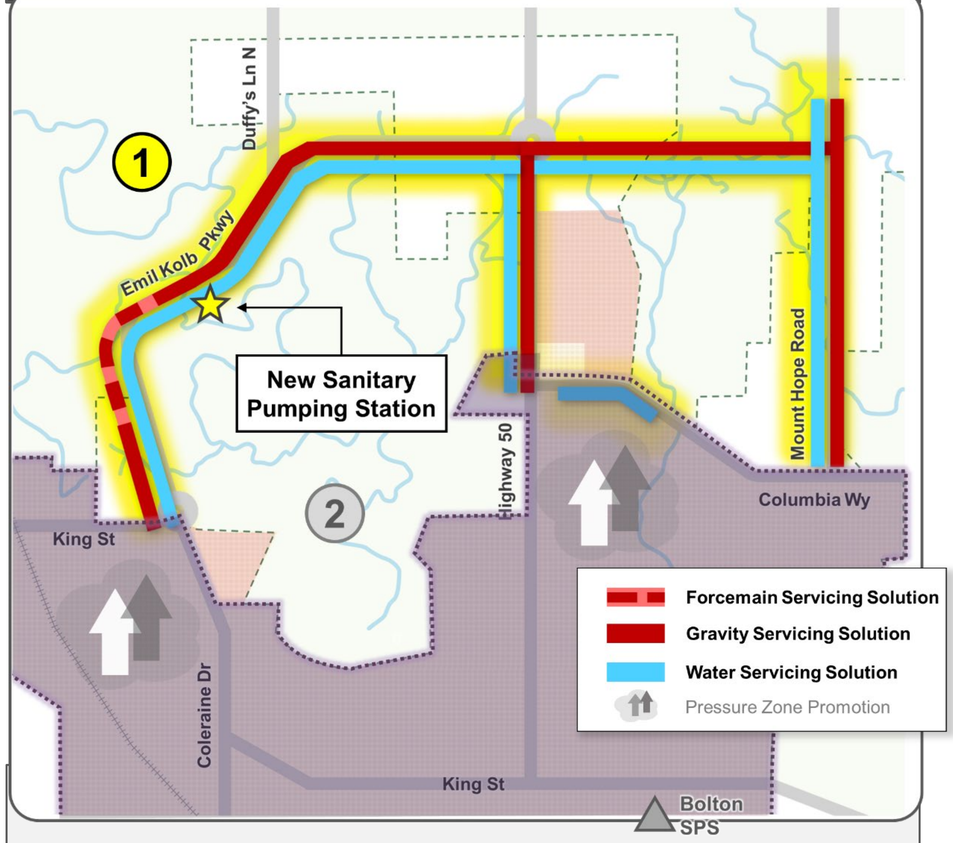
Focus Area 1

Servicing New Growth



The evaluation and selection of the preliminary preferred design concept for **Focus Area 1** included the following steps.

Step 1

How will the solution be constructed?

- How will the watermain, gravity sanitary sewer, and sanitary forcemain be constructed?
- There are two main construction methodologies: open-cut construction and trenchless construction.
- The selection of the construction methodology considered:
  - Required depth of the watermain, sewer and forcemain.
  - Presence of environmental crossings.

Step 2

Where will the shafts be constructed?

- Shafts are required for trenchless construction.
- Shaft compounds require available space for staging and storage areas.
- Key sites were identified to optimize and integrate water and sanitary shaft locations to reduce surface impacts.
- Sites were selected to minimize overall impacts to the community including traffic, natural environment, archaeological and cultural heritage.
- Sites also avoided conflicts with existing infrastructure and utilities.

Step 3

Where will the routes be constructed?

- Routes were selected to minimize overall impacts to the community including traffic, natural environment, archaeological and cultural heritage.
- Routes avoided conflicts with existing infrastructure and utilities.

Step 4 (Wastewater only)

Where will the Sanitary Pumping Station (SPS) be located?

- The location of the sanitary pumping station was validated during Phase 2 and further refined during Phase 3.
- The selection of the SPS location was an integrated approach, in tandem with the selection of the gravity sanitary sewer and forcemain alignment.

Preliminary Preferred Design Concept - Water

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Preliminary Preferred Design Concept – Water

The first step in the water design concept evaluation process is to identify the preferred method of construction.

The following provides the **preferred methods** for the watermain alignment and the key rational for selection.

Open-Cut Construction

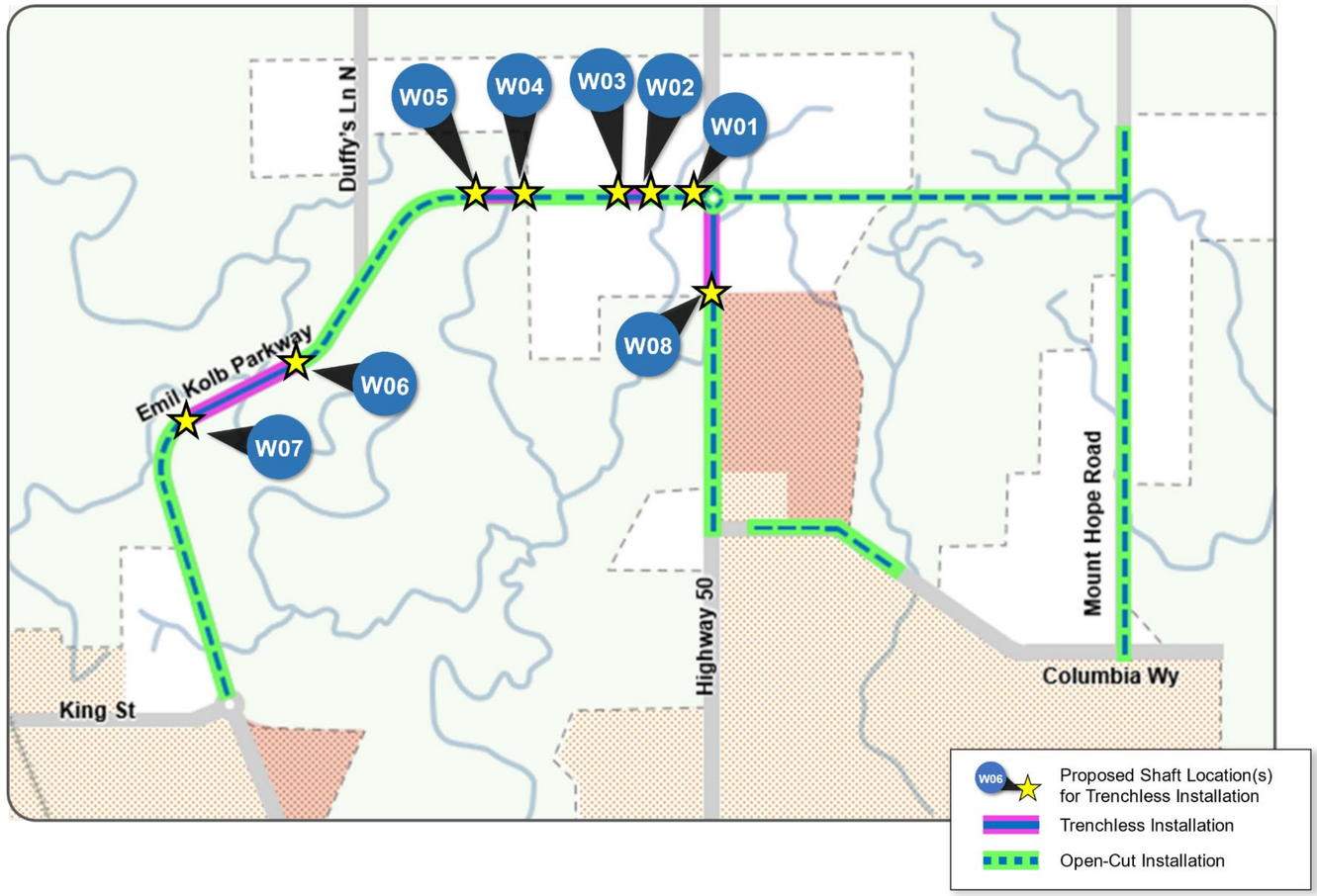
- Watermains are generally constructed by open cut methodology as they can be constructed at shallow depths.

Recommended open cut sections (green)

Tunnelling Construction

- Crossings of significant environmental or socio-cultural features to minimize impacts to the natural environment and community (e.g., watercourses, roundabouts).
- Shaft sites were selected to minimize overall impacts to the community including traffic, natural environment, archaeological and cultural heritage.
- Shaft sites considered existing infrastructure and utilities.

Recommended tunnelled sections (purple)



Step 2. Where will the shafts be constructed?
Preliminary Preferred Design Concept – Water

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Trenchless installation is the preferred method for crossing the Humber River Tributary. It will avoid impacts to the watercourse which is a suitable habitat for Redside Dace fish (Species at Risk – Endangered).

Two shafts (W04 and W05) have been identified to support the trenchless installation, located outside of the river sensitive meander belt and floodplain.

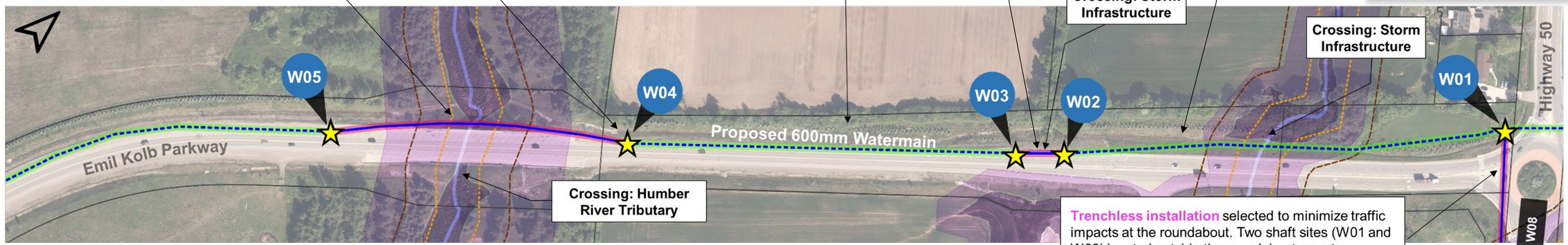
Watermain located on the north side of the road ROW.

Trenchless installation is the preferred method for crossing the existing storm culvert concrete box to avoid impacts to the infrastructure and its function. Two shaft sites (W02 and W03) have been identified.

Open-Cut installation was selected as the proposed watermain can achieve the required vertical clearance below the HDPE storm pipe (1.7m minimum) within the existing road.

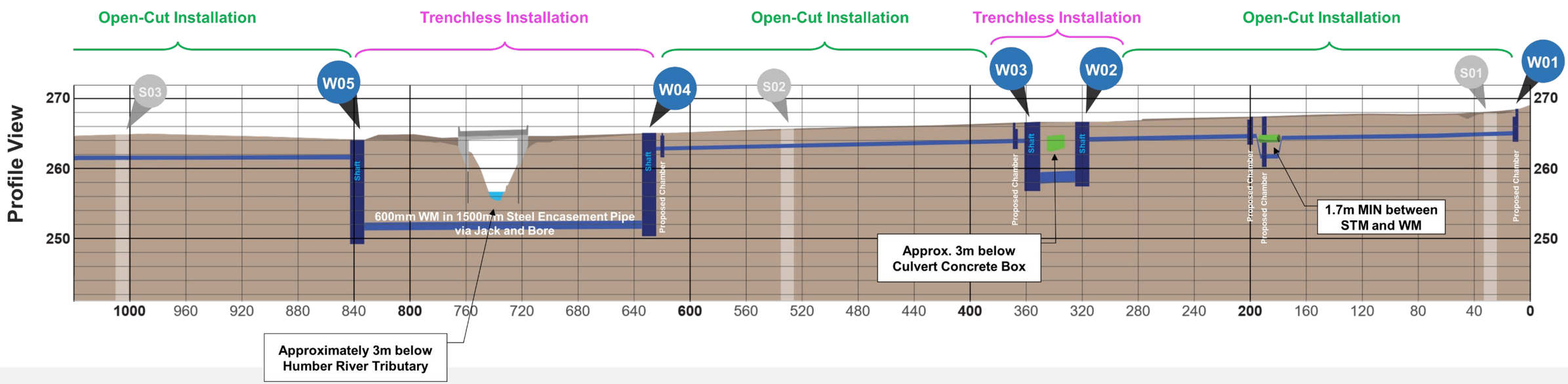
- Proposed Shaft Location(s) for Trenchless Installation
- Trenchless Installation
- Open-Cut Installation
- Watercourses
- TRCA Meander Belt
- TRCA Meander Belt (30m inclusive)
- Parcel
- TRCA Floodplain
- TRCA Regulated Area

Plan View



Trenchless installation selected to minimize traffic impacts at the roundabout. Two shaft sites (W01 and W08) located outside the roundabout area to minimize surface works at the roundabout area.

Profile View



Approximately 3m below Humber River Tributary

Step 2. Where will the shafts be constructed?
Preliminary Preferred Design Concept – Water

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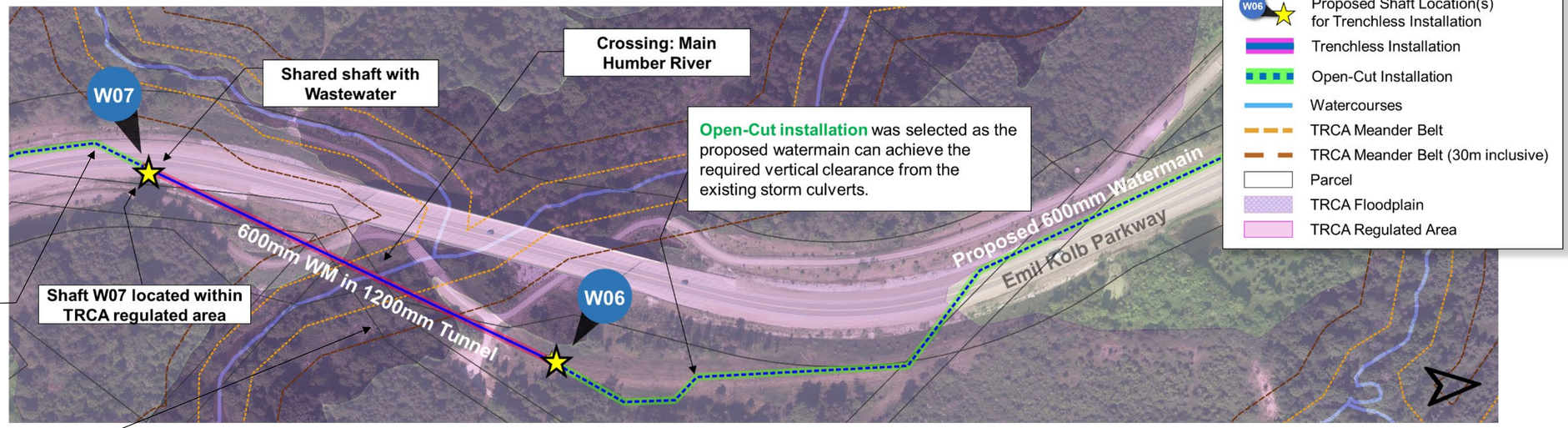
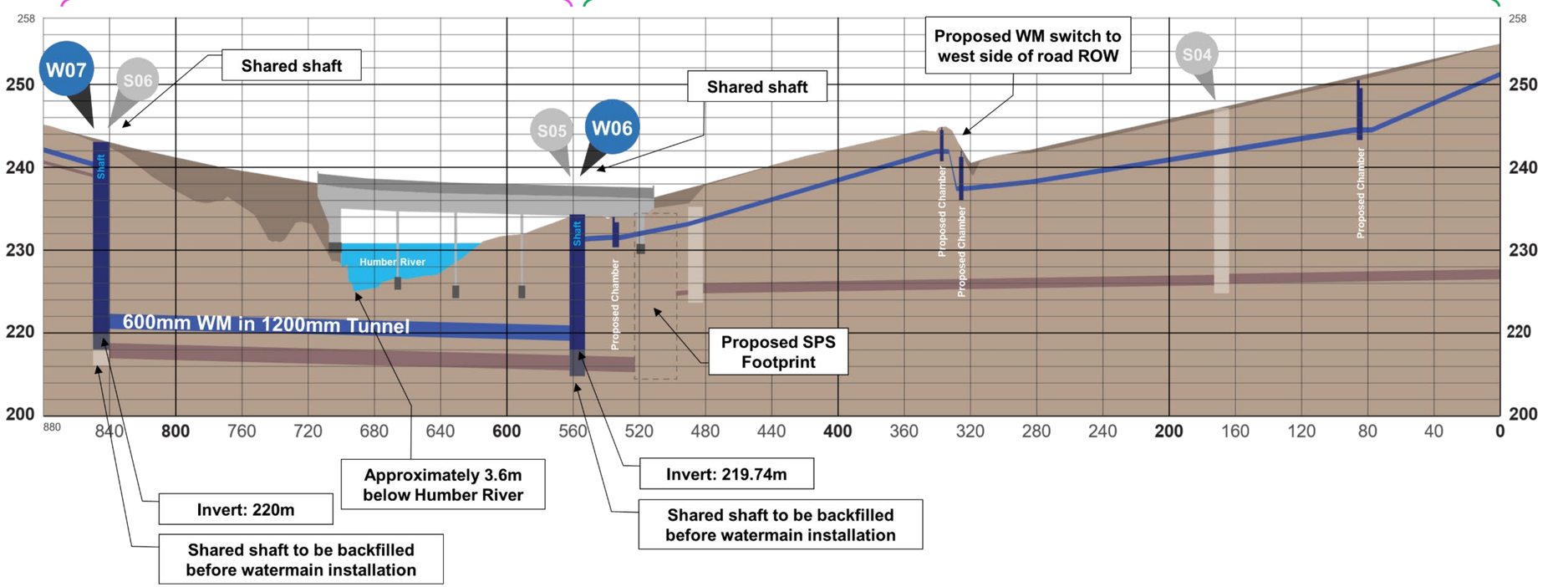
Two shafts (W06 and W07) have been identified to support the trenchless installation, located outside the river sensitive meander belt and floodplain.

Trenchless installation is the preferred method for crossing the Humber River. It will avoid impacts to the watercourse which is a suitable habitat for Redside Dace fish (Species at Risk – Endangered).

Plan View



Profile View

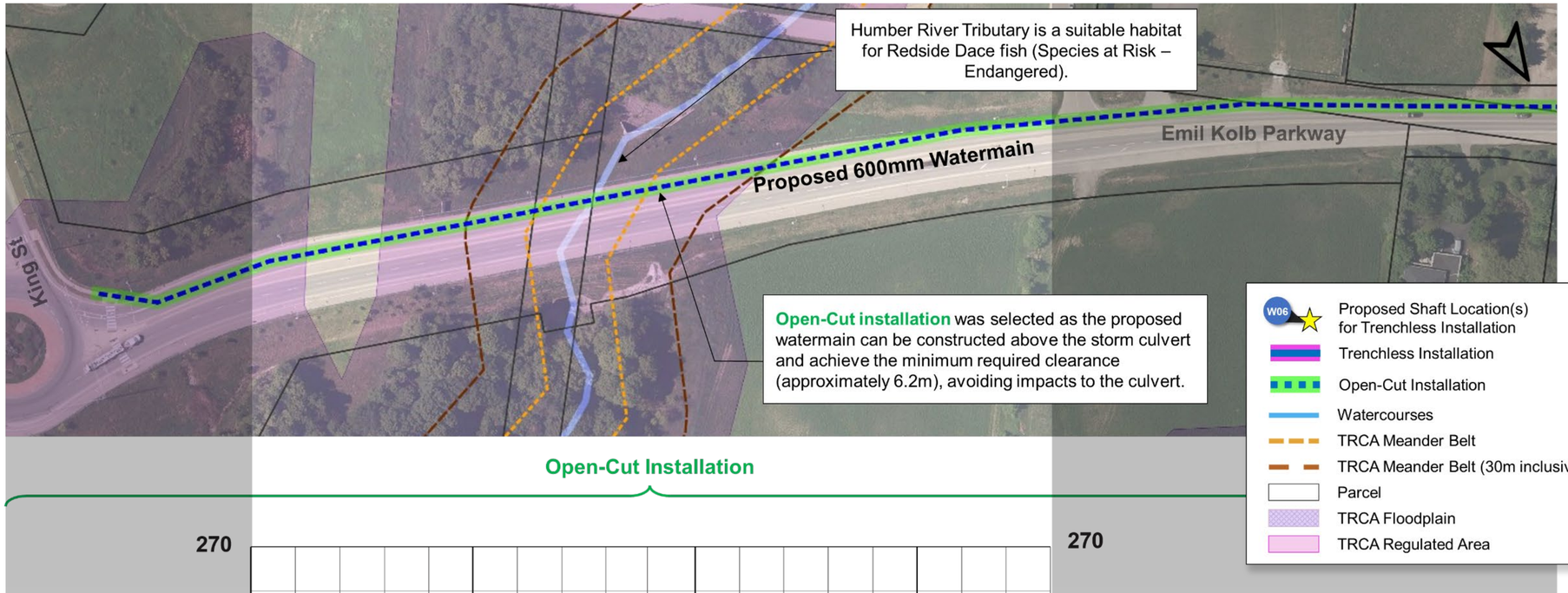


Step 2. Where will the shafts be constructed?

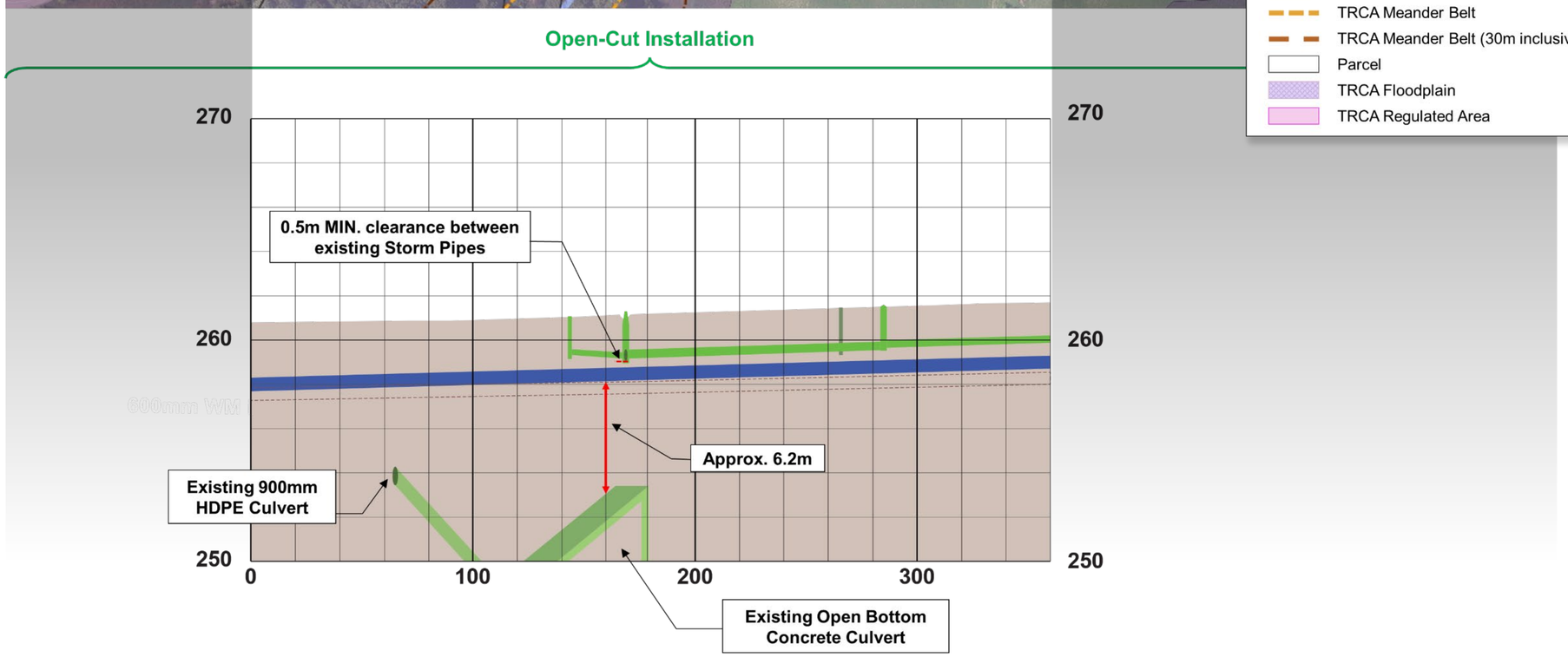
Preliminary Preferred Design Concept – Water

Region of Peel
working with you

Plan View



Profile View



Preliminary Preferred Design Concept – Water

The third step in the water design concept evaluation process is to identify the **preferred location** of the watermain route.

The location of the routes considered the following:

- selected construction methodology for both the watermain and gravity sanitary sewers,
- existing constraints, and,
- overall impacts to the community including traffic, natural environment, archaeological and cultural heritage.

The routes are separated into the below components:

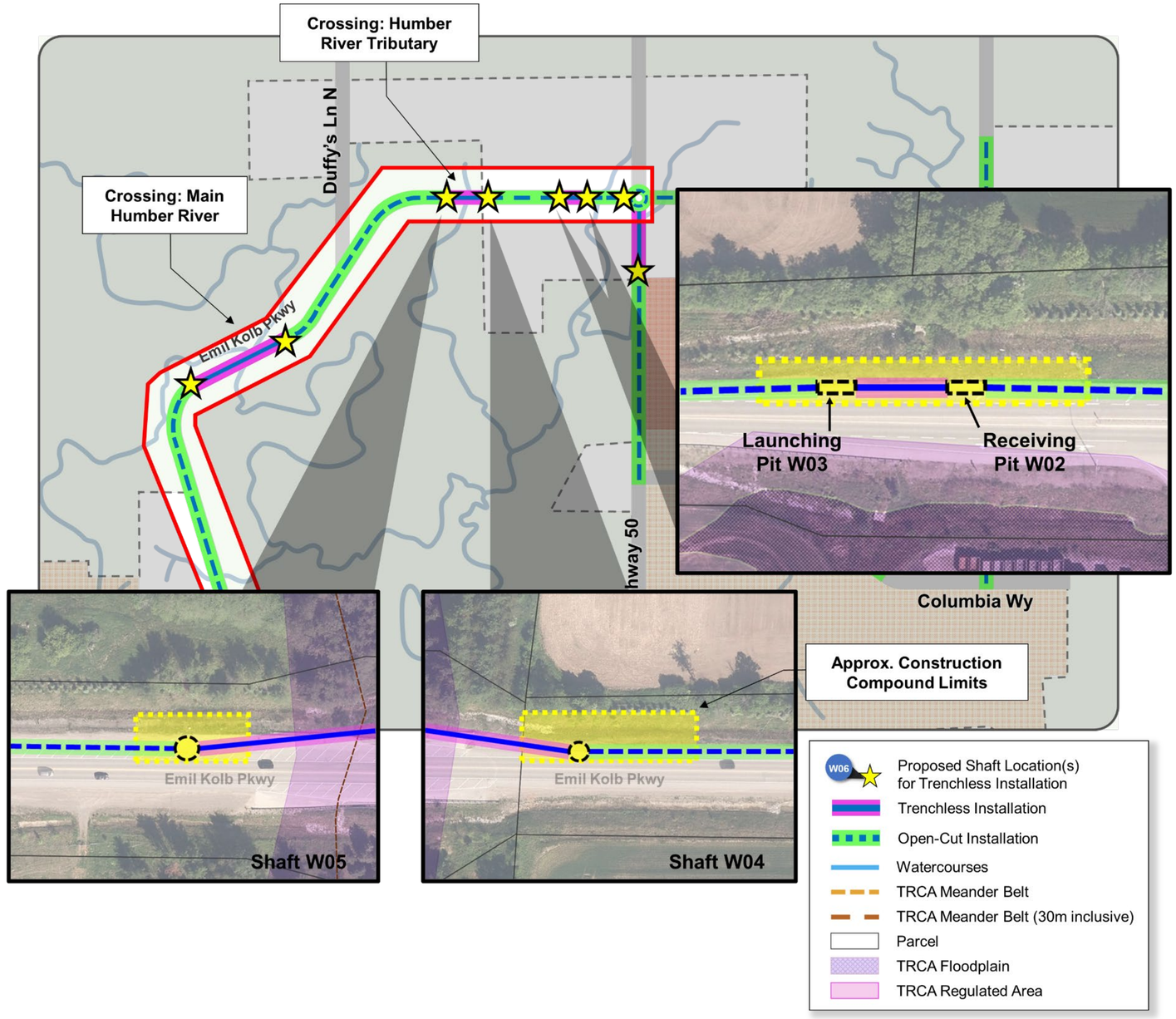
Emil Kolb Parkway | Highway (Regional Road) 50 | Mount Hope Road | Utility Corridor | Columbia Way (water only)

Emil Kolb Parkway

Majority of the watermain alignment will be open-cut, with key crossings to be tunneled to avoid impacts to the fish and fish habitat and other key structures.

The watermain is located on the **north side** of the road ROW:

- No conflicts within existing infrastructure.
- Available space for open cut construction within road shoulder.
- Minimal impacts to traffic with no reduction in number of traffic lanes.
- Provides setback from cultural heritage property, north of King Street.
- No archaeological potential within the road right of way.



Preliminary Preferred Design Concept – Water

Region of Peel working with you

Emil Kolb Parkway | Highway (Regional Road) 50 | Mount Hope Road | Utility Corridor | Columbia Way (water only)

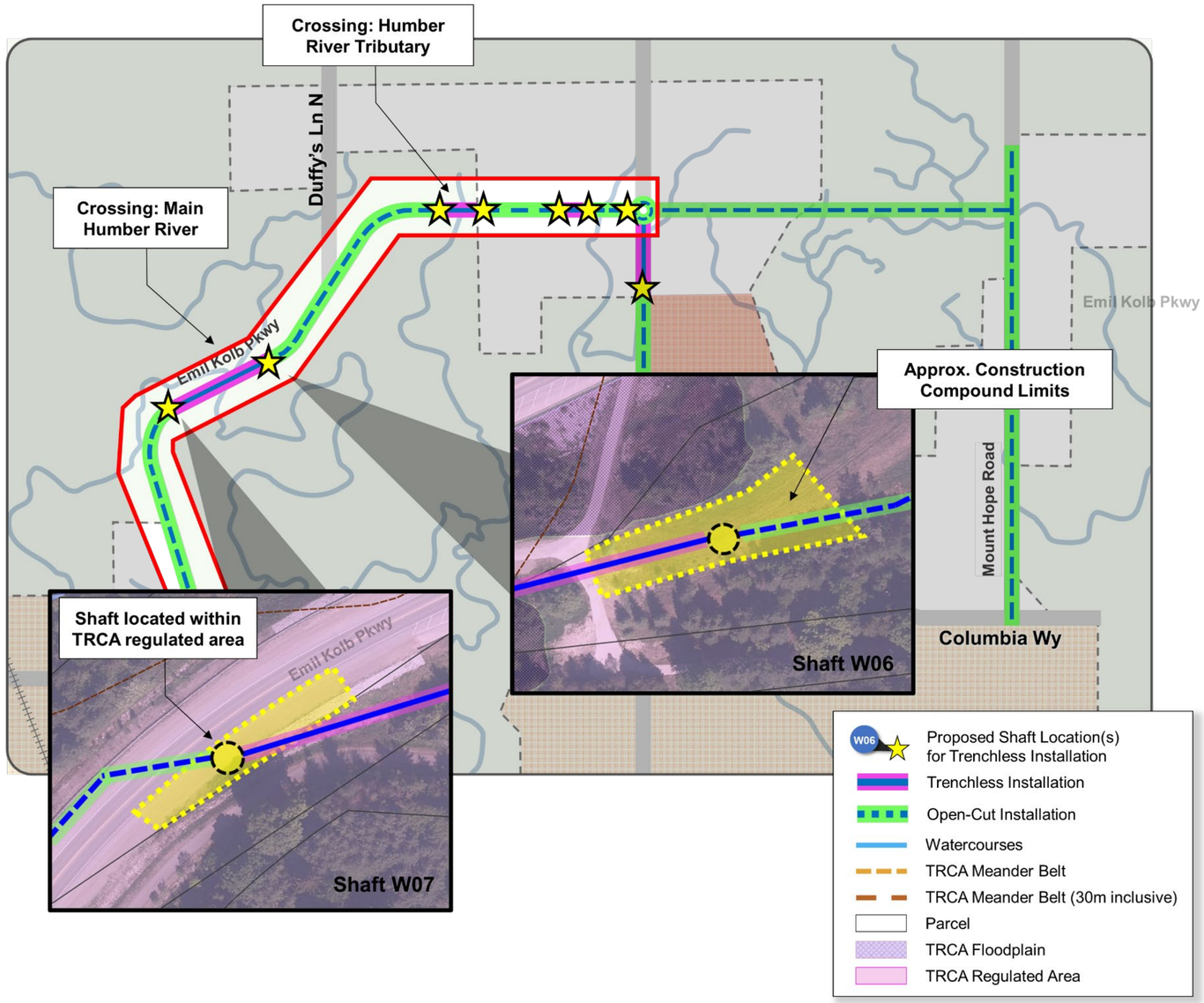
Emil Kolb Parkway (cont'd)

Majority of the watermain alignment will be open-cut, with key crossings to be tunneled to avoid impacts to the fish and fish habitat and other key structures.

The watermain is located on the **north side** of the road ROW:

- No conflicts within existing infrastructure.
- Available space for open cut construction within road shoulder.
- Minimal impacts to traffic with no reduction in number of traffic lanes.
- Provides setback from cultural heritage property, north of King Street.
- No archaeological potential within the road right of way.

Water Shafts W06 and W07 is shared with Wastewater Shafts S05 and S06.



Preliminary Preferred Design Concept – Water

Region of Peel
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Emil Kolb Parkway | **Highway (Regional Road) 50** | Mount Hope Road | Utility Corridor | Columbia Way (water only)

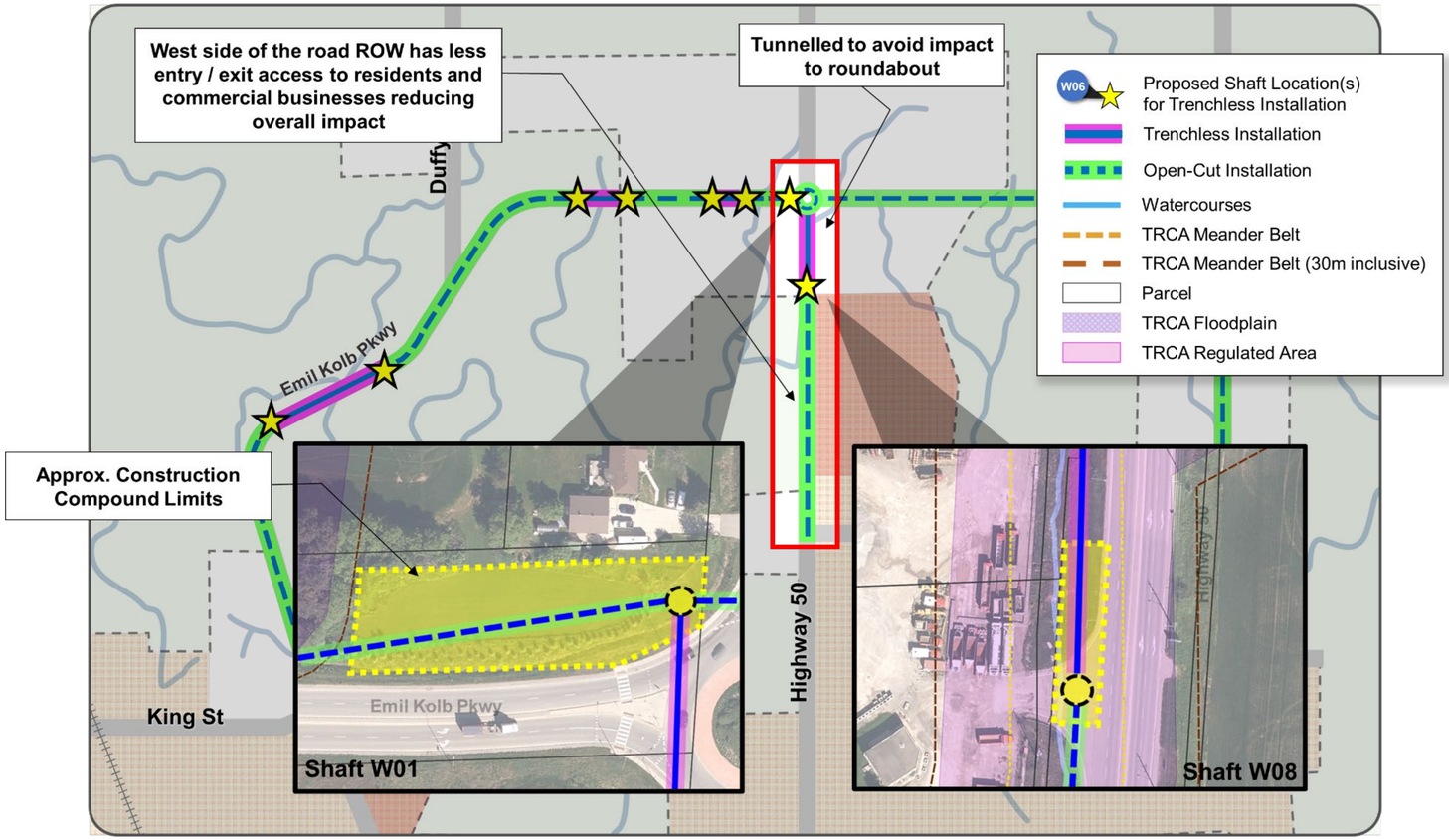
Highway (Regional Road) 50

Watermain alignment will be tunneled from the roundabout at the intersection of Highway 50 and Emil Kolb Parkway, with the remaining to be open-cut to Columbia Way.

The watermain is located on the **west side** of the road ROW:

- No conflicts within existing infrastructure.
- Available space for open cut construction within road shoulder.
- No watercourse crossings.
- Minimal impacts to traffic with no reduction in number of traffic lanes.
- No archaeological potential within the road right of way.

West side of the road ROW has less entry / exit access to residents and commercial businesses reducing overall impact.



Preliminary Preferred Design Concept – Water

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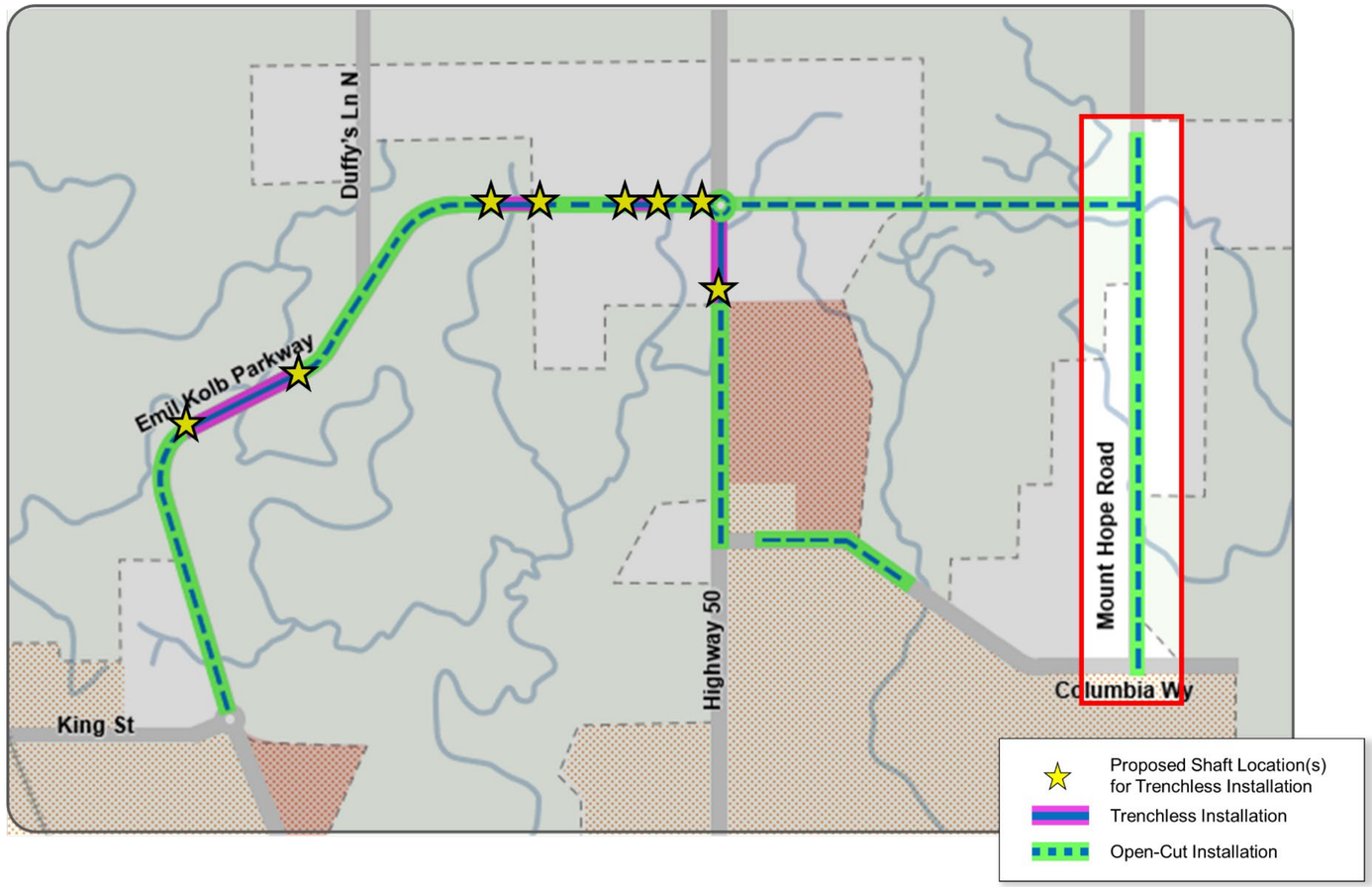
Emil Kolb Parkway | Highway (Regional Road) 50 | **Mount Hope Road** | Utility Corridor | Columbia Way (water only)

Mount Hope Road

Majority of the watermain alignment will be open-cut, with key crossings to be tunneled to avoid impacts to the fish and fish habitat and other key structures.

The watermain is located on the **east side** of the road ROW:

- No conflicts within existing infrastructure.
- Available space for open cut construction within road shoulder.
- Minimal impacts to traffic with no reduction in number of traffic lanes.
- No archaeological potential within the road right of way.



Preliminary Preferred Design Concept – Water

Region of Peel working with you

Emil Kolb Parkway | Highway (Regional Road) 50 | Mount Hope Road | **Utility Corridor** | **Columbia Way (water only)**

Utility Corridor

Majority of the watermain alignment will be open-cut, with key crossings to be tunneled to avoid impacts to the fish and fish habitat and other key structures.

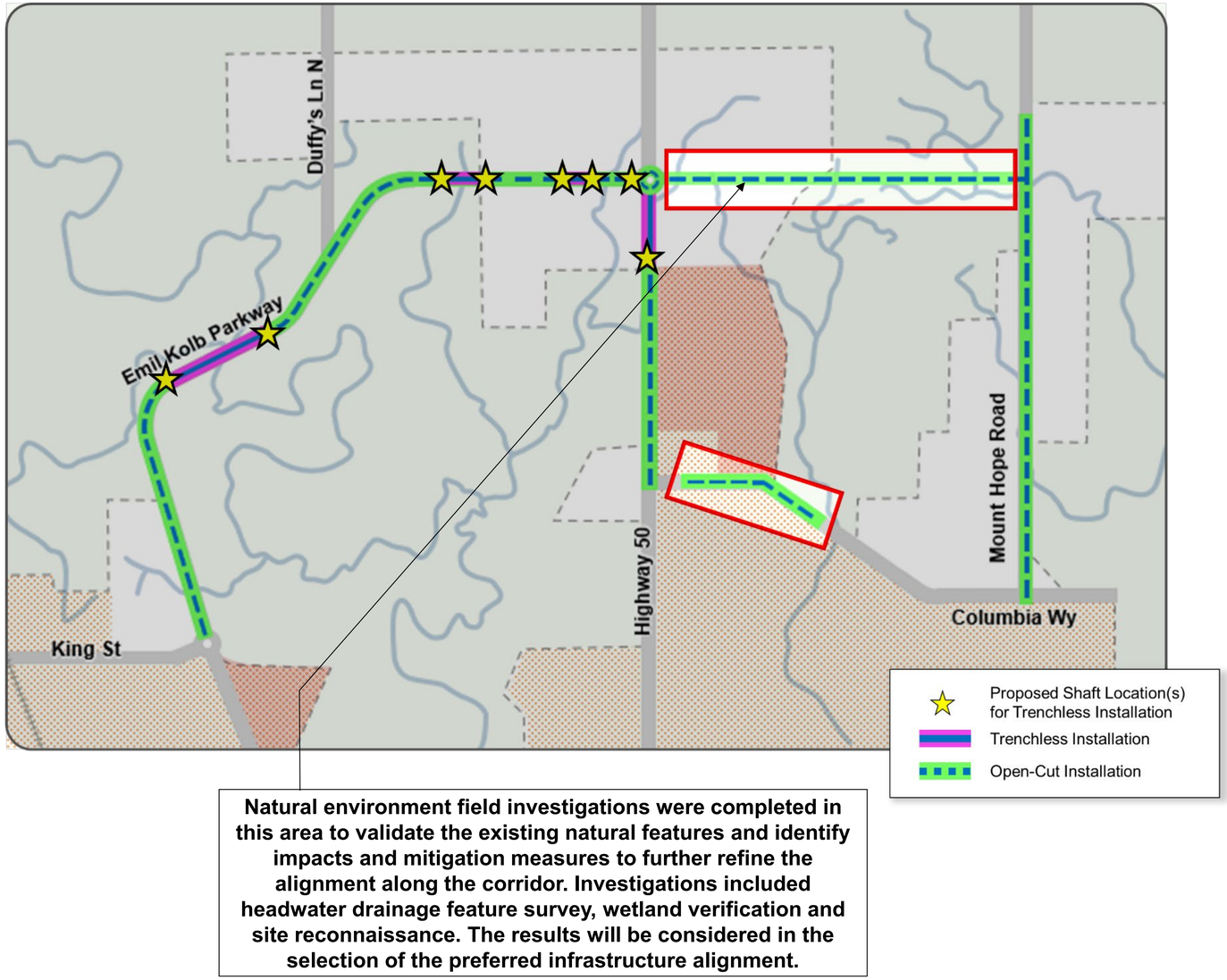
The watermain is located **within a new utility corridor** which aligns with Town of Caledon's planned local road.

- No conflicts with existing infrastructure.
- Alignment provides a looped water system minimizing water quality issues, reducing service risk, and increasing system resiliency.
- Landowners willing to work with the Region.
- Corridor is within the Regional 2051 urban boundary.
- Natural features and areas of potential archaeological importance have been identified and will be considered in the selection of the preferred infrastructure alignment.

Columbia Way

Proposed watermain alignment will be open-cut. The watermain is located on the **south side** of the road ROW:

- Additional sections of watermain along Columbia Way to connect into the existing system to support the looped water system.



Natural environment field investigations were completed in this area to validate the existing natural features and identify impacts and mitigation measures to further refine the alignment along the corridor. Investigations included headwater drainage feature survey, wetland verification and site reconnaissance. The results will be considered in the selection of the preferred infrastructure alignment.

Preliminary Preferred Design Concept - Wastewater

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Preliminary Preferred Design Concept – Wastewater

The first step in the wastewater design concept evaluation process is to identify the **preferred method** of construction.

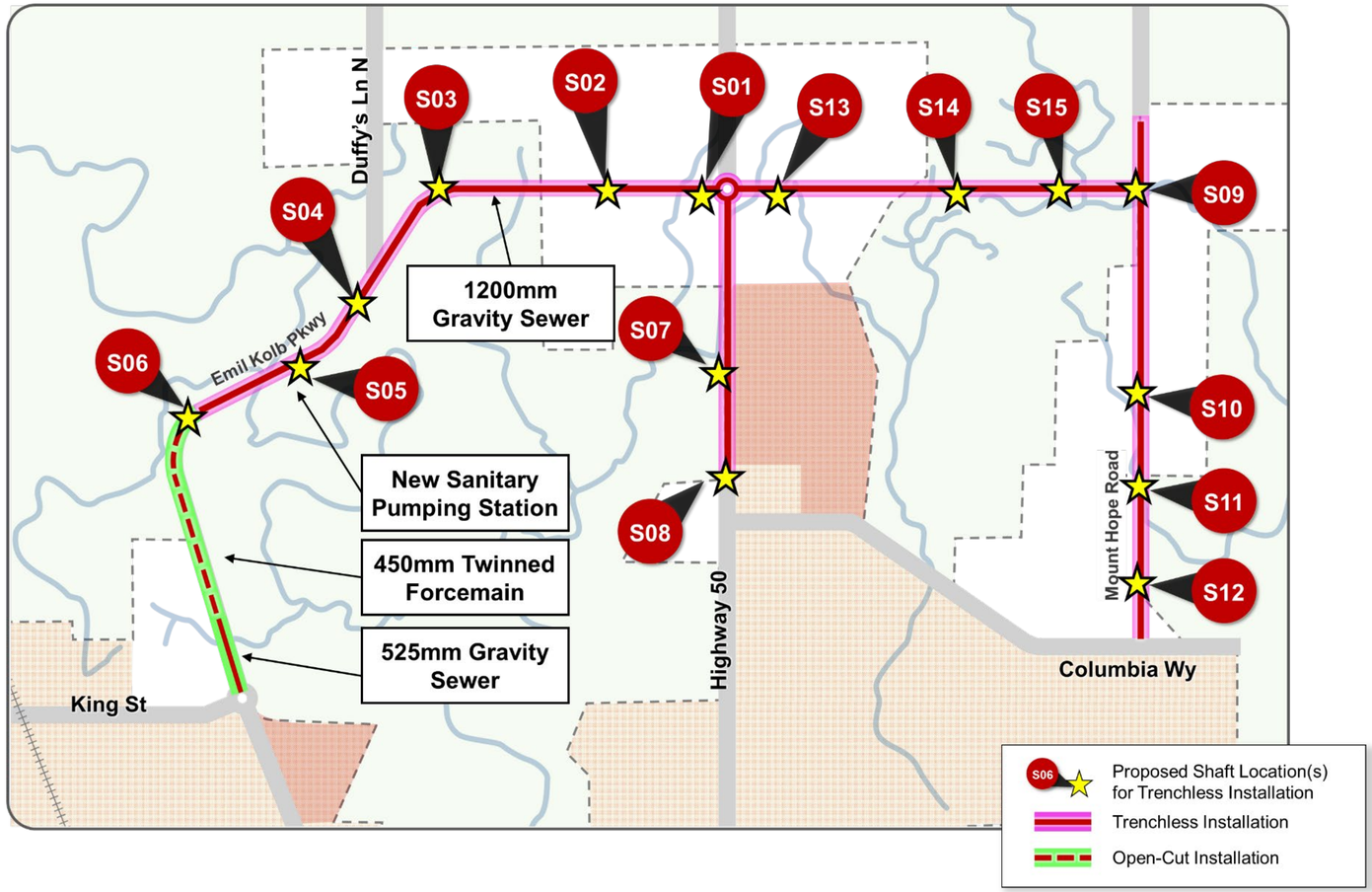
The following provides the preferred methods for the gravity sanitary sewer and forcemain alignments and the key rational for selection.

Open-Cut Construction

- Forcemain enables pumped sanitary flow and can be constructed by open-cut since it does not require a minimum slope and can be constructed at shallow depths.

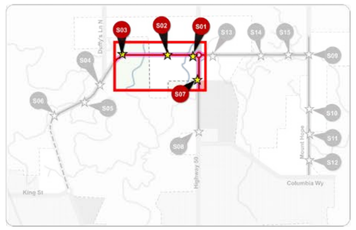
Tunnelling Construction

- The new gravity sewer must connect to the existing sanitary system at specific elevations. Gravity sewers must also meet a minimum slope to operate. Tunnelling is required to attain the required deep depth for the gravity sewers to connect to the existing system and achieve the minimum slope.
- Crossings of significant environmental or socio-cultural features to minimize impacts to the natural environment and community (e.g., watercourses, roundabouts).
- Shaft locations were selected to minimize overall impacts to the community including traffic, natural environment, archaeological and cultural heritage.
- Shaft locations considered existing infrastructure and utilities.



Step 2. Where will the shafts be constructed?
Preliminary Preferred Design Concept – Wastewater

Region of Peel
working with you



Trenchless installation is the preferred method for crossing the Humber River Tributary. It will avoid impacts to the watercourse which is a suitable habitat for Redside Dace fish (Species at Risk – Endangered).

Since the preferred construction methodology for the wastewater design concept is **trenchless installation**, the tunnel drive length between the shaft sites was maximized **(~500-600 m)** to reduce the number of shaft sites required.

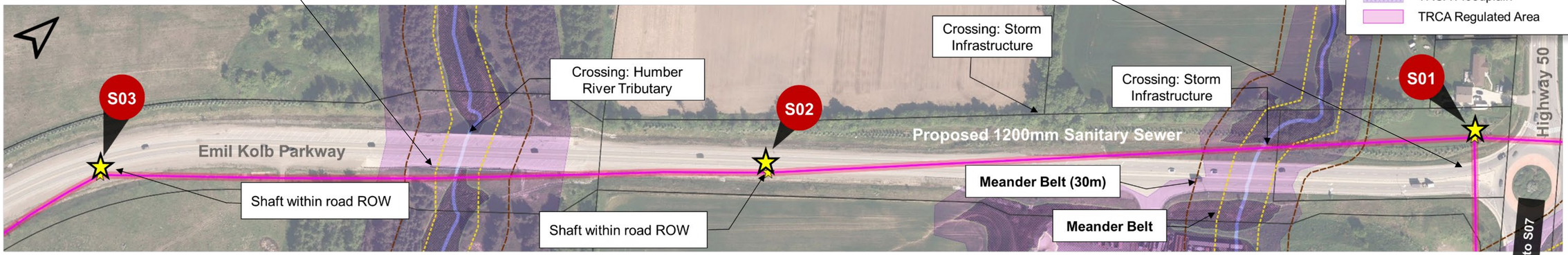
Location of proposed shaft locations are within existing road right-of-way (ROW) and is wide enough to maintain existing number of travel lanes during construction.

Trenchless installation selected to minimize traffic impacts at the roundabout. Two shaft sites (S01 and S07) located outside the roundabout area to avoid surface works at the roundabout area.

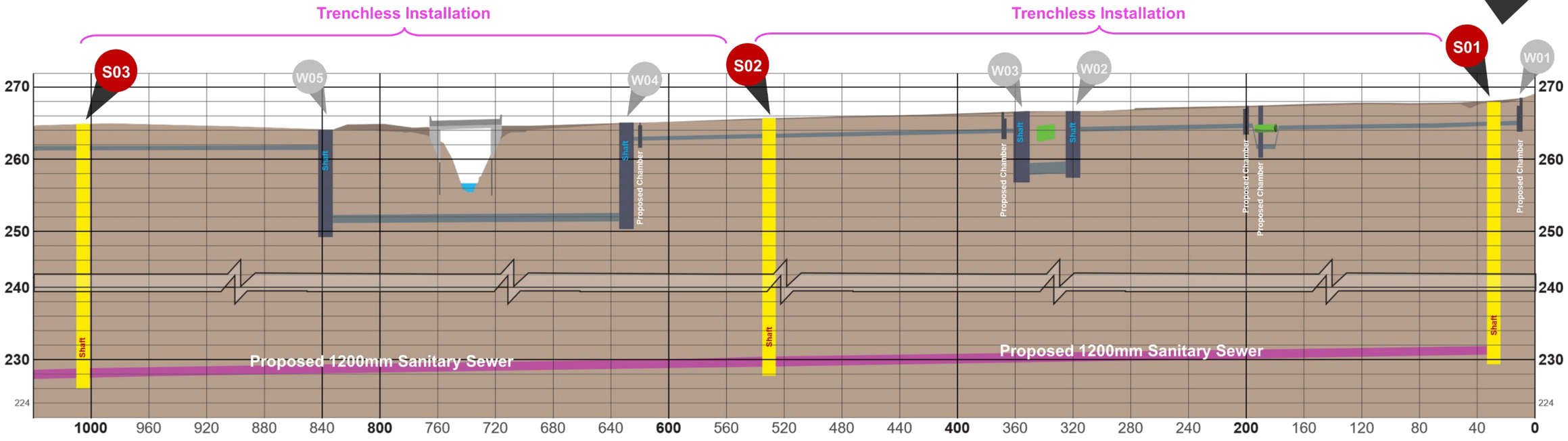
Shaft sites will be shared with W01 to support an integrated solution.

- S06 — Proposed Shaft Location(s) for Trenchless Installation
- Trenchless Installation
- Open-Cut Installation
- Watercourses
- TRCA Meander Belt
- TRCA Meander Belt (30m inclusive)
- Parcel
- TRCA Floodplain
- TRCA Regulated Area

Plan View

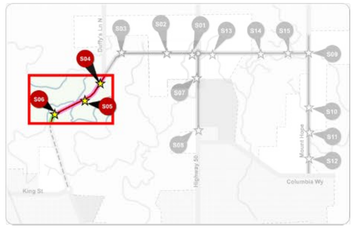


Profile View

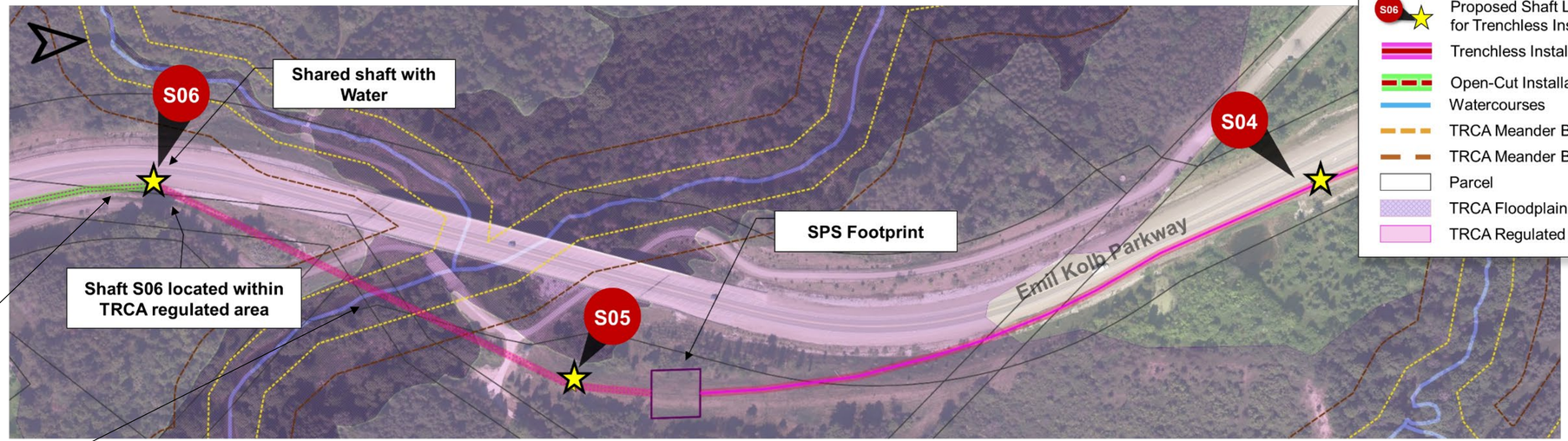


Preliminary Preferred Design Concept – Wastewater

Region of Peel
working with you



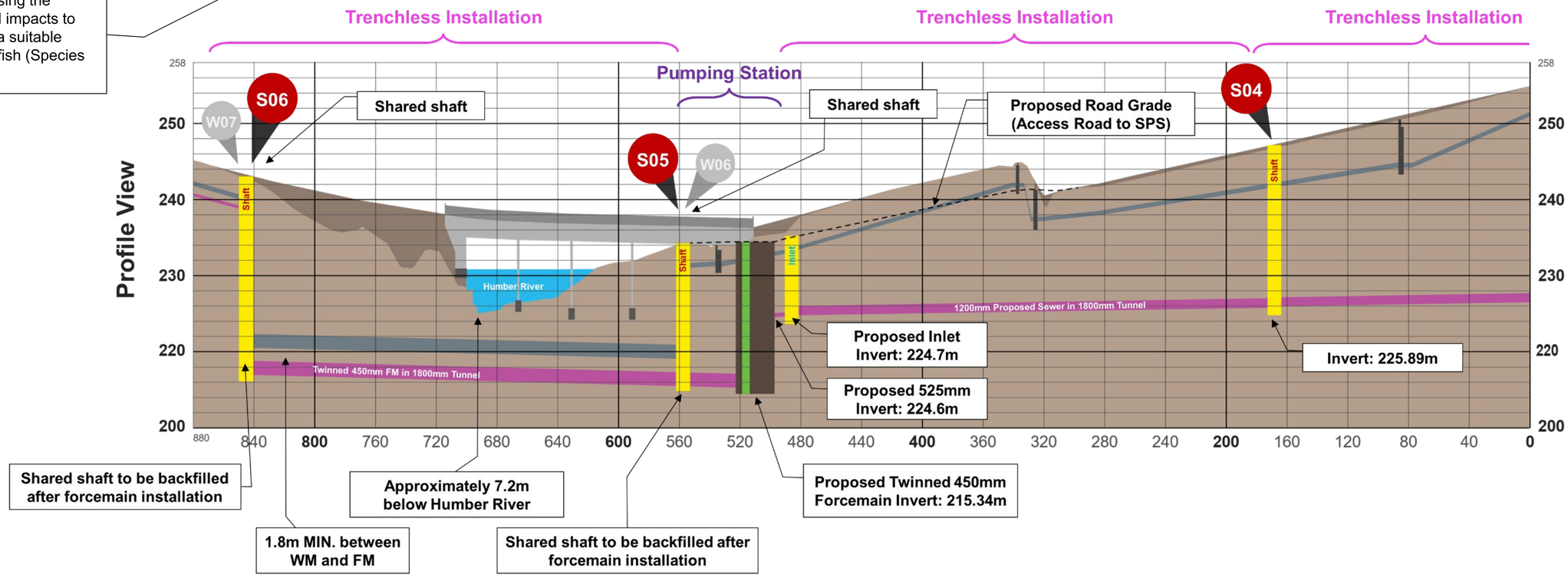
Plan View



Two shafts (S05 and S06) have been identified to support the trenchless installation, located outside of the river sensitive meander belt and floodplain.

Trenchless installation is the preferred method for crossing the Humber River. It will avoid impacts to the watercourse which is a suitable habitat for Redside Dace fish (Species at Risk – Endangered).

Profile View



Shared shaft to be backfilled after forcemain installation

Approximately 7.2m below Humber River

1.8m MIN. between WM and FM

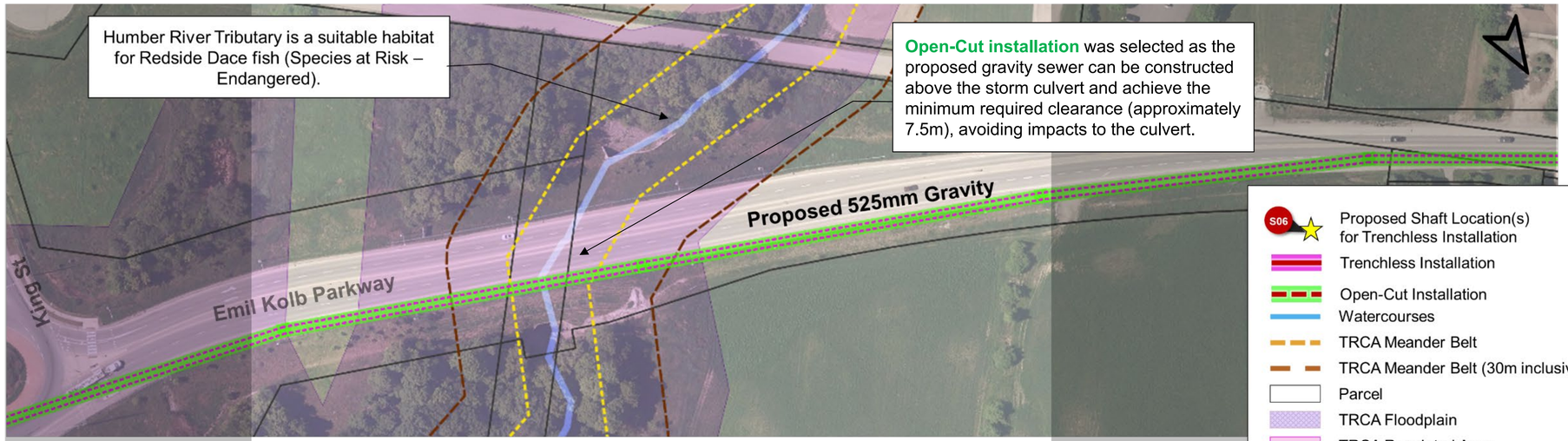
Shared shaft to be backfilled after forcemain installation

Proposed Twinned 450mm Forcemain Invert: 215.34m

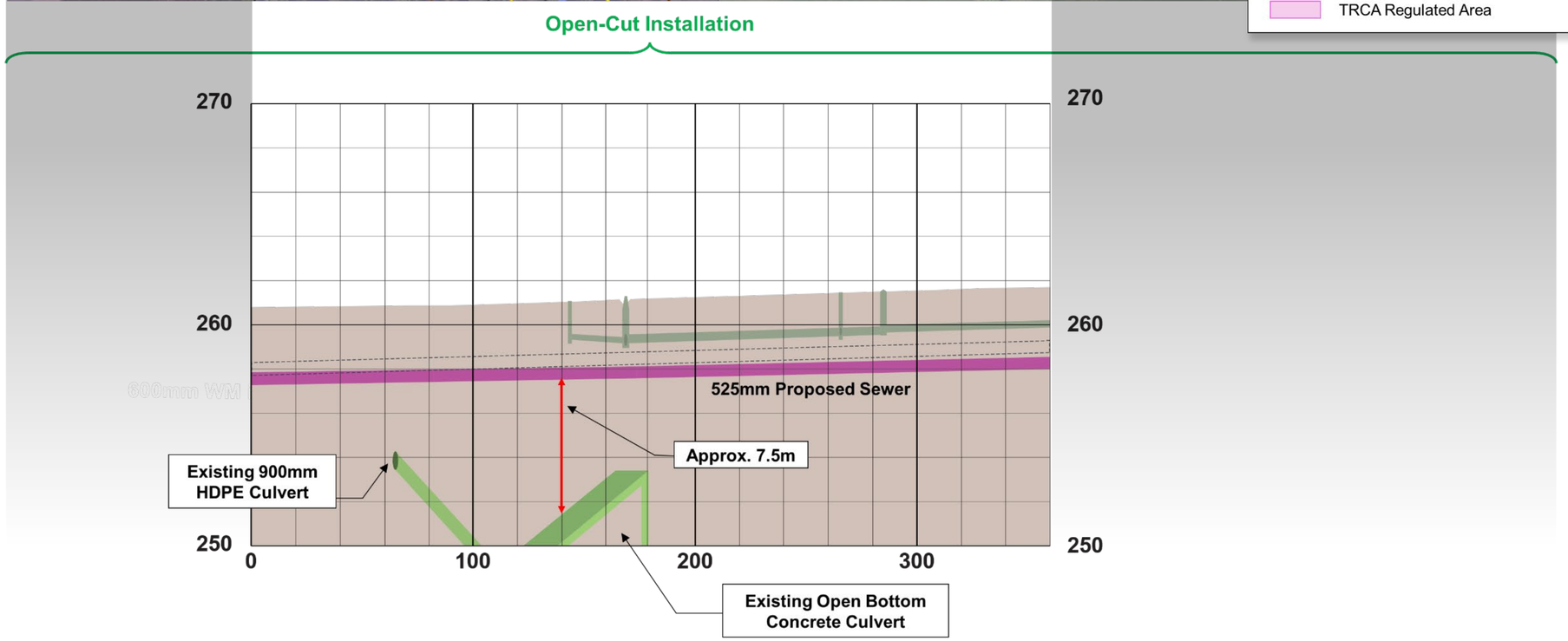
Preliminary Preferred Design Concept – Wastewater

Region of Peel
working with you

Plan View



Profile View



Preliminary Preferred Design Concept – Wastewater

The third step in the wastewater design concept evaluation process is to identify the **preferred location** of the sewer and forcemain route.

The location of the routes considered the following:

- selected construction methodology for both the watermain and gravity sanitary sewers,
- existing constraints, and,
- overall impacts to the community including traffic, natural environment, archaeological and cultural heritage.

The routes are separated into the below components:

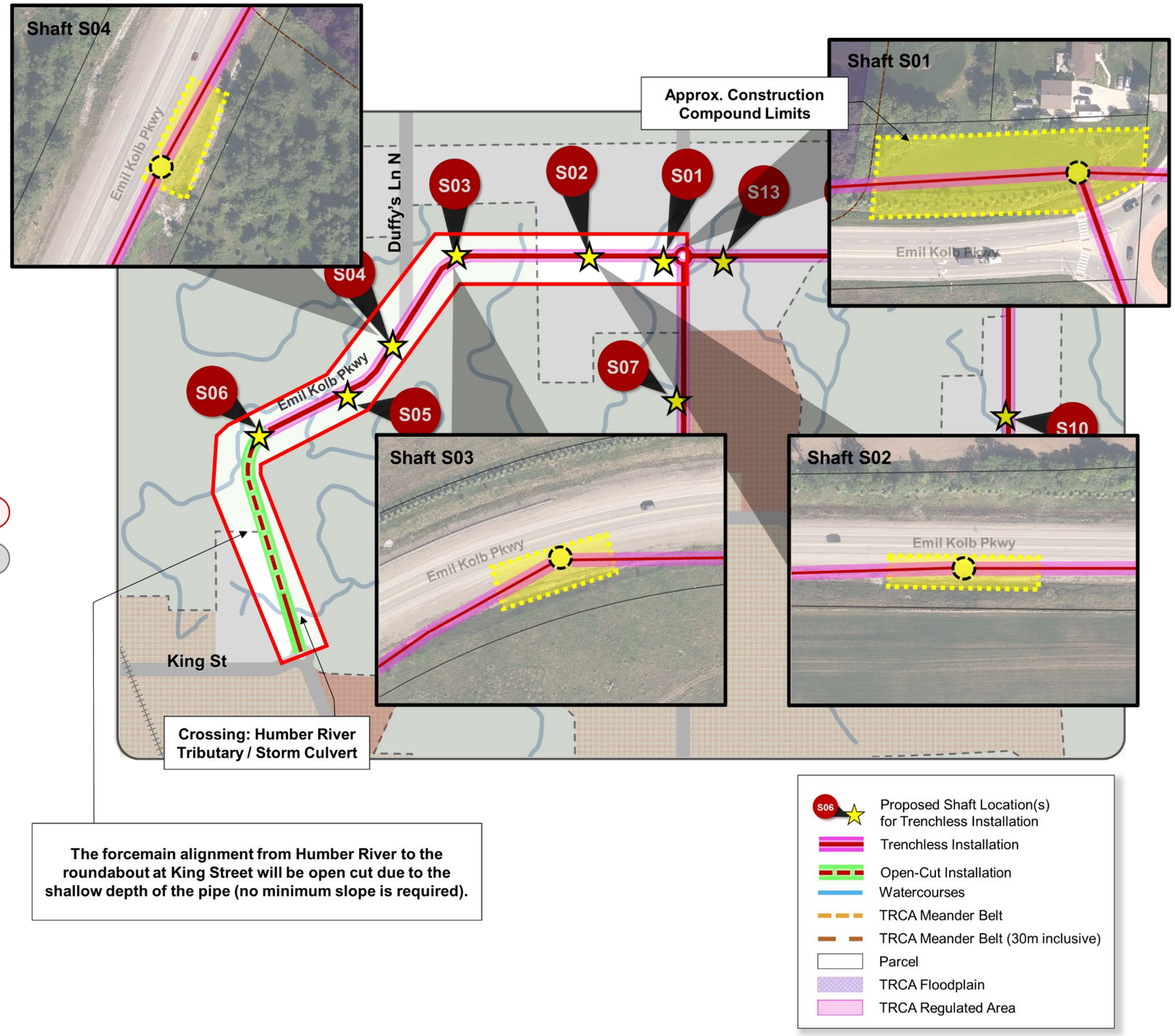
Emil Kolb Parkway | Highway (Regional Road) 50 | Mount Hope Road | Utility Corridor | Columbia Way (water only)

Emil Kolb Parkway

The gravity sewer alignment from Highway 50 to the Humber River (S01 to S06) will be tunnelled due to the depth of the pipe required to achieve minimum slope.

The Sewer is located on the **south side** of the road ROW:

- No conflicts within existing infrastructure.
- Available space for proposed shaft compounds.
- Minimal impacts to traffic with no reduction in number of traffic lanes.
- No archaeological potential within the road right of way.



Preliminary Preferred Design Concept – Wastewater

Region of Peel working with you

Emil Kolb Parkway | Highway (Regional Road) 50 | Mount Hope Road | Utility Corridor | Columbia Way (water only)

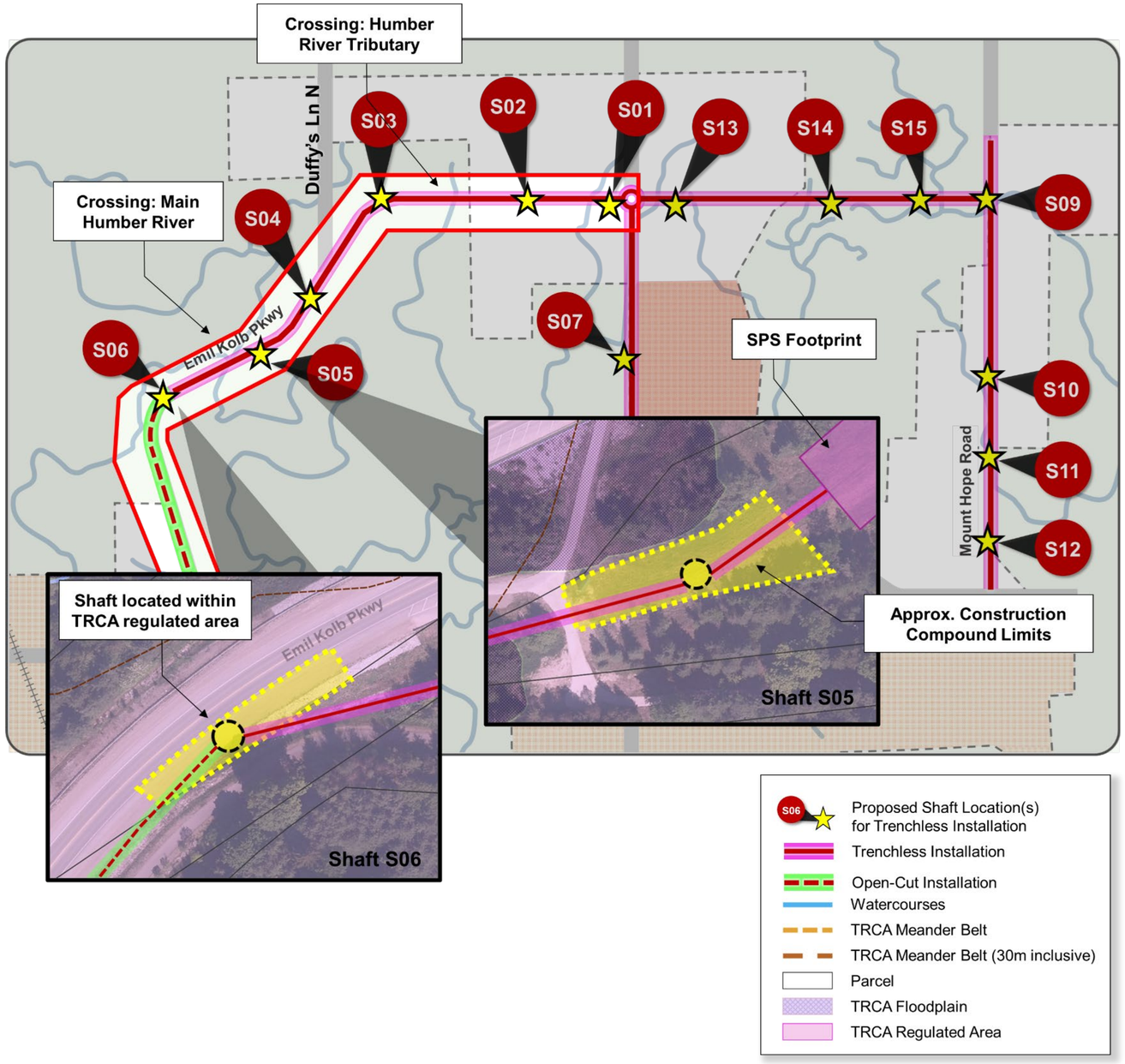
Emil Kolb Parkway (cont'd)

The gravity sewer alignment from Highway 50 to the Humber River (S01 to S06) will be tunnelled due to the depth of the pipe required to achieve minimum slope.

The Sewer is located on the **south side** of the road ROW:

- No conflicts within existing infrastructure.
- Available space for proposed shaft compounds.
- Minimal impacts to traffic with no reduction in number of traffic lanes.
- No archaeological potential within the road right of way.

Wastewater Shafts S05 and S06 is shared with Water Shafts W06 and W07.



Preliminary Preferred Design Concept – Wastewater

Region of Peel
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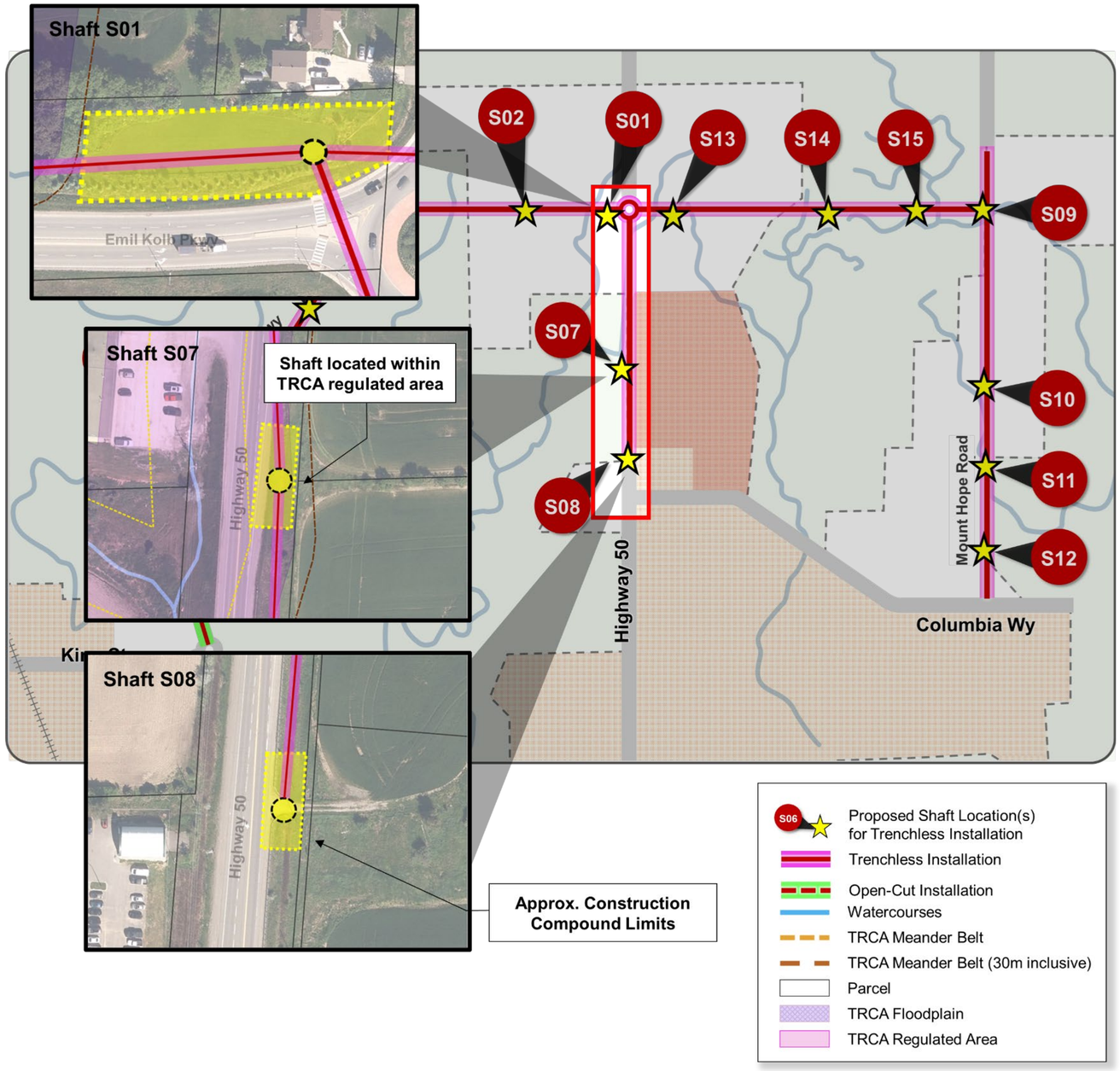
Emil Kolb Parkway | **Highway (Regional Road) 50** | Mount Hope Road | Utility Corridor | Columbia Way (water only)

Highway (Regional Road) 50

The gravity sewer alignment will be tunneled from the roundabout at the intersection of Emil Kolb Parkway and Highway 50 and will run south to Columbia Way.

The sewer is located on the **east side** of the road ROW:

- No conflicts within existing infrastructure.
- Available space for open cut construction within road shoulder.
- Reduced impacts to trees and no watercourse crossings.
- Minimal impacts to traffic with no reduction in number of traffic lanes.
- No archaeological potential within the road right of way.



Preliminary Preferred Design Concept – Wastewater

Region of Peel
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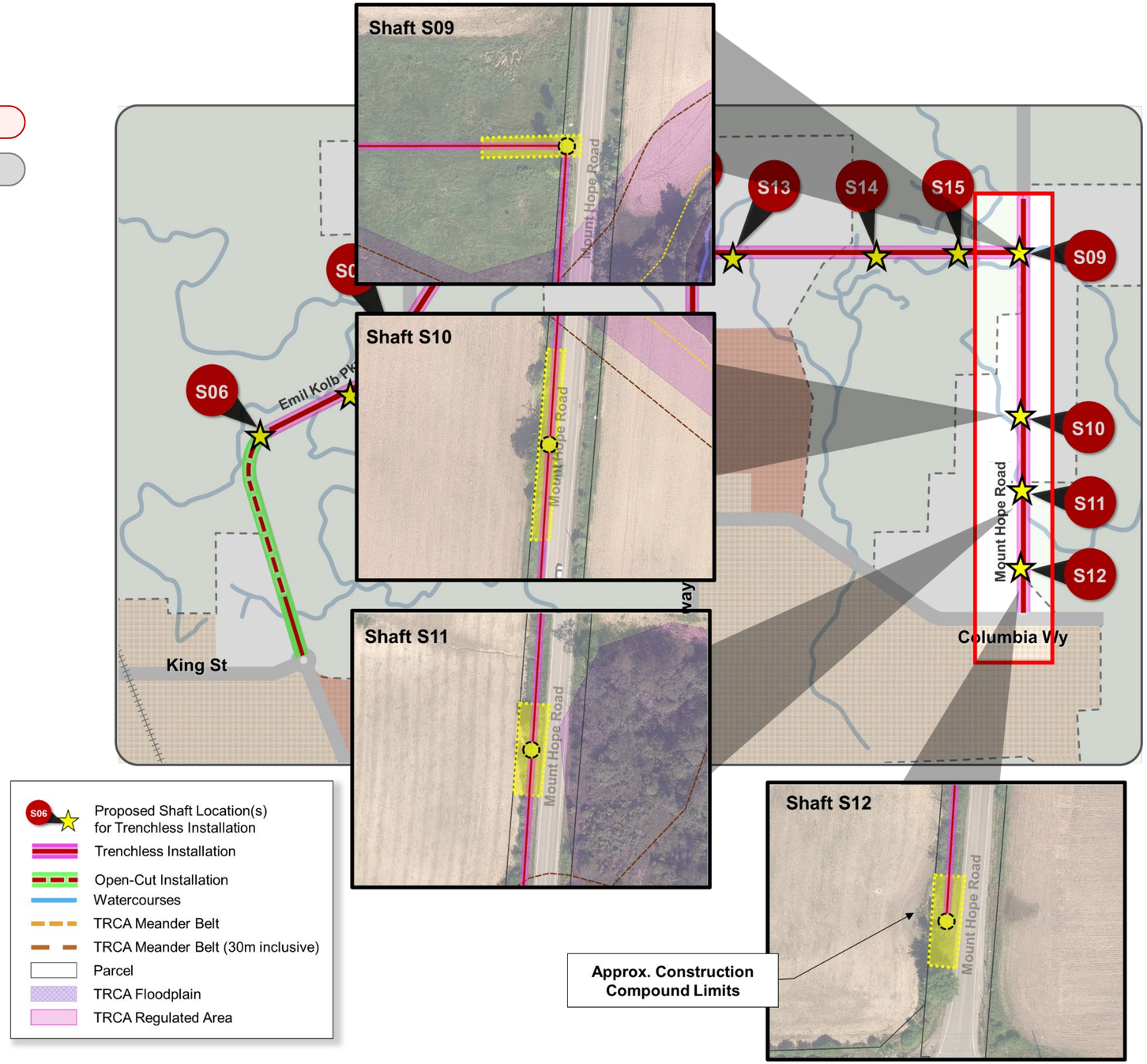
Emil Kolb Parkway | Highway (Regional Road) 50 | **Mount Hope Road** | Utility Corridor | Columbia Way (water only)

Mount Hope Road

The gravity sewer alignment will be tunneled from the intersection of Columbia Way to the new utility corridor located along the planned Town local road.

The sewer is located on the **west side** of the road ROW:

- No conflicts within existing infrastructure.
- Available space for open cut construction within road shoulder.
- Watercourse crossing sections will be tunnelled to avoid impacts to the fish and fish habitat.
- Minimal impacts to traffic with no reduction in number of traffic lanes.
- No archaeological potential within the road right of way.



Preliminary Preferred Design Concept – Wastewater

Region of Peel working with you

Emil Kolb Parkway | Highway (Regional Road) 50 | Mount Hope Road | **Utility Corridor** | Columbia Way (water only)

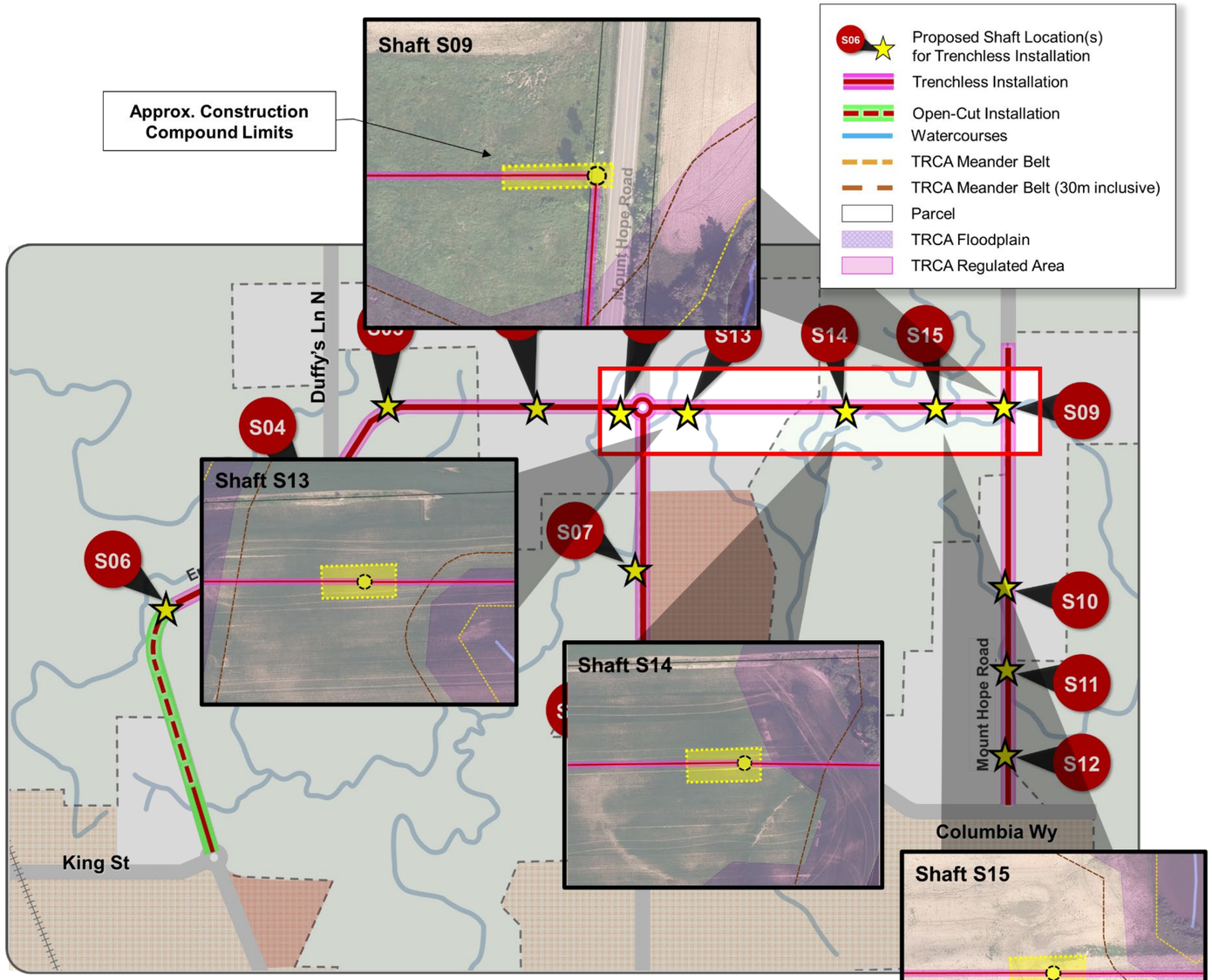
Utility Corridor

The gravity sewer alignment from the roundabout at Emil Kolb Parkway and Highway 50 will be tunnelled to Mount Hope Road to avoid impacts to the fish and fish habitat and other key structures.

Note: Ongoing natural environment, cultural heritage and agricultural studies to support location of wastewater alignment to minimize impacts to the natural environment.

The sewer is located **within a new utility corridor** which aligns with Town of Caledon's planned local road.

- Field investigation cleared the alignment of any further archaeological impact.
- No conflicts with existing infrastructure.
- Alignment provides a looped water system minimizing water quality issues, reducing service risk, and increasing system resiliency.
- Landowners willing to work with the Region
- Natural features and areas of potential archaeological importance have been identified and will be considered in the selection of the preferred infrastructure alignment.



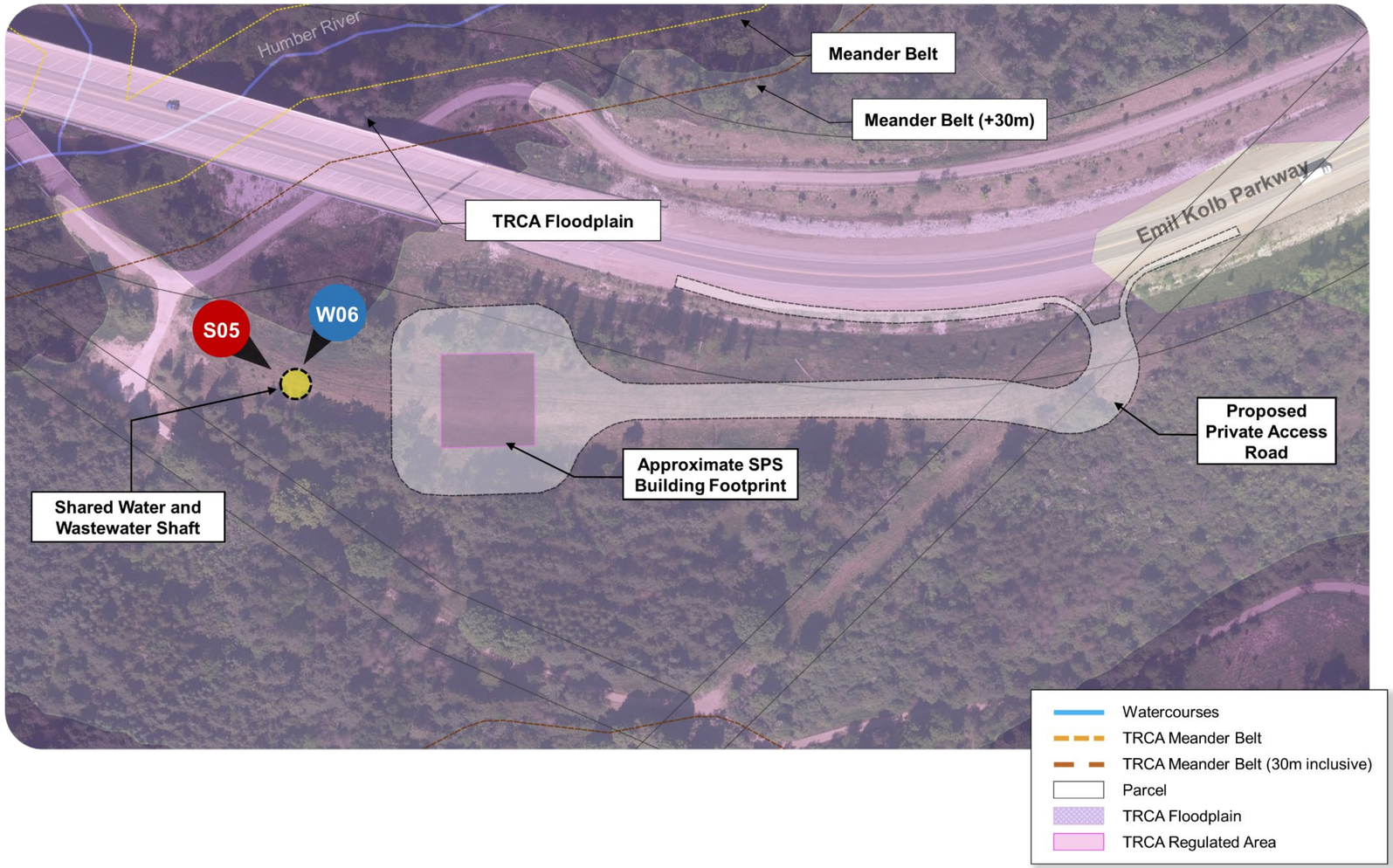
Note* Natural environment field investigations were completed in this area to validate the existing natural features and identify impacts and mitigation measures to further refine the alignment along the corridor. Investigations included headwater drainage feature survey, wetland verification and site reconnaissance. The results will be considered in the selection of the preferred shaft locations and infrastructure alignment.

Preliminary Preferred Design Concept – Wastewater

The last step in the wastewater design concept evaluation process is to identify the **preferred location for the Sanitary Pumping Station (SPS) site, access road and forcemain route**. The location of the SPS and forcemain considered the selected construction methodology for both the watermain and sewers, existing site constraints and overall impacts to the community including traffic, natural environment, archaeological and cultural heritage features.

Sanitary Pumping Station (SPS) Site and Access Road

- Validated during Phase 2 and further refined during Phase 3.
- Aligns with watermain, gravity sanitary sewer and forcemain alignment and shaft locations.
- Located on TRCA owned property (property acquisition required) and within TRCA regulated lands.
- SPS site and access road located outside the floodplain and meander belt (including 30m buffer) limits.
- Partially located on previously disturbed lands (previous road alignment).
- Private access road includes an entrance / exit on the east side of Emil Kolb Parkway.
- Mitigation measures will be needed to support operations and movement.
- Site-specific natural environment investigations were completed including headwater drainage survey, wetland delineation surveys, tree habitat survey and a bat cavity assessment. Mitigation measures include construction timing outside key ecological seasons and tree protection / replacement.
- No Species at Risk trees were identified.
- Cultural Heritage, Archaeological and Phase 1 ESA have been completed at this location to further inform the preferred site and identify impacts and mitigation measures.

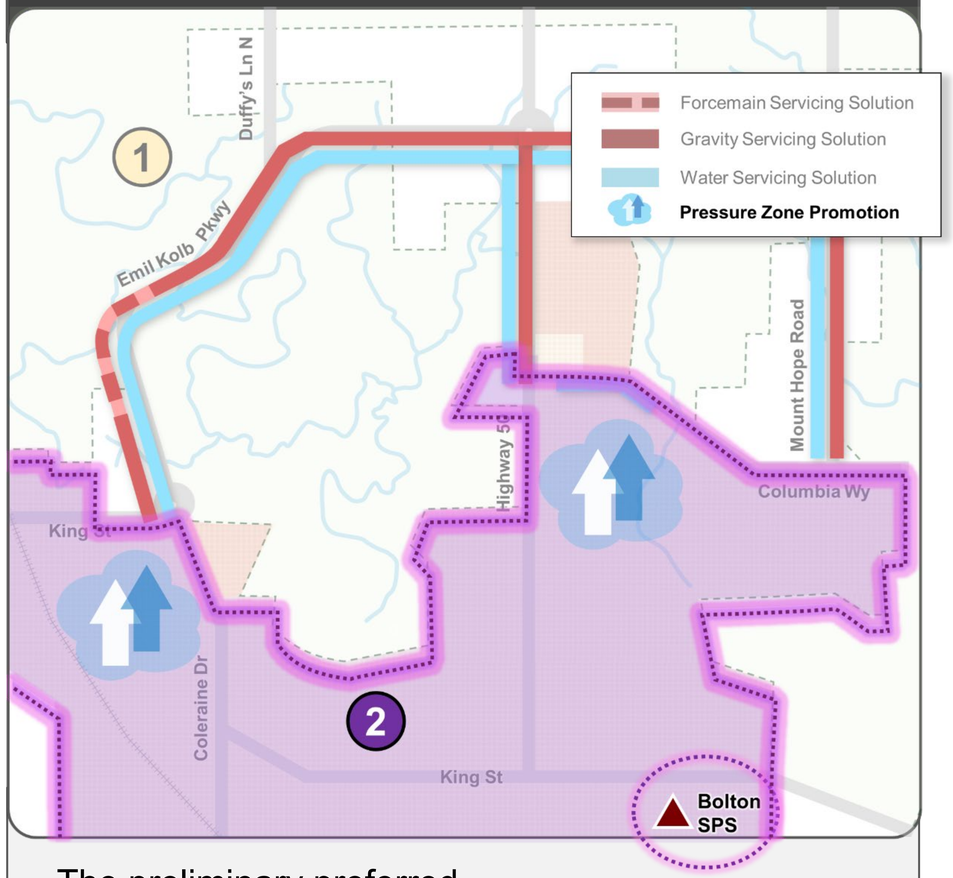


Bolton Class EA – Focus Area 2

Region of Peel
working with you

Focus Area 2

Optimizing the Existing System



The preliminary preferred solution for **Focus Area 2** includes the following elements listed on the right.

Water System

Pressure Zone Promotion

- Pressure Zone 6 areas promoted to new Pressure Zone 7 to optimize level of service.

Wastewater System

Bolton SPS and Forcemain Optimization

- New sanitary forcemain from Bolton SPS along Old King Road to existing trunk sewer on Nunnville Road ultimately conveying flow to the Albion-Vaughan Trunk Sewer.
- Maintain the existing sanitary forcemain system on Strawberry Hill Court to provide operational flexibility and resiliency.

Inflow and Infiltration (I&I) Reduction

- Inflow is rainwater or snowmelt that enters the wastewater system through direct connections (e.g., downspouts, stormwater catch basins, building foundation drains). Infiltration is rainwater and/or groundwater that enters the wastewater system through defects in the sewer.
- The Region has an ongoing wastewater flow monitoring program and comprehensive I&I reduction strategy developed to reduce and mitigate I&I in the wastewater system.

What are the next steps?

Schedule and Future Considerations

Region of Peel working with you

Public and stakeholder consultation was maintained through all phases of the Class Environmental Assessment process.

PHASE 1

June 2023
Issue Notice of Study Commencement.

Summer 2023
Agency and Stakeholder Pre-Consultation Workshops.

Fall 2023
Review of Baseline Data and Information to Define Problem and Opportunity Statement.

November 2023
PIC No. 1 – Presented the Study Problem and Opportunity Statement and Conceptual Servicing Alternatives.

PHASE 2

Fall 2023
Prepare Natural, Hydrogeological, Social, Cultural, Archaeological, and Economic Inventory.

Winter 2024
Identify Key Factors and Considerations along with Potential Impacts and How to Address them.

Spring 2024
Evaluate and Review Alternatives and Construction Methodologies.

June 2024
PIC No. 2 – Presented Preliminary Preferred Servicing Strategies.

PHASE 3

Summer 2024
Validate Preliminary Preferred Servicing Strategy.

September 2024
Identify Preferred Design Technology Alternatives and Methodologies.

Fall 2024
Evaluate Preferred Design Technologies and Refine Tunnel Shaft Locations.

December 2024 – January 2025
PIC No. 3 – Presented the Preliminary Preferred Design Concept and Tunnel Shaft Locations.
We are Here!

PHASE 4

February 2025
Confirm Preferred Design Concepts.

Spring 2025
Finalize Environmental Study Report (ESR) and Conceptual Designs.

Spring 2025
Issue Notice of Study Completion and 45-Day Public Review and File Final ESR.

PHASE 5

Fall 2025
Detailed Design Commences.

2027
Construction of Gravity sewers and Watermain from Highway 50 and Emil Kolb Pkwy to Columbia Way. Duration is approximately 12 months.

2027 to 2028
Construction of Gravity Sewers and Watermain from Emil Kolb Pkwy south to Highway 50. Duration is approximately 14-18 months.

2027 to 2029
Approximate Construction Start for Emil Kolb Pkwy Sewage Pumping Station. Duration is approximately 14-24 months.

Post-2029
Construction of Gravity Sewers and Watermain Alignment from Proposed Easement and along Mount Hope Rd South.

Solution Construction Complete and Strategy in Service 2028/2029.

Thank you!

Region of Peel
working with you

What are we doing next?

- Review and incorporate responses from PIC No. 3.
- Complete supporting technical studies including agricultural impact assessment and Phase 1 ESA.
- Confirm preferred design concepts for the preferred solution.
- Engagement with Indigenous Rights and Interest Holders.
- Consultation with affected / directly impacted parties, public review agencies, and other interested stakeholders.
- Prepare Environmental Study Report for 45-day public review period.

Project Overview:

- Winter 2025 - Confirm the preferred design concepts for the preferred solution.
- Spring 2025 - A detailed costing, phasing and implementation plan will be developed.
- Spring 2025 - Notice of Study Completion and 45-day public review period.

Stay Engaged!

- ✓ Have a look at the project information available on the project website.
- ✓ Provide your feedback regarding the information presented.

Do you have any questions, comments, or want to stay up to date?

Please contact us anytime!

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Please note that information related to this study will be collected in accordance with the *Freedom of Information and Protection of Privacy Act*. All comments received will become part of the public record and may be included in the study documentation prepared for public review.

If you need any accommodations to provide comments and/or feedback for this study, please contact the Project Manager.

Excerpts From Hydrogeological Report

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A REPORT TO
UNITED HOLDINGS INC.

PRELIMINARY HYDROGEOLOGICAL ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT

NORTHWEST QUADRANT OF MOUNT HOPE ROAD AND COLUMBIA WAY,
TOWN OF CALEDON

REFERENCE NO. 2309-W138

January 24, 2025

DISTRIBUTION

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1 Digital Copy - Soil Engineers Ltd. (Richmond Hill)

LIMITATIONS OF LIABILITY

This report was prepared by Soil Engineers Ltd. for the account of for United Holdings Inc. and for review by its designated agents, financial institutions and government agencies, and can be used for development approval purposes by the Town of Caledon and Region of Peel and their peer reviewer who may rely on the results of the report. The material in it reflects the judgement of Yogirajsinh Rana, B.Sc., C.Tech., and Narjes Alijani, M.Sc., P.Geo. Any use which a Third Party makes of this report and/or any reliance on decisions to be made based on it is the responsibility of such Third Parties. Soil Engineers Ltd. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this.

One must understand that the mandate of Soil Engineers Ltd. is to obtain readily available current and past information pertinent to the Subject Site for a Hydrogeological Study only. No other warranty or representation, expressed or implied, as to the accuracy of the information is included or intended by this assessment. Site conditions are not static and this report documents site conditions observed at the time of the Subject Site reconnaissance.

Issues and Revisions Registry

Modification	Date	Description of issued and/or revision
1st Draft Report	December 20, 2024	For Review
2nd Draft Report	January 23, 2025	For Comments Response from Client
Final Report	January 24, 2025	For Review

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1.0 EXECUTIVE SUMMARY

United Holdings Inc. retained Soil Engineers Ltd. (SEL) to conduct a hydrogeological assessment for the property located at the northwest quadrant of the intersection of Mount Hope Road and Columbia Way in the Town of Caledon, Ontario (the Subject Site).

The Subject Site is currently a vacant land utilized as agricultural land, and it is surrounded by agricultural fields and rural residential properties.

Based on the Concept Plan and a Draft Plan provided by SGL Planning and Design Inc. dated January 23, 2025, it is understood that the proposed development will include the construction of residential lots, a Mid/High Rise Block located on the southeast, a commercial block in the southwest portions of the Subject Site along with stormwater management blocks and a park block. The proposed subdivision will also be provided with roads and municipal services.

The current investigation revealed that:

- The Subject Site lies within the physiographic region of southern Ontario known as the South Slope and the landform is identified as Till Plain (Drumlinized).
- The Subject Site is located within an area mapped as Clay to silt-textured till (derived from glaciolacustrine deposits or shale) (5d).
- The Subject Site is located within the Humber River Watershed that falls in the Toronto and Region Conservation Authority (TRCA) jurisdiction.
- The ground surface elevation ranges approximately between 257.6 metres above sea level (masl) to 263.0 masl based on ground surface elevations measured at the borehole and monitoring wells' locations.
- The subsoil investigation has revealed that beneath the topsoil veneer, and the Earth fill at the western portion of the site mainly comprises silty clay and silty clay till with interbedded layers of silty fine sand within the northwestern portion of the Subject Site.
- Based on the review of the Hydrographs and manual groundwater levels the highest and lowest stabilized shallow groundwater levels measured at El. 263.1 masl and 255.5 masl at BH/MW 12 and BH/MW 5, respectively.
- Based on the review of the Hydrographs and manual water table data, the highest and lowest stabilized surficial water tables interacting with the shallow stratigraphy measured at El. 262.1 masl and 256.3 masl at MP 1 and MP 12, respectively.
- The results of analysis for the unfiltered groundwater indicate no exceedance when compared and evaluated against the Region of Peel Sanitary and Storm Sewer Use By-Law parameters.

- Based on the review of the draft concept plan the details for the residential subdivision are not available for review at the time of preparation of this report. Therefore, the dewatering requirement and the short-term dewatering and long-term foundation drainage flow rates should be assessed once the detailed design becomes available.
- Considering the early stage of the proposed development, the construction approach, detailed design drawings and excavation phases are not available. As such, recommendations on obtaining a permit from MECP should be assessed once the data become available for review. The potential dewatering impact should be assessed, and a mitigation plan should be provided once the detailed design becomes available for the proposed development.
- Obtaining a discharge permit from the Region of Peel may be required if the potential collected discharge water during construction is proposed to be discharged to the region's sewer system.

2.0 INTRODUCTION

2.1 Site Location and Project Description

United Holdings Inc. retained Soil Engineers Ltd. (SEL) to conduct a hydrogeological assessment for the property located on the Northwest Quadrant of Mount Hope Road and Columbia Way in the Town of Caledon, Ontario (the Subject Site).

The Subject Site is currently a vacant land utilized as agricultural land and it is surrounded by agricultural fields and rural residential properties. The location of the Subject Site is shown on **Drawing 1**.

Based on the Concept Plan and a Draft Plan provided by SGL Planning and Design Inc. dated January 23, 2025, it is understood that the proposed development will include the construction of residential lots, a Mid/High Rise Block located on the southeast, a commercial block in the southwest portions of the Subject Site along with stormwater management blocks and a park block. The proposed subdivision will also be provided with roads and municipal services.

2.2 Project Objectives

The current preliminary hydrogeological assessment report presents the regional and local setting of the Subject Site. The findings of the fieldwork, including subsoil investigation, groundwater level and surface water monitoring, groundwater quality assessment and hydraulic conductivity testing are presented in the report.

Potential needs for short-term dewatering and long-term foundation drainage control will be assessed, and hydrogeological impacts of the proposed development to the nearby groundwater receptors including water supply wells, natural heritage features, and structures will be assessed (if applicable) and presented in the final hydrogeological assessment. The final hydrogeological assessment report will provide mitigation plans on the potential impacts of the proposed development to the groundwater receptors, and structures. Comments and recommendations will be provided on any needs for applying for a Permit to Take Water (PTTW) or posting Environmental Activity and Sector Registry (EASR) with the Ministry of the Environment, Conservation and Parks (MECP).

2.3 Scope of Work

The scope of work for the hydrogeological assessment is summarized below:

- *Background Review:* Available background geological and hydrogeological information for the Subject Site including topographic mapping, surface geological, natural heritage features

databases, Town of Caledon official plans, Toronto and Region Conservation Authority (TRCA) regulated area plans, and MECP water well records were reviewed.

- *Fieldwork:* Fieldwork includes inspecting the Subject Site and surrounding properties concerning the natural features, groundwater receptors, and structures, as well as installing and developing the monitoring wells. Additionally, groundwater levels within the installed monitoring wells were monitored over ten (10) monitoring events, in-situ hydraulic conductivity testing was completed within the installed monitoring wells. Additionally, one (1) set of groundwater samples was collected and submitted to a CALA laboratory to characterize groundwater quality in comparison with the Region of Peel Storm and Sanitary Sewer Use By-Law parameters.
- *Wetlands and Watercourses Monitoring Program:* Installation of piezometers and staff gauges and establishment of the surface water flow monitoring stations within the wetland areas and watercourses. The wetland monitoring program consists of the monitoring of the installed piezometers, staff gauges and flow monitoring stations over a 2-year monitoring program. Additionally, the surface water quality monitoring program for the watercourses over 2 years is proposed for the selected locations. The location of the surface water sampling is proposed based on the review of the Town of Caledon Terms of Reference for the Local Sub watershed Studies Dated May 2024.
- *Short-Term Dewatering Needs:* Based on a review of the available design drawings, findings of the current subsurface investigation, and recommendations provided in the geotechnical investigation report (if available), short-term dewatering flow rate including groundwater seepage, and anticipated water that should be collected over potential storm events will be calculated and presented in the final hydrogeological assessment report. A mitigation plan will be recommended to mitigate potential short-term dewatering impacts to the nearby groundwater receptors (including natural heritage features and water supply wells), and structures, if applicable.
- *Permit Requirements:* Considering the estimated short-term construction dewatering and long-term foundation drainage flow rates, as a part of the final hydrogeological assessment report, recommendations will be provided on any need for applying for a PTTW or posting on the EASR with the MECP, and the Town of Caledon/ Region of Peel, if required.

3.0 APPLICABLE REGULATIONS AND OFFICIAL PLANS

The regulations and policies relevant to this hydrogeological assessment and the location of the Subject Site within the official plans are summarized below.

3.1 Toronto Regional Conservation Authority (TRCA) Policies and Regulation (O. Reg. 41/24)

Under Section 28 of the Conservation Authorities Act, local conservation authorities are mandated to protect the health and integrity of the regional greenspace system and to maintain or improve the hydrological and ecological functions performed by valley and stream corridors. The TRCA, through its regulatory mandate, is responsible for issuing permits under Ontario Regulation (O. Reg.) 41/24, Development, Interference with Wetlands and Alterations to Shorelines and Watercourses for development proposal or Site alteration work to shorelines and watercourses within the regulated areas.

TRCA Regulated Area online mapping was reviewed on December 16, 2024. It is our understanding that the small area surrounding the two existing creeks or swales, which cross the Subject Site from northwest to southeast in the north portion of the Subject Site, and another originating from the southern portion of the Subject Site to the southeast boundary, falls within a TRCA Regulated Area. Therefore, it is expected that obtaining a permit from the TRCA under O. Reg. 41/24 will be necessary for the proposed development.

3.2 Clean Water Act

The MECP mandates the protection of existing and future sources of drinking water under the Clean Water Act, 2006 (CWA). Initiatives under the CWA include the delineation of Wellhead Protection Areas (WHPAs), significant groundwater recharge areas (SGRAs) and Highly Vulnerable Aquifers (HVAs) as well as the assessment of drinking water quality and quantity threats within Source Protection Regions. Source Protection Plans are developed under the CWA and include the restriction and prohibition of certain types of activities and land uses within WHPAs.

Based on a regional-scale source water protection mapping (Source Water Protection Information atlas) provided by the MECP on December 17, 2024, the Subject Site is not located within a WHPA area Q1 and Q2, issue contributing area and intake protection zone, event-based area and HVA. However Subject Site is located in the Significant Groundwater Recharge Area (SGRA)

3.3 Future Town of Caledon Official Plan

The Town of Caledon Official Plan establishes the policies to guide the development of the Town. Caledon Council on March 26, 2024, adopted the future Caledon Official Plan to shape the future of

Caledon for the next 30 years. The Future Caledon Official Plan implements the Region of Peel Official Plan (April 2022) which identifies the Mount Hope West lands as "2051 Urban Area" on Schedule E-1 (Regional Structure).

Future Caledon Official Plan maps were reviewed for the current study with the results summarized below:

- Schedule B1 (Town Structure) - A review of the map, dated March 2024, delineates the Mount Hope West lands as "Urban Area".
- Schedule B2 (Growth Management) – A review of the map, dated march 2024, delineates the Mount Hope Land as “New Urban Area 2051”.
- Schedule B4 (Land Use Designation) - A review of the map, dated March 2024, indicates that the Subject Site is located within the New Community Area.

Based on the information reviewed from the Notice of the Passing of Zoning By-Bylaw 2024-057, it is understood that the purpose and effect of By-law 2024-057 is to amend Comprehensive Zoning By-law No. 2006-50, as amended to rezone lands to provide a range of housing and land uses that aim to advance Caledon’s Housing Pledge and the prescribed provincial priority of building 1.5 million new residential units by December 2031. The town of Caledon Council in November 2024 also approved a Growth Management and Phasing Plan which identified the Mount Hope West lands as being in Phase 1 of the town's future Growth.

4.0 METHODOLOGY

4.1 Borehole Advancement, Monitoring Well and Piezometer Installation

Drilling boreholes and construction of monitoring wells were conducted for geotechnical investigation by SEL Ltd (SEL). Between September 23 and 26, 2023. The program consisted of the drilling of thirteen (13) boreholes (BH) and the installation of twelve (12) monitoring wells for geotechnical and hydrogeological assessment purposes.

Moreover, additional drilling and installation of the monitoring wells and mini piezometers (MP), and piezometer (PZ) were conducted for the hydrogeological assessment and wetland monitoring program by SEL Ltd (SEL) between May 8 and May 9, 2024. The program consisted of the drilling and installation of nine (9) monitoring wells and twelve (12) mini piezometers for wetland monitoring and hydrogeological assessment. The locations of the boreholes and monitoring wells are shown on **Drawing 2**.

Borehole drilling and monitoring well construction were completed by a licensed water well contractor, under the full-time supervision of a drilling supervisor from SEL. SEL's geotechnical/hydrogeological supervisor logged the soil strata encountered during borehole advancement and collected representative soil samples for textural classification. The boreholes were drilled using a track-mounted drill rig equipped with continuous flight, solid-stem augers. Detailed descriptions of the encountered subsoil and groundwater conditions are provided by SEL and presented on the borehole and monitoring well logs, on the enclosed **Appendix A-1 and Appendix A-2**.

The monitoring wells were constructed using 50-mm diameter Trilock pipes and 1.5 to 3.0 m long slotted well screens, which were installed in each of the selected geotechnical boreholes. All of the monitoring wells were equipped with monument protective casings above the ground surface.

The 30 mm diameter Trilock pipes and 0.6 m long slotted well screen, were installed at the selected location. The mini piezometers were installed to observe the surficial water interaction with the shallow stratigraphy at the selected locations close to the wetland and or drainage features.

The UTM coordinates and ground surface elevations at the monitoring wells and piezometer locations, as well as the construction details, are presented in **Table 4-1**. The ground surface elevations and horizontal coordinates at the monitoring wells and piezometers' locations were determined at the time of the investigation, using a TSC 3 SP 60 (Trimble) handheld Global Navigation Satellite System.

Table 4-1 Monitoring Well and Piezometer Installation Details

MW, MP, PZ ID	Installation Date	UTM Coordinates (m)		Ground El. (masl)	Screen Interval (mbgs)	Soil in the Screen Interval	Casing Dia. (mm)	Protective Casing Type
		Easting	Northing					
BH/MW 1	October 24, 2023	601146.9	4861361.0	262.5	13.8 – 16.8	Silty Clay Till	50	Monument
BH/MW 2S	October 26, 2023	601039.9	4861194.0	262.6	4.6 – 6.1	Silty Clay Till	50	Monument

MW, MP, PZ ID	Installation Date	UTM Coordinates (m)		Ground El. (masl)	Screen Interval (mbgs)	Soil in the Screen Interval	Casing Dia. (mm)	Protective Casing Type
		Easting	Northing					
BH/MW 2D	October 26, 2023	601041.9	4861194.6	262.7	15.1 – 16.6	Silty Clay	50	Monument
BH/MW 4	October 25, 2023	600901.5	4861281.0	261.0	13.6 – 16.6	Silty Clay Till	50	Monument
BH/MW 5	October 25, 2023	600762.5	4861114.5	259.2	6.2 – 7.7	Silty Clay	50	Monument
BH/MW 6	October 25, 2023	600742.8	4861271.6	258.9	6.2 – 7.7	Silty Clay	50	Monument
MP 3	May 8, 2024	600777.2	4861281.8	258.7	0.8 – 1.4	Earth Fill	30	NA
MP 4	May 8, 2024	600656.7	4861357.3	259.9	0.8 – 1.4	Silty Clay (interpolated)	30	NA
BH/MW 7	October 23, 2023	600948.6	4861533.2	259.0	3.1 – 6.1	Silty Clay	50	Monument
MP 12	May 8, 2024	600966.5	4861545.8	257.6	0.9 – 1.5	Silty Clay	30	NA
BH/MW 8	May 9, 2024	600741.9	4861547.5	262.0	2.8 – 5.8	Silty Clay and Silty Clay Till	50	Monument
BH/MW 9	October 24, 2023	600753.9	4861727.0	260.6	3.2 – 6.2	Silly Clay and Silty Clay Till	50	Monument
BH/MW 10	October 23, 2023	600530.9	4861721.7	263.1	3.1 – 6.1	Silty Clay	50	Monument
BH/MW 12	October 24, 2023	600343.4	4861928.9	263.0	3.1 – 6.1	Silty Clay and Silty Clay Till	50	Monument
BH/MW 13	October 24, 2023	600326.8	4862131.4	262.0	3.3 – 6.3	Silty Clay	50	Monument
BH/MW 101	May 9, 2024	600993.9	4861264.1	262.2	2.9 – 4.6	Silty Clay	50	Monument
MP 1	May 8, 2024	600992.9	4861249.2	262.0	0.8 – 1.4	Silty Clay	30	NA
BH/MW 102	May 9, 2024	600943.4	4861385.8	259.5	3.0 – 4.5	Silty Clay	50	Monument
MP 2	May 8, 2024	600937.3	4861382.4	259.4	0.9 – 1.5	Silty Clay	30	NA
BH/MW 103	May 8, 2024	600594.0	4861494.2	259.1	3.1 – 4.6	Silty Clay	50	Monument
MP 5	May 8, 2024	600582.3	4861515.7	259.0	0.9 – 1.5	Silty Clay	30	NA
BH/MW 104	May 8, 2024	600456.8	4861666.4	261.6	3.1 – 4.6	Silty Clay and Silty Fine Sand	50	Monument
MP 6	May 8, 2024	600464.0	4861665.3	261.6	0.9 – 1.5	Silty Clay	30	NA
BH/MW 105	May 8, 2024	600375.0	4861775.8	261.8	3.1 – 4.6	Silty Clay and Silty Fine Sand	50	Monument
MP 7	May 8, 2024	600373.9	4861783.0	261.6	0.8 – 1.4	Silty Clay	30	NA
MP 8	May 8, 2024	600342.6	4861753.2	261.5	0.8 – 1.4	Silty Clay	30	NA
BH/MW 106	May 8, 2024	600293.4	4861830.3	261.5	3.1 – 4.6	Silty Clay	50	Monument
MP 9	May 8, 2024	600257.5	4861819.4	261.3	0.7 – 1.3	Silty Clay & Silty Fine Sand	30	NA
BH/MW 107	May 9, 2024	600466.1	4862007.4	259.9	3.1 – 4.6	Silty Clay	50	Monument
MP 10	May 8, 2024	600484.2	4862022.1	259.4	0.9 – 1.5	Silty Clay	30	NA
BH/MW 108	May 9, 2024	600689.0	4861819.8	259.3	3.1 – 4.6	Silty Clay	50	Monument
MP 11	May 8, 2024	600686.3	4861821.9	259.2	0.9 – 1.5	Silty Clay	30	NA

MW, MP, PZ ID	Installation Date	UTM Coordinates (m)		Ground El. (masl)	Screen Interval (mbgs)	Soil in the Screen Interval	Casing Dia. (mm)	Protective Casing Type
		Easting	Northing					
PZ 1S	December 7, 2023	600283.2	4862009.2	260.4	3.0 – 4.5	Silty Clay	20	Monument
PZ 1D	December 7, 2023	600283.4	4862009.8	260.4	4.8 – 6.3	Silty Clay	20	Monument

Notes:
mbgs metres below ground surface,
masl metres above sea level,
MP- Mini Piezometer,
PZ- Piezometer
S- Shallow nested monitoring well/piezometer
D- deep nested monitoring well/piezometer

4.2 MECP Water Well Records Review

MECP Water Well Records (WWRs) were reviewed for the registered wells located at the Subject Site and within a 500 m radius of the Subject Site boundaries (Study Area). The water well records indicate that twenty-three (23) wells are located within the 500 m zone of influence Study Area relative to the Subject Site. The findings of the MECP well records are summarized in **Section 5.6** of the current report.

4.3 Groundwater and Wetland/Surface Water Monitoring

All Twenty (20) installed monitoring wells were utilized to measure and monitor groundwater and Twelve (12) mini piezometers and piezometers were utilized to measure and monitor wetlands and water courses in the Subject Site and adjacent land to the north and west of the Subject Site.

Monitoring wells BH/MW 1 to 7 and BH/MW 9 to 13 were developed on November 15, 2023, and BH/MW 101 to 108 and BH/MW 8 were developed on May 28, 2024. BH/MW 1, 8, 101 to 108, and MP 1 to 12 were instrumented with the automated transducer data logger to continuously monitor the groundwater and water table fluctuation in the wetland features and watercourse/water bodies. The groundwater level and water table monitoring program in the wetland features is currently ongoing and this report will be updated upon completion of the 2-year long-term groundwater and wetland monitoring program.

The stabilized groundwater levels were also measured manually over ten (10) monitoring events from November 15, 2023, to November 4-5, 2024, with the results presented in **Appendices C** and **D**.

4.4 In-Situ Hydraulic Conductivity Test

SEL has conducted in-situ hydraulic conductivity tests (falling head) at all the BH/MW locations. The in-situ hydraulic conductivity test (falling head and rising head) provides estimated hydraulic conductivity (K) for subsoil strata at the depths of the well screens. The monitoring wells were developed in advance of the tests. Well development involves the purging and removal of groundwater from each monitoring

well to remove remnants of clay, silt and other debris introduced into the monitoring well during construction, and to induce the flow of formation groundwater through the well screens, thereby improving the transmissivity of the subsoil strata formation at the well screen depths.

The in-situ falling head hydraulic conductivity test involves the placement of a slug of known volume into the monitoring well, below the water table, to displace the groundwater level upward. The in-situ rising head hydraulic conductivity test involves removing a volume of water from the monitoring well to displace the groundwater level downward. The rate at which the water level recovers to static conditions (rising head/falling head) is tracked manually using a water level tape and a data logger. The rate at which the water table recovers to static conditions is used to estimate the K value for the water-bearing strata formation at the well screen depth using the Bouwer and Rice method (1976). The findings for the hydraulic conductivity testing are presented in **Section 7.6** of the current report.

4.5 Groundwater Quality Assessment

SEL completed a groundwater quality assessment on January 4, 2024. One (1) set of groundwater samples was collected from one (1) selected monitoring well (BH/MW 2D) to characterize its quality for evaluation against the Region of Peel Sanitary and Storm Sewer Use By-Law parameters. This assesses whether any anticipated dewatering effluent can be disposed of into the Region of Peel Storm and Sanitary Sewer system during construction. Based on the results, recommendations for any pre-treatment for any dewatering/drainage effluent can be developed, if required.

SGS Canada Inc. performed the sample analysis and the results of the analysis are discussed in **Section 7.7** of the current report.

4.6 Review of Regional Data and Available Reports for the Subject Site

The maps, data, and documents provided by the MECP, Ontario Geological Survey (OGS), Ministry of Natural Resource (MNR), Oak Ridges Moraine Group (ORMGP), and TRCA were reviewed. Additionally, an issued geotechnical report was reviewed at the time of preparation of the current hydrogeological assessment report, with the findings summarized in **Sections 5 and 6**.

5.0 REGIONAL AND LOCAL SITE SETTING

5.1 Regional Geology

The current understanding of the surface geological setting of the Subject Site is based on scientific work conducted by the OGS (OGS, 2003). The Subject Site is located within an area mapped as Clay to silt-textured till (derived from glaciolacustrine deposits or shale) (5d). **Drawing 3** illustrates the mapped surficial geology for the Subject Site and the surrounding area.

The Oak Ridges Moraine Groundwater Program (ORMGP) produced a cross-sectional geological map to aid in the characterization of the general area. Considering the regional cross-section, it is understood that the overburden units prevalent in this area are as follows, with the youngest unit at the top:

- *Undifferentiated Sediments:* Undifferentiated sediments present in the ground surface, with an approximate thickness of ranging from 0.07 to 1.38 m the Subject Site.
- *Halton Till (Upper Till):* The Halton Till is mainly comprised of sandy silt to clayey silt till interbedded with silt, clay, and a number of discontinuous sand and gravel lenses. It was deposited approximately 12,500 years ago. Based on cross-section, the Halton Till or equivalent can be contacted beneath the undifferentiated sediments with an approximate thickness ranging from 9.6 m to 30.2 m.
- *Oak Ridges Moraine:* The Oak Ridges Aquifer Complex (ORAC) is a regionally significant aquifer in southern Ontario. It is primarily composed of interbedded fine sand and silt deposits with localized coarse sand and gravel deposits. The ORAC is approximately 90 m thick beneath the crest of the moraine but thins out rapidly towards the margins. The approximate thickness of the ORAC ranges from 36 m to 54 m in across the Subject Site.
- *Lower New Newmarket Till:* The Newmarket Till is a regionally extensive till formation that acts as an aquitard separating the Oak Ridges Aquifer Complex (ORAC) from the underlying Thorncliffe Formation. Based on the ORMGP cross-section, Newmarket Till is mapped beneath the ORAC. The thickness of the lower Newmarket Till ranges from 0.2 to 2.3 m beneath the Subject Site.
- *Thorncliffe Formation:* The Thorncliffe Formation consists of glaciofluvial and glaciolacustrine sand and silt deposited approximately 30,000 to 50,000 years ago. The Thorncliffe Formation shows a considerable variation in grain size and thickness, both locally and regionally. It acts as a regional aquifer. Based on the ORMGP cross-section, the approximate thickness of the Thorncliffe at the Subject Site ranges from 5.8 to 16.2 m across the Subject Site.

The underlying bedrock at the Subject Site is the Georgian Bay Formation, which consists of limestone along with shale (OGS, 2007). A review of the ORMGP cross-section indicates that the bedrock could be

contacted at an approximate depth ranging between 52 and 104.0 metres below ground surface (mbgs) beneath the Subject Site.

5.2 Regional Physiography

The Subject Site lies within the physiographic region of southern Ontario known as the South Slope and the landform is identified as Till Plain (Drumlinized). **Drawing 4** shows the location of the Subject Site within the regional physiography map.

5.3 Regional Topography and Drainage

A review of a regional topography map presented on **Drawing 5** indicates that the topography of the Subject Site and surrounding area is gradually sloping towards the south. The site topography is undulating. The ground surface elevation ranges approximately between 257.6 metres above sea level (masl) to 263.0 masl based on ground surface elevations measured at the borehole and monitoring wells' locations.

5.4 Watershed Setting

The Subject Site is located within the Humber River Watershed that falls in the Toronto and Region Conservation Authority (TRCA) jurisdiction.

5.5 Local Surface Water and Natural Heritage Features

The MNR database was reviewed for any natural heritage features including, watercourses, bodies of water, wetland features, Area of Natural and Scientific Interest (ANSI) and wooded areas. **Drawing 6-1** shows the location of the Subject Site within the surrounding Natural Heritage Features.

Record review Indicates that there are a total of two (2) tributaries of the Cold Creek that outlet to Humber River. One (1) Tributary is mapped in the Northern portion of the Subject Site flowing from the west to the southeast direction. The second tributary is located in the southern portion of the Subject Site flowing from the east to the southwest direction and eventually south/southeasterly direction towards the Humber River.

Records of water bodies (pounded water) are mapped within the Subject Site and surrounding lands. Three (3) records are mapped in the north, central and south portions of the Subject Site.

The record review indicates that there is a wetland feature, not evaluated as per Ontario Evaluation Wetland System (OWES), within the south portion of the Subject Site (marked as A on **Drawing 6-2**). A body of water is also mapped at this location, where a watercourse generates and flows east/northeasterly

direction. Furthermore, as per the reviewed records, records of wetland features are mapped around the Subject Site as follows:

- Three (3) wetlands are mapped as unevaluated wetland features outside of the west boundary of the Subject Site. The records are marked as B, C and D on **Drawing 6-2**.
- Four (4) wetlands are mapped as Provincially Significant Wetland (PSW) including two (2) records in the northwest and two (2) records in the west outside of the Subject Site boundary. The records are marked as E, F, G and H on **Drawing 6-2**.

SEL installed mini piezometers and monitoring wells to monitor the selected existing wetlands mapped within and in close proximity to the Subject Site. The location of the monitoring stations is presented in **Drawing 6-2**. The names and types and nearby monitoring wells and details of the wetlands are provided in **Table 5-1**.

"The Natural Heritage Characterization Report for Mount Hope Lands", prepared by GEI Consultants on December 20, 2024, has been reviewed. A summary of information is presented in **Table 5-1**. In cases where there are discrepancies between the mapping in the Natural Heritage Characterization Report and the MNR datasets, the map prepared by GEI should be considered as it reflects actual site conditions based on ground-truthed surveys. Preliminary Natural Heritage Constraints is provided in the **Appendix A-3**.

Table 5-1 List of the Evaluated and unevaluated Wetlands and Nearby Monitoring Wells

Nearby Installed Monitoring Wells, Mini Piezometers and Piezometers by Soil Engineers Ltd.	Wetland Name and Significance Based on the review of the MNRF's Natural Heritage Area Map	Based on the review "Natural Heritage Characterization Report for Mount Hope Lands", prepared by GEI Consultants on December 20, 2024	
		Wetland Type	Details
BH/MW 101 and MP 1	NA	Marsh	Unevaluated Wetlands to be removed and replicated in greenbelt
BH/MW 102 and MP 2	Unevaluated Wetland	Marsh	Unevaluated Wetlands to be removed and replicated in greenbelt
BH/MW 6 and MP 3	NA	Marsh	Provincially Significant Wetland to be removed and replicated along the realigned water course
MP 4	Watercourse	NA	Watercourse
BH/MW 103 and MP 5	Unevaluated Wetland	Marsh	Two unevaluated wetlands (requiring evaluation) located close to the monitoring well and mini piezometer
BH/MW 104 and MP 6	Castlederg Wetland Complex – Evaluated Provincial	Marsh	Provincially Significant Wetland (PSW)
BH/MW 105 and MP7	Waterbody	NA	Based on Figure 6 in GEI's report, no wetland was identified at this location

Nearby Installed Monitoring Wells, Mini Piezometers and Piezometers by Soil Engineers Ltd.	Wetland Name and Significance Based on the review of the MNRF's Natural Heritage Area Map	Based on the review "Natural Heritage Characterization Report for Mount Hope Lands", prepared by GEI Consultants on December 20, 2024	
		Wetland Type	Details
MP 8	Unevaluated Wetland and Waterbody	NA	Based on Figure 6 in GEI's report, no wetland was identified at this location
BH/MW 106 and MP 9	Unevaluated Wetland	Marsh	Unevaluated Wetland
BH/MW 13, PZ 1S and PZ 1D	Castlederg Wetland Complex – Evaluated Provincial	Thicket Swamp	Provincially Significant Wetland (PSW) to be re-evaluated
BH/MW 13, PZ 1S and PZ 1D	Castlederg Wetland Complex – Evaluated Provincial	Marsh	Provincially Significant Wetland (PSW) to be re-evaluated
BH/MW 107 and MP 10	Waterbody associated with drainage feature	Marsh	Provincially Significant Wetland (PSW) to be re-evaluated
BH/MW 108 and MP 11	NA	NA	Headwater Drainage Feature
BH/MW 7 and MP 12	NA	NA	Headwater Drainage Feature

NA- Not Available

There are records of wooded areas associated with the above-motioned wetland features. Small bodies of water are also mapped within and close proximity of the Subject Site.

5.6 Ground Water Resources (MECP Well Records)

The MECP well record database was reviewed for records located within a radius of 500 m from the approximate Site boundary (the Study Area). The records indicate that twenty-three (23) well records are located within the Study Area relative to the Subject Site boundaries. A summary of data obtained from the records review is presented in **Table 5-1**.

The locations of the well records, based on the UTM coordinates provided by the records, are shown on **Drawing 7**. Details of the MECP water well records that were reviewed are provided in **Appendix B**.

Table 5-2 MECP Well Record Summary

Water Use (Final Status)	
Status	**Number of Records**
Unknown	2
Abandoned-Other	4
Abandoned-Supply	1
Abandoned-Quality	1
Monitoring and Test Hole	2
Water Supply	12
Test Hole	1
Total	**23**

The above summary indicates that there are two (2) records of water supply wells located within the Subject Site. Additionally, there are records of water supply wells within the close proximity of the Subject Site.

5.7 Active Permit to Take Water Application Record Review

The MECP website was reviewed for any active PTTW application records within a 1.0 km radius of the Subject Site on December 17, 2024. Record review indicates there are no records for active PTTW within the Study Area.

5.8 Active EASR Registration Record Review

The MECP Website was reviewed for any active EASR Registration record within a 1.0 Km radius of the Subject Site on December 17, 2024. Record review indicates that there are no records of active EASR registration within the study area.

6.0 SOIL LITHOLOGY AND SUBSURFACE INVESTIGATION

The subsoil investigation has revealed that beneath the topsoil veneer, and the Earth fill the Subject Site mainly comprises silty clay, silty clay till and silty fine sand. Information regarding borehole logs is presented in **Appendix A-1 and A-2**. The approximate locations of boreholes are shown on **Drawing 2**. Additionally, a cross-section Key plan and geological cross-sections are presented on **Drawings 8-1, 8-2A** and **8-2B**, respectively. Based on a review of the geotechnical investigation report prepared by SEL and additional hydrogeological and wetland monitoring the stratigraphy beneath the investigated areas of the Subject Site generally consists of the following:

6.1 Topsoil

A surficial topsoil layer was encountered at all borehole locations. The measured topsoil depths ranged from 10 cm to 36 cm.

6.2 Earth Fill

A layer of earth fill, consisting of silty clay with topsoil and organics inclusion, was contacted beneath the topsoil veneer at Boreholes 5 and 6. The fill extends to depths of 4.7 m and 3.7 mbgs, respectively. The water content values range from 13% to 26%, with a median of 21%, indicating the fill is in a moist condition.

6.3 Silty Clay Till and Silty Clay

Native silty clay till and silty clay were generally contacted beneath the topsoil veneer and earth fill. Occasional wet sand and silt layers were also identified within the drift.

The natural water content values range from 9% to 37%, with a median of 23%, indicating that silty clay till and silty clay are generally in moist conditions. The colour change from brown to grey was observed at approximately 3.5 to 7.0 mbgs.

The estimated permeability for the silty clay unit encountered at BH/MW 1, 2, 7, 4, 5, 12, 103 and 101 at depths of 10.7, 15.2, 3.1, 10.7, 6.1, 2.3, 4.6, and 3.0 mbgs is about 10^{-7} cm/sec. Grain size analyses were performed on eight (8) subsoil samples, and the gradation is plotted in **Appendix A-1** (**Figure 14-15)** and **Appendix A-2 (10 and 11)**.

6.4 Silty Fine Sand

A layer of silty fine sand was encountered in BH/MW 104, 105 and 106 and was encountered within the silty clay unit. The natural water content of the soil samples ranges between 18% and 20%, at a median of 19%, showing a moist to very moist condition. The consistency of the soil ranges from loose to dense.

The silty clay material was observed brown in color. The estimated permeability for the silty fine sand unit encountered at BH/MW 105 at a depth of 2.5 mbgs is about 10^{-3} cm/sec. Grain size analyses were performed on one (1) subsoil sample, and the gradation is plotted in **Appendix A-2** (**Figure 12)**.

7.0 LOCAL HYDROGEOLOGICAL STUDY

7.1 Monitoring Well Development and Groundwater Level Monitoring

All Twenty (20) installed monitoring wells were utilized to measure and monitor groundwater level fluctuation. Monitoring wells BH/MW 1 to 7 and BH/MW 9 to 13 were developed on November 15, 2023, and BH/MW 101 to 108 and BH/MW 8 were developed on May 28, 2024. BH/MW 1, 8, 101 to 108 were instrumented with the automated transducer data logger to continuously monitor the groundwater level fluctuation. The monitoring program is currently ongoing and this report will be updated upon completion of the 2-year long-term groundwater and wetland monitoring program.

The stabilized groundwater levels were also measured manually over ten (10) monitoring events from November 15, 2023, to November 4-5, 2024. SEL measured the groundwater levels using an interface probe (Heron Water Tape Series #1900). A summary of the groundwater level observations and their corresponding elevations are provided in **Appendix C**.

The automated transducer Dataloggers were also installed to record groundwater fluctuation hourly basis. The hydrographs are presented in **Appendix D (Pages 1 to 10)**.

Based on the review of the manual groundwater level monitoring data presented in **Appendix C** and hydrographs presented in **Appendix D**, the highest and lowest stabilized shallow groundwater levels were measured ranging between El. 263.1 masl and 255.5 masl at BH/MW 12 and BH/MW 5, respectively.

A review of the groundwater levels measured in shallow and deep nested monitoring wells BH/MW 2S and BH/MW 2D installed at depths of 6.1 mbgs and 16.6 mbgs, respectively indicates a downward vertical hydraulic gradient.

7.2 Wetland and Surface Water Fluctuation Monitoring

Twelve (12) mini piezometers were utilized to measure and monitor wetlands or surface water including the existing watercourses and water bodies.

MP 1 to 12 were instrumented with the automated transducer data logger to continuously monitor the water table fluctuation in the wetland features. The water table monitoring beneath the Subject Site is currently ongoing and this report will be updated upon completion of a 2-year long-term wetland monitoring program.

Furthermore, water table fluctuations were manually measured over ten (10) monitoring events from November 15, 2023, to November 4-5, 2024.

Based on the review of the Hydrographs presented in **Appendix D (Pages 11 to 22)** and manual water table monitoring presented in **Appendix C** the highest and lowest surficial water table interacting within the shallow stratigraphy measured at El. 262.1 masl and 256.3 masl at MP 1 and MP 12, respectively.

The existing water bodies were also equipped with staff gauges. The findings will be interpreted and presented in the updated report.

7.3 Surface Water Flow Monitoring

Surface water flow monitoring stations were established at the upstream and downstream of both creeks located on the Subject Site. Creek 1 is located in the southern portion of the Subject Site and Creek 2 is located in the northern portion of the Subject Site.

Creek flow monitoring was completed at the created surface water monitoring stations in upstream and downstream locations for each creek. The OTT MF pro-meter was utilized at the established sections of the creeks using a Cross-Sectional Discharge Measurement Technique. Since direct measurement of stream discharge is not possible; instead, it is calculated using directly measurable variables such as stream depth, width, and flow velocity. Typically, this calculation involves multiplying the stream's cross-sectional area by the water's average velocity within that section.

During the site visits conducted on June 17, August 29 and November 5, 2024, both of the creeks were observed dry at the established flow station locations. The summary of the observation is presented in **Appendix E**.

7.4 Surface Water and Groundwater Interaction Monitoring

Interaction between surface water and groundwater was monitored in multiple locations at the Subject Site. A summary of findings is presented as follows:

- A review of the groundwater level and shallow water table in BH/MW 101 ad MP1 installed within the south portion of the Subject Site indicates a downward hydraulic gradient.
- Monitoring BH/MW102 and piezometer MP2 were installed adjacent to the existing water body. A review of the water table fluctuation indicates a downward hydraulic gradient.
- Monitoring well BH/MW 103 and piezometer MP5 were installed adjacent to a potential wetland a review of the monitoring data indicates a downward hydraulic gradient.
- Monitoring well BH/MW 7 and piezometer MP12 were installed adjacent to an intermittent stream. A review of the findings indicates an upward hydraulic gradient.

- Monitoring Well BH/MW 104 and piezometer MP6 were installed adjacent to an existing water body located in adjacent land to the west boundary of the Subject Site. A review of the findings indicates a downward hydraulic gradient.
- A review of the monitoring data collected from BH/MW 108 and piezometer MP11 indicates a downward hydraulic gradient.
- Monitoring Well BH/MW 105 and piezometer MP 7 and MP 8 were installed adjacent to an existing water body located in adjacent land to the west boundary of the Subject Site. A review of the findings indicates a downward hydraulic gradient.
- Monitoring Well BH/MW 106 and piezometer MP 9 were installed adjacent to an existing water body located in adjacent land to the west boundary of the Subject Site. A review of the findings indicates a downward hydraulic gradient.
- Monitoring Well BH/MW 107 and piezometer MP 10 were installed adjacent to an existing water body located in the north portion of the Subject Site. A review of the findings indicates an upward hydraulic gradient.

A review of the findings during the monitoring program at the Subject Site generally indicates a downward hydraulic gradient, except for two locations near an intermittent stream and in the north portion of the site, which show an upward hydraulic gradient As previously mentioned, the monitoring program is ongoing and the findings will be updated when the monitoring program is completed.

7.5 Shallow Groundwater Flow Pattern

Groundwater level elevations measured on June 17, 2024, were considered to interpret the shallow groundwater flow pattern beneath the Subject Site. This interpretation suggests that it flows mainly towards the tributaries of the cold creek in an easterly westerly and southern direction from the center of the Subject Site.

It is important to note that this groundwater flow pattern will be updated following the completion of the long-term groundwater monitoring program. The interpreted shallow groundwater flow pattern beneath the Subject Site is illustrated on **Drawing 9**.

7.6 Single Well Response Test

Selected BH/MWs underwent single well response testing (SWRTs) to assess the hydraulic conductivity (K) for saturated shallow aquifer or water-bearing units at the depths of the well screens. Each monitoring well was equipped with a digital transducer to record the fluctuation made to complete the SWRT. The results of the SWRT tests are presented in **Appendix F**, with a summary of the findings provided in **Table 7-1**.

Table 7-1 A Summary of Falling Head Hydraulic Conductivity Testing

Well ID	Ground El. (masl)	Monitoring Well Depth (mbgs)	Screen Interval (mbgs)	Screened Soil Strata	Hydraulic Conductivity (K in m/s)	Test Method
BH/MW 2D	262.6	16.6	15.1 – 16.6	Silty Clay	2.0×10^{-6}	Falling Head Test
BH/MW 2S	262.6	6.2	4.7 – 6.2	Silty Clay Till	6.2×10^{-7}	Falling Head Test
BH/MW 4	261.0	16.6	13.6 – 16.6	Silty Clay Till	3.1×10^{-7}	Falling Head Test
BH/MW 5	259.2	7.7	6.2 – 7.7	Silty Clay	4.9×10^{-8}	Falling Head Test
BH/MW 7	259.0	6.1	3.1 – 6.1	Silty Clay	1.3×10^{-7}	Falling Head Test
BH/MW 9	260.6	6.2	3.2 – 6.2	Silty Clay and Silty Clay Till	4.6×10^{-7}	Falling Head Test
BH/MW 12	263.0	5.9	2.9 – 5.9	Silty Clay and Silty Clay Till	5.0×10^{-8}	Falling Head Test
BH/MW 13	262.0	6.3	3.3 – 6.3	Silty Clay	1.1×10^{-7}	Falling Head Test

Notes:
mbgs metres below ground surface
masl metres above sea level

7.7 Groundwater Quality

One (1) set of groundwater samples was collected for analysis from the monitoring well BH/MW 2D on January 4, 2024, by SEL. The samples were submitted for analysis and evaluation against the Region of Peel Sanitary and Storm Sewer Use By-Law parameters. After sampling, all the bottles were placed in a cooler for shipment to the analytical laboratory. Sample analysis was performed by SGS Canada Inc., which is accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA). Results of the analysis are provided in **Appendix G**, with a discussion of the findings provided below. The chain of custody number for the submitted samples that underwent analysis is 038107.

The groundwater samples collected, comprised unfiltered groundwater. As per the Region of Peel Sanitary and Combined and Storm Sewer Use By-Law parameters sewer use analysis, a complete set of unfiltered groundwater samples were submitted to the laboratory with the results being presented as totals for various analyzed parameters.

The results of analysis for the unfiltered groundwater indicate no exceedance when compared and evaluated against the Region of Peel Sanitary and Storm Sewer Use By-Law parameters.

The final design for any dewatering effluent pre-treatment system is the responsibility of the contractors responsible for construction, or of the water treatment system design specialist, or mechanical engineer, if required, for any long-term foundation drainage system for the completed underground structure.

8.0 DISCHARGE WATER CONTROL

8.1 A Review of Proposed Development Plans

Based on the Concept Plan and a Draft Plan provided by SGL Planning and Design Inc. dated January 23, 2025, it is understood that the proposed development will include the construction of residential lots, a Mid/High Rise Block located on the southeast, a commercial block in the southwest portions along with stormwater management blocks and a park block. The proposed subdivision will be provided with roads and municipal services.

Considering the early stage of the development, a detailed design of the proposed development was not available for review. Therefore, this report needs to be updated once the detailed design becomes available. The reviewed plan is presented in **Appendix H**.

8.2 A Review of Geotechnical Investigation Report

A review of the Geotechnical Investigation report prepared by SEL Ltd. dated December 2023, indicates that:

- The investigation revealed that beneath a veneer of topsoil, and a layer of earth fill in places, the site is generally underlain by strata of silty clay and silty clay till.
- The topsoil must be stripped before site grading and construction. It can only be reused for landscaping purposes. Any surplus should be disposed of off-site.
- The existing earth fill and any badly weathered/ploughed soils should be sub excavated, inspected, and sorted free of organics and/or deleterious material, before reusing for structural backfill or engineered fill.
- Where site grading with additional fill is required, the earth fill should be constructed in an engineered manner for building foundation, underground services and road construction.
- The low-rise residential dwellings with basements can be supported with conventional spread and strip footings founded on engineered fill or sound native soils. In conventional design, the foundation wall must be damp-proofed and provided with a perimeter sub drain at the wall base, connected to a positive outlet.
- Bulk excavation for the mid-rise buildings with 2 levels of underground parking will likely extend to at least 6 to 7 m below grade, in which native silty clay till or silty clay is anticipated, and it is suitable to support the proposed structure on conventional spread and strip footing.

- Excavation should be carried out in accordance with O. Reg. 213/91. Where safe sloped excavation is not feasible, temporary braced shoring walls will be required for the excavation and construction of the underground parking and foundation.

8.3 Construction Dewatering Requirements

Based on the review of the draft concept plan the details for the proposed residential subdivision are not available for review at the time of preparation of this report. Therefore, the dewatering requirement and the short-term dewatering and long-term foundation drainage flow rates should be assessed once the detail design become available.

8.4 Permit Requirements

Short-Term Construction Dewatering: Water takings of more than 50,000 L/day but less than 400,000 L/day are to be registered on EASR, while water takings of more than 400,000 L/day require a PTTW issued by the MECP. If it is identified that an EASR or PTTW is required for the Subject Site, a hydrogeological assessment report will need to be submitted in support of the application.

However, considering the early stage of the proposed development, the construction approach, detailed design drawings and excavation phases are not available. As such, recommendations on permit requirements should be assessed once the data become available for review.

Obtaining a discharge permit from the Region of Peel may be required if the potential collected discharge water during construction is proposed to be discharged to the region's sewer system.

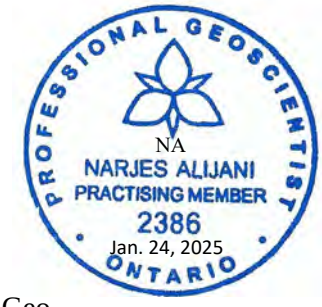
9.0 CONCLUSIONS AND RECOMMENDATIONS

- The Subject Site lies within the physiographic region of southern Ontario known as the South Slope and the landform is identified as Till Plain (Drumlinized).
- The Subject Site is located within an area mapped as Clay to silt-textured till (derived from glaciolacustrine deposits or shale) (5d).
- The Subject Site is located within the Humber River Watershed that falls in the Toronto and Region Conservation Authority (TRCA) jurisdiction.
- The ground surface elevation ranges approximately between 257.6 metres above sea level (masl) to 263.0 masl based on ground surface elevations measured at the borehole and monitoring wells' locations.
- The subsoil investigation has revealed that beneath the topsoil veneer, and the Earth fill at the western portion of the site mainly comprises silty clay and silty clay till with interbedded layers of silty fine sand within the northwestern portion of the Subject Site.
- Based on the review of the Hydrographs and manual groundwater levels the highest and lowest stabilized shallow groundwater levels measured at El. 263.1 masl and 255.5 masl at BH/MW 12 and BH/MW 5, respectively.
- Based on the review of the Hydrographs and manual water table data, the highest and lowest stabilized surficial water tables interacting with the shallow stratigraphy measured at El. 262.1 masl and 256.3 masl at MP 1 and MP 12, respectively.
- The results of analysis for the unfiltered groundwater indicate no exceedance when compared and evaluated against the Region of Peel Sanitary and Storm Sewer Use By-Law parameters.
- Based on the review of the draft concept plan the details for the residential subdivision are not available for review at the time of preparation of this report. Therefore, the dewatering requirement and the short-term dewatering and long-term foundation drainage flow rates should be assessed once the detailed design becomes available.
- Considering the early stage of the proposed development, the construction approach, detailed design drawings and excavation phases are not available. As such, recommendations on obtaining a permit from MECP should be assessed once the data become available for review. The potential dewatering impact should be assessed, and a mitigation plan should be provided once the detailed design becomes available for the proposed development.
- Obtaining a discharge permit from the Region of Peel may be required if the potential collected discharge water during construction is proposed to be discharged to the region's sewer system.

10.0 CLOSURE

We trust that the above-noted information is suitable for your review. If you have any questions regarding this information, please do not hesitate to contact the undersigned.

Yours truly,
SOIL ENGINEERS LTD.



Yogirajsinh Rana, B.Sc., C.Tech.
Project Manager-Hydrogeological Services

Narjes Alijani, M.Sc., P.Geo.
Department Manager-Hydrogeological Services

600000
600500
601000
601500
4862000
4861500

BH/MW 13 (261.1)
BH/MW 107 (259.4)
BH/MW 12 (262.6)
BH/MW 106 (260.9)
BH/MW 105 (261.3)
BH/MW 10 (262.0)
BH/MW 104 (261.1)
BH/MW 108 (258.7)
BH/MW 9 (259.6)
BHMW 8 (261.0)
BH/MW 103 (258.3)
BH/MW 7 (258.3)
BH/MW 102 (257.4)
BH/MW 6 (258.2)
BH/MW 101 (261.4)
BH/MW 2S (261.1)
BH/MW 5 (256.7)

Cold Creek

SENATOR WAY
FOREST GATE AVENUE
KNOLLHAVEN CIRCLE
MOUNT HOPE ROAD
EWART STREET
BEEHIVE DRIVE
GOODFELLOW CRESCENT
COLUMBIA WAY
MCCABE CRESCENT

D:\Projects\2309-W138\

N

References: Ontario Ministry of Natural Resources and Forestry
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Key Map

Legend

- Approximate Boundary of Subject Site
- Borehole with Monitoring Well
- Local Road
- Contour - 0.25m
- Waterbody
- Watercourse
- Highest Interpreted Shallow Groundwater Elevation Contour
- Highest Inferred Shallow Groundwater Elevation Contour
- Interpreted Shallow Groundwater Flow Direction
- (261.9) Highest Shallow Groundwater Level Measured on June 17, 2024

Soil Engineers Ltd.

Shallow Groundwater Flow Pattern Plan

Hydrogeological Assessment
Proposed Residential Development
Northwest Quadrant of
Mount Hope Road and Columbia Way
Town of Caledon

Reference No. 2309-W138

Date: October 15, 2024

Scale:

0 25 50 100 150 200 250
Metres

Drawing No. 9

BPS Design Basis Report by DLW

MOUNT HOPE SUBDIVISION TEMPORARY WATER BOOSTER PUMPING STATION

Design Basis Report

JANUARY 2026

Report Prepared For:

United Holding Inc.

Report Prepared By:

DLW Engineering Services Limited
1900 Dundas Street West
Unit A242
Mississauga, Ontario
L5K 1P9
Phone: (647) 627-3982

DLW Project Number UHI 001

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1 Introduction

1.1 Project Information

The DLW Engineering Services Limited has been retained by United Holdings Inc. to undertake the design of the Mount Hope/ Columbia Way Temporary Booster Pumping Station (BPS) for the proposed Solmar developments located in the Town of Bolton, Region of Peel.

The booster pumping station will service the Solmar development, which includes 500 residential units. The development will receive water from the Region of Peel water supply system via a watermain extension along Columbia Way. The Region of Peel has determined that the water will be provided to these developments at adequate pressure for fire flows. However, the Region has also determined that under peak hour flow conditions, some of the areas in the proposed developments will not be provided with sufficient pressures per MECP and Region of Peel standards. Thus, a temporary booster pumping station is required to boost the water pressure for these developments. The water servicing for the Solmar development aligns with Solmar's other infrastructure project for a temporary sewage pumping station, which will also be in the Solmar development and sized to serve the 500 units. Hence, in this design basis report, we have only covered the BPS design based on the peak flow from the 500 units in the Solmar development.

The proposed Solmar development area is located north of Columbia Way, extending along the western sides of Mount Hope Road (Figure 1.1). The proposed water infrastructure is intended to address anticipated low-pressure conditions during periods of peak demand within the service area. We understand that hydraulic modeling completed by the Region of Peel's Modelling Group indicates that, under peak demand conditions, pressures at Columbia Way and Mount Hope Road, as well as Columbia Way and Kingsview Drive, are anticipated to fall below the minimum pressure of 276 kPa (40 psi). To address these projected deficiencies and maintain compliance with the Region's level of service objectives, the proposed works include the construction of a booster pumping station on Columbia Way (Figure 1.1). It is worth noting that when the Region completed the modelling exercise, it was assumed that the BPS would be sized for 20 L/s, which is slightly more than the newly established peak demand flow of 19.31 L/s for 500 units. Nevertheless, the Region's modelling showed that even at a flow rate of 20 L/s, the supply pressures in the development can be as low as 37 psi. Associated work includes the extension of the 400 mm diameter watermain along Columbia Way, approximately 660 metres east to Mount Hope Road (which will be designed by others). Due to the temporary nature of this facility, the Region of Peel is considering the use of a

pre-engineered booster pumping station. In early consultation with the Region of Peel's Engineering staff, it was determined that this station will not be required to process fire flows, will not require the provision of pressure tanks, and will not be required to provide standby power facilities. This design basis report reviews two potential sites (Figure 1.1) for the BPS, and one of them will be finalized, subject to discussions with the Region and the internal Consultant design team.

1.2 Referenced Reports and Guidelines

The following design guidelines and reports will be used for the design of BPS:

- Region of Peel watermain design standards (Nov 2022)
- MECP Design Guidelines for Drinking Water Systems, 2008
- Applied Fluid Mechanics, W.P. Boyle

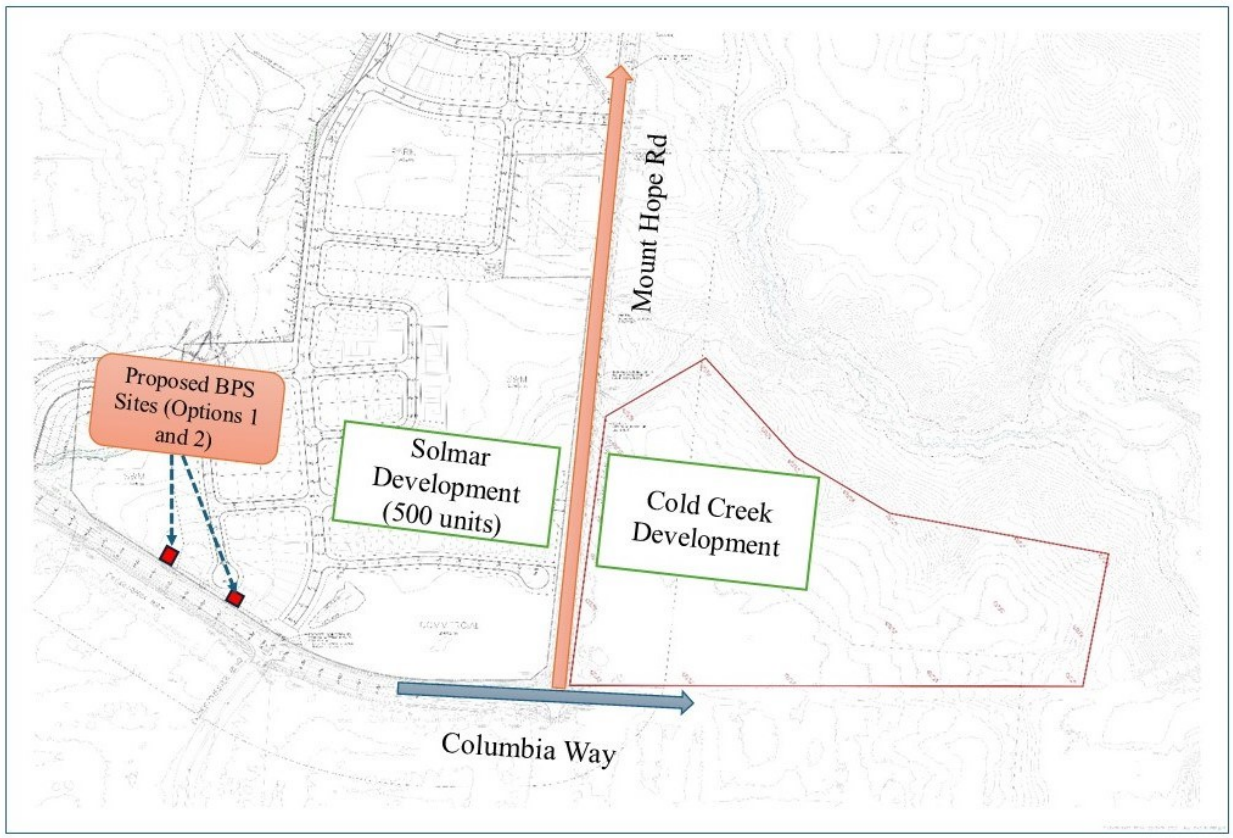


Figure 1.1: Showing the proposed developments and the BPS site

1.3 Purpose of Report

The purpose of this report is to provide the design basis of the temporary BPS in the vicinity of the Solmar Mount Hope development to maintain the required service pressure under peak-hour demand conditions.

The general scope of this report is as follows:

- Development of design flows and required service pressures for the BPS.
- Establish the sizing of the pumps for the BPS.
- Development of preliminary layout of the BPS showing proposed equipment layout.
- Develop preliminary BPS estimate of probable costs.

2 Design Basis

2.1 Design population

Based on the concept plan for 598 units (provided by the KLM planning), the number and type of units proposed are 100 single-detached units, 328 semi-detached units, and 170 townhouse units. This is equivalent to 16.7% of single-detached units, 54.8% of semi-detached units, and 28.4% of Townhouse units. We used the same percentages to estimate the number and types of residences for 500 units. The residential density (in persons per unit or ppu) specified in the Region of Peel's linear wastewater standards is used for population projections.

Table 2.1: Design population projections

Type of Units	Residential Density (ppu)	Number of units	Population	Number of units	Population
Single Detached	4.2	100	420	84	351
Semi-Detached	4.2	328	1,378	274	1,152
Townhouses	3.4	170	578	142	483
Totals		**598**	**2,376**	**500**	**1,986**

2.2 Design Water Demand

The average day demand (ADD), maximum day demand (MDD), peak hour demand (PHD), and fire flow are estimated using the Region of Peel and MECP Design Guidelines for Drinking Water Systems, 2008.

Table 2.2. Water Design Criteria

Average Day Demand	280 L/Capita/day
Minimum Hour Factor	0.45
Maximum Day Factor	2
Peak Hour Factor	3
Fire Flow	95 L/s for 2 hrs (500 Units)

Based on the above, the design water demands for the proposed development are estimated as follows:

Design Flows	**500 units**
Average Day Demand (ADD)	= Population × Average Day Demand = 1,986 × 280 L/Capita/d = 556,161 L/d **= 6.44 L/s**
Minimum Hour Demand (MHD)	= Average Day Flow × Minimum Hour Factor = 6.44 L/s × 0.45 **= 2.90 L/s**
Maximum Day Demand (MDD)	= Average Day Flow × Maximum Day Factor = 6.44 L/s × 2.0 **= 12.87 L/s**
Peak Hour Demand (PHD)	= Average Day Flow × Peak Hour Factor = 6.44 L/s × 3 **= 19.31 L/s**
Fire Demand	= **95 L/s for 2 hrs**

2.3 Design concept of the BPS for 500 units

The Mount Hope Subdivision Temporary Booster Pumping Station (BPS) will receive water directly from the proposed 400-mm PVC watermain along Columbia Way. The ground elevations at the proposed BPS sites (options 1 and 2) are 259.0 m and 262m.

While the ground elevations at the connection point to the proposed watermain along Columbia Way (suction side of the BPS) are 259.95 m for option 1 and 262 m for option 2. Assuming the watermain on the suction and discharge sides of the BPS is 2m below the ground elevation, this corresponds to a suction side pipe invert elevation of 257.95m and a discharge side invert of 257m for option 1, whereas 259.01 m and a discharge side invert of 260m for option 2 (Refer to the HGLs). Based on recent discussions with the Region of Peel (Justin Lee, November 27, 2025 and January 15, 2026), the minimum and maximum hydraulic grade lines (HGLs) at the suction side are 291.0 m and 297.0 m, respectively. These HGLs correspond to minimum and maximum suction-side pressures of 33.05 m (47.01 psi) and 39.05 m (55.55 psi), calculated using the suction side pipe invert elevation of 257.95 m for option 1. Similarly, using the suction side pipe invert elevation of 259.01m, the minimum and maximum suction-side pressures are 31.99 m (45.50 psi) and 37.99 m (54.03 psi) for option 2.

The watermain elevations downstream of the BPS for the Solmar development are between 258.52 m and 262.51 m. The BPS must maintain downstream pressures within the range of 40 psi to 100 psi at peak flows (Region of Peel and MECP guidelines).

For the proposed design, a minimum required pressure of 50 psi (35.15 m) has been assumed, plus an allowance of 10 psi (7.0 m) for distribution losses (to be confirmed through modeling) at peak flow demands of 19.31 L/s. Based on these assumptions:

For options 1 and 2, the required minimum HGL is 304.66 m (Refer to the attached HGLs). At peak demand flows, this corresponds to pressures of 50 psi to 56 psi, assuming the minimum supply pressure to the BPS, and 58 psi to 64 psi at the maximum supply pressure to the BPS.

In consultation with various suppliers of this equipment (Refer to the appendix A), our proposed BPS design will range in size from a typical seacan size building (2.4m x 6m) to a more compact FRP style building (3.4m x 2.7m). The proposed BPS site near the SWM pond (Option-1) provides sufficient space to accommodate a larger package BPS. In contrast, if the package BPS is located within a cul-de-sac (Option-2), a more compact BPS design would be preferred based on optics.

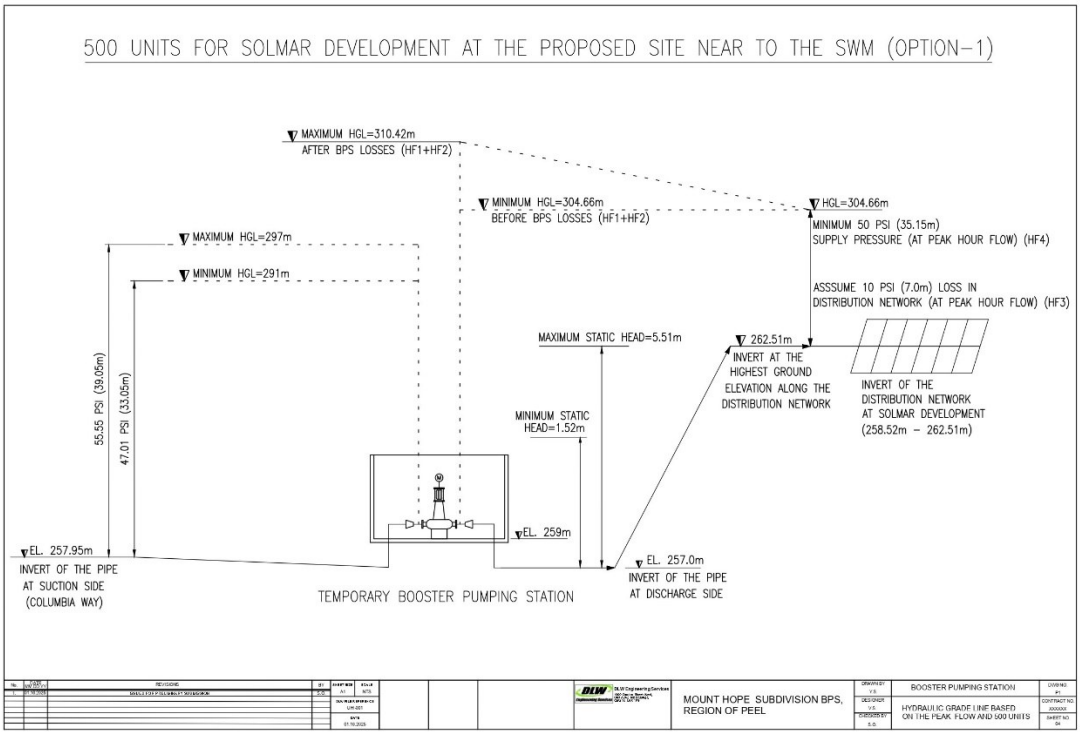


Figure 2.1: Hydraulic grade line for the BPS with respect to the proposed site (option 1)

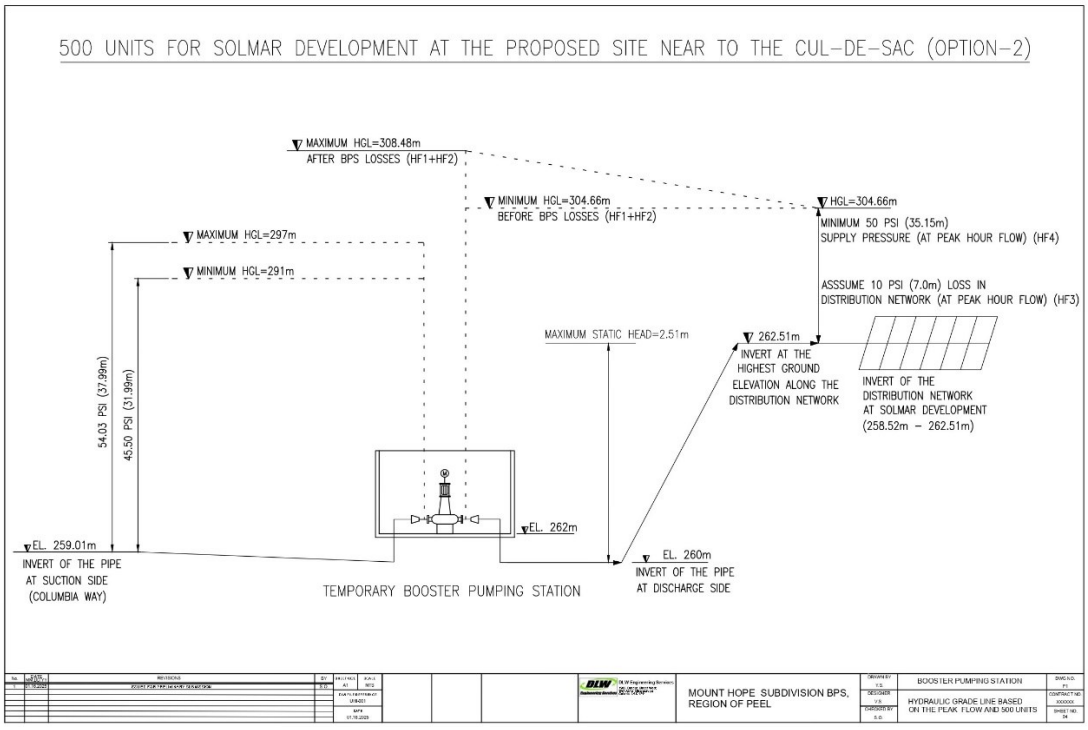


Figure 2.2: Hydraulic grade line for the BPS with respect to the proposed site (Option 2)

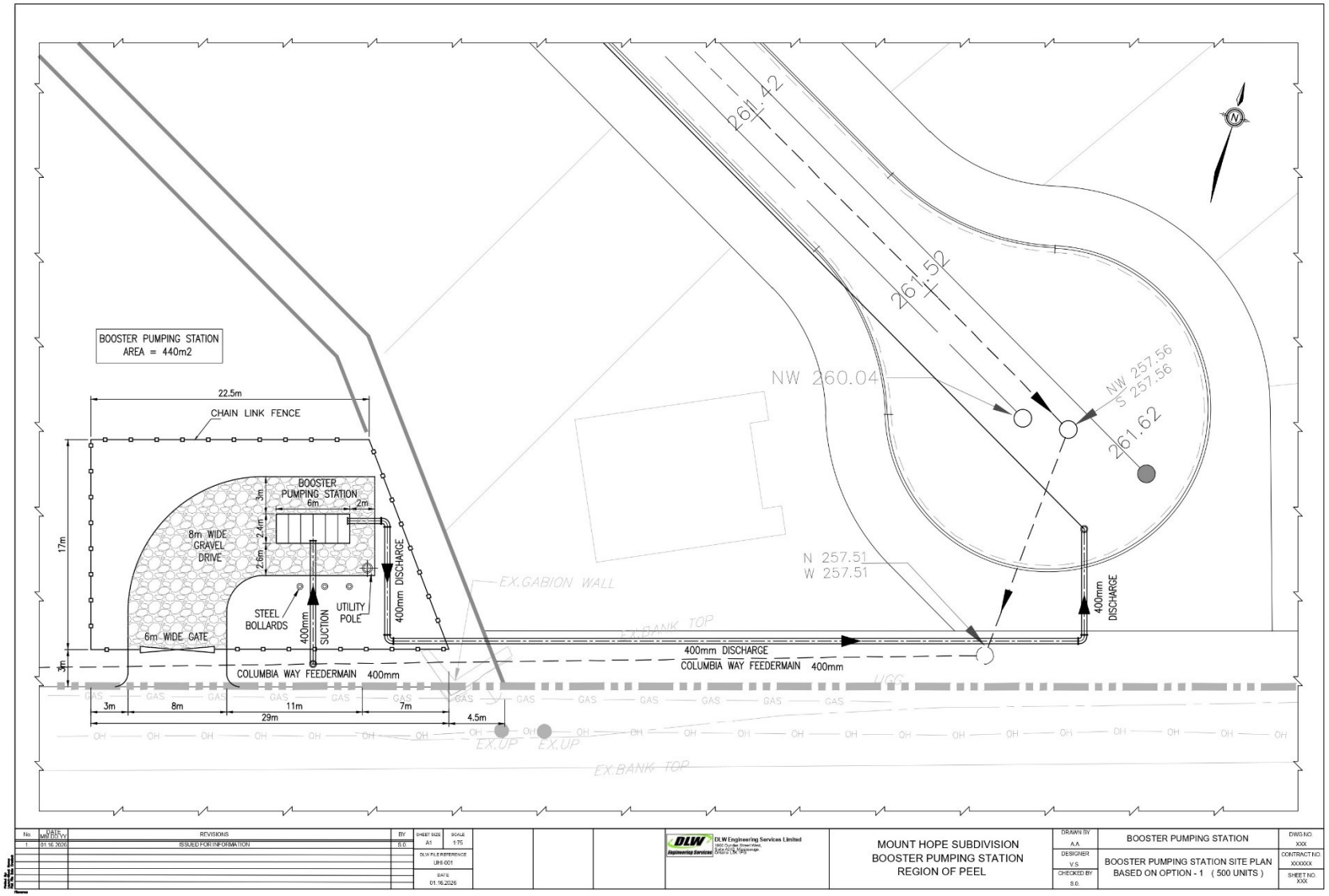


Figure 2.3: Site Layout based on the Option-1 (near the SWM Pond)

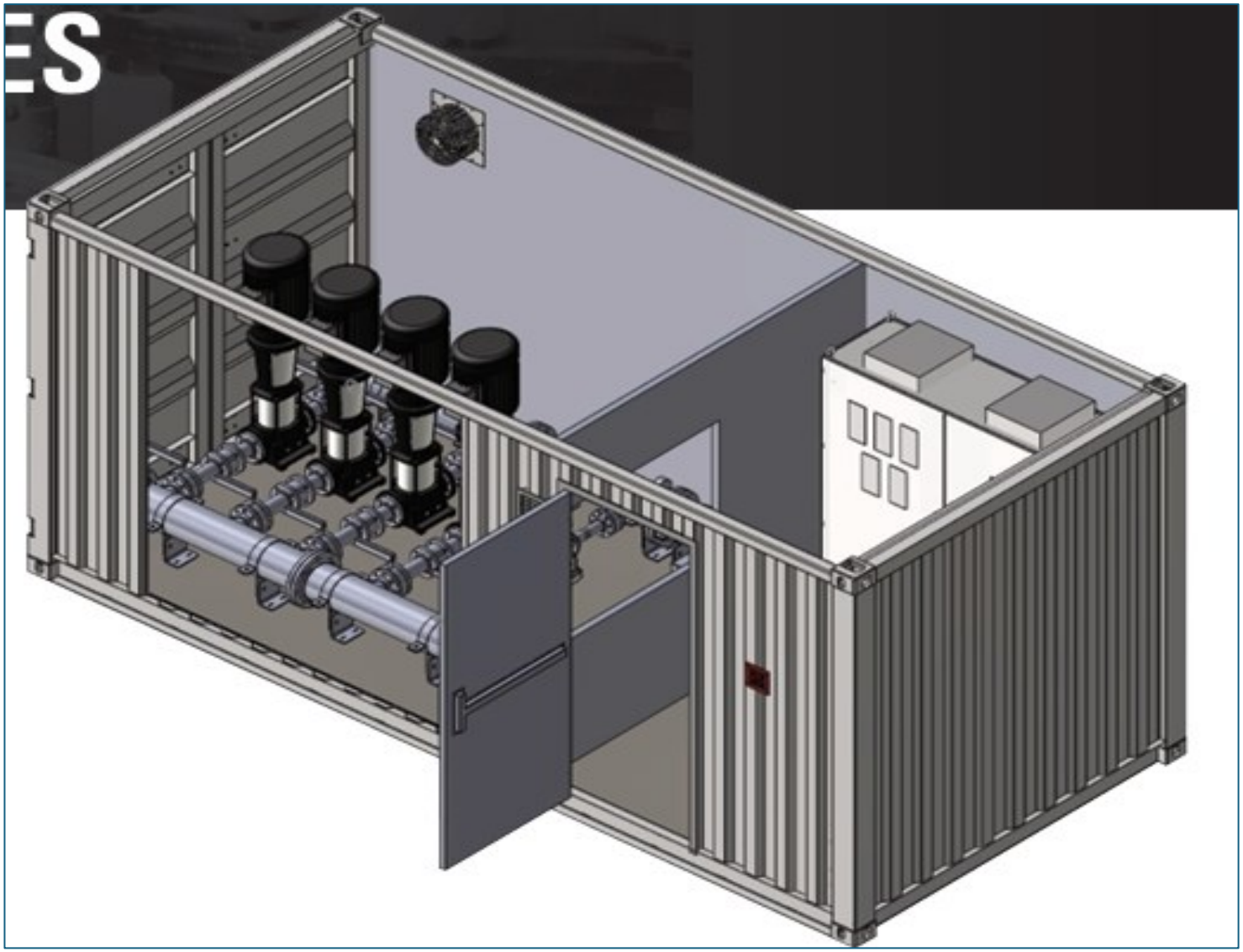


Figure 2.4: A typical BPS package in a seacan (2.4M x 6m) container proposed for option-1

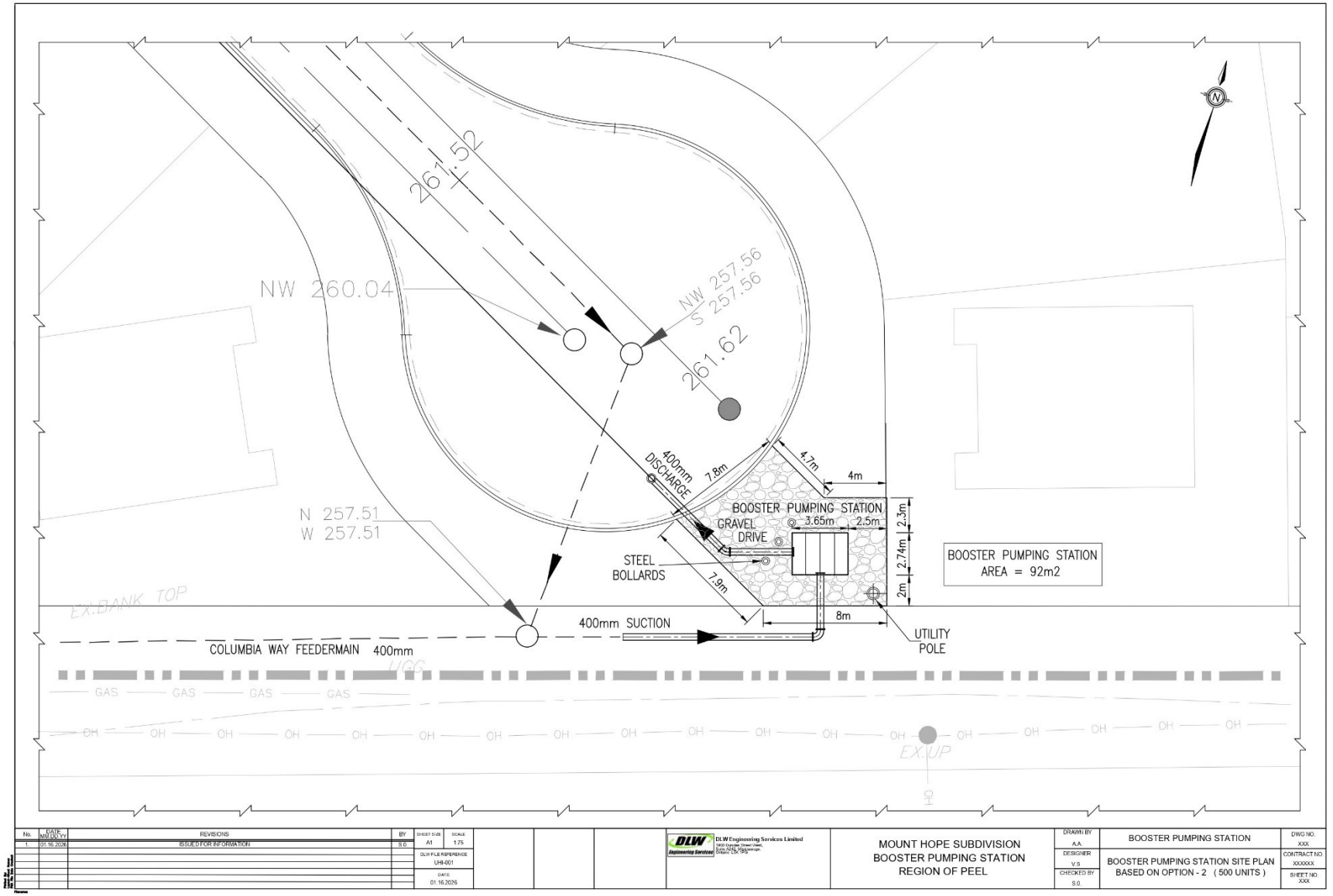


Figure 2.5: Site Layout based on Option 2 (near the Cul-De-Sac)

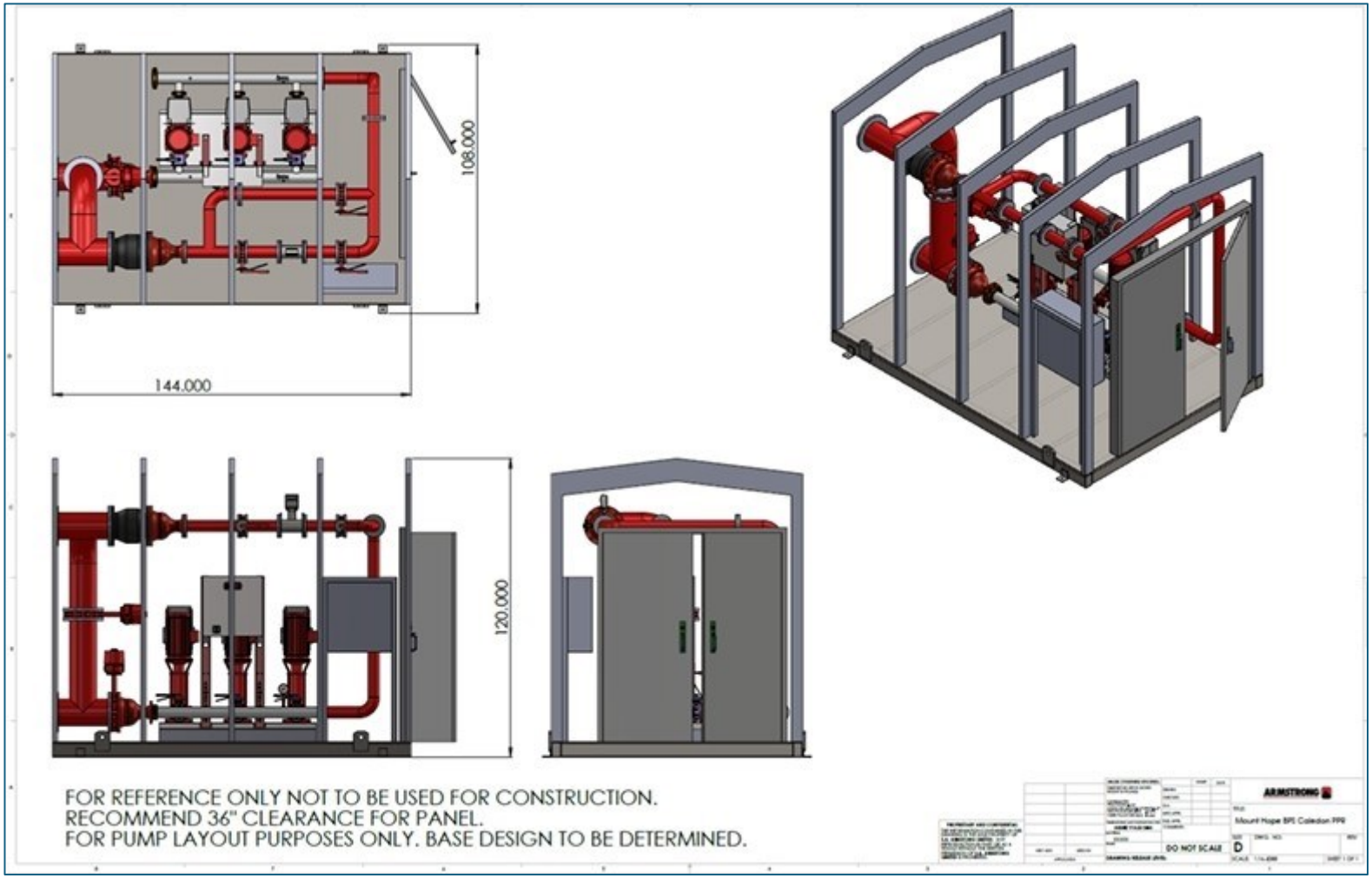


Figure 2.6: A package BPS proposed at Option 2 (near the Cul-De-Sac) in a prefabricated enclosure

The BPS will connect to the proposed watermain on Columbia Way, and discharge into the watermain located at the service road within the Solmar development (Refer to Figures 2.2 and 2.3 above and Figure 2.5 below). According to the water distribution model, the BPS is required only to supplement system pressure under peak hour demand conditions (we assume this pressure boosting will also take place during Average Day and Maximum Day demands). No pressure boosting is needed during fire flow scenarios, as the proposed distribution system provides sufficient pressures during fire flows. During a fire event, the motorized gate valve at the BPS inlet will close automatically in response to the pressure drop in the system. This will divert the flow directly through the bypass line to the BPS discharge pipe, which bypasses the booster pumps (refer to Figure 2.5 below). Under normal operating conditions, the inlet motorized gate valve will remain open, while the valve on the bypass line will remain closed.

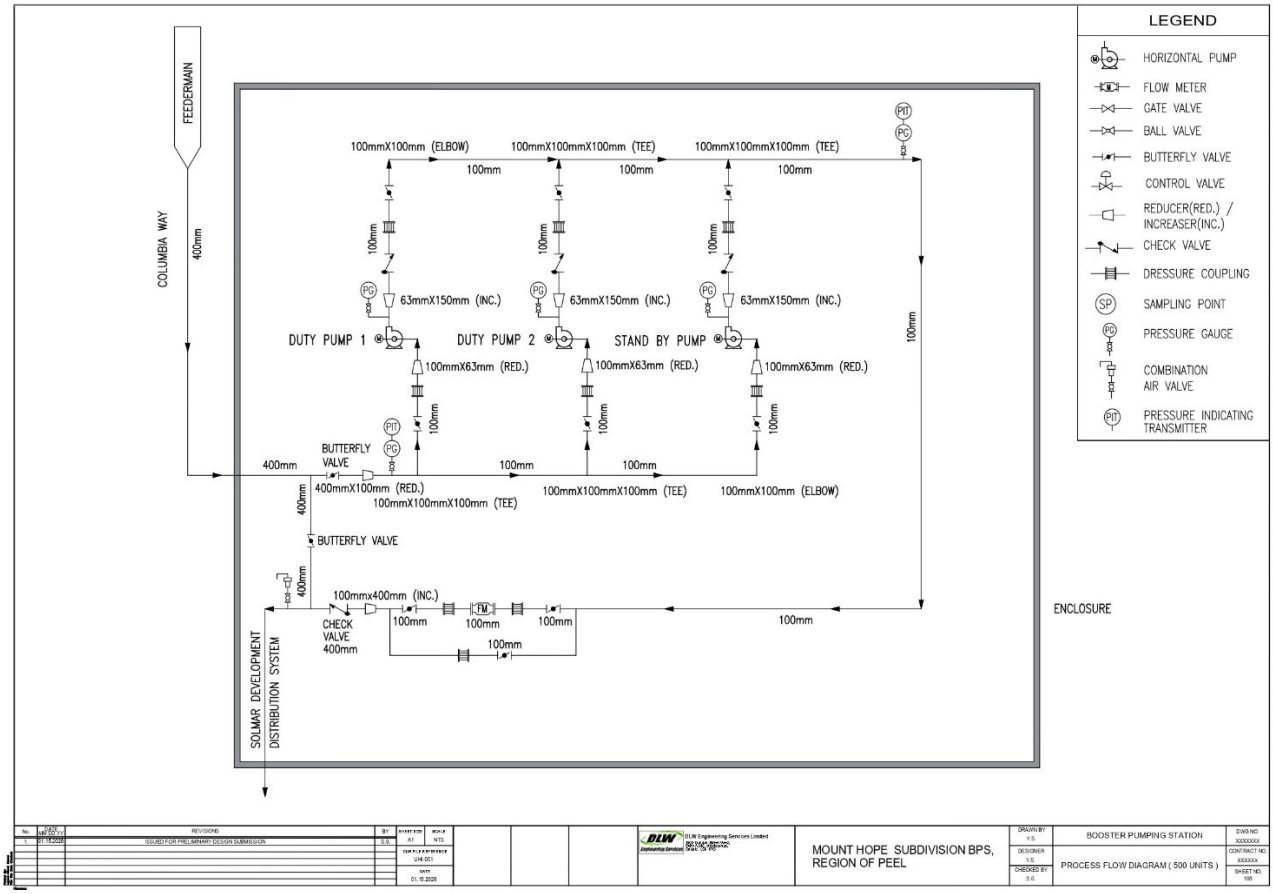


Figure 2.7: Process flow diagram for the proposed BPS (options 1 and 2)

3 Booster Pumping Station

3.1 Capacity and Number of Duty Pumps

As discussed in Section 2.2, the peak hour demand for the proposed 500 units is 19.31 L/s. To meet these flow requirements, two duty pumps and one standby pump are proposed, each with a capacity of 9.65 L/s. All pumps will be equipped with variable frequency drives (VFDs) to provide operational flexibility and enable efficient adjustment of pump output in response to varying system demands.

Under average day demand conditions, a single duty pump operating with a VFD will be sufficient to maintain the required flow and pressure. During maximum day demand conditions, one duty pump (with VFD control) will operate at synchronous (or full) speed to meet the increased demand. At peak hour demand, two duty pumps at 100% speed will be in operation to supply the required flow. The standby pump will remain available to ensure system reliability and redundancy in case of maintenance or pump failure.

3.2 Total Dynamic Head for Duty Pumps

The total dynamic head is crucial in selecting a pump, as it determines the type of pump required to deliver water at the required pressure for a given flow rate and the power needed for the pump. The total dynamic head of the pump can be calculated as follows:

Total Dynamic Head = Static Head + Friction losses at BPS + Friction losses in the distribution system + Supply pressure required – Pressure supplied at the inlet of the BPS

- **Static Head**

Static Head = Elevation in the distribution network – Elevation at the BPS

- **Friction Losses at BPS and the Distribution System**

The friction losses (h_f) through pipe fittings and pipe occur when water flows through the fittings and encounters resistance to flow. This resistance causes a pressure drop, also known as head loss. The amount of friction loss in a pipe fitting is determined by several factors, including the type of fitting, the diameter of the pipe, the roughness coefficient of the pipe, and so on. Friction losses can be calculated using the equivalent length method:

$$(h_f) = \frac{10.634 \times L_{eq} \times Q^{1.852}}{C^{1.852} \times D_{element}^{4.87}}$$

Where, $L_{eq} = L_{eq(element)} (D_{eq} / D_{element})^5$
L_{eq} = equivalent length
$L_{eq(element)}$ = equivalent length of element
D_{eq} = diameter at which the equivalent length is estimated

$D_{element}$ = diameter of element
$L_{eq(element)} = K\ D_{element}/f$
K = head loss coefficient
$D_{element}$ = diameter of element
f = friction factor
Q = flow
C = roughness coefficient
$D_{element}$ = diameter of element

Head loss coefficient (K) was considered as given in Applied Fluid Mechanics, W.P. Boyle. Roughness coefficient (C) was considered as 100 for laterals and 100 for forcemain as per the MECP design standards for drinking water systems (Table 10-1).

In accordance with MECP design guidelines, normal pressures in the distribution system should not go above 700 kPa (100 PSI) nor below 275 kPa (40 PSI) during normal demand periods. The guidelines also state that normal operating pressure in water distribution systems should generally be in the range of 345 kPa to 480 kPa (50 to 70 PSI) under maximum daily flow. For this design, we have assumed 345kPa (50 PSI) will be delivered at the highest point in the distribution system (See Figures 2.1 and 2.2 above).

Table 3.1 and **3-2** shows the total dynamic head required for options 1 and 2 under peak hour flow, maximum day flow, and average day flow conditions. The total dynamic head at peak hour flow of **19.31 L/s** (Option 1) is **19.42 m**, thus the two duty pumps, each with a capacity of **9.65 L/s, at 19.42 m** of the total dynamic head are required. On the other hand, the total dynamic head required at peak hour flow of **19.31 L/s** (Option 2) is **17.48 m**, thus the two duty pumps, each with a capacity of **9.65 L/s, at 17.48 m** of total dynamic head are required

Table 3.1. The required total dynamic head of the duty pumps at ADD, MDD, and PHD for 500 units at the site option-1

Flow (Q) (L/s)	Total Dynamic Head (m)		
	Average Day Flow	Maximum Day Flow	Peak Hour Flow
6.44	11.12		
12.87		14.55	
19.31			19.42

Table 3.2: The required total dynamic head of the duty pumps at ADD, MDD, and PHD for 500 units at the site option-2

Flow (Q) (L/s)	Total Dynamic Head (m)		
	Average Day Flow	Maximum Day Flow	Peak Hour Flow
9.66	9.81	NA	NA
19.31	NA	12.61	NA
28.97	NA	NA	17.48

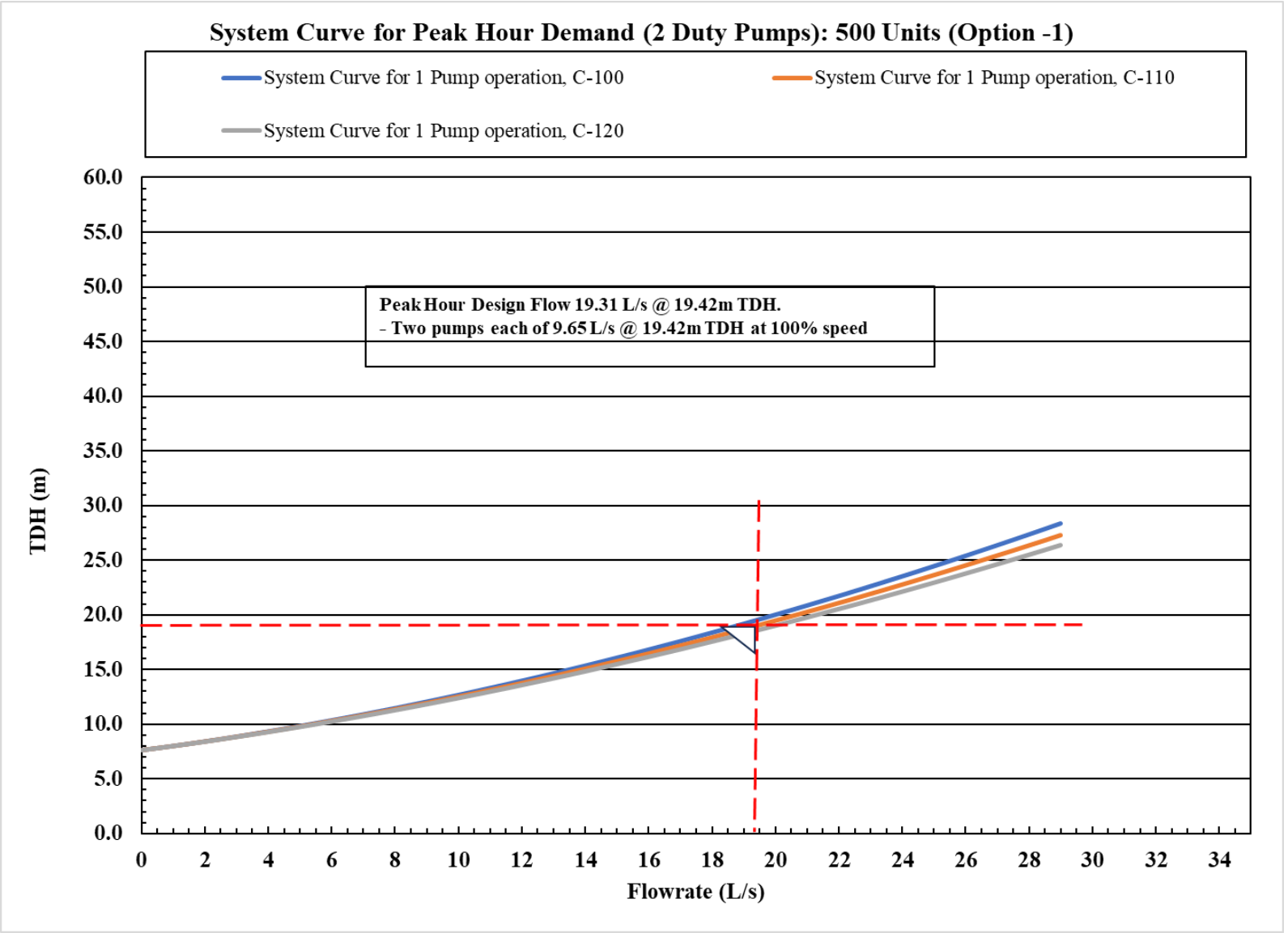


Figure 3.1. System Curve Based on the Peak Hour Demand for 500 units at the Option-1 Site

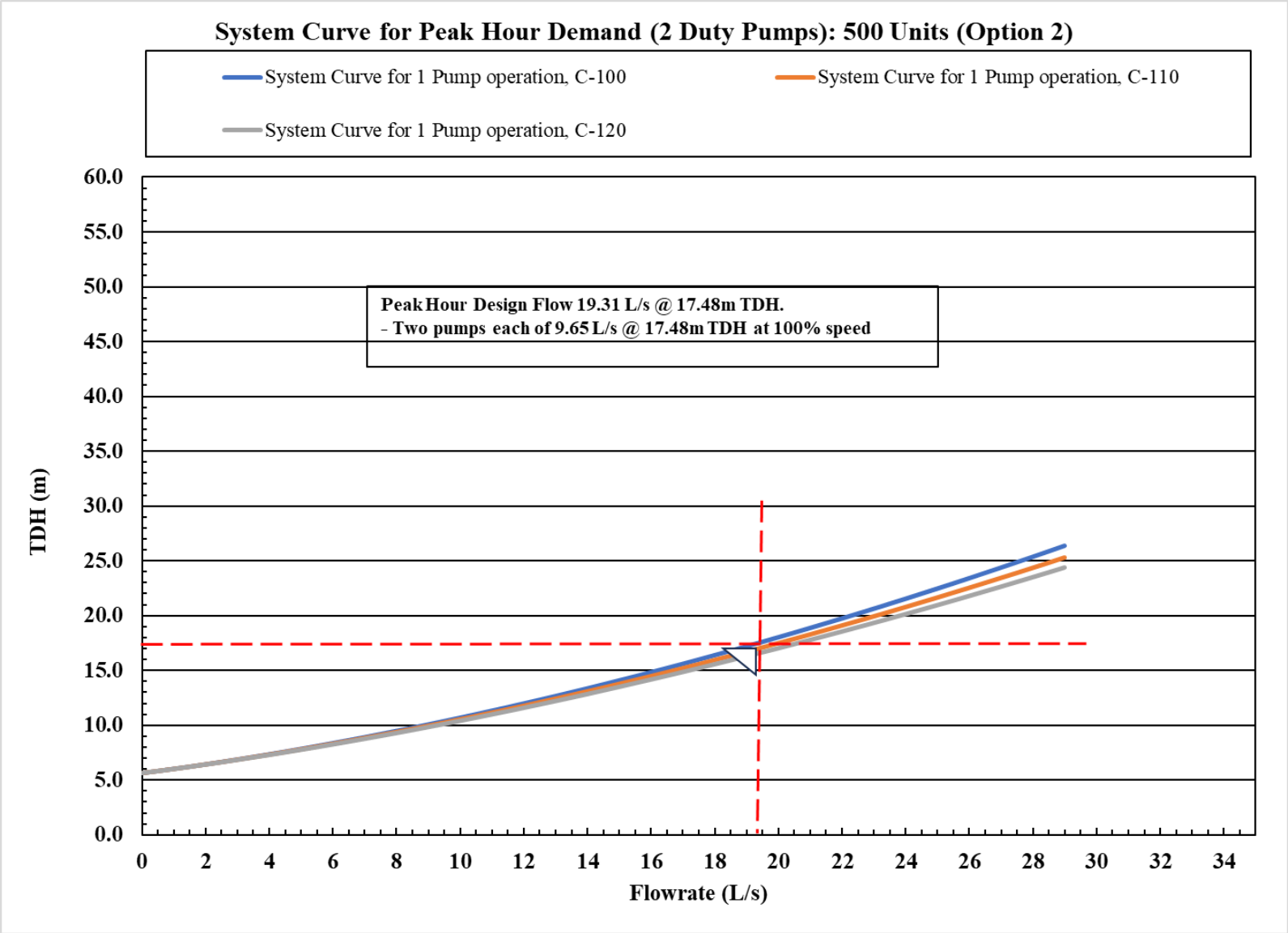


Figure 3.2. System Curve Based on the Peak Hour Demand for 500 Units at the Option 2 Site

4 Electrical

The electrical system will be sized such that each of the duty pumps will be driven by 5hp variable frequency drives for the booster pumping station servicing 500 units for both options. The electrical system will include loads to operate two pumps, as well as control power and outdoor lighting. A 600-volt, three-phase, 60-hertz electrical service will be provided at the temporary booster pumping station.

Respectfully Submitted,

DLW ENGINEERING SERVICES LTD.

Dr. Virender Singh

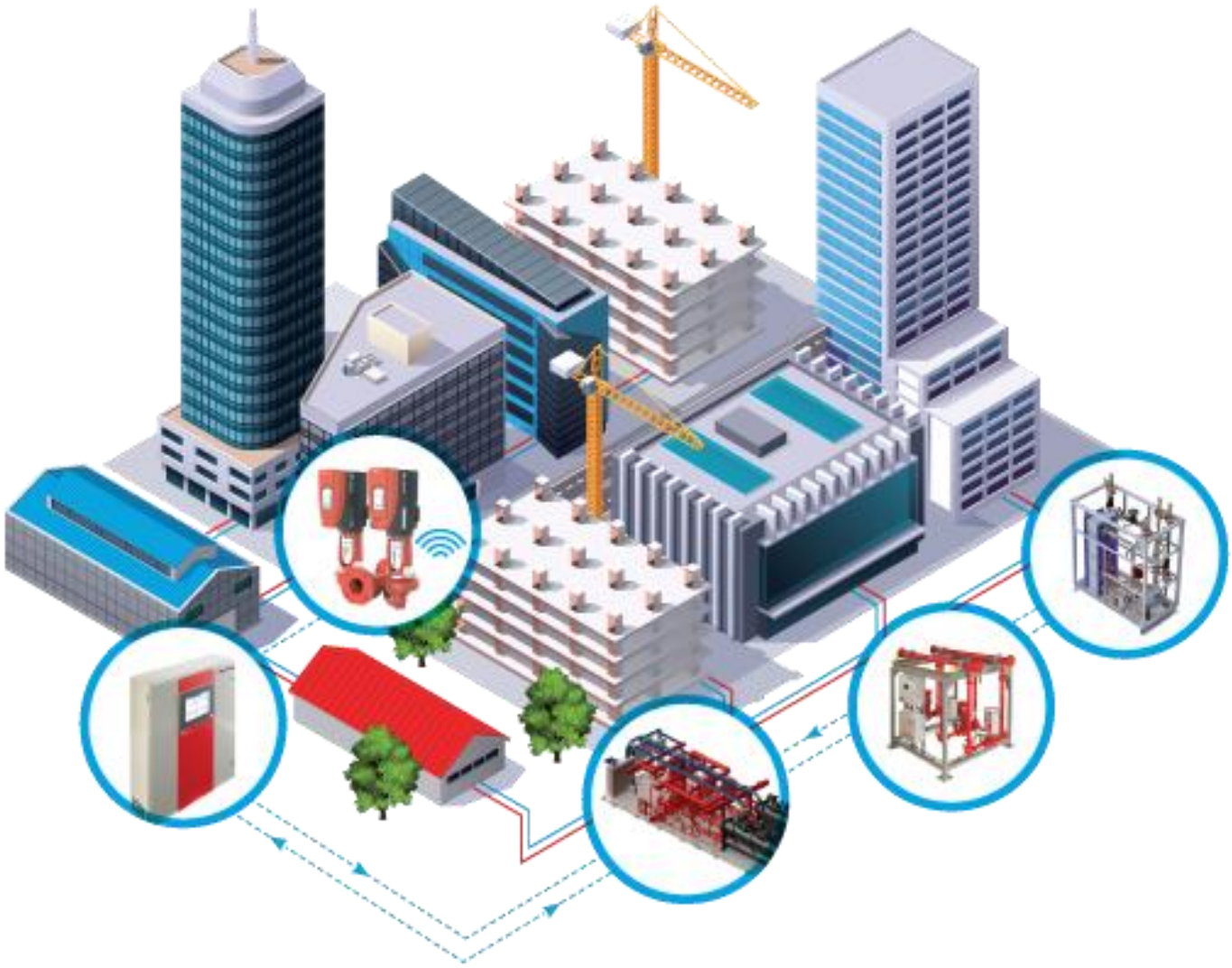
Virender Singh, Ph.D.
Water & Wastewater Practice Leader

SOBrien

Stephen O'Brien, P.Eng.
President

APPENDIX A : BPS PACKAGE PROPOSALS

DECEMBER 24, 2025



BUDGETARY - MOUNT HOPE BPS CALEDON

Ref #: AH251216AP1

NASIR HUSSAIN
ARMSTRONG FLUID TECHNOLOGY
Armstrong Pumps Inc.; 93 East Avenue; North Tonawanda, New York, USA; 14120-6594

ARMSTRONG FLUID TECHNOLOGY
ESTABLISHED 1934
ARMSTRONGFLUIDTECHNOLOGY.COM

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Technical Scope of Supply – Option2: Solmar + Cold Creek 5
Exceptions and Clarifications 8
Conditions and Offer of Sale 9

Project Benefits and Value

Your Armstrong off-site prefabricated solution minimizes your project risk, through our experience and expertise in mechanical and electrical design and manufacture. It will minimize your installed cost through shorter construction schedule, lower site costs, and easier integration process. Your customer will benefit from the compact design that provides easy maintainability and serviceability. The Armstrong commitment to pre-assembly and off-site manufacture brings many benefits to the construction process. Off-site construction and pre-assembly of building services increases predictability and reduces or eliminates many of the risks inherent in traditional construction methodologies.

Armstrong Design Envelope (DE) Technology, integrates the latest selection, control, and hydronic tools into heat-transfer solutions that naturally accommodate changes in building design and demand to ensure system performance is optimal at all times.

- Lowest installed and lowest life cycle costs.
- Embedded intelligence – demand based control.
- Variable speed integration.
- BMS ready, or independent – plug and play technology.
- Pre commissioning with embedded on board controls.
- Data acquisition and diagnostics.
- Increased efficient capacity.
- Optimal match up, smaller and more efficient.

Technical Scope of Supply – Option1: Solmar

Description:

Fluid Management Systems – Booster Pump Room

The pumping system shall be capable of producing 19.31 L/s at 17.75 m. All components outlined below are to be mounted on a common base assembly.

Project Services:

Project Management
Engineering Design and Technical Submittal
Operation and Maintenance Manuals

Submittal Process:

2 to 3 weeks from order: Outline submittals - Data Sheet, Block Layout, Schematic / P&ID.
3 to 4 weeks from order: Full technical submittal (Detailed Drawings, Schematic, Manufacturers Details, etc.).
I&O Manual: On commissioning

Sizes and Weights:	
Approx Size (s)	144 inches (L) x 108 inches (W) x 120 inches (H)
Delivered in	One section
Approx Weights (s)	18500 lbs (Assembled weight)

Equipment Items:	
Item	**Description / Notes**
Booster Package **Tag: Solmar only**	1 X Model: NVS-232021-10S-7.5 hp Booster series: 6800G Total flow: 19.31L/s; Suction (supply) pressure: 33.1 m Boost pressure: 17.75 m; System discharge pressure: 50.8 m Header size: 4 in; System description: Triplex Power supply: 575/3/60 Suction Connection Orientation: Left. Discharge Connection Orientation: Right. Motor Enclosure: TEFC; Header Connections: Grooved Connections. Panel Enclosure: NEMA4 Painted Steel; BMS Port (Serial Communication port for connection to BMS)-BACnet/IP; Human Machine Interface (HMI): Touch Screen 7" Color. Individual Disconnect: No; SCCR Rating: 5kA.
Modulating valves, Flow Meter	(2) 16” Valmatic C504 butterfly valves & (1) ABB FEW325.100.H.1.S.4.A1.B.1.A.1.A.2.P.2.B.3.A.1-M5.V3.CWM flowmeter. Supplied by Directrik, mounted and piped by Armstrong.
Connection Size	16” suction and discharge connections
Ancillary Components	Pressure Gages Flex connectors 16inch check valve on discharge line
Single Point Power	Main disconnect for single point power connection.

Technical Scope of Supply – Option2: Solmar + Cold Creek

Description:

Fluid Management Systems – Booster Pump Room

The pumping system shall be capable of producing 29 L/s at 20 m. All components outlined below are to be mounted on a common base assembly.

Project Services:

Project Management
Engineering Design and Technical Submittal
Operation and Maintenance Manuals

Submittal Process:

2 to 3 weeks from order: Outline submittals - Data Sheet, Block Layout, Schematic / P&ID.
3 to 4 weeks from order: Full technical submittal (Detailed Drawings, Schematic, Manufacturers Details, etc.).
I&O Manual: On commissioning

Sizes and Weights:	
Approx Size (s)	144 inches (L) x 108 inches (W) x 120 inches (H)
Delivered in	One section
Approx Weights (s)	18500 lbs (Assembled weight)

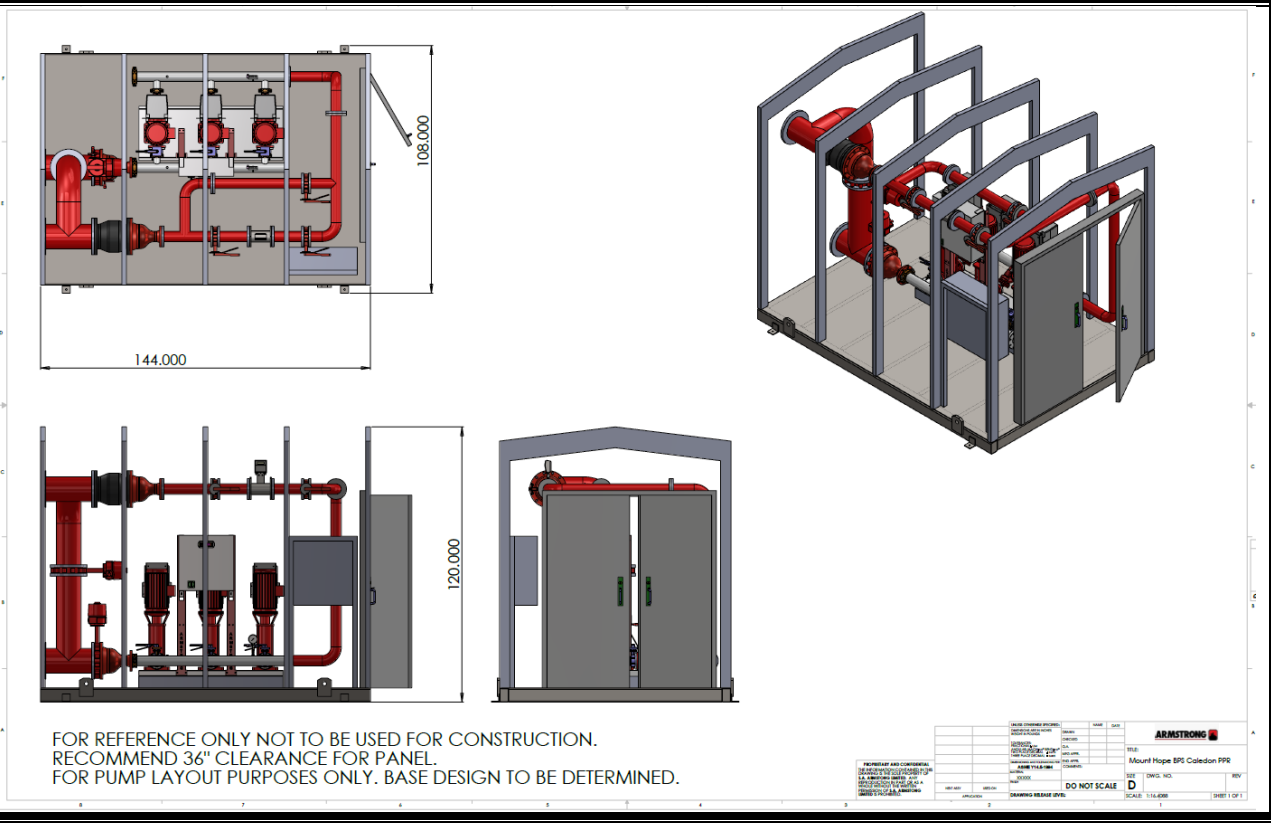
Equipment Items:	
Item	**Description / Notes**
Booster Package **Tag: Solmar only**	1 X Model: NVS-245010-10S-7.5 hp Booster series: 6800G Total flow: 29L/s; Suction (supply) pressure: 33.1 m Boost pressure: 20 m; System discharge pressure: 53.05 m Header size: 6 in; System description: Triplex Power supply: 575/3/60 Suction Connection Orientation: Left. Discharge Connection Orientation: Right. Motor Enclosure: TEFC; Header Connections: Grooved Connections. Panel Enclosure: NEMA4 Painted Steel; BMS Port (Serial Communication port for connection to BMS)-BACnet/IP; Human Machine Interface (HMI): Touch Screen 7" Color. Individual Disconnect: No; SCCR Rating: 5kA.
Modulating valves, Flow Meter	(2) 16” Valmatic C504 butterfly valves & (1) ABB FEW325.100.H.1.S.4.A1.B.1.A.1.A.2.P.2.B.3.A.1-M5.V3.CWM flowmeter. Supplied by Directrik, mounted and piped by Armstrong.
Connection Size	16” suction and discharge connections
Ancillary Components	Pressure Gages Flex connectors 16inch check valve on discharge line
Single Point Power	Main disconnect for single point power connection.

Premium Enclosure Details	
Structure:	• Outer perimeter and cross members shall be structural steel members spaced as necessary to support heavy equipment and floor deck perimeter. All package components are mounted on a structural steel base with a maximum deflection of span/360 when lifted at the designated lifting points. • Base paint to be glass-filled epoxy, anti-slip, anti-corrosion, anti-chemical, non-slip, suitable for coastal environments. • HSS square tube super structure. • Designed to accommodate the full operating load of the installed equipment.
Floor:	• 1/4" mild steel plate is laid over the insulation. • Floor drain incorporated. • Under Floor foam Insulation (closed cell) with an R10.5 minimum at 3" thick.
Cladding System:	• FM Approval in accordance with FM Class 4881 • Wall: 2" thick Insulated Metal Wall Panel, R-value: 17.5 (26 Ga/26 Ga) • Roof: 4" thick Insulated Metal Roof Panel, R-value: 35 (24 Ga/26 Ga). • Walls and Roof are not fire rated. • Internal liner pre-coated steel 0.35mm thick. • Foamed-in-place, PIR Foam Core, zero ozone depleting (zero ODP) Class 1 foam. • Lightly profiled 1/16" deep, longitudinal planks spaced at nominal 4" on center. • Acoustic performance produces a predicted single Weighted Sound Reduction Index (Rw) value of 27dB or STC value of 25. • ASTM E84, Flame spread ≤25, smoke developed ≤450. • NFPA 286: Test meets criteria of the IBC Section 803.1.2.1 • The roof shall be double pitched at 7 degrees. • Performance life of the cladding system shall be 25 years in normal environments.
Doors:	• Doors shall be UL listed and 1.5 hr Fire Rated • The door shall be honeycomb insulated hollow metal, 18 gauge, with 16-gauge welded frame, 5-3/4" typical depth. Single door (3' width x 7' height) or double doors (6' width x 7' height) will be determined by size of equipment. • Door shall be supplied with suitable lock, handle, internal push bar for emergency exit, swing chain and stop/hold mechanism. • There shall be a minimum of 36" clearance in front of the door for egress in the case of emergency.
Environmental Conditions Internal to Enclosure	• Heaters shall be sized to maintain a minimum of 50ºF/10ºC internal temperature on design heating day. • A ventilation fan is provided. • Lighting: LED lights • 2 x 15A power receptacles to be supplied as minimum, with GFCI (ground fault) breaker protection.

Testing / Commissioning:	
Testing at Factory	Hydrostatic pressure of Fluid Management System to 150% of the maximum working pressure
Site Supervision	Not Included
Commissioning	Not Included. Provided by Directrik, if required at $1,500 per day.
Operator Training	Not Included. Provided by Directrik, if required at $1,500 per day.

Standards of Construction:	Refer to File No # 9.8123. Date October 21, 2016

Reference Drawing:	Mount Hope BPS Caledon PPR R2



Exceptions and Clarifications

Exceptions and Clarifications	
Section / Document Number	**Clarification (C) / Exception (E)**
No Specification provided to Armstrong; any specification is excluded	**Armstrong standard of construction will apply.**

Additional Clarification:	

Items Not Included:
 	
• Controls and PLC based control-logic
• Insulation for all piping
• Heat Tracing
• Sensors of any kind (Differential, Temperature, Flow, etc.)
• Flue stacks of any kind
• Seismic Calculations
	Contractor Site Responsibilities:
	
	• Offloading and positioning
	  ○ Removal of protective wrapping such as shrink-wrap, wood crating and packing.
	  ○ Receiving (including interior and exterior inspection) and maintaining the cleanliness of the package (interior and exterior), including debris, while on-site.
	  ○ Inspect interior and exterior and report any obvious damage or equipment shifting that may have taken place
	• Site hoisting and lifting / handling equipment
	  ○ Touch up and paint scratches and minor dents occurred during hoisting and rigging.
	• Join the sections (if shipped in sections) following the instructions enclosed with the unit.
	• Tighten all mechanically fastened connections that may have vibrated loose during shipping.
	• Levelling or shimming
	• Re-align and level equipment including pumps.
	• Connection of external electrical and piped services
	• Filling, flushing and water treatment
	• Fire alarm installation (if required)
	• Lightning protection (if required)
	• External electrical earthing continuity (grounding)
	• Site electrical live testing
	• Commissioning including balancing other than stated above.
	• Installation of loose equipment accessories.
	• Install all life safety equipment as needed.
	• Obtain all relevant permits and inspections needed to start-up the equipment.

Conditions and Offer of Sale

Validity: For budgetary purpose only.

Payment Stages: Progress Payment Schedule:

- 5% of Total Contract Price with Purchase order
- 15% Progress payment due at time of approved submittal (with release of drawing for production)
- 30% Progress payment due at start of fabrication
- 25% Progress payment due prior to release of shipment
- 25% Progress payment due (this is 30 days after shipment from factory)

Budgetary Price: Booster Enclosure (Solmar)

Booster Enclosure (Solmar + Cold Creek)

Freight Not Included

Taxes: Taxes (province and federal) not included

Lead Time: 20-22 weeks after approval of submittal.
Quoted lead times are subject to confirmation at the time of order. The Armstrong Project Manager will coordinate the ship date and lead-time based on construction schedule after receipt of the purchase order.

Documentation Lead Time: Submittals (Data Sheets, General Arrangement Drawings/Block Layouts, and Schematics/P&ID): 2 to 3 weeks from order.
Full technical submittal (Detailed Drawings, Sequence of Operation, Manufacturers Details): 3 to 4 weeks from order
Installation & Operations Manual: At Shipment - Included with delivery of equipment.

Shipping: According to Incoterms 2010
EXW Factory, North Tonawanda, NY

Storage: If, for any reason, the buyer is not able to take delivery at the place of delivery on the agreed delivery date, then either i) the buyer shall take delivery at an alternative place and bear any additional costs of shipping; or ii) Armstrong will arrange shipment into storage on the buyer's behalf, with all costs borne by the buyer. In any event the warranty period shall become effective from the agreed delivery date.

Warranty: Terms and Conditions: For budgetary purpose only.

*** For After Sales Service/Spares pricing please contact AfterSalesService@armstrongfluidtechnology.com or call 1-844-238-2377*

TOWN OF CALEDON - MOUNT HOPE ROAD TEMPORARY BOOSTER PUMPING STATION

DLW Engineering Services Limited

Proposal Date	2026-01-12

PROPOSAL

To	DLW Engineering Services Limited	Attention	Meenu Rose Thankachan, M.Eng, P.Eng
	1900 Dundas Street West, Unit A242 Mississauga, Ontario L5K 1P9	Email	mthankachan@dlwengineering.ca

Project Name	Town of Caledon - Mount Hope Road Temporary Booster Pumping Station
Subject	Budgetary Quotation
Scope	Booster Pumping Station Container
Prepared By	Radostina Vassileva
Sales Contacts	David Howes & Rick Fisher

Dear Meenu Rose Thankachan,

As per your request, SCG Process is pleased to submit the following budget proposal for your consideration and approval.

SCG Process is a provider of smart solutions for water, wastewater, and process applications through the delivery of customized design packages. As an experienced manufacturer, distributor, and service provider, SCG Process is confident that our proposal will provide the right solution for your application requirements.

Our scope of supply is limited to the sections referenced AND the notes, and/or exceptions (if applicable) outlined in our proposal. Should you have any questions concerning this proposal or require any additional information, please do not hesitate to contact us.

Kind Regards,

Radostina Vassileva, Applications Specialist
o: 289-459-1897 | e: rvassileva@scgprocess.com

C.C. **David Howes,** Regional Sales Manager
c: 416.579.1938| e: dhowes@scgprocess.com

C.C. **Rick Fisher,** Product Champion-Booster Pump Products
c: 250-706-3017| e: rfisher@scgprocess.com

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SCOPE OF SUPPLY

DATA PROVIDED FOR SIZING & SELECTION OF EQUIPMENT
REQUIRED Case 1: Peak Hour Flow: 19.31 l/s @ 17.75m TDH Max Static Head: 5.51m Min Static Head: 1.52m Number of Pumps: 2 Duty + 1 Standby 9.6 L/s (2 duty pumps + 1 standby) @ 17.75m (only solmar development) Case 2: Peak Hour Flow : 28.97 l/s @ 20m TDH Max Static Head: 5.51m Min Static Head: 1.52m Number of Pumps: 2 Duty + 1 Standby 14.5 L/s (2 duty pumps + 1 standby) @ 20.00m (solmar development plus cold creek developments)
The inlet will be a 400mm watermain with a minimum inlet pressure of 31-33m.

OPTION #1 – SCG PROCESS BOOSTER PUMPING STATION (CASE 1, DESIGN FLOWS OF 9.6 L/S)

Quantity One (1) SCG Process Containerized Booster Pumping Station
Model BPS-3-2-575-1-1-3-1-64-3
The booster system package will be housed in a new twenty (20) foot long insulated shipping container that has been modified to suit the project requirements. The system components of the proposed booster system will be pre-assembled and pre-installed inside of the shipping container which will be outfitted with lighting, HVAC, power distribution panels, pump equipment, and related process piping, wiring, instrumentation and controls. As this will be a temporary installation, it is assumed that remote communication will not be required (please confirm). The power supply available at site is 600V/3ph/60Hz.

System comes complete as follows:

Quantity One (1) 20-ft Modified Shipping Container
Engineered solution to match customer requirements

- ❒ New 20’ shipping container
- ❒ Interior strapped steel 2x4 on 16” c/c
- ❒ Supply and install minimum 2” spray foam on all walls
- ❒ Supply and install minimum 3” spray foam on ceiling and under floor
- ❒ 5/8” plywood lined all walls and ceiling
- ❒ 22-gauge white steel lined all interior walls and ceiling
- ❒ One (1) floor drain

- Supply and install (2) 36" (Interior) steel insulated door with all trim and lockset
- Supply and install the following electrical:
  - 600V distribution panel, and transformer
  - 600V main service disconnect included
  - (1) 100 Amp 120/240 Volt distribution panel c/w breakers as required
  - Install three (3) pumps and connect to control panel
  - 120 Volt 20-amp convenience outlets as required, GFI, surface wall mounted
  - (4) 48” vapour tight LED light fixtures, surface mounted
  - Pump control panel wired
  - Switch locations as required for lighting control
  - (1) Exterior wall pack fixture over door c/w motion controls
  - Required wiring and connections for (3) 5 HP pumps
  - All wiring in surface run EMT conduit c/w RW90 CU conductors
  - Teck cable and liquid tight conduit c/w connectors as required
  - All mechanical support and grounding to ESA code requirements
  - 5KW AC/Heat split unit
  - Two (2) exhaust fans
  - ESA field evaluation included

Quantity One (1) SCG Process Booster Pump Package

- Booster set with three CR pumps (2 duty / 1 stand-by), each connected to external VFD (in control panel)
- Vertical, multistage centrifugal pump, model CR-32-1 with 5 HP, 575V/3ph/60Hz inverter duty motor
- Pump speed: 3468 rpm, actual calculated flow: 9.6 l/s, resulted pump head: 17.75m
- Dry-running protection (via monitoring with pressure transmitter)

The pumps of the booster system are controlled individually by the PLC-based local control panel which maintains constant pressure through continuous variable adjustment of the speed of the pumps; performance is adjusted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation. Pump changeover is automatic and depends on load, time and fault. All pumps in operation will run at equal speed.

One (1) Booster Pump Control Panel

- NEMA 12 enclosure
- Qty 3 575V / 5 HP VFDs – ABB
- Rockwell CompactLogix PLC c/w 7” HMI
- System Fault Light
- Audible Alarm
- Pump Run Lights
- Normal/Emergency Switch
- Service Disconnect Switch
- Surge Protection
- Configurable digital outputs available for monitoring
- Alarm condition monitoring for: low/high system pressure, individual pump failure, VFD fault, low suction pressure, etc.
- Inclusive of panel construction, panel design, and programming

- ❒ cUL508 certification

Quantity One (1) Floor Mounted Skid and Lot of Accessories (pre-mounted/installed)

- ❒ Two (2) 4” manifolds, 316SS (one for suction and one for discharge)
- ❒ Six (6) 2.5” butterfly valves, lugged style – 2 per pump
- ❒ Three (3) 2.5” check valves on discharge – 1 per pump
- ❒ Three (3) pressure gauges on discharge, Trerice D83LFSS – 1 per pump
- ❒ Two (2) pressure transmitters, E&H Cerabar PMP51 - 1 per manifold
- ❒ Two (2) pressure gauges, Trerice D83LFSS – 1 per manifold
- ❒ One (1) air release valve for drain line
- ❒ One (1) discharge flowmeter, 4”, E&H Promag W 400
- ❒ Three (3) check valves – distribution line & flowmeter bypass
- ❒ Two (2) motorized resilient wedge gate valves, 16”, with Auma actuator SQ14.2-AC02-120/60
- ❒ One (1) check valve, 16”

Note: Based on the above pump selections, the required connections are as follows: 4” common suction/discharge manifolds, 2.5” pump connections to the manifolds

- ❒ One (1) lot of 316SS interconnecting piping spools
- ❒ One (1) base/frame with 304 SS formed pump mount stand with manifold supports included
- ❒ All welds mechanically cleaned and spatter removed

OPTION #2 – SCG PROCESS BOOSTER PUMPING STATION (CASE 2, DESIGN FLOWS OF 14.5 L/S)

Quantity One (1) SCG Process Containerized Booster Pumping Station
Model BPS3-2-575-1-1-3-1-90-3

The booster system package will be housed in a new twenty (20) foot long insulated shipping container that has been modified to suit the project requirements. The system components of the proposed booster system will be pre-assembled and pre-installed inside of the shipping container which will be outfitted with lighting, HVAC, power distribution panels, pump equipment, and related process piping, wiring, instrumentation and controls. As this will be a temporary installation, it is assumed that remote communication will not be required (please confirm). The power supply available at site is 600V/3ph/60Hz.

System comes complete as follows:

Quantity One (1) 20-ft Modified Shipping Container

Engineered solution to match customer requirements

- New 20’ shipping container
- Interior strapped steel 2x4 on 16” c/c
- Supply and install minimum 2” spray foam on all walls
- Supply and install minimum 3” spray foam on ceiling and under floor
- 5/8” plywood lined all walls and ceiling
- 22-gauge white steel lined all interior walls and ceiling
- One (1) floor drain
- Supply and install (2) 36" (Interior) steel insulated door with all trim and lockset
- Supply and install the following electrical:
  - 600V distribution panel, and transformer
  - 600V main service disconnect included
  - (1) 100 Amp 120/240 Volt distribution panel c/w breakers as required
  - Install three (3) pumps and connect to control panel
  - 120 Volt 20-amp convenience outlets as required, GFI, surface wall mounted
  - (4) 48” vapour tight LED light fixtures, surface mounted
  - Pump control panel wired
  - Switch locations as required for lighting control
  - (1) Exterior wall pack fixture over door c/w motion controls
  - Required wiring and connections for (3) 7.5 HP pumps
  - All wiring in surface run EMT conduit c/w RW90 CU conductors
  - Teck cable and liquid tight conduit c/w connectors as required
  - All mechanical support and grounding to ESA code requirements
  - 5KW AC/Heat split unit
  - Two (2) exhaust fans
  - ESA field evaluation included

Quantity One (1) SCG Process Booster Pump Package

- Booster set with three CR pumps (2 duty / 1 stand-by), each connected to external VFD (in control panel)
- Vertical, multistage centrifugal pump, model CR-45-1 with 7.5 HP, 575V/3ph/60Hz inverter duty motor
- Pump speed: 3467 rpm, actual calculated flow: 14.5 l/s, resulted pump head: 20m

- ❒ Dry-running protection (via monitoring with pressure transmitter)

The pumps of the booster system are controlled individually by the PLC-based local control panel which maintains constant pressure through continuous variable adjustment of the speed of the pumps; performance is adjusted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation. Pump changeover is automatic and depends on load, time and fault. All pumps in operation will run at equal speed.

One (1) Booster Pump Control Panel

- ❒ NEMA 12 enclosure
- ❒ Qty 3 575V / 7.5 HP VFDs – ABB
- ❒ Rockwell CompactLogix PLC c/w 7" HMI
- ❒ System Fault Light
- ❒ Audible Alarm
- ❒ Pump Run Lights
- ❒ Normal/Emergency Switch
- ❒ Service Disconnect Switch
- ❒ Surge Protection
- ❒ Configurable digital outputs available for monitoring
- ❒ Alarm condition monitoring for: low/high system pressure, individual pump failure, VFD fault, low suction pressure, etc.
- ❒ Inclusive of panel construction, panel design, and programming
- ❒ cUL508 certification

Quantity One (1) Floor Mounted Skid and Lot of Accessories (pre-mounted/installed)

- ❒ Two (2) 4" manifolds, 316SS (one for suction and one for discharge)
- ❒ Six (6) 3" butterfly valves – 2 per pump
- ❒ Three (3) 3" check valves on discharge – 1 per pump
- ❒ Three (3) pressure gauges on discharge, Trerice D83LFSS – 1 per pump
- ❒ Expansion joints included
- ❒ Two (2) pressure transmitters, E&H Cerabar PMP51 - 1 per manifold
- ❒ Two (2) pressure gauges, Trerice D83LFSS – 1 per manifold
- ❒ One (1) air release valve for drain line
- ❒ One (1) discharge flowmeter, 4", E&H Promag W 400
- ❒ Three (3) check valves – distribution line & flowmeter bypass
- ❒ Two (2) motorized resilient wedge gate valves, 16", with Auma actuator SQ14.2-AC02-120/60
- ❒ One (1) check valve, 16"

Note: Based on the above pump selections, the required connections are as follows: 4" common suction/discharge manifolds, 3" pump connections to the manifolds

- ❒ One (1) lot of 316SS interconnecting piping spools
- ❒ One (1) base/frame with 304 SS formed pump mount stand with manifold supports included
- ❒ All welds mechanically cleaned and spatter removed

QUOTATION PRICE

DESCRIPTION	ITEM PRICE (CAD)
OPTION #1 - SCG PROCESS BOOSTER PUMPING STATION (CASE 1)	$454,900.00
OPTION #2 - SCG PROCESS BOOSTER PUMPING STATION (CASE 2)	$472,600.00
Optional Deduct for Option #1 or Option #2 to Switch from Two (2) Motorized 16” Resilient Wedge Gate Valves to Twon (2) Motorized 16” Butterfly Valves	$55,800.00

NOTES

- **As this installation will be temporary, we have excluded remote communication from our scope at this time. Please confirm whether the BPS will use require remote communication (i.e., ethernet or cellular)**
- **Watermain/supply/drain hookups by contractor, along with the required plumbing materials associated with this work.**
- **Installation hardware, anchor bolts, seismic restraints, or any other materials and components required for installation by others.**
- **Anything not specifically outlined in the above scope is excluded and to be provided by others**
- **Heat tracing and insulation (if required) for piping external to the container by contractor**
- **Concrete pad and any associated civil work (pipes, openings and embedded items, anchor bolts for slab, etc.,) for container installation by contractor. Drain integration into concrete pad by contractor.**
- **Container unloading (and crane for unloading) and installation at site by others**

EXCEPTIONS

- **Not applicable**

START-UP, COMMISSIONING AND TRAINING

START-UP, COMMISSIONING AND TRAINING
Start-up, commissioning, and training are included. We have considered the following: Two (2) Days for installation inspection, commissioning and start-up One (1) Day for operator/staff training on pump maintenance and operation **Any additional days billable at extra cost**
Our certified Field Technicians provide commissioning and start-up services, practical hands-on training, and technical support on SCG Process provided products. **To inquire about Technical Services provided by SCG Process, please contact us at 866-924-7802 or email sales@scgprocess.com

TERMS & CONDITIONS

QUOTATION SUBJECT TO SCG PROCESS STANDARD TERMS & CONDITIONS UNLESS OTHERWISE NOTED	
Quotation Validity:	30 days from date of quotation
Payment Terms:	Net 30 days from date of invoice, subject to prior credit approval
Submittals:	4 - 6 weeks after receipt of order
Delivery Schedule:	18 - 20 weeks after approval of submittals
Terms of Delivery:	FCA Site (Unloading by others)
Start-up, Commissioning & Training:	As noted above
Warranty (Equipment & Service):	FCA Concord, ON, for 12 months after Start- up or 18 months after Delivery whichever comes first

Notes:
Payment Terms:

- **10% upon drawing submittal**
- **20% upon ordering of major materials**
- **60% upon shipment of equipment**
- **10% upon successful commissioning (no later than 90 days from shipment)**

TERMS & CONDITIONS

1. DEFINITIONS: The following defined terms mean:
"**Company**" means Smith Cameron Pump Solutions Inc., d.b.a. SCG Process.
"**Purchaser**" means party named on the order confirmation as the purchaser of the Goods or Services.
"**Agreement**" means the order confirmation, together with all documents, drawings and specifications referred to therein, including these Terms and Conditions.
"**Equipment**" means all supplies, goods, materials, equipment, components and spares required to be supplied by the Company in accordance to the Agreement.
"**Services**" means all labour, supervision, administration, supplies, tools, equipment and other work and materials to be supplied, installed performed or otherwise used by the Company as required by the Agreement.
"**Substantial Completion**" means that a substantial part of the work is ready for use or is being used for the purpose intended.
"**Completion**" means

a) in relation to Services, that the Services have been fully performed and completed; and
b) in relation to Equipment, the Equipment has been fully completed, supplied and delivered, each in accordance with the Agreement.

2. EFFECT: These terms and conditions form part of every Agreement entered into by the Company with a Purchaser. If the Purchaser authorizes the Company to supply Services or Equipment, then these terms and conditions shall apply, unless an authorized representative of the Company agrees in writing to different terms and conditions. Any variation will affect only those terms and conditions specified, and the remainder will remain in force without amendment. Company's acknowledgement of Purchaser's purchase order shall not constitute acceptance of any terms and conditions therein regardless of how such terms and conditions may be prefaced or described.

3. LAW: The contract between the Company and the Purchaser shall be construed under and governed by the laws of the Province of British Columbia and Canada, regardless of where the contract is made or performed. Subject to paragraph 18, the courts of the Province of British Columbia shall have exclusive jurisdiction over any dispute arising from or regarding this Agreement. Compliance with local laws or standards relating to the location, use or operation of the Equipment, by itself or in conjunction with other equipment, and including any fines or penalties, shall be the sole responsibility of the Purchaser.

4. TITLE AND RISK: Title and risk of loss of or damage to the Equipment shall pass to the Purchaser when the Equipment is shipped, whether from the manufacturing facility or the Company's premises. The Purchaser agrees to insure the Equipment with the Company named as loss payee until the Company has been paid in full.

5. CREDIT AND PAYMENT TERMS: The Purchaser shall furnish to Company all financial information reasonably requested by Company from time to time for the purpose of establishing or continuing Purchaser's credit limit. The Purchaser agrees that the Company shall have the right to decline to extend credit to Purchaser and to require that the applicable purchase price be paid prior to shipment. The Purchaser shall promptly notify the Company of all changes to the Purchaser's name, address, or the sale of substantially all of its assets. The Company shall have the right from time to time, without notice, to change or revoke the Purchaser's credit limit on the basis of changes in the Company's credit policies or the Purchaser's financial conditions and/or payment record. Unless the Company has made a contrary agreement in writing, payment for the Services and Equipment is due within 30 days following the earliest of:

a) Shipment or offer to ship the Equipment to the Purchaser;
b) Substantial Completion of the Services;
c) The date of the Company's invoice to the Purchaser.

Overdue amounts will bear interest at 2% per month, compounded monthly (26.82% per annum) until paid. Payment is due without set off or counter-claims for any amounts claimed by the Purchaser or any affiliate of the Purchaser from the Company, whether or not such claim arises out of this agreement.
Company shall issue its invoice upon shipment or upon readiness to ship, whichever is earlier. Depending on the value of the order, the Company may at its sole discretion require progress payments.

6. SECURITY INTEREST: The Company retains a security interest in the Equipment, and any proceeds derived from the sale or exchange of the Equipment, until the price has been paid in full. The Purchaser agrees to notify the Company immediately of any change in the location of the Equipment, and to take all steps requested by the Company to establish, perfect, continue, and enforce the security interest. The Purchaser waives the right to receive copies of any financing statement, financing change statement, or verification statement.

7. DELIVERY: Any delivery date specified is an estimate only, and subject to delay caused by labour disputes, shortages of material, transportation or manufacturing delays, inclement weather or other cause beyond the reasonable control of the Company. The Company will take commercially reasonable steps to meet any delivery date specified, but will not be liable for the consequences of delay in delivery.

8. TAXES AND DUTIES: The price does not include any present or future federal, provincial, state or local licenses, permits, sales taxes or assessments which may be applicable to or result from the sale of Equipment or Services. Unless otherwise stated, the price does include customs or import duties. Tax exemptions must be clearly noted on Purchaser purchase orders or the appropriate documentation must be presented to Company.

9. PRICES: Unless specified on the quote, prices are guaranteed for 30 days from date of quote.

10. CANCELLATION POLICY: Order cancellation requires written consent from Company. Cancellation of standard product normally stocked and without modification will incur a 25% cancellation charge. Nonstandard or modified product cannot be cancelled without written consent. The Purchaser will agree to pay for all cancellation costs, expenses, commitments, liabilities, and other costs including overhead incurred with respect to all uncompleted goods.

11. RETURNS: The Purchaser shall not return any Equipment to the Company without prior written authorization. Any authorized returns will be subject to a minimum 20% re-stocking charge. Returns must be prepaid, unopened, unused and ready for resale. Product shall be deemed suitable and not returnable after 60 days from delivery date.

12. WARRANTY: The Company warrants that the Equipment and Services will be free of defects in material and workmanship for a period of twelve months from the date the Purchaser begins to operate the Equipment, or eighteen months from the date of shipment to the Purchaser, whichever shall first occur. The Company may, at its option, repair or replace the Equipment and Services. This warranty specifically excludes:

a) any claim where the Purchaser has not stored, installed, maintained or operated the Equipment in accordance with the manufacturer's specifications or instructions;
b) the cost of any repairs, replacements, or adjustments (including labour) to the Equipment performed by the Purchaser or others;
c) the effects of corrosion, erosion, or normal wear and tear;
d) any claim which the Purchaser has not immediately reported, in writing, to the Company;
e) any claim where the Purchaser has not complied with specific recommendations of the Company or the manufacturer of the Equipment;

f) any warranty with respect to the performance of the Equipment, unless given by the Company in writing, and in that event, the Company's sole obligation shall be as specified in this paragraph 12, as limited by paragraph 13.

13. LIMITATION OF LIABILITY: The warranty given in paragraph 12 excludes all other warranties, whether express, implied, contractual, statutory or otherwise. All implied warranties, including any warranty of merchantability or fitness for a particular purpose, are hereby disclaimed. The Company makes no other warranty or representation of any kind whatsoever, except as to title to the Equipment.

The maximum liability of the Company with respect to this contract, the Equipment and the Services, whether based on contract, warranty, negligence, indemnity, strict liability or otherwise, shall not exceed the price of the Equipment or Services upon which such liability is based.

The Company shall in no event be liable to the Purchaser for any consequential, incidental, indirect, special or punitive damages arising out of this contract, any breach thereof, any defect in, failure or malfunction of the Equipment and Services, whether based upon lost goodwill, lost profits or revenue, interest, work stoppage, impairment of other goods, loss by reason of shutdown or non-operation, increased expenses of operation of the Equipment, loss of use of electrical systems, cost of purchase of replacement power, claims of the Purchaser or customers of the Purchaser for service interruption, or otherwise, and whether or not such loss or damage is based on contract, warranty, negligence, indemnity, strict liability or otherwise.

14. SURVIVAL OF AGREEMENT: The effect of these terms and conditions shall survive the delivery and completion of the purchase contemplated by this agreement.

15. SEVERABILITY: If any provision in these terms and conditions is held by a court of competent jurisdiction to be contrary to law, the remaining provisions will remain in full force and effect.

16. FORCE MAJEURE: Neither Purchaser nor Company shall hold the other responsible for damages or delays in performance caused by Force Majeure or other events beyond the control of the other Party which could not reasonably have been anticipated or prevented. Force Majeure shall include, but not be limited to, unusually severe weather, floods, power outages, epidemics, war, acts of terrorism, riots, strikes, lockouts, exercise of police power, condemnation, or eminent domain. The foregoing shall not give rise to any claims or damages or be considered a waiver by either Party of the obligations of this Agreement.

17. NO WAIVER: Failure of the Company to enforce these terms and conditions, on any occasion, shall not operate as a waiver of such provisions or rights on future occasions.

18. ARBITRATION: Any dispute between the Company and the Purchaser concerning the purchase of Services or Equipment, or these terms and conditions, shall be resolved by a single arbitrator appointed and acting under the Arbitration Act; the arbitrator's decision shall be final and binding upon the parties. The arbitration shall be held in Vancouver, British Columbia.

19. ENTIRE AGREEMENT: These terms and conditions and the Company's order confirmation contain the entire agreement between the parties, and supersede all prior contracts or negotiations. There are no representations, warranties, conditions, collateral agreements, understandings, or inducements which are not contained in these terms and conditions, or the order confirmation.

20. ASSIGNMENT: Neither party shall assign its interest in this contract without the written consent of the Company.

21. GENERAL: These terms and conditions are the official terms and conditions for sale between the Company and Purchaser and may be amended from time to time without notice at Company's sole discretion.

22. TARIFFS: Prices quoted are based on the current tariff rates, duties, government charges, and trade regulations as of the date of this quote. If any new tariffs, duties, taxes, or similar charges are imposed, or if existing ones are increased or modified by any government or regulatory authority (collectively, "Tariff Changes"), resulting in higher costs, the Company reserves the right to adjust the pricing of the affected goods accordingly. The Company is not obligated to deliver the goods and/or services until a new price agreement is reached. The prices listed in sales orders are based on the tariff rates, duties, government charges, and trade regulations effective as of the sales order Effective Date. If any new tariffs, duties, taxes, or similar charges are imposed, or if existing ones are increased or modified by any government or regulatory authority (collectively, "Tariff Changes") after the Effective Date, resulting in higher costs, the Company reserves the right to adjust the pricing of the affected goods accordingly. The Company is not obligated to deliver the goods and/or services until a new price agreement is reached.

SPS Design Basis Report by DLW

MOUNT HOPE ROAD TEMPORARY SEWAGE PUMPING STATION AND FORCEMAIN DESIGN BASIS REPORT

UNITED HOLDINGS INC.

TOWN OF BOLTON, REGION OF PEEL

PREPARED BY:
DLW ENGINEERING SERVICES LIMITED
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JANUARY 2026

DLW FILE NO: UHI-001

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1. Introduction

DLW Engineering Services Limited (DLW) has been retained by Solmar Development Corp. to provide consulting engineering services related to the design of a temporary sewage pumping station (SPS) in support of the servicing for the residential subdivision, in the Town of Bolton for United Holdings Inc.

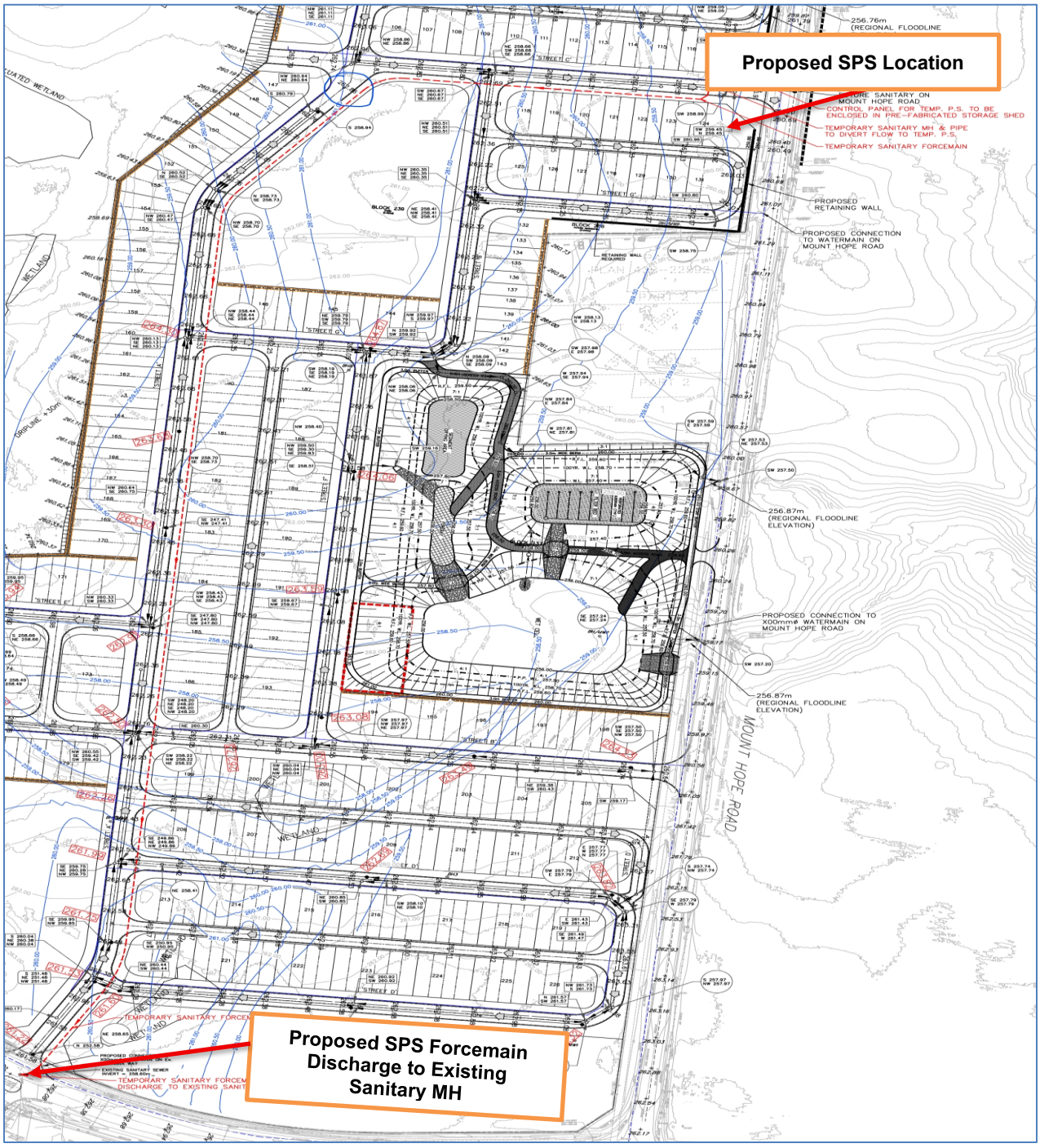


Figure 1.1: Location Plan

The proposed wastewater infrastructure includes a temporary sewage pumping station located west of Mount Hope Road and a forcemain with an approximate length of 865m that will discharge southwestward to the intersection of Columbia Way and Westchester Blvd. Initially, it was considered to design the temporary sewage pumping station to deliver the flow from 500 units to the existing sanitary sewer manhole (located at the intersection of Columbia Way and Westchester Blvd), which directs it to the downstream Bolton SPS. However, the Region of Peel has modelled this proposal and found that at 500 units, the sanitary collection system upstream of the Bolton SPS will experience basement flooding. They also concluded that the Bolton SPS does not have sufficient capacity to accommodate the peak flows from the 500 proposed units. According to Region of Peel staff, the Bolton SPS can only be able to accommodate the peak wet weather flows from an additional 300 units from the proposed Mount Hope Subdivision development. Thus, this temporary SPS will be designed for a peak wet weather pumping capacity of 300 units and flows more than this design capacity must be stored in equalization tanks at the pumping station site and discharged back into the wet well for pumping when the peak flows fall below the process capacity of the proposed temporary SPS. This will ensure that the Bolton SPS capacity is not exceeded and the sewers upstream of the Bolton SPS will not experience basement flooding. Hence, this report outlines the design requirements of the temporary SPS, and its operational approach based on the limited capacity of both the downstream sanitary sewers and the Bolton SPS.

The proposed pumping station will be designed and constructed in accordance with the following standards and guidelines:

- Design Guidelines for Sewage Works, Ministry of the Environment, Conservation and Parks (MECP Design Guidelines), 2008
- Region of Peel Sewage Pumping Station Design Guidelines
- Region of Peel Linear Wastewater Standards

2. Design Population

The design population for the entire subdivision is based on 598 units. However, in this section, we have determined the service capacity of 500 units, 400 units, and 300 units. Based on the concept plan for 598 units (provided by the KLM planning), the number and type of units proposed are 100 single-detached units, 328 semi-detached units, and 170 townhouse units. This is equivalent to 16.7% of single-detached units, 54.8% of semi-detached units, and 28.4% of Townhouse units. We used the same percentages to estimate the type of units of 500, 400, and 300 units below. The residential density (in persons per unit or ppu) specified in the Region of Peel's linear wastewater standards is used for population projections.

Type of Units	Residential Density (ppu)	Number of units	Population	Number of units	Population	Number of units	Population	Number of units	Population
Single Detached	4.2	100	420	84	351	67	281	50	211
Semi-Detached	4.2	328	1,378	274	1,152	219	921	165	691
Townhouses	3.4	170	578	142	483	114	387	85	290
Totals		**598**	**2,376**	**500**	**1,986**	**400**	**1,589**	**300**	**1,192**

3. Design Flows

The criteria followed for the SPS design were based on the Region of Peel and MECP guidelines given in the Table below.

- Sewage generation Rate 280 Lpcd (from Region of Peel Watermain Design Criteria)
- Maximum Day Peaking Factor = 2
- Infiltration Allowance = 0.26 L/s/ha
- Total Site Area = 29.65 ha
- Site Area used for I/I purposes = 20.75 ha (The total area used in the infiltration calculation is 20.75 ha and excludes the SWM pond block, park, channel, commercial block, and mid/high-rise blocks. The total area used in the infiltration calculation is 20.75 ha and excludes the SWM pond block, park, channel, commercial block, and mid/high-rise blocks.)

Developmental Units	300 Units		400 Units		500 Units		598 Units
Population	1,192		1,589		1,986		2,376
Harmon Peaking Factor	3.75		3.66		3.59		3.53
Infiltration Flow (L/s)	5.40		5.40		5.40		5.40
Average Dry Weather Flow L/s)	3.86		5.15		6.44		7.70
Average Wet Weather Flow (L/s)	9.26		10.54		11.83		13.09
Maximum Day Wet Weather Flow (L/s)	13.12		15.69		18.27		20.79
Peak Dry Weather Flow (L/s)	14.48		18.85		23.10		27.15
Peak Wet Weather Flow (L/s)	**19.88**		24.25		**28.49**		32.54

As discussed in the introduction section, the existing capacity of the Bolton SPS can only accommodate 300 units, which translates into a peak wet weather flow of 19.88 L/s. However, the sewage pumping station will be designed to accommodate the sewage flows from 500 units. The resultant peak wet weather flow from the 500 units would be 28.49 L/s. With the limited capacity of only 19.88 L/s for Bolton SPS, the remaining peak flow of 8.61 L/s will need to be stored onsite in equalization tankage and released as the flows to the station drop below the peak flow of 19.88 L/s. It is noteworthy that the peak wet weather flow for 300 units (at 19.88 L/s) is slightly in excess of the maximum day wet weather flows for 500 units (at 18.27 L/s). Thus, only the wet-weather peak flows for the additional 200 units must be attenuated to ensure that the temporary SPS is not overwhelmed during peak rainfall events when the site is fully built out. This analysis shows that for the most part, the proposed temporary SPS will handle all but the peak wet weather flow for 500 units, which is a very infrequent occurrence. Given that peak hour flows typically last between 1 and 2 hours, we propose that the equalization storage required to shave the peak flows be based on the differential in wet weather flows between 300 and 500 units for a 4-hour period.

4. Temporary Sewage Pumping Station Classification

Sewage pump stations in the Region of Peel are classified into four types: Type I, Type II, Type III, and Type IV based on design flows. At 20 L/s, a Type I facility is required, and above 20 L/s (up to 60 L/s), a Type II facility is required. The main differences in the two station types are the number of

pumps required and the number of forcemains required. Based on the Region of Peel's design criteria, the temporary SPS should be classified as a Type-I station.

As a Type-I station, the pump configuration will be based on a two-pump design with one duty pump and one standby pump, with each pump sized for 19.88 L/s. We recommend that the pumps operate on variable frequency drives to provide some variability in flow. The minimum flows would ensure that cleansing velocities are always achieved in the forcemain.

If pumps with VFD's are available for these flows, then the VFDs will provide some protection against transient phenomena. Harmonics issues associated with the VFDs will be addressed with the use of harmonics filters, if required.

5. Pump Station Structure

The incoming 300 mm diameter (inlet) sewer enters the wet well at elevation 254.15 m. An In-line grinder will be provided just at the exit of the incoming sewer pipe as it enters the wet well to grind the larger particles. As per the Region's guidelines (page 18, section 8.3.1 FRP Wet Wells), the pre-engineered fibreglass reinforced plastic wet wells can only be considered for Type I stations. Hence, we recommend that the proposed sewage pumping station be a prefabricated fibreglass reinforced plastic (FRP) type with an integral prefabricated FRP valve chamber. The diameter of the wet will be **3.0 m** with a depth of **10.34 m**. This style of station will allow for ease of installation and ease of decommissioning when the station is no longer required.

The pre-engineered pump station package will include the submersible pumps, discharge elbows, Type 316 stainless steel guide rails, lifting system, fibreglass wet well, internal stainless steel piping, platforms, ladders, railings, ventilation pipes, machined inlet and outlet nozzles including conduit penetrations, lifting lugs/trunnion, access hatches, and anchor brackets for instruments all in accordance with Peel's SPS Standards. The wet well basin and roof shall be made of fibreglass reinforced plastic, UV-resistant, and suitable for corrosive wastewater environments. A safety factor of three in the minimum ultimate tensile strength of the laminate bottom shall be used in designing the basin and cylinder wall thicknesses for the station, taking into account all normally imposed loads arising from floatation, soil pressures, normal backfill, handling loads, operating loads and static loads imposed by equipment used in hoisting the pumps in and out of the station. The wet well structure will also be designed to counteract flotation, assuming that the soils will be fully saturated.

6. Wet Well Design

The SPS will operate in a duplex fashion, with either pump capable of pumping the peak design flow. There would be one duty and one standby pump. Duty status will alternate between pump starts.

To size the wet well, the working volume (normal volume between one pump start and stop) must be properly selected. The working volume must be large enough that the pumps do not cycle more than six times an hour when running. Higher cycling times can cause early wear on the pumps and motors. Regardless of the calculated pump cycle working volume, the minimum difference between normal pump starts and stop setpoints shall be 0.5 m per Region of Peel design criteria.

Based on MECP design criteria, the working volume for one pump operation at the design flow is **2.98 m^3**. With a 3.0 m diameter wet well, this results in an operating depth of approximately 0.41 m between pump start and pump stop. However, based on the minimum difference between normal pump start and stop setpoints, an operating depth of 0.5 m will be used.

The station will be designed to operate on PLC-based (Milltronics) level controls with float backup. The pump operating levels in the wet well are as shown in the following **Table 6.1**:

Table 6.1 - Recommended Wet Well Pump Control Elevations – Phase-1

Ground Elevation	261.15	m
Basement Flood Elevation	257.54	m
Incoming Sewer Elevation	254.15	m
Available Freeboard Depth	0.55	m
HL Alarm Level	253.60	m
Duty Pump Start (Float)	253.10	m
Duty Pump Start (PLC)	252.60	m
All Pumps Stop (PLC)	252.31	m
All Pumps Stop (Float)	251.81	m
Minimum depth to avoid Vortexing	251.41	m
Assume Submergence Depth	0.6	m
Wet Well floor Elevation	250.81	m
Pumping Station Depth	**10.34**	m

Aluminum hatch covers will be provided in the wet well top for both personnel access and pump removal. Hatches will be equipped with safety locks to ensure that the hatches do not accidentally close. Aluminum ladders secured to the station wall will be installed from the access hatch down to the base of the wet well.

7. Emergency Storage and Equalization Volume

7.1. Emergency Storage Volume

The required emergency storage volume based on SPS classification is given below in Table 7.1:

Table 7.1: Required emergency storage volume based SPS classification

Station Type	Storage Capacity at Rated Capacity
Type I	2.0 hours
Type II	2.0 hours
Type III	Minimum 1.0 hour on-site (no less than 432 m^3 on-site) 2.0 hours total
Type IV	Minimum 1.0 hour on-site 2.0 hours total

The emergency storage volume has been designed based on a peak wet-weather flow rate of 28.49 L/s. According to the Region of Peel's design criteria summarized in the table above, a dedicated on-site emergency storage volume of 2 hours is typically required. **However, because this is a temporary SPS and additional flow equalization storage will also be provided for peak shaving, a reduced on-site emergency storage period of 1 hour (60 minutes) is proposed, corresponding to a required volume of 103 m³.** The estimated basement flood elevation for this development is estimated to be at an elevation of 257.74 m. The maximum allowable water depth in the wet well for emergency storage purposes is calculated to be 3.69 m, which provides approximately 26.8 m³ of storage in the wet well. This would leave an additional required storage volume of roughly 80 m³ to meet the proposed 1-hour storage criterion. However, for this temporary SPS, the available wet-well volume is not being considered toward the emergency storage requirement and neither is the storage in the upstream sewers and manholes being considered, as a full 1 hour of dedicated external emergency storage is assumed. Therefore, the design will include a dedicated emergency storage volume of 103 m³.

7.2. Equalization Volume

As noted earlier, peak wet weather flows typically persist for 1 to 2 hours. However, for design conservatism, we are assuming that peak flow conditions may last up to 4 hours. As a result, a dedicated on-site equalization volume is required to attenuate these extended peak events. Using a differential for peak wet-weather flows of between 300 and 500 units (or 8.62 L/s) for equalization, the required equalization volume is calculated to be 124 m³, based on a 4-hour hydraulic retention time (HRT) at 8.62 L/s.

7.3. Total volume and resultant HRT

The combined emergency storage and equalization volume is 227 m³. This total storage capacity provides approximately 7.31 hours of hydraulic retention time (HRT) at the differential between the peak wet-weather flow for 500 units and the SPS design flow. It also provides approximately 2.21 hours of HRT at the full peak wet-weather flow for 500 units. As noted earlier, for conservatism of the design, the HRT values above do not include any additional storage provided in the upstream

sanitary sewer system and upstream sanitary manholes or the additional storage in the wet well above the high level alarm.

7.4. Storage tank configuration

For emergency storage and equalization tanks, we are proposing three options. In the first option, a cast-in-place concrete underground tank (total volume of 227 m³) will be used (refer to **site layout A & Section B)**. Given that this SPS is temporary and will be used for only 3-6 years, the second option is to reuse the existing precast concrete sewage storage tanks from Solmar's Erin facility, which will soon be decommissioned. The volume of each of the four tanks at the Erin facility is 132 m^3 (Length 18.3m x Width 3m x SWD 2.4m). Therefore, two tanks are required to match the storage volume for the Mount Hope facility **(refer to the site layout C & Section D)**. However, the structural integrity of these tanks is only stable at soil cover depth up to 3.5m. Consequently, the invert of these tanks needs to be placed above the invert of the incoming sewer to the wet well. In the third option, new precast concrete tanks will be used similar to those used in the Erin facility, which will be structurally stable at soil cover depths of 4.9m to 5.1m **(refer to the site layout E & Section F).**

The proposed site layouts, equalization, and emergency storage tank configurations are shown in the following preliminary drawings. The drawings also show the proposed FRP wet well configurations proposed by Xylem that have the integral valve chambers. While these valve chamber designs are not typical for the Region of Peel wastewater infrastructure, we recommend that the Region consider this design, particularly since this station is considered temporary. This FRP design will lower the initial construction cost and provide an ease of decommissioning at the end of the service life of this station.

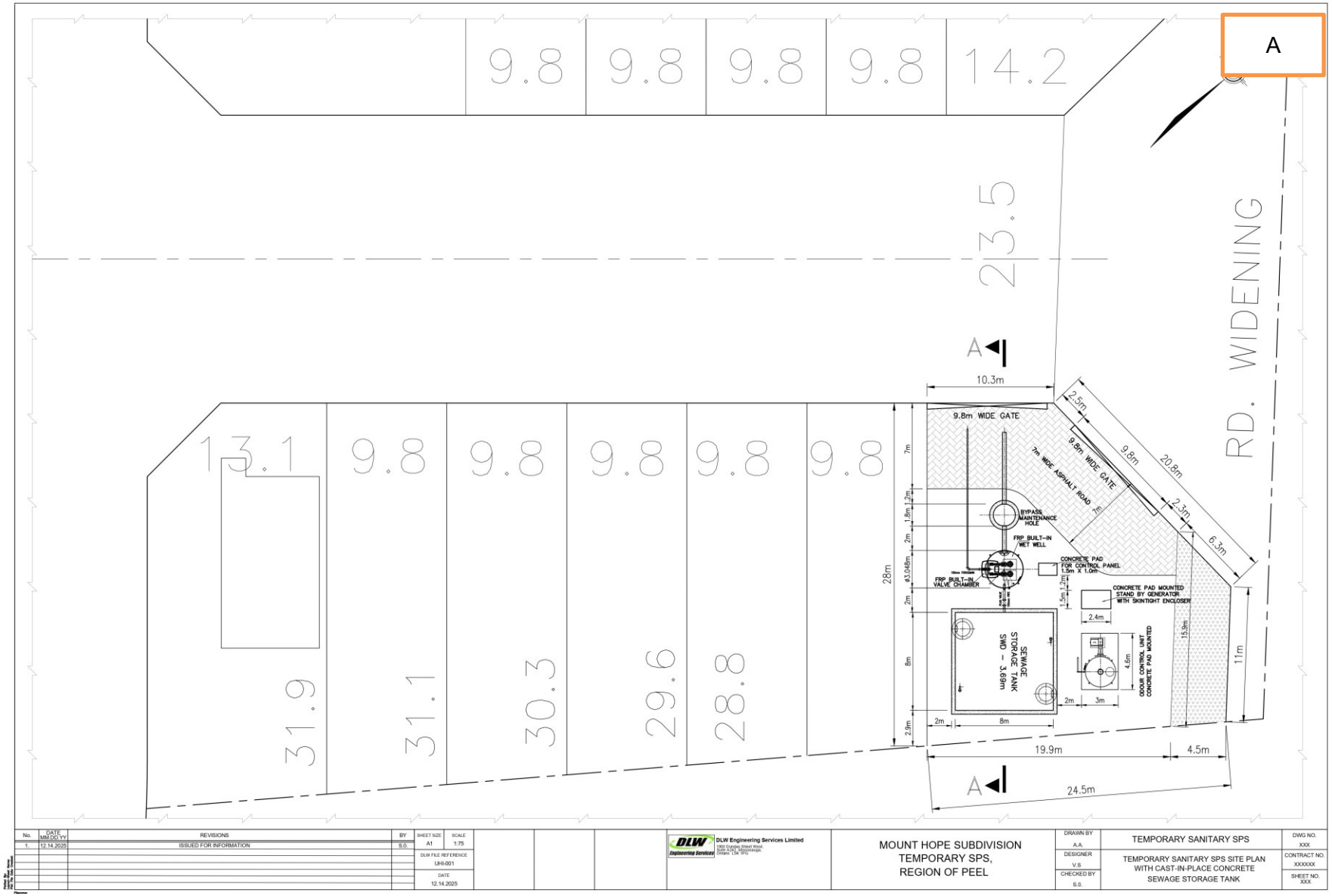


Figure 7.4.1: Overall site layout for temporary SPS with cast-in-place emergency storage plus equalization tank

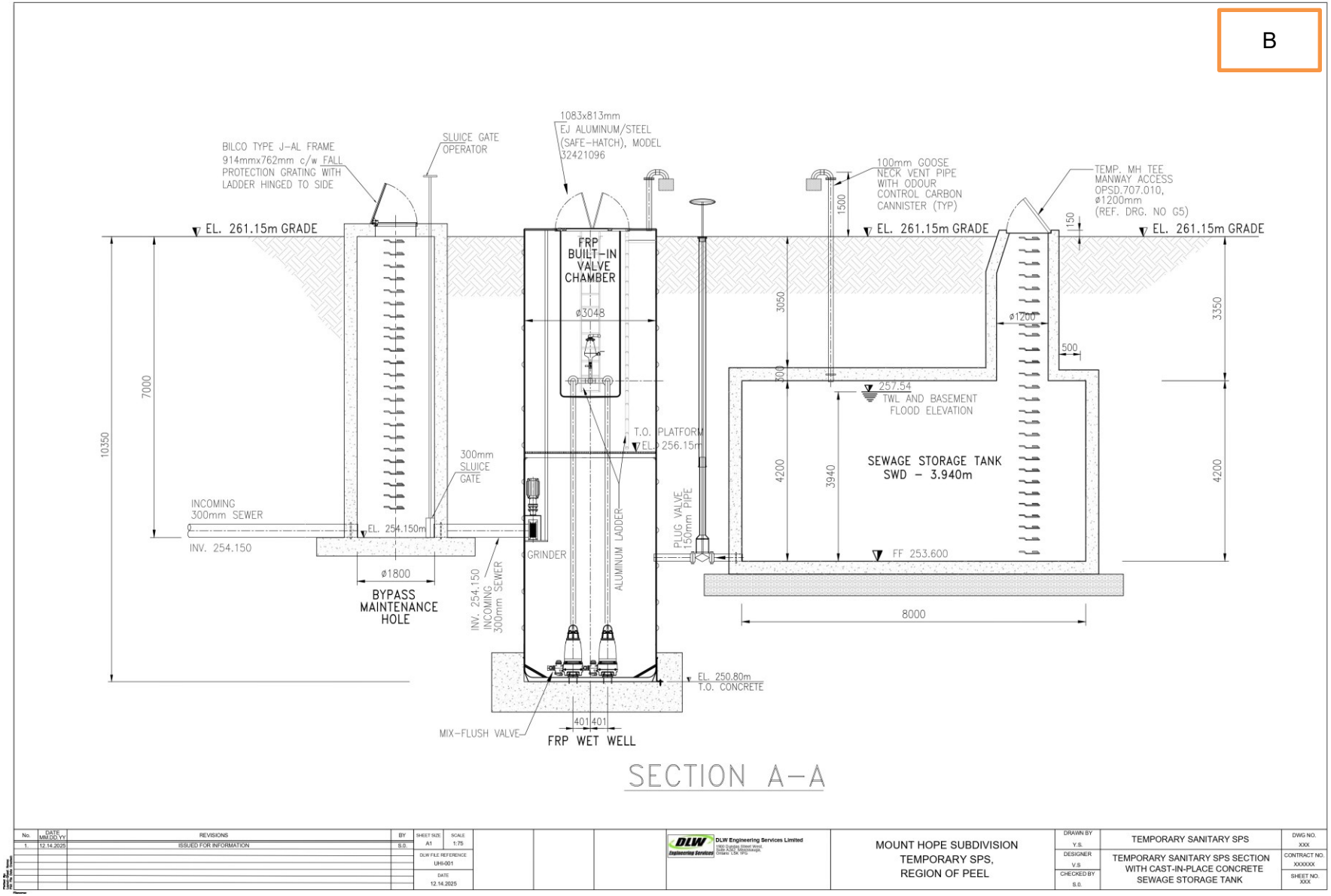


Figure 7.4.2: Plan and section of the temporary SPS with cast-in-place emergency storage plus equalization tank

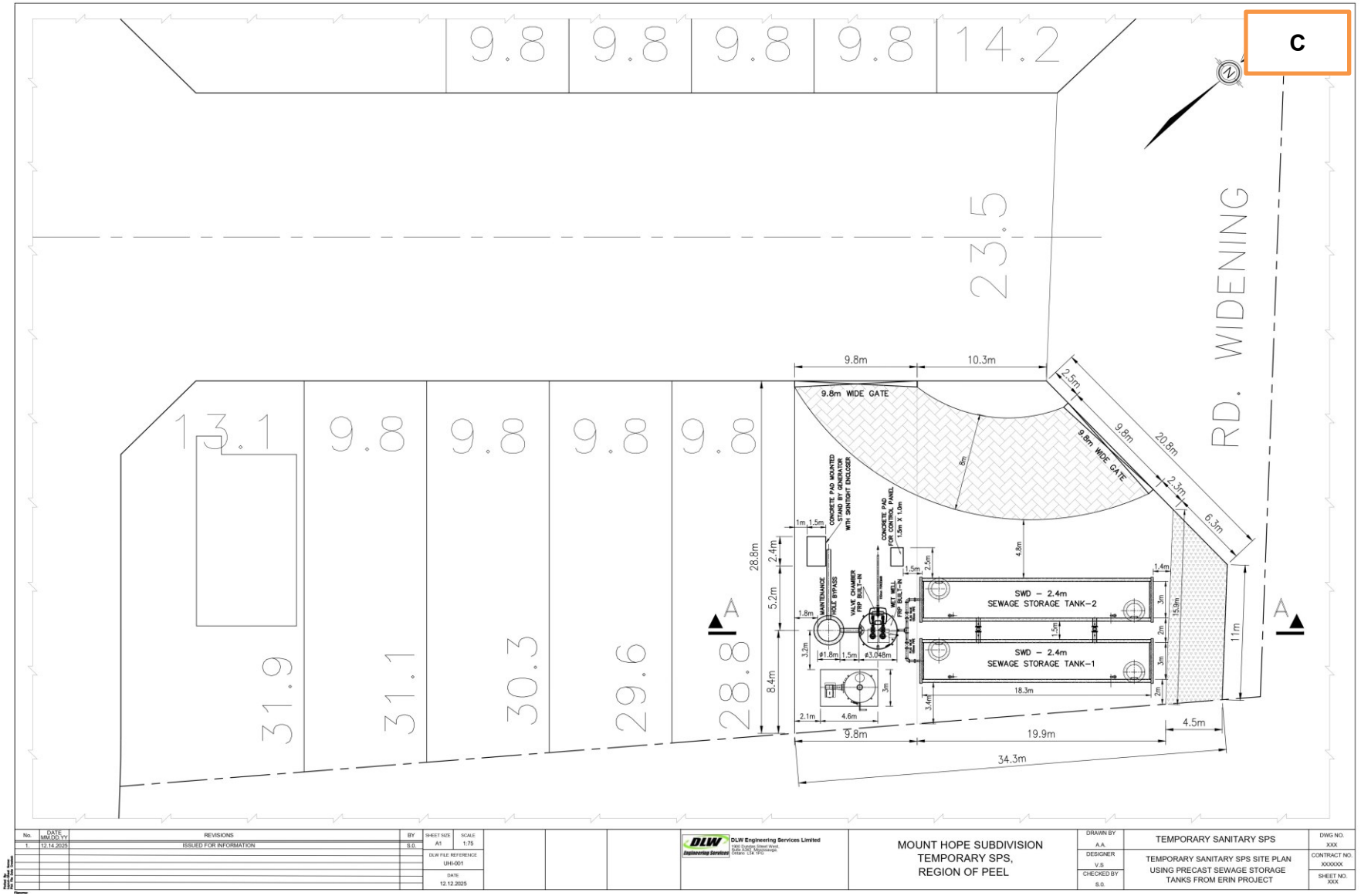


Figure 7.4.3: Overall site layout for temporary SPS with precast (from the Erin project) emergency storage plus equalization tanks

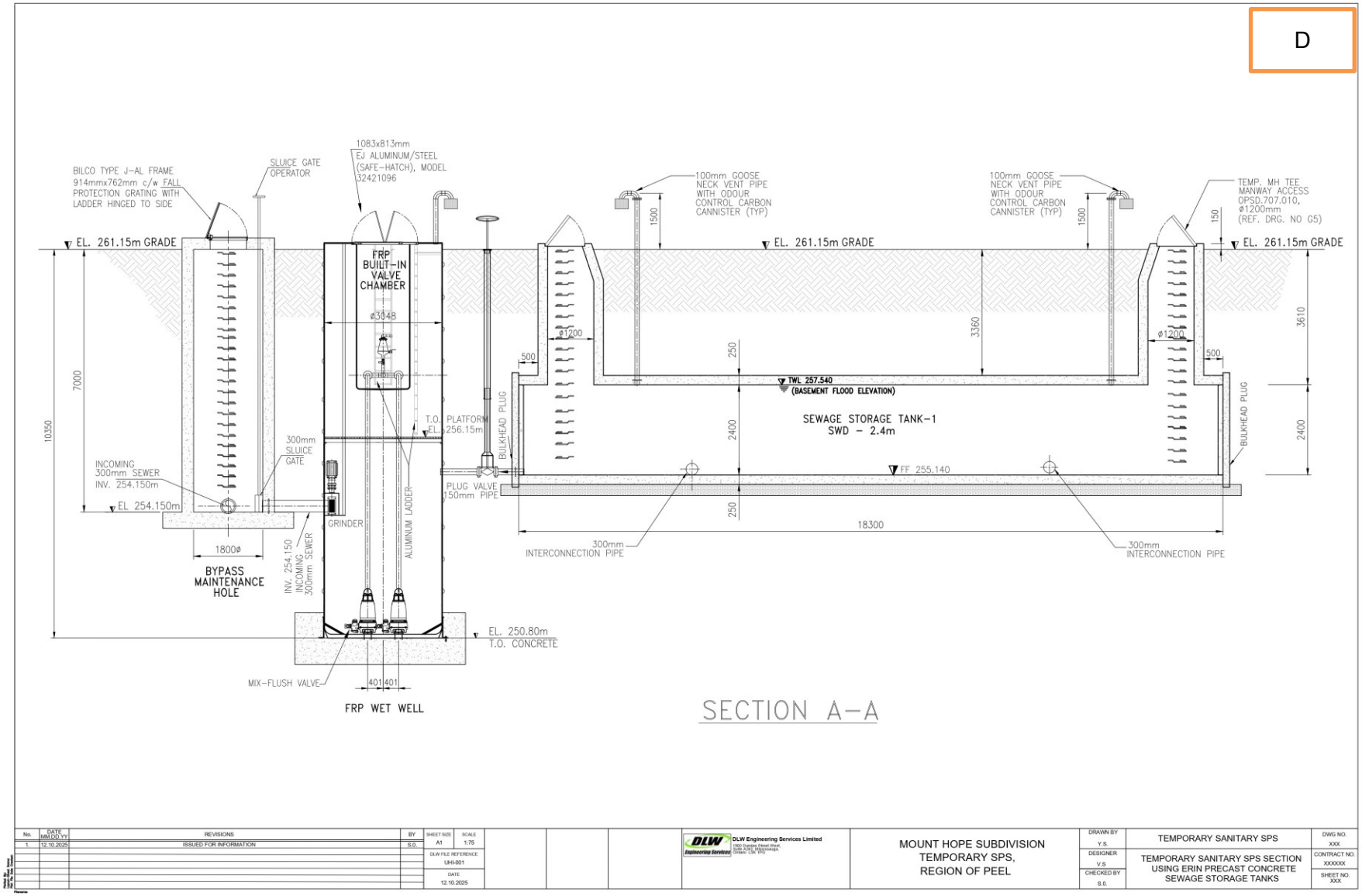


Figure 7.4.4: Plan and section of the temporary SPS with precast (from the Erin project) emergency storage plus equalization tanks

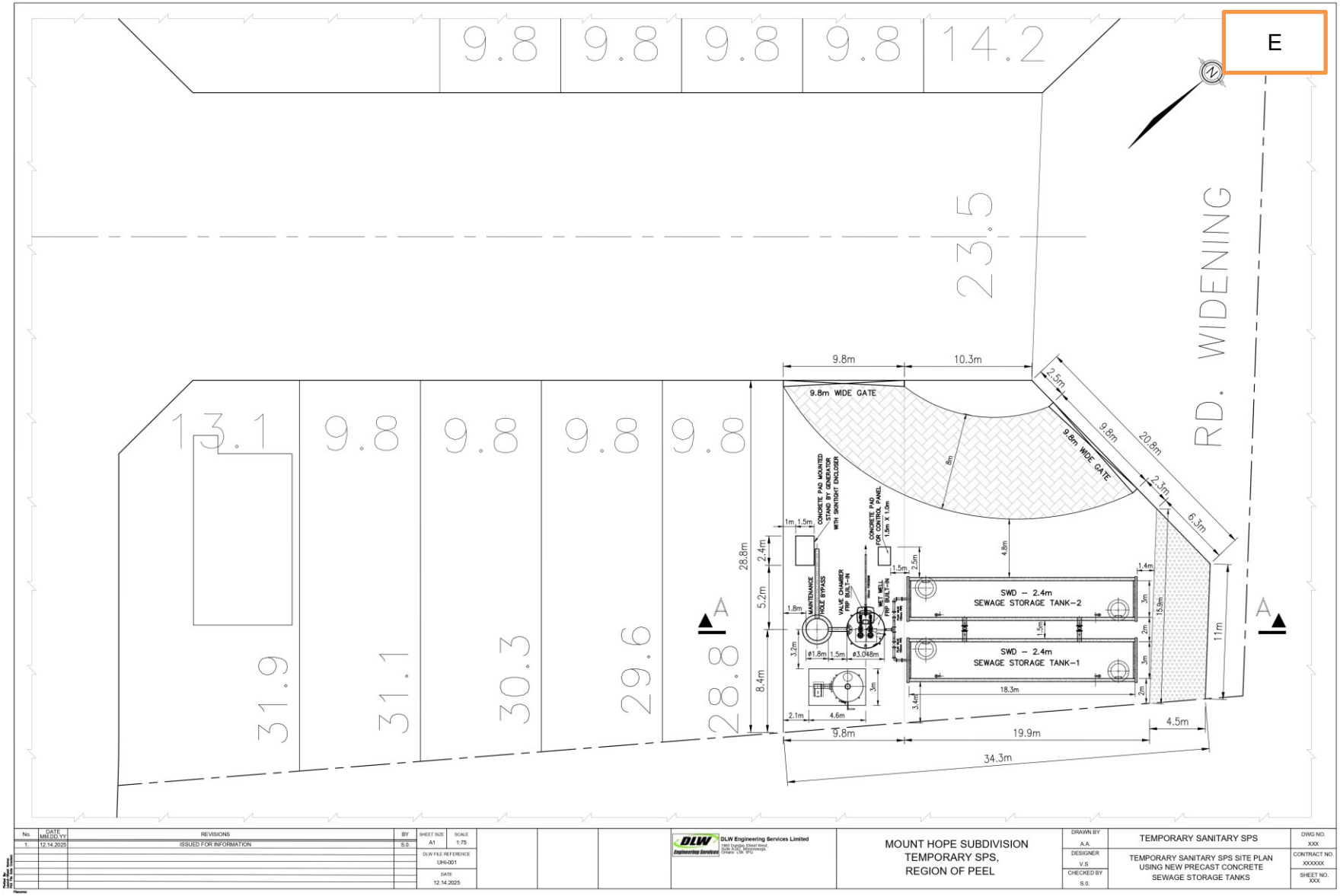


Figure 7.4.5: Overall site layout for temporary SPS with new precast emergency storage plus equalization tanks

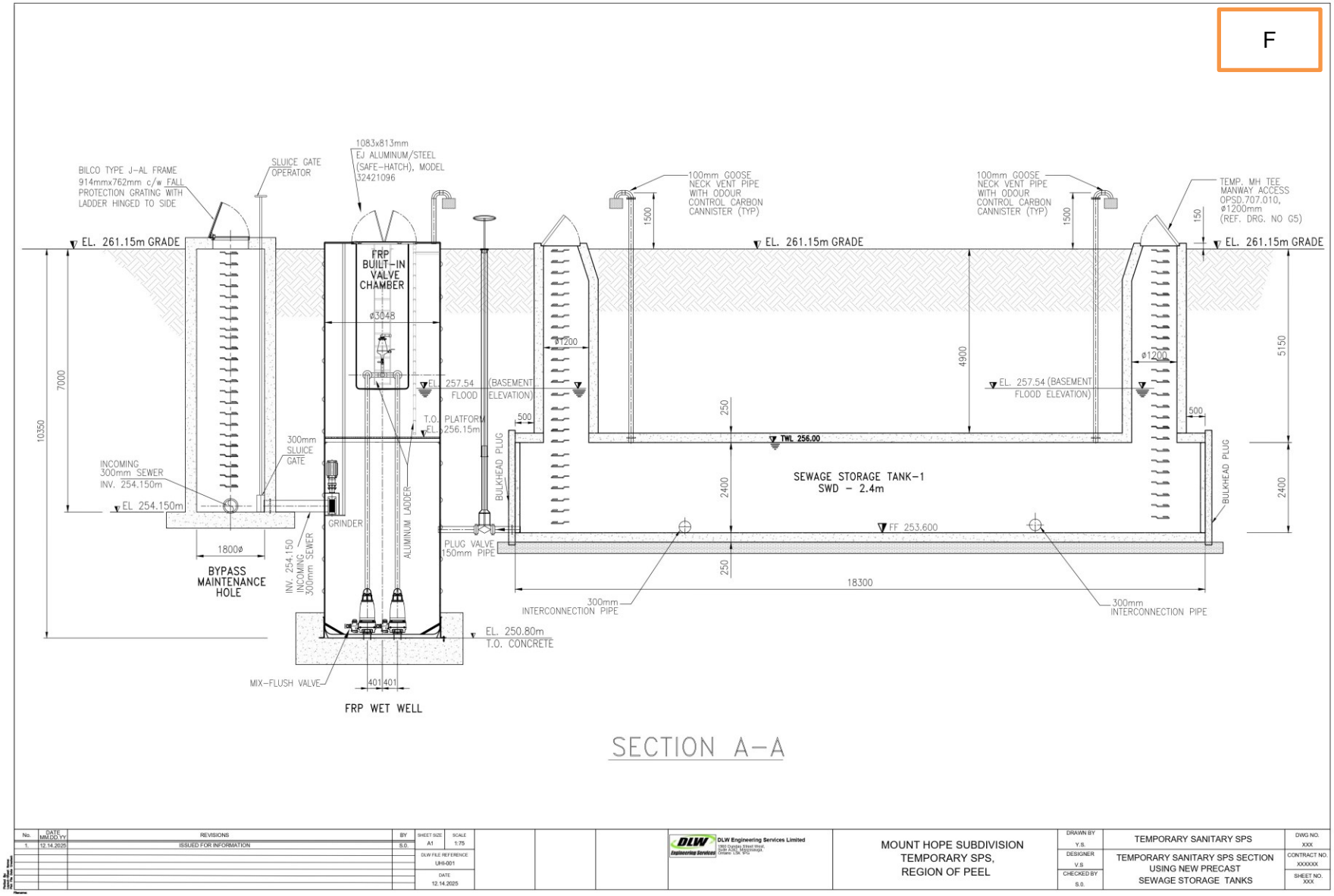


Figure 7.4.6: Plan and section of the temporary SPS with new precast emergency storage plus equalization tanks

8. Forcemain Size Selection

Assuming that the station will be a Type-I SPS, the system will be designed for a single **865 m** long forcemain. The minimum velocity through the discharge forcemain should be 1 m/s, and the maximum velocity should be 2.5 m/s, in accordance with the Region of Peel's design criteria. The minimum velocity provides self-cleaning, preventing solids from settling and clogging the pipeline, and the maximum velocity prevents excessive scouring of the forcemain. **Table 8.1** below illustrates the velocity at various forcemain diameters at the design flow of 19.88 L/s**.**

Table 8.1 – Forcemain sizing and velocity

Design Flow	Velocity in the Forcemain (m/s)		
	Single 100 mm Diameter	Single 150 mm Diameter	Single 200 mm Diameter
19.88 L/s	2.53	1.12	0.63

At 150 mm, the velocity at design flows in the forcemain is above the minimum 1.0 m/s in accordance with Region of Peel design criteria and above the minimum 0.6 m/s in accordance with MECP design guidelines. However, under VFD applications, forcemains could run as low as 0.8 m/s as long as flushing velocities above 1.0 m/s occur a few times per week. The minimum velocity (0.8 m/s) in a 150mm diameter forcemain that still meets the Region of Peel's minimum design criteria will be at a flow of 14.0 L/s. Thus, the 150mm diameter forcemain will operate over a range of 14.0 – 19.88 L/s. We also recommend a single 150mm forcemain to optimize the power requirement for the pumps.

9. Hydraulic Calculations for Pump Selection

The total dynamic head (TDH) for the pump selection is the addition of the static head for the system plus the dynamic losses through the piping and fittings from the SPS to the discharge point.

Static Head

The static head for this system is based on the high point along the forcemain of **263.86** m. The operating levels in the wet well are **252.60 m** and **252.31 m**. Thus, the static head for the system is as follows:

- Minimum Static Head = 263.86 m – 252.31 m= 9.60 m
- Maximum Static Head = 263.86 m – 252.60 m= 9.31 m

Total Dynamic Head

Typically, to select the appropriate pump and forcemain, we calculate the total dynamic head (TDH) for various pump and flow scenarios to determine the optimal pump horsepower and lifecycle cost of the pumping station and forcemain. The pump system shall be designed to operate within the pump's Preferred Operating Range (POR) under all anticipated design conditions (high and low static heads, and high and low C factors). According to the Peel Region criteria, pump selection shall consider forcemain friction factor. Pumping station design shall be based on system-head calculations and friction curves (C-factor values) as specified within MECP Design Guidelines for Sewage Works.

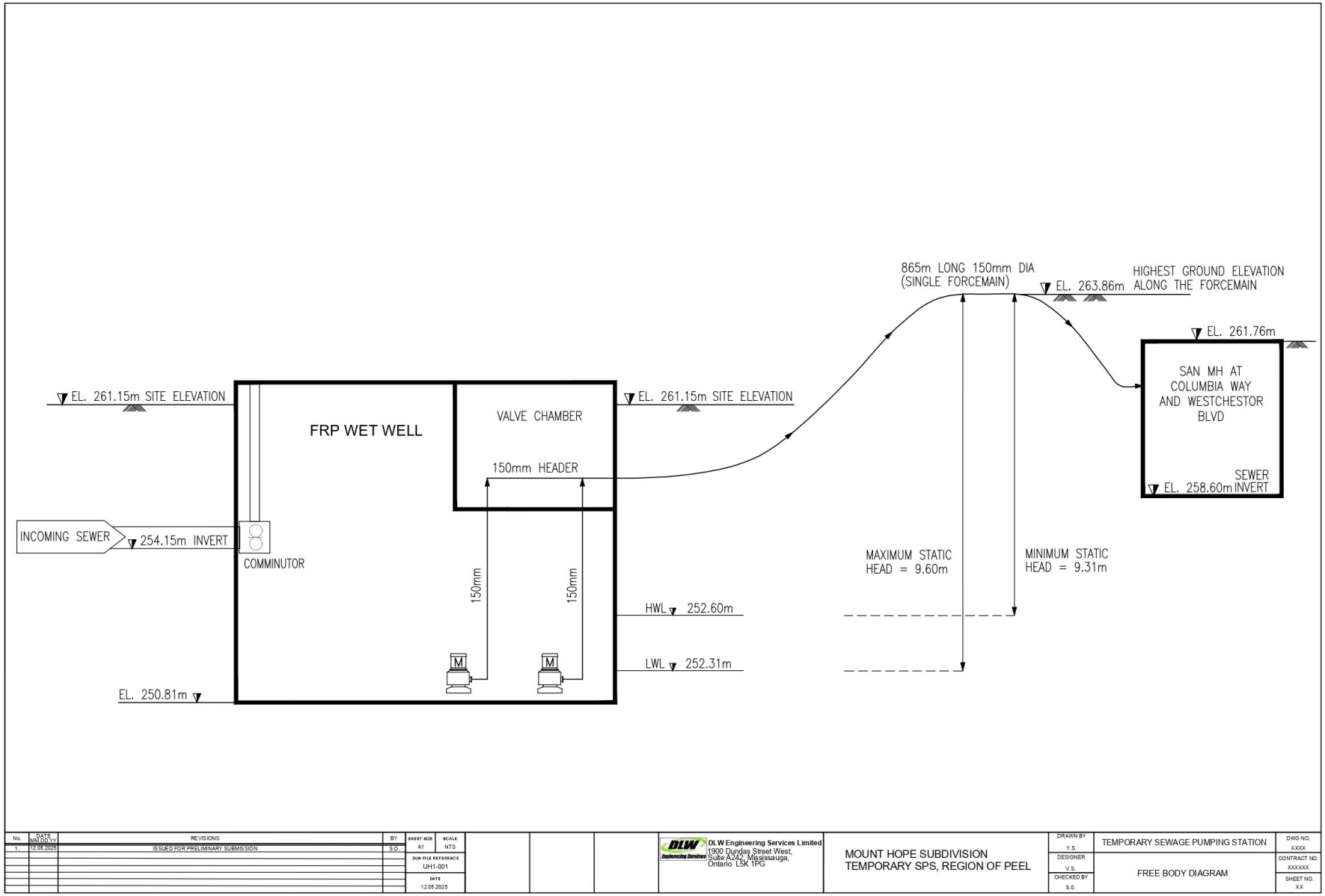
In accordance with the MECP design guidelines, system operating curves should be developed for the following conditions:

- Friction Factor = 100 and low water level
- Friction Factor = 110 and medium water level
- Friction Factor = 120 and high-water level

While this MECP critera is good in general for large diameter forcemains, in practice, we know that for smaller diameter forcemains, the friction factors tend to be lower. Thus, we will use friction factors in the range of C=100 for the low water level to C=120 for the high-water level.

We have used the Equivalent Length method for determining the station losses, and the resulting system curve is appended to this report. Pump curves based on a preliminary pump selection are selected to meet the design conditions shown on the system curve appended to this report. Based on the design flow **of 19.88 L/s** and using a friction factor of **C = 110**, the TDH for the pumps will be **24.13 m**.

We have included a freebody diagram and process flow diagram for the proposed facility below, along with the established system curve with preliminary selection of pumps.


865m LONG 150mm DIA
(SINGLE FORCEMAIN)
HIGHEST GROUND ELEVATION
ALONG THE FORCEMAIN
EL. 263.86m
EL. 261.76m
SAN MH AT
COLUMBIA WAY
AND WESTCHESTOR
BLVD
SEWER
EL. 258.60m INVERT
EL. 261.15m SITE ELEVATION
FRP WET WELL
VALVE CHAMBER
EL. 261.15m SITE ELEVATION
150mm HEADER
INCOMING SEWER
254.15m INVERT
COMMINUTOR
150mm
150mm
MAXIMUM STATIC
HEAD = 9.60m
MINIMUM STATIC
HEAD = 9.31m
HWL 252.60m
LWL 252.31m
EL. 250.81m
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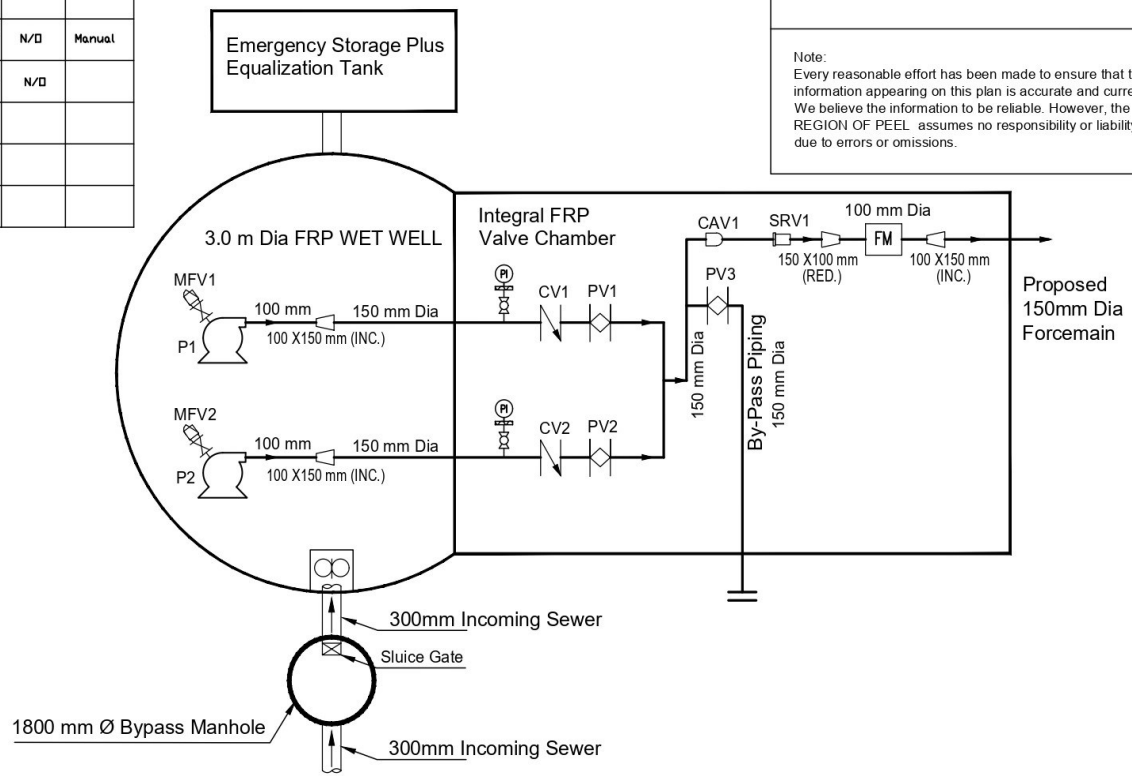
MOUNT HOPE SUBDIVISION
TEMPORARY SPS, REGION OF PEEL
DRAWN BY Y.S.
DESIGNER V.S.
CHECKED BY S.O.
TEMPORARY SEWAGE PUMPING STATION
FREE BODY DIAGRAM
DWG NO. XXXX
CONTRACT NO. XXXXXX
SHEET NO. XX

Valve Schedule

Valve Number	Type Valve	Size(mm)	Location	Mode	Operator
CV1	Check Valve	150	FRP Valve Chamber		
CV2	Check Valve	150	FRP Valve Chamber		
CAV1	Combination Air/Vacuum Valve	150	FRP Valve Chamber		
PV1	Plug Valve	150	FRP Valve Chamber	N/O	Manual
PV2	Plug Valve	150	FRP Valve Chamber	N/O	Manual
PV3	Plug Valve	150	FRP Valve Chamber	N/O	Manual
PRV1	Surge Relief Valve	150	FRP Valve Chamber	N/O	
SR1	Sluice Gate	300	BY Pass Manhole		
MFV1	Mix Flush Valve	100	FRP Wet Well		
MFV2	Mix Flush Valve	100	FRP Wet Well		

Notes:
1. All dimensions are in metres unless otherwise indicated.
2. Drawings are not scaled for construction.
3. The contractor shall field verify all dimensions prior to the commencement of work-related activities and shall report any discrepancies to the engineer immediately upon finding them.
4. Determine the exact location of utilities by coordinating with the utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for protection from damage, to the satisfaction of the utility service provider.
5. Remove and dispose all temporary works. Re-establish existing locations and restore all areas impacted by construction activities.

Note:
Every reasonable effort has been made to ensure that the information appearing on this plan is accurate and current. We believe the information to be reliable. However, the REGION OF PEEL assumes no responsibility or liability due to errors or omissions.



LEGENDS:-

- Comminutor Muffin Monster
- Surge Release Valve
- Combination Air Release Vacuum Valve
- Check Valve
- Plug Valve
- Increaser
- FM Flowmeter
- Submersible Pump
- Cam lock fitting
- PI Pressure Indicator
- Sluice Gate
- Mix Flush Valve

No.	DATE MM/DD/YY	REVISIONS	BY
1.	12.08.2025	ISSUED FOR PRELIMINARY SUBMISSION	S.O.

SHEET SIZE: A1 | SCALE: NTS
DLW FILE REFERENCE: UHI-001
DATE: 12.08.2025

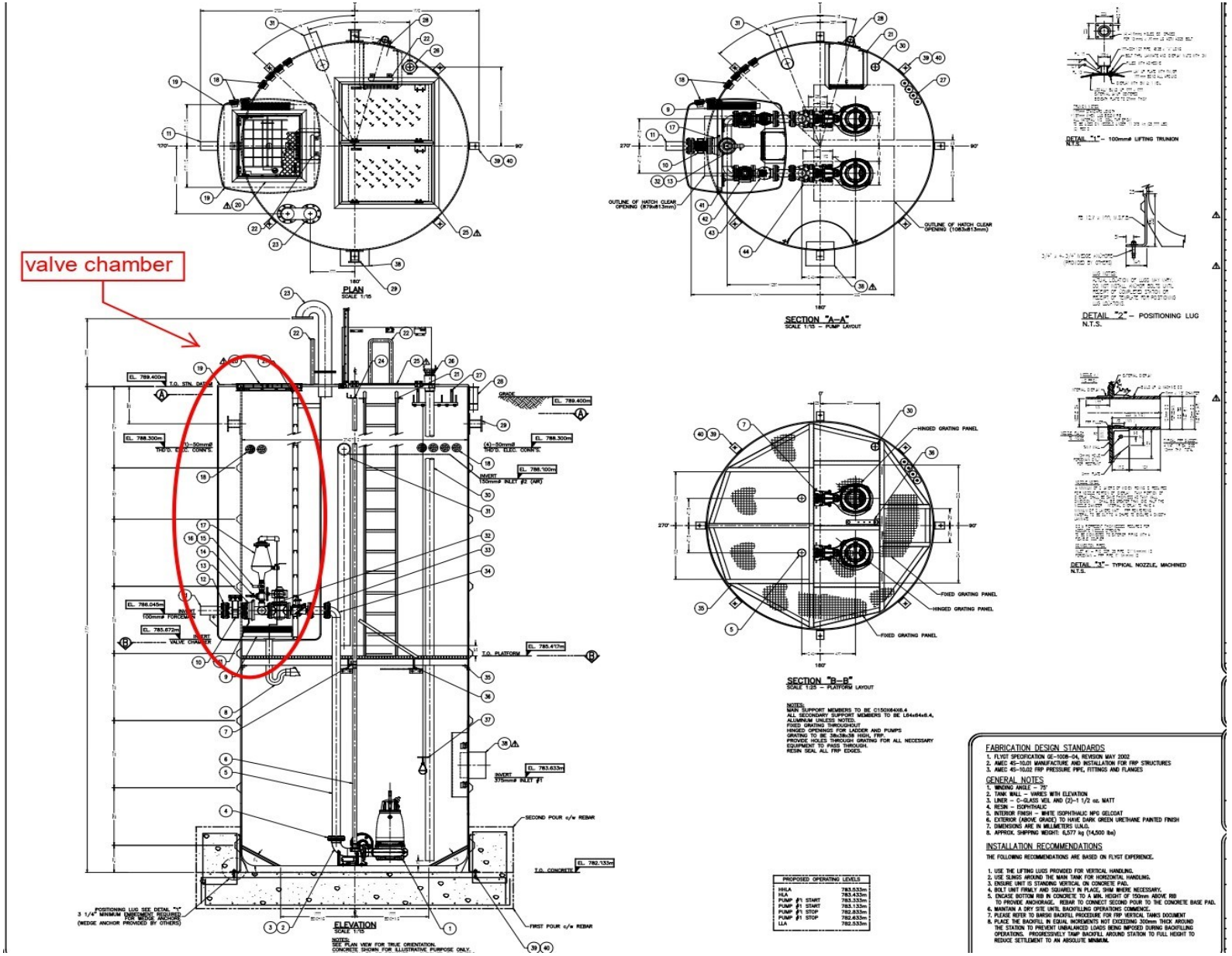
DLW Engineering Services Limited
1900 Dundas Street West, Suite A242, Mississauga, Ontario L5K 1P9

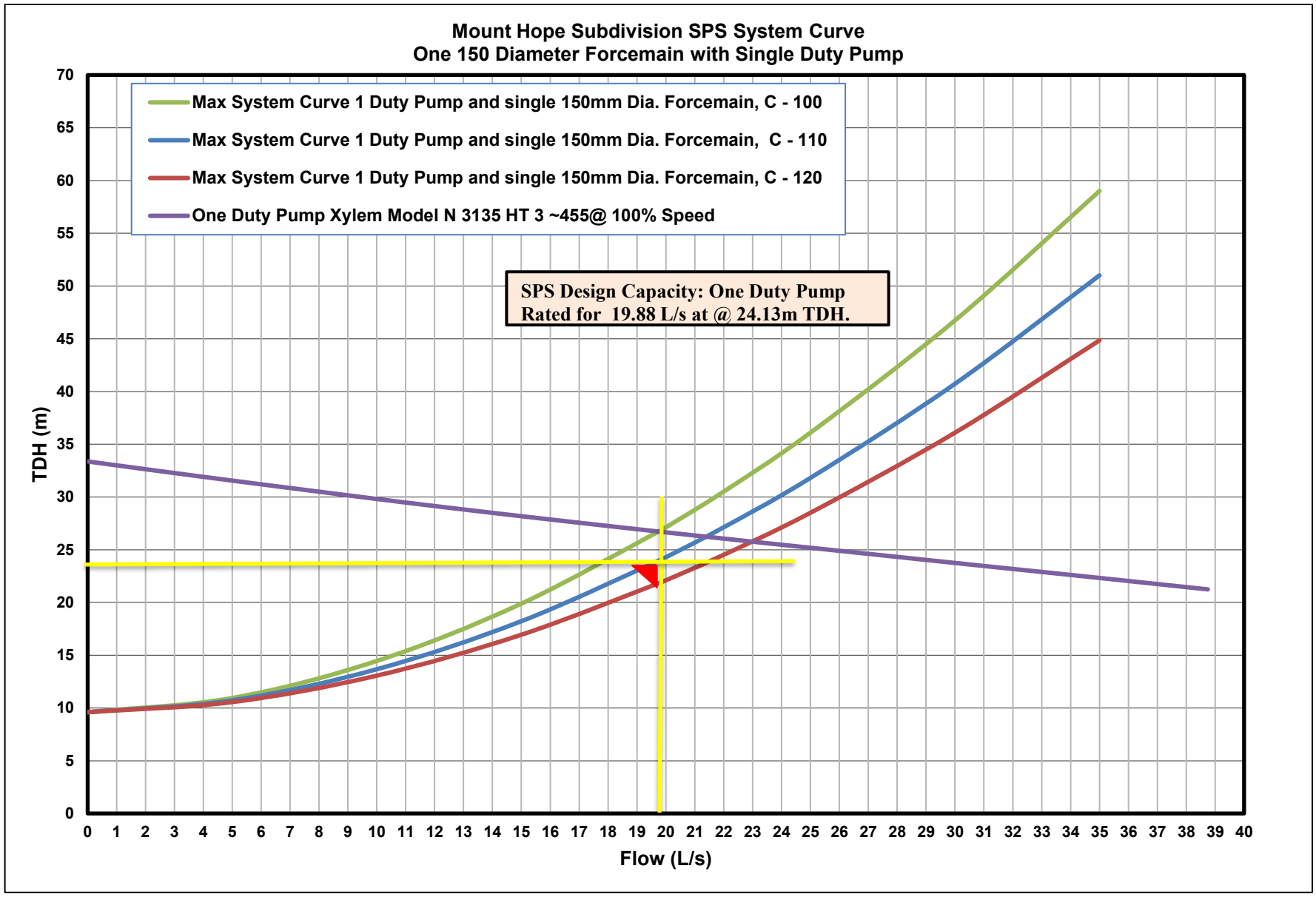
MOUNT HOPE SUBDIVISION
TEMPORARY SPS, REGION OF PEEL

DRAWN BY: Y.S.
DESIGNER: V.S.
CHECKED BY: S.O.

TEMPORARY SEWAGE PUMPING STATION
PROCESS FLOW DIAGRAM

DWG NO.: XXXX
CONTRACT NO.: XXXXXX
SHEET NO.: XXXXXX


valve chamber
PLAN
SCALE 1:15
SECTION "A–A"
SCALE 1:15 – PUMP LAYOUT
DETAIL "1" – 100mmø LIFTING TRUNION
N.T.S.
DETAIL "2" – POSITIONING LUG
N.T.S.
DETAIL "3" – TYPICAL NOZZLE, MACHINED
N.T.S.
HINGED GRATING PANEL
FIXED GRATING PANEL
HINGED GRATING PANEL
FIXED GRATING PANEL
SECTION "B–B"
SCALE 1:25 – PLATFORM LAYOUT
ELEVATION
SCALE 1:15
SECOND POUR c/w REBAR
FIRST POUR c/w REBAR
T.O. CONCRETE
T.O. PLATFORM
PROPOSED OPERATING LEVELS
FABRICATION DESIGN STANDARDS
1. FLYGT SPECIFICATION GE-1008-04, REVISION MAY 2002
2. AWEC 45-10.01 MANUFACTURE AND INSTALLATION FOR FRP STRUCTURES
3. AWEC 45-10.02 FRP PRESSURE PIPE, FITTINGS AND FLANGES
GENERAL NOTES
1. WINDING ANGLE – 75°
2. TANK WALL – VARIES WITH ELEVATION
3. LINER – C-GLASS VEIL AND (2)–1 1/2 oz. MATT
4. RESIN – ISOPHTHALIC
5. INTERIOR FINISH – WHITE ISOPHTHALIC NPG GELCOAT
6. EXTERIOR (ABOVE GRADE) TO HAVE DARK GREEN URETHANE PAINTED FINISH
7. DIMENSIONS ARE IN MILLIMETERS U.N.O.
8. APPROX. SHIPPING WEIGHT: 6,577 kg (14,500 lbs)
INSTALLATION RECOMMENDATIONS
THE FOLLOWING RECOMMENDATIONS ARE BASED ON FLYGT EXPERIENCE.
1. USE THE LIFTING LUGS PROVIDED FOR VERTICAL HANDLING.
2. USE SLINGS AROUND THE MAIN TANK FOR HORIZONTAL HANDLING.
3. ENSURE UNIT IS STANDING VERTICAL ON CONCRETE PAD.
4. BOLT UNIT FIRMLY AND SQUARELY IN PLACE, SHIM WHERE NECESSARY.
5. ENCASE BOTTOM RIB IN CONCRETE TO A MIN. HEIGHT OF 150mm ABOVE RIB TO PROVIDE ANCHORAGE. REBAR TO CONNECT SECOND POUR TO THE CONCRETE BASE PAD.
6. MAINTAIN A DRY SITE UNTIL BACKFILLING OPERATIONS COMMENCE.
7. PLEASE REFER TO BARDIS BACKFILL PROCEDURE FOR FRP VERTICAL TANKS DOCUMENT
8. PLACE THE BACKFILL IN EQUAL INCREMENTS NOT EXCEEDING 300mm THICK AROUND THE STATION TO PREVENT UNBALANCED LOADS BEING IMPOSED DURING BACKFILLING OPERATIONS. PROGRESSIVELY TAMP BACKFILL AROUND STATION TO FULL HEIGHT TO REDUCE SETTLEMENT TO AN ABSOLUTE MINIMUM.


Mount Hope Subdivision SPS System Curve
One 150 Diameter Forcemain with Single Duty Pump
Max System Curve 1 Duty Pump and single 150mm Dia. Forcemain, C - 100
Max System Curve 1 Duty Pump and single 150mm Dia. Forcemain, C - 110
Max System Curve 1 Duty Pump and single 150mm Dia. Forcemain, C - 120
One Duty Pump Xylem Model N 3135 HT 3 ~455@ 100% Speed
SPS Design Capacity: One Duty Pump
Rated for 19.88 L/s at @ 24.13m TDH.
TDH (m)
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70
Flow (L/s)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

10. Pump Selection and Design

Pumps will be submersible style sewage pumps and supported by discharge elbows permanently mounted in the base of the wet well. The pumps will connect to the base elbows by means of a self-sealing quick-disconnect flange that will allow pump removal without entering the wet well. A lift-out galvanized steel rail system will guide the pump during removal and reinstallation. The base elbow will support the pumps, support the discharge piping, and serve as an anchor for the guide rails.

At 19.88 L/s, Xylem (Flygt) has provided the pumps with a **14.9 Kw (20 Hp)** motor. Discharge piping in the wet well and valve chamber will be 100mm/150mm diameter ductile iron piping Class 53, and each pump discharge line will be equipped with a check valve and an isolating plug valve. The pump discharge piping will connect to a common discharge header that will connect to the forcemain.

11. Ventilation

As a minimum, all wet wells and emergency and maintenance wastewater storage structures shall be equipped with a passive ventilation system to permit rising and falling liquid levels. Portable mechanical ventilation equipment (fan and hose) will also be provided, as this is required for Type I and II stations.

The ventilation system for process areas shall be designed in accordance with NFPA 820. The ventilation system for occupiable spaces shall be designed in accordance with the requirements of the OBC and ANSI/ASHRAE 62.1.

12. Odour Control

An odour control system is required when a new sewage pumping station is being constructed that is within 50 m of sensitive receptors (i.e., residential or commercial areas, parks, schools, etc.). The passive odour control facilities, such as gooseneck vents with activated carbon cannisters, would be provided at the top of the wet well and emergency storage tank(s). An active odour control unit with a weatherproof enclosure located on a concrete pad of size **1.8m x 1.8m** will be provided as the development is in proximity (5-10 m) to the pumping station. The active odor control unit (OCU) is rated for 12 air changes per hour (at max speed at **530 CFM**).

13. Standby Generator

Based on the preliminary proposed loads for this facility, we estimate that the generator set will be approximately sized at a minimum of **25 kW**.

We recommend that the Region consider the provision of a permanent standby power to meet the full load capacity of the facility. A standby generator will be located on a concrete pad adjacent to the wet well with a subbase fuel tank. We will provide a pre-engineered packaged stand-alone backup power system consisting of a closed-loop liquid-cooled generator within a self-contained, lockable, sound-attenuating outdoor walk-in enclosure.

We recommend going with a diesel standby generator for this application. The generator will provide backup electrical power to the pumps and miscellaneous loads during a power failure. The generator will be complete with an automatic transfer switch, silencer, and fuel storage/delivery system.

If the power fails, the power transfer switch will signal the generator to start. The transfer switch will automatically change state from normal supply to emergency supply. The generator will continue to deliver power until the normal supply returns for at least 5 minutes, at which time the load will be transferred back to normal power. The transfer switch will feature a time delay during transfer sufficient to cause all motors and starters to de-energize.

14. Electrical Service

A 600-volt, three-phase, 60-hertz electrical service will be provided at the pumping station. The control panels would be externally pad-mounted with a NEMA 4X enclosure type.

15. Pumping Station Property Area

The property area for the pumping station varies based on the proposed sewage equalization options. The option involving reusing the precast tanks needs a larger area of 781 m^2 because of their longitudinal orientation, compared to providing a single Cast-in-place tank having a smaller area of 500 m^2 due to its higher side water depth (refer to the site layouts A, C, & E). The property area comprises the FRP wet well, emergency storage tank/equalization tank, FRP built valve chamber, and concrete pad-mounted active odor control unit, standby generator, and outdoor located electrical control panel.

Respectfully Submitted,

DLW ENGINEERING SERVICES LTD.

Dr. Virender Singh

Virender Singh, Ph.D.
Water & Wastewater Practice Leader

SOBrien

Stephen O'Brien, P.Eng.
President

APPENDIX A: PUMPS

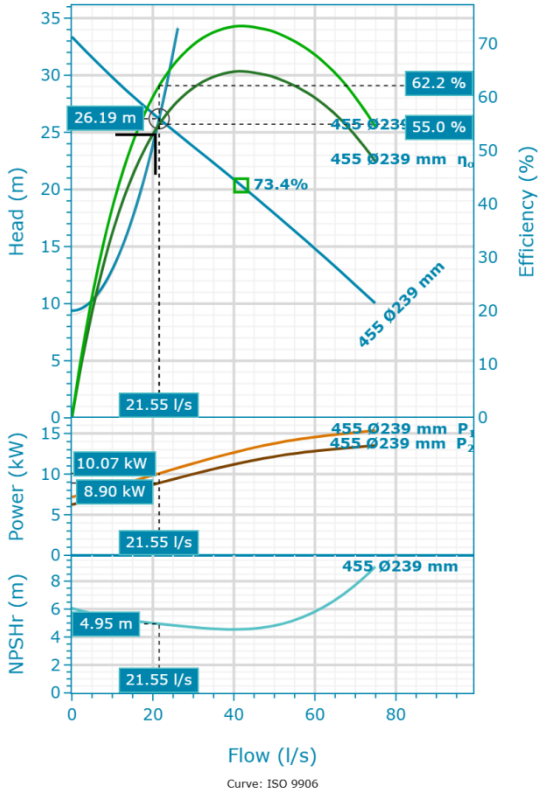
xylem
Let's Solve Water

NP 3153 HT 3~ 455

Created On: 11/26/25

NP 3153 HT 3~ 455 | Configuration Summary

Flygt's self-cleaning non-clog N-pumps feature innovative designs and functions that deliver high sustained efficiency and the most reliable operation. This makes them the most reliable choice available for a broad range of wastewater applications for tough applications such as unscreened sewage, wastewater and sludge up to an 8 percent solids concentration. Impeller material available in Hardened cast Iron, Hard Iron and Stainless Steel to fit any wastewater application.



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

GENERAL

Explosion Proof
No

Impeller Diameter
239 mm

Max. Pumped Media Temp.
40 °C

MATERIAL AND COATING

Impeller Material
Stainless Steel

Volute Material
Grey Cast Iron

MOTOR

Rated Voltage
600 V

Motor Efficiency Class
Standard

Coupling
D

Rated Power
14.9 kW

INSTALLATION

Installation Type
P - Semi-Permanent, Wet

NP 3153 HT 3~ 455 | Product Details

Description

N 3153

The Flygt N-series are equipped with the Flygt invented N-technology with its innovative self-cleaning impeller. Solid objects entering the pump will pass through the impeller between the impeller vanes. If an object gets caught on the leading edge of one of the vanes, it will slide along the backswept shape towards the perimeter of the inlet where it will be guided by a relief groove through the pump housing. This ensures a high sustained total efficiency over time. Due to the mechanical self-cleaning design, a sludge concentration of solids up to 8% can easily be pumped. The pump can easily be installed in either permanently or temporary submerged, or horizontally or vertically dry installations.

Flexible and Modular Design

The modular hydraulic design enables customization of the hydraulics to meet the requirements of many applications.

- Replaceable wear ring in two materials, gray iron or Hard Iron, for different operation conditions
- Hardened gray iron impeller for typical wastewater applications
- Hard-Iron impeller for heavy duty wastewater applications containing abrasive and corrosive content
- Chopper ring intended for tough wastewater applications where cutting is required due to long fibres and solid concentrations up to 10-12%
- Stainless steel impeller for special applications that require duplex stainless steel

Robust and Reliable

- Short shaft overhang reduces shaft deflection and increases seal and bearing life
- Class H Motor designed for submersible use. Heat is concentrated to the stator core for improved cooling properties.
- The Plug-in seal with Active Seal system eliminates the risk associated with incorrect installation and careless handling. All in one unit. Available in Tungsten carbide (WCCR) or Silicone carbide (SiC) depending on pumped media.
- Motor cable SUBCAB® specially developed for submersible use
- Offers flexible cooling systems, e.g. closed-loop cooling system, media cooled or external cooling that allows full motor potential in dry installations.
- Premium brand bearings, greased for life, ensures a minimum of 50 000 hours of duty
- Leakage sensor and motor temperature sensor as standard

The N 3153 is available with the following options:

- ATEx, FM, CSA-approvals
- Premium efficiency motors
- Hard Iron hydraulic design
- Stainless Steel hydraulic design
- Vibration-sensor, extended motor temperature sensors, additional leakage-sensor, current-sensor and pump memory
- Compatible with SmartRun® Wastewater pump controller
- Compatible with MAS 801 monitoring system

Product Features

- State-of-the-art wastewater pump with N-technology
- Sustained high efficiency pumping with energy savings up to 25%
- Flexible and modular design
- Robust and reliable

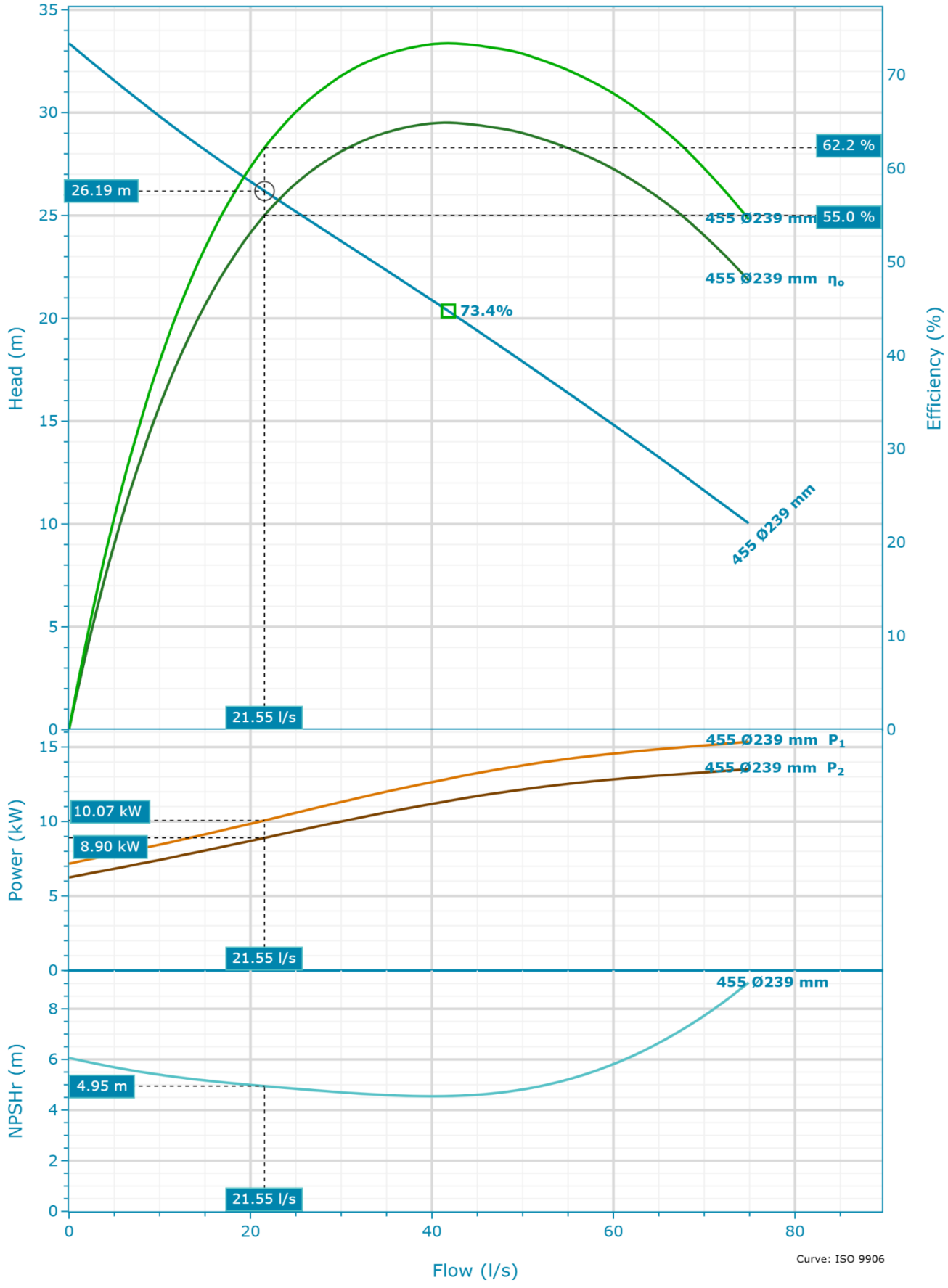
Construction Materials

Impeller Material	Volute Material	Stator Cover Material
Stainless Steel	Grey Cast Iron	-

Motor

Rated Power	Number Of Phases	Start Current Ratio	Motor Issue
14.9 kW	3	5.94	12
Motor Denomination	Rated Motor Speed	Insulation Class	Locked Rotor Code
21-18-4AA	1,760 RPM	H	H
Motor Efficiency Class	Rated Voltage	Approval	Max starts per hour
Standard	600 V	STD	30
Version Code	Rated Current	Total moment of inertia	Power Factor 100%
660	21 A	0.09 kgm²	0.79
Frequency	Start Current	Type of duty	Power Factor 75%
60 Hz	123 A	S1	0.73
Max P2 (1x)	Starting Current, Direct Starting	Stator Variant	Power Factor 50%
13.52 kW	123 A	8	0.61
Number Of Poles	Starting Current, Star Delta	Motor Module	Efficiency 100%
4	41 A	167	87.6 %
			Efficiency 75%
			88.5 %
			Efficiency 50%
			87.9 %

NP 3153 HT 3~ 455 | Hydraulic Data & Performance Curve



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Project:	Created By:	Created On:	Last Update:
NP 3153 HT 3~ 455	Obaid Shaikh	11/26/25	-

Selection

Series N 3000	Curve Code 455
Name NP 3153 HT 3~ 455	Impeller Diameter 239 mm
Frequency 60 Hz	Inlet Diameter 150 mm
Total Flow 20.64 l/s	Outlet Diameter 100 mm
Total Head 24.8 m	Number Of Vanes 2
Pump Flow 20.64 l/s	
Pump Head 24.8 m	
System Type Single Pump	
Operating Pumps 1	
Standby Pumps No Standby Pump	

Fluid and Operating Conditions

Fluid Type Water	Density 1,000 kg/m³
Fluid Temperature 4 °C	Dynamic Viscosity 0.002 Pa·s
Specific Gravity 1	Fluid Vapor Pressure 8.14 mbar
	Atmospheric Pressure 1,013.53 mbar
	Elevation 0 m
	Ambient Temperature 20 °C
	NPSH Available 10.27 m
	Submergence 0 m

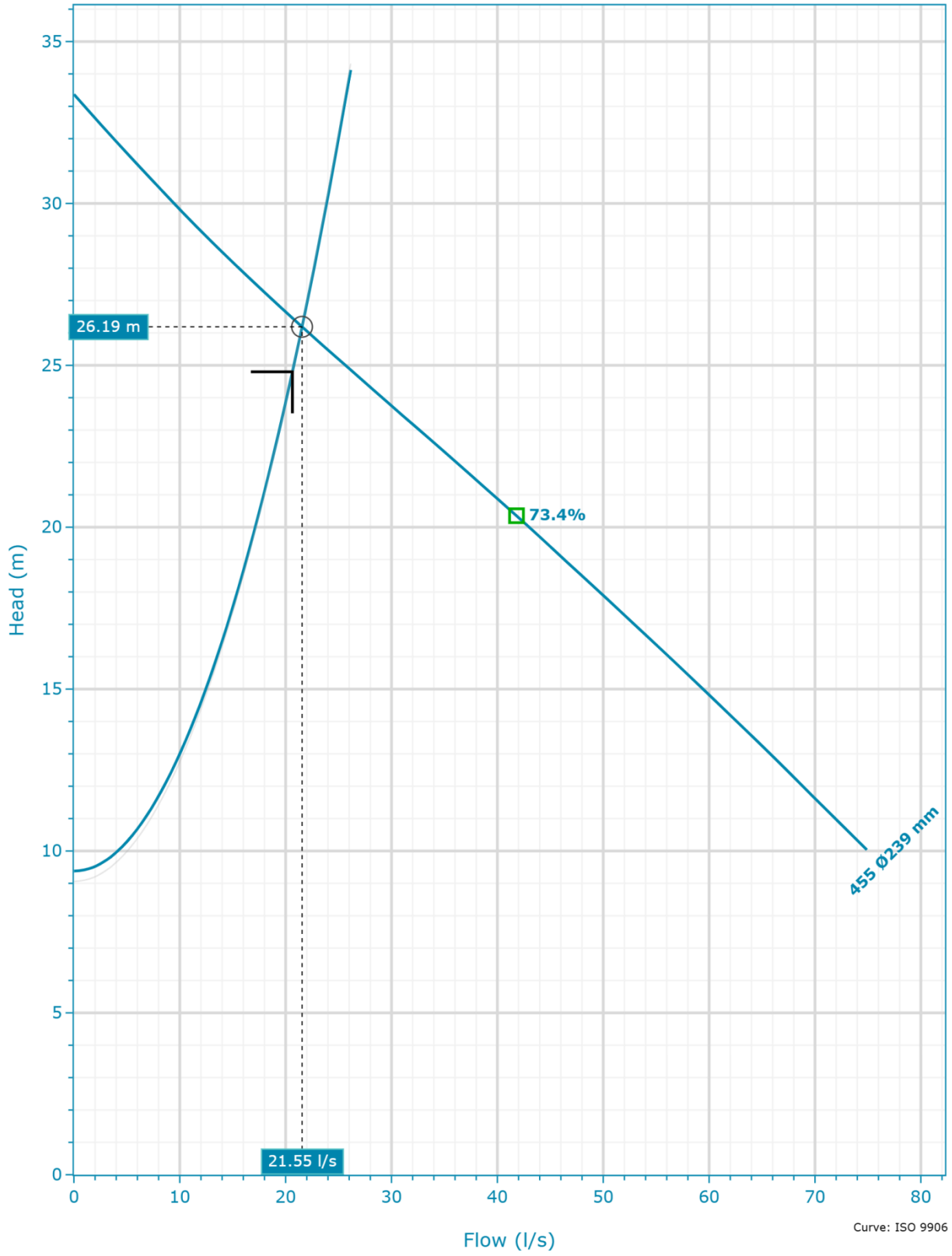
Design Point

Flow 21.55 l/s	Shaft power (P2) 8.9 kW
Head 26.19 m	NPSHR 4.95 m
Overall Efficiency (ηo) 54.97 %	Static Head 9.38 m
Pump Efficiency (ηp) 62.2 %	Flow To BEP Ratio 51.55 %
Input Power (P1) 10.07 kW	

Design Curve

Rated Speed 60 Hz	BEP Flow 41.81 l/s
Max Flow 74.9 l/s	BEP Head 20.35 m
H@QMin 33.37 m	Max P2 13.52 kW
H@QMax 10.04 m	Specific Energy 0.13 kWh/m³
BEP 73.37 %	

NP 3153 HT 3~ 455 | Duty Analysis

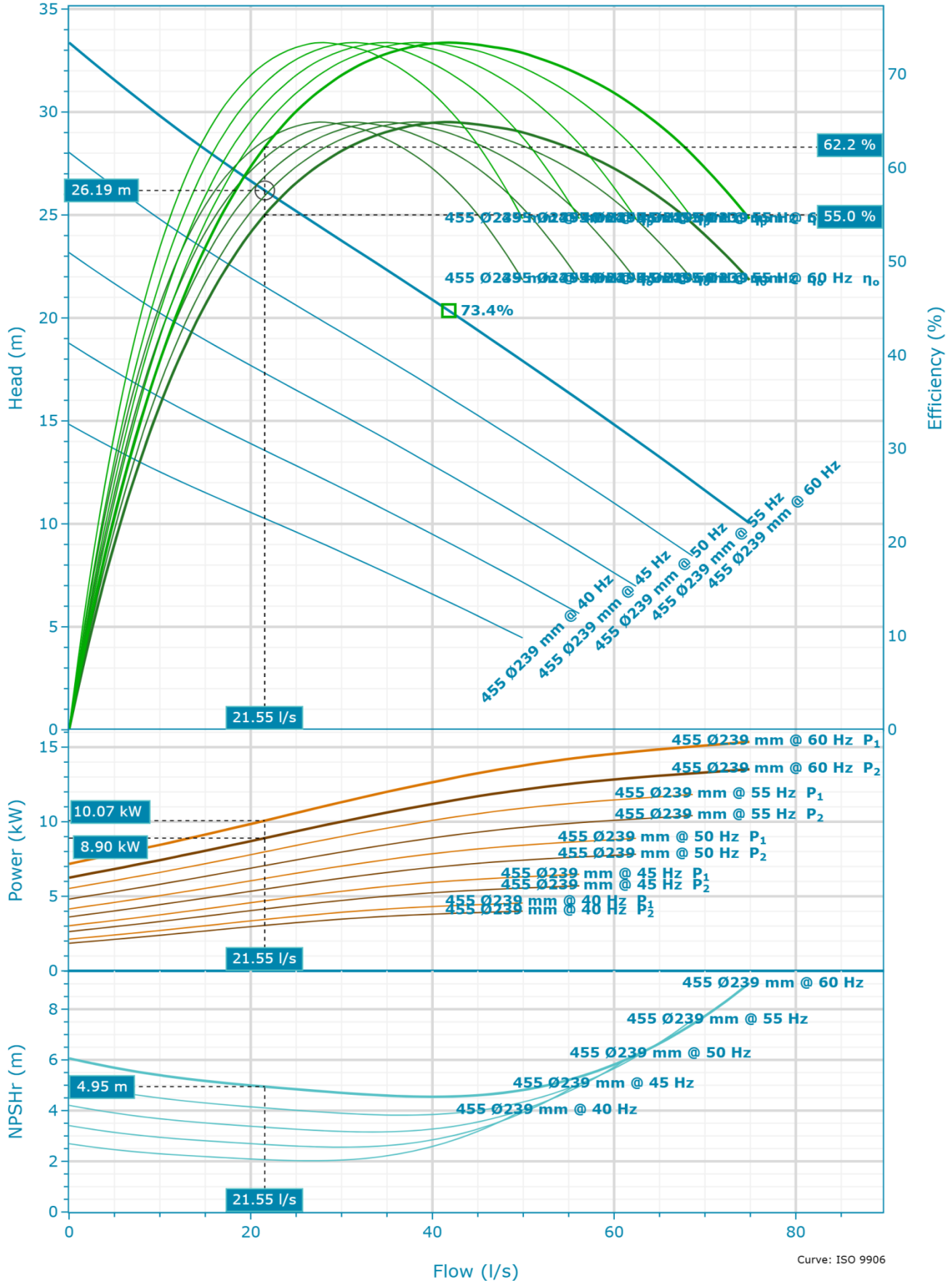


Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Name	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	ηp [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	21.55	26.19	8.9	21.55	26.19	8.9	62.2	0.13	4.95
DP2 @ 1x	21.53	26.19	8.9	21.53	26.19	8.9	62.18	0.13	4.95

Project:	Created By:	Created On:	Last Update:
NP 3153 HT 3~ 455	Obaid Shaikh	11/26/25	-

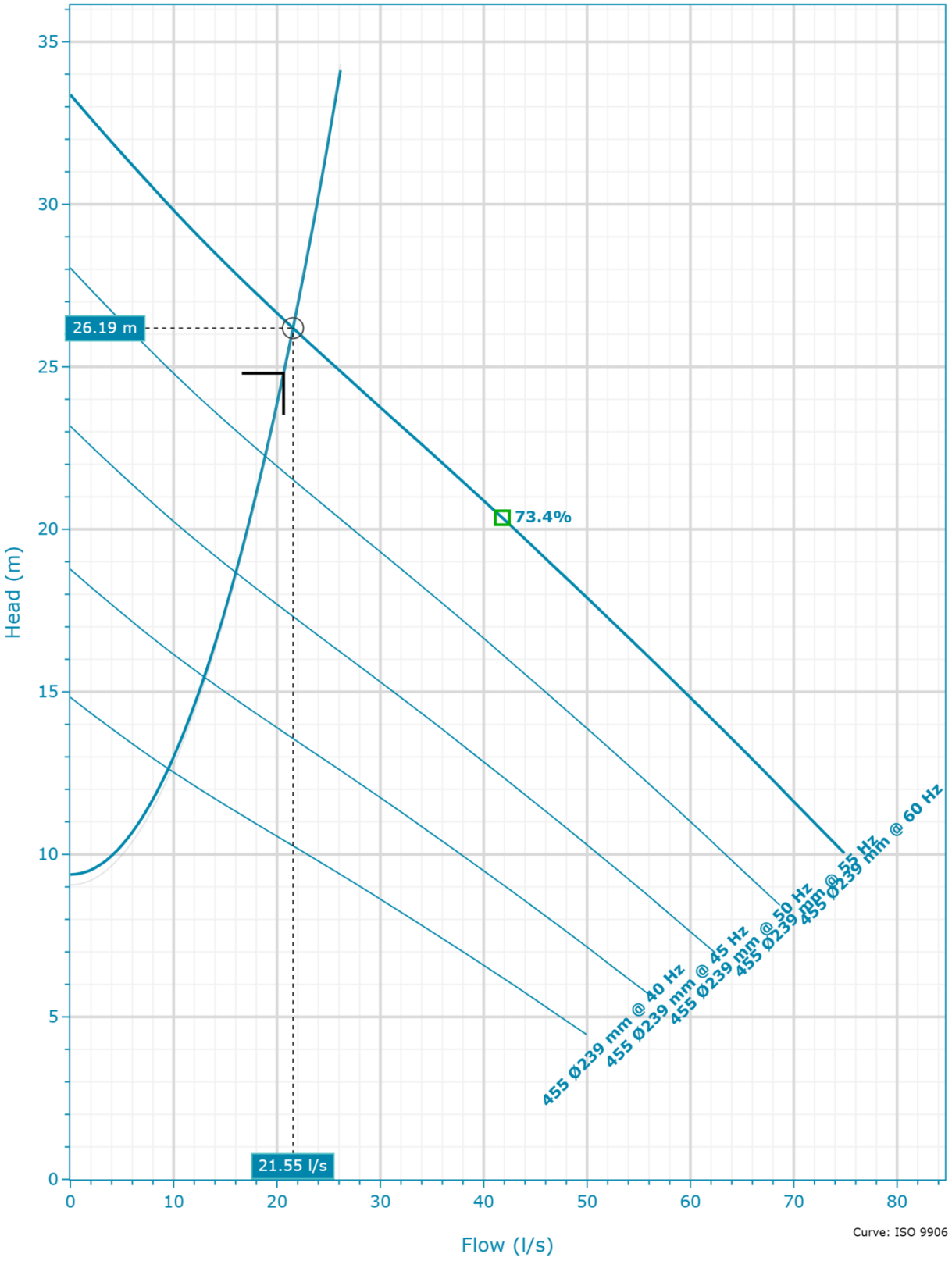
NP 3153 HT 3~ 455 | Variable Speed Curve



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Project:	Created By:	Created On:	Last Update:
NP 3153 HT 3~ 455	Obaid Shaikh	11/26/25	-

NP 3153 HT 3~ 455 | Variable Speed Analysis



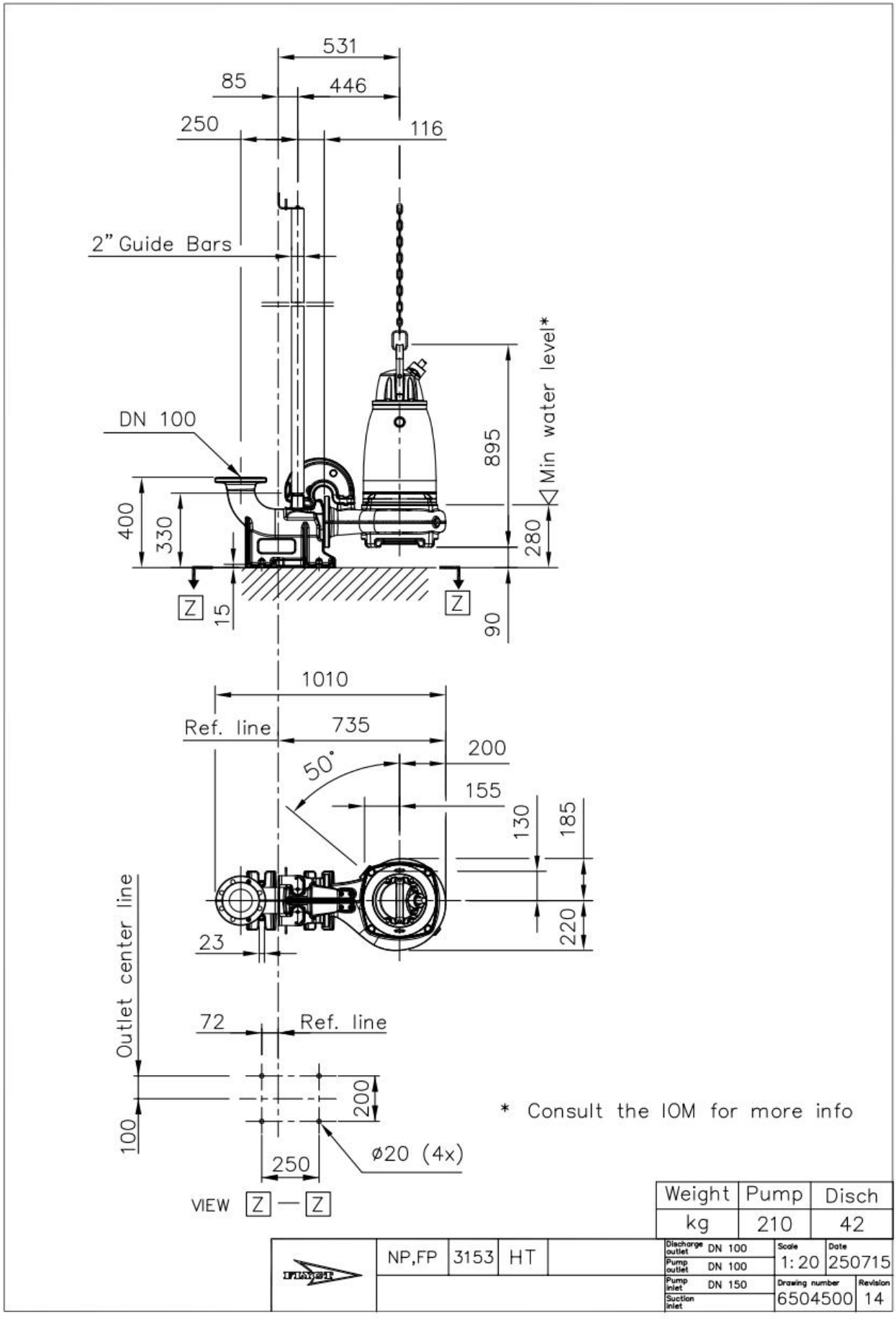
Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances. Please consult your local Flygt representative for additional performance guarantees.

Name	Speed	Q (1x) [l/s]	H (1x) [m]	P2 (1x) [kW]	Q [l/s]	H [m]	P2 [kW]	ηp [%]	SE [kWh/m³]	NPSHr [m]
DP @ 1x	40 Hz	9.48	12.63	2.36	9.48	12.63	2.36	49.85	0.08	2.31
DP @ 1x	45 Hz	12.96	15.46	3.52	12.96	15.46	3.52	55.78	0.09	2.86
DP @ 1x	50 Hz	16.02	18.67	4.98	16.02	18.67	4.98	58.96	0.1	3.49

Project:	Created By:	Created On:	Last Update:
NP 3153 HT 3~ 455	Obaid Shaikh	11/26/25	-

DP @ 1x	55 Hz	18.86	22.25	6.76	18.86	22.25	6.76	60.91	0.11	4.18
DP @ 1x	60 Hz	21.55	26.19	8.9	21.55	26.19	8.9	62.2	0.13	4.95
DP2 @ 1x	40 Hz	9.76	12.58	2.37	9.76	12.58	2.37	50.73	0.08	2.3
DP2 @ 1x	45 Hz	13.12	15.42	3.53	13.12	15.42	3.53	56.15	0.08	2.86
DP2 @ 1x	50 Hz	16.11	18.65	4.98	16.11	18.65	4.98	59.12	0.1	3.48
DP2 @ 1x	55 Hz	18.89	22.24	6.76	18.89	22.24	6.76	60.96	0.11	4.18
DP2 @ 1x	60 Hz	21.53	26.19	8.9	21.53	26.19	8.9	62.18	0.13	4.95

NP 3153 HT 3~ 455 | Dimensional Data & Drawing



Weight	Pump	Disch
kg	210	42

	NP,FP	3153	HT	Discharge outlet DN 100	Scale 1:20	Date 250715
				Pump outlet DN 100		
				Pump inlet DN 150	Drawing number 6504500	Revision 14
				Suction inlet		

Company	Xylem Flygt
Contact	Obaid Shaikh
Phone No.	6476193456
Email	obaid.shaikh@xylem.com

xylem
Let's Solve Water

Appendix B

Water Supply Servicing

Required Fire Flow Calculations (FUS 2020) - Without Firewalls

Project Title:	Mount Hope
Project No.:	5476
Municipality	Town of Caledon
Building/Parcel:	Without Firewalls

Required Fire Flow

A - Construction Type

Type of Construction: Type IV - C - Mass Timber Construction (Ordinary Mass Timber)
Construction C Value: 1

B - Floor Area

If Construction C Value >= 1.0:

2419 m^2 Gross Floor Area
2419 m^2 Total Floor Area Considered for RFF Calculation (Non fire-resistive construction)
*Includes all storeys, excludes basements at least 50% below grade

Height in Storeys
3 storeys

C - Required Fire Flow (Rounded, Unadjusted)

11000 L/min *Required Fire Flow (Unadjusted)*

Adjustments

D - Fire Hazard Occupancy

Occupancy Group: C - Residential
Occupancy and Contents: Limited Combustible

-15% *Total Adjustment for Fire Hazard Occupancy*
9350 L/min *Required Fire Flow (Unadjusted)*

E - Sprinkler System

Is an automatic sprinkler system in accordance with NFPA 13 present? No
Is the water supply standard for both the system and fire department hose required? No
Is the system fully supervised? No

0% *Total Adjustment for Sprinkler System*

F - Building Exposure

North Side

3 m Building Separation
Apply corresponding maximum exposure charge? Yes
Is the building exposed to the subject building fully protected with an automatic sprinkler system? No
Is there a fire wall (minimum 2-hr rating, protected per NBC) between the subject building and exposed building? No
25% *Adjustment for North Side*

East Side

31 m Building Separation
Apply corresponding maximum exposure charge? Yes
Is the building exposed to the subject building fully protected with an automatic sprinkler system? No
Is there a fire wall (minimum 2-hr rating, protected per NBC) between the subject building and exposed building? No
0% *Adjustment for East Side*

South Side

3 m Building Separation
Apply corresponding maximum exposure charge? Yes
Is the building exposed to the subject building fully protected with an automatic sprinkler system? No
Is there a fire wall (minimum 2-hr rating, protected per NBC) between the subject building and exposed building? No
25% *Adjustment for South Side*

West Side

3 m Building Separation
Apply corresponding maximum exposure charge? Yes
Is the building exposed to the subject building fully protected with an automatic sprinkler system? No
Is there a fire wall (minimum 2-hr rating, protected per NBC) between the subject building and exposed building? No
25% *Adjustment for West Side*

75% *Total Adjustment for Building Exposure*

G - Net Required Fire Flow

16000 L/min
267 L/s **Required Fire Flow**
4227 USGPM

Phase 1 Water Supply Calculations

Project No. 5476
February 2026

Proposed Site Plan Mt. Hope and Columbia Way, Caledon

Water Supply Demand: **290** L/capita/day

Population Summary

Drainage Area	Land Use	Number of Units	Pop. Density (persons/unit)†	Population
1	Townhouses	56	3.4	191
2	Single/Semi-Detatched	244	4.2	1025
4	Commercial	-	-	133

Water Demands

Land Use	Average Day Demand (L/s)‡	Peak Hour Demand Peaking Factor†	Peak Hour Demand (L/s)	Max Day Demand Peaking Factor‡	Max Day Demand (L/s)	Fire Flow* (L/s)	Max Demand + Fire Flow (L/s)
Residential	4.53	3.0	13.58	2.0	9.06	267	276.06
Total	**4.53**	**-**	**13.58**	**-**	**9.06**	**267**	**276.06**

Notes
† As per Region of Peel Linear Wastewater Design Guidelines (2023)
‡ Based on Region of Peel Public Works Watermain Design Criteria (2010)
*Fire demand calculated using the Fire Underwriters Survey (2020) guidelines

Ultimate Water Supply Calculations

Project No. 5476
February 2026

Proposed Site Plan Mt. Hope and Columbia Way, Caledon

Water Supply Demand: Residential‡ 290 L/capita/day

Population Summary

Drainage Area	Land Use	Number of Units	Pop. Density (persons/unit)†	Population
1	Townhouses	170	3.4	578
2	Single/Semi-Detatched	428	4.2	1798
3	Future Residential	-	-	46
4	Commercial	-	-	133

Water Demands

Land Use	Average Day Demand (L/s)‡	Peak Hour Demand Peaking Factor†	Peak Hour Demand (L/s)	Max Day Demand Peaking Factor‡	Max Day Demand (L/s)	Fire Flow* (L/s)	Max Demand + Fire Flow (L/s)
Residential	8.58	3.0	25.73	2.0	17.15	267	284.15
Total	**8.58**	**-**	**25.73**	**-**	**17.15**	**267**	**284.15**

Notes
† As per Region of Peel Linear Wastewater Design Guidelines (2023)
‡ Based on Region of Peel Public Works Watermain Design Criteria (2010)
*Fire demand calculated using the Fire Underwriters Survey (2020) guidelines

Phase 1 Population Estimate

Project No. 5476 **Date:** 27-Feb-26

Proposed Outlet to Columbia Way:

Total Site Area: **10.70 ha**

Item	Lots/Blocks	Land Use Type	Number of Units	Population Density (pp/unit)	Population (Residential)	Area (ha)	Population Density (pp/ha)	Populati on (Reside
1	80	13.7m Semi-Detached	160	4.2	672	3.45	70	242
2	84	9.8m Single Detached	84	4.2	353	2.65	70	186
3	9	6.1m Street Towns	56	3.4	191	1.52	175	266
5	1	Commercial	-	-	133	2.65	50	133
6	1	NHS	-	-	-	0.43	-	-
Total			***300***		**1348**	**10.70**		**826**

Area Taken from Draft Plan

Ultimate Population Estimate

Project No. 5476 **Date:** 27-Feb-26

Proposed Outlet to Columbia Way:

Total Site Area: **17.75 ha**

Item	Lots/Blocks	Land Use Type	Number of Units	Population Density (pp/unit)	Population (Residential)	Area (ha)	Population Density (pp/ha)	Populati on (Reside
1	164	13.7m Semi-Detached	328	4.2	1378	6.96	70	487
2	100	9.8m Single Detached	100	4.2	420	3.04	70	213
3	29	6.1m Street Towns	170	3.4	578	3.23	175	565
4	1	Future Residential	-	-	46	0.66	70	46
5	1	Commercial	-	-	133	2.65	50	133
6	2	NHS	-	-	-	1.21	-	-
Total			***598***		**2555**	**17.75**		**1444**

Area Taken from Draft Plan

Appendix C

Sanitary Servicing

Proposed Phase 1 Sanitary Flow Calculation

Project No. 5476

27-Feb-26

Infiltration Rate: 0.26 L/s/ha
Residential Generation Rate: 290 L/capita/day

Proposed Outlet to Columbia Way

Total Developable Land Area (ha): 14.65 ha

Summary of Sanitary Design Flow Calculation

Population Type	Total Population	Average Demand (L/s)	Harmon's Peaking Factor (M)*	Peak Flow (L/s)	Total Developable Land Area (ha)	Infiltration (L/ha/s)	Infiltration (L/s)	Total Peak Flow (L/s)
Residential	1216	4.53	3.71	16.81	14.65	0.26	3.81	20.62
Commerical	133							

$M = 1 + 14/(4 + (P/1000)^{0.5})$
Maximum M=4
*Population Estimate based on the Region of Peel's Linear Wastewater Standards (March 2023)

Proposed Ultimate Sanitary Flow Calculation

Project No. 5476

27-Feb-26

Infiltration Rate: 0.26 L/s/ha
Residential Generation Rate: 290 L/capita/day

Proposed Outlet to Columbia Way

Total Developable Land Area (ha): 30.77 ha

Summary of Sanitary Design Flow Calculation

Population Type	Total Population	Average Demand (L/s)	Harmon's Peaking Factor (M)*	Peak Flow (L/s)	Total Developable Land Area (ha)	Infiltration (L/ha/s)	Infiltration (L/s)	Total Peak Flow (L/s)
Residential	2422	8.58	3.50	30.02	30.77	0.26	8.00	38.02
Commerical	133							

$M = 1 + 14/(4 + (P/1000)^{0.5})$
Maximum M=4
*Population Estimate based on the Region of Peel's Linear Wastewater Standards (March 2023)

Appendix D

Stormwater Management Calculations

Drainage Area Runoff Coefficients

Mount Hope West
West Pond Post-Development Drainage Area Runoff Coefficient

SUBJECT SITE CONDITIONS

Composite Runoff Coefficient

	Area (ha)	Runoff Coeff	Impervious	A*R	A*Imp	Ximp	A*Ximp
Street Townhouse	0.95	0.75	0.79	0.71	0.75	0.38	0.36
Semi Detached	2.12	0.70	0.71	1.48	1.51	0.35	0.74
Single Detached	1.63	0.65	0.64	1.06	1.05	0.35	0.57
Commercial Block	2.65	0.90	1.00	2.39	2.65	1.00	2.65
SWM Blocks	1.45	0.50	0.43	0.73	0.62	0.43	0.62
Walkway/Servicing Block	0.03	0.90	1.00	0.03	0.03	1.00	0.03
ROW	2.69	0.90	1.00	2.42	2.69	1.00	2.69
Total Area	**11.52**	**0.77**	**0.81**	**8.81**	**9.30**	**0.67**	**7.66**

Mount Hope West
East Pond Post-Development Drainage Area Runoff Coefficient

SUBJECT SITE CONDITIONS

Composite Runoff Coefficient

	Area (ha)	Runoff Coeff	Impervious	A*R	A*Imp	Ximp	A*Ximp
Single Detached	1.42	0.65	0.64	0.92	0.91	0.28	0.40
Townhouse	2.23	0.75	0.79	1.67	1.75	0.38	0.85
Semi Detached	4.92	0.70	0.71	3.44	3.51	0.35	1.72
SWM Blocks	2.76	0.50	0.43	1.38	1.18	0.43	1.18
Parks/Green Space	1.42	0.25	0.07	0.36	0.10	0.07	0.10
Future Dev.	0.09	0.90	1.00	0.08	0.09	1.00	0.09
ROW	5.71	0.90	1.00	5.14	5.71	1.00	5.71
Total Area	**18.55**	**0.70**	**0.72**	**12.99**	**13.26**	**0.54**	**10.05**

Mount Hope West
Post-Development Drainage Area Composite Runoff Coefficient

SUBJECT SITE CONDITIONS

Composite Runoff Coefficient

	Area (ha)	Runoff Coeff	Impervious	A*R	A*Imp	Ximp	A*Ximp
Single Detached	3.05	0.65	0.64	1.98	1.96	0.51	1.57
Future Residential	0.66	0.65	0.64	0.43	0.42	0.51	0.34
Townhouse	3.18	0.75	0.79	2.39	2.50	0.57	1.82
Semi Detached	7.04	0.70	0.71	4.93	5.03	0.50	3.52
Commercial Block	2.65	0.90	1.00	2.39	2.65	1.00	2.65
SWM Blocks	4.21	0.50	0.43	2.11	1.80	0.43	1.80
Parks/Green Space	2.70	0.30	0.14	0.81	0.39	0.14	0.39
Servicing Block	0.12	0.90	1.00	0.11	0.12	1.00	0.12
Future Development	0.09	0.90	1.00	0.08	0.09	1.00	0.09
ROW	8.28	0.90	1.00	7.45	8.28	1.00	8.28
Total Area	**31.98**	**0.71**	**0.73**	**22.67**	**23.24**	**0.64**	**20.58**

Estimating Sheet - TIMP/XIMP for Typical 32ft LOTs

W= Lot Width	32	ft.	→ 9.8	m
D= Lot Depth	28	m		
bs= minimum Back yard set back	7.5	m		
fs= minimum Front set back	5.5	m		
ss= Minimum side set back	1.2	m		
dw = driveway Width	3	m		
Porch area=	6.53	sqm	(min. set back for Porch is 4m)	

Calculation based on lot Fabric

Total Lot Area	273.10	sqm	
Roof Area	110.30	sqm	40%
Porch	6.53	sqm	2%
Drive way	16.50	sqm	6%
Grass Area	139.77	sqm	51%

Total impervious Areas	133.33	sqm
Direct Impervious areas	78.18	sqm

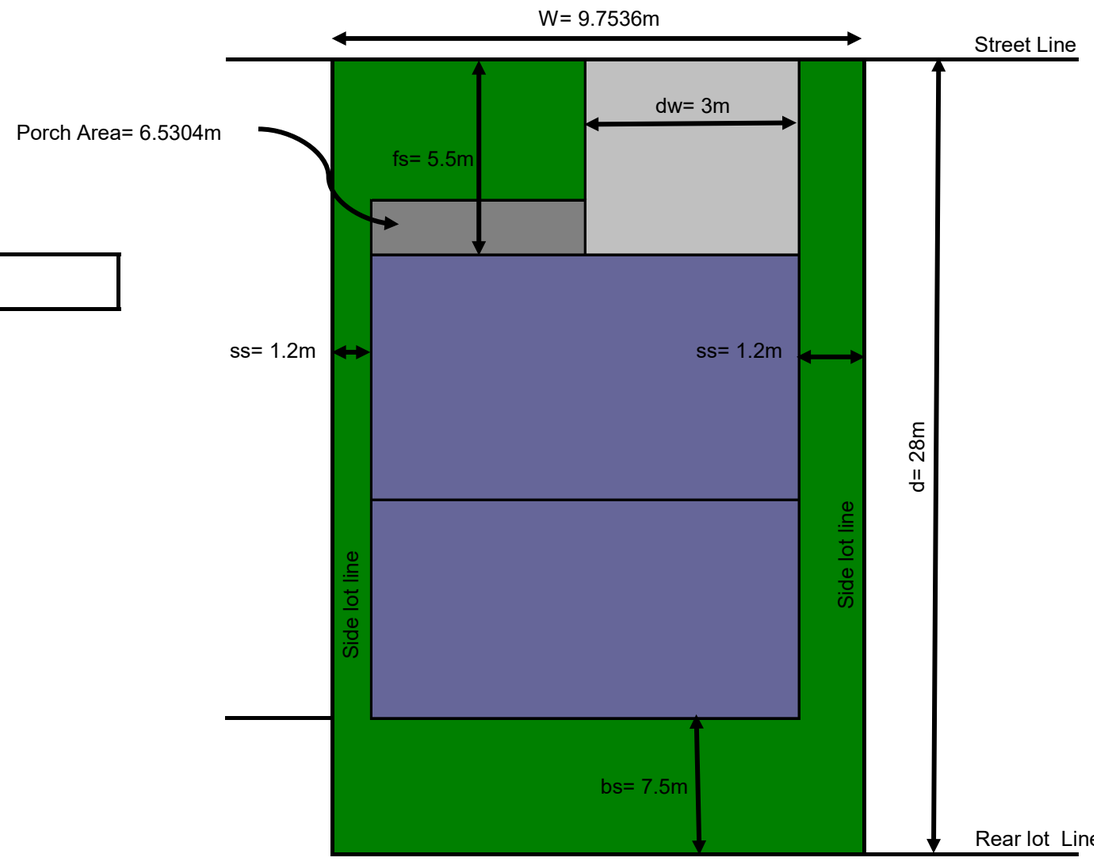
TIMP	52%
XIMP	29%

Minimum TIMP based on Region of Peel's Criteria

C*	0.65	(Single Detached Residential)
TIMP	64%	

Minimum TIMP/XIMP used in the model

C	0.66
TIMP	64%
XIMP	29%



Note: This schematic is not to scale

Estimating Sheet - TIMP/XIMP for Typical 45ft LOTs

W= Lot Width	45	ft.	→ 13.7	m
D= Lot Depth	28	m		
bs= minimum Back yard set back	7.5	m		
fs= minimum Front set back	5.5	m		
ss= Minimum side set back	0.4	m		
dw = driveway Width	3	m		
Porch area=	14.87	sqm	(min. set back for Porch is 4m)	

Calculation based on lot Fabric

Total Lot Area	384.05	sqm	
Roof Area	193.74	sqm	50%
Porch	14.87	sqm	4%
Drive way	16.50	sqm	4%
Grass Area	158.93	sqm	41%

Total impervious Areas	225.11	sqm
Direct Impervious areas	128.24	sqm

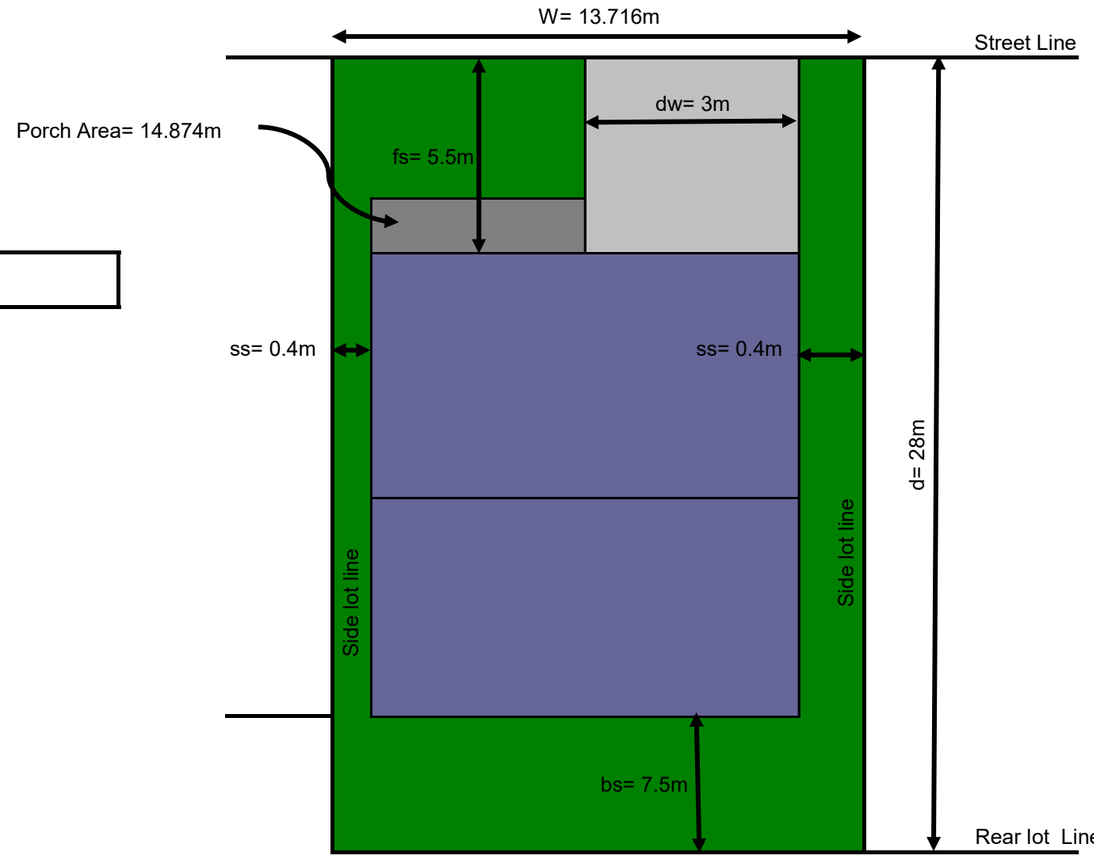
TIMP	62%
XIMP	33%

Minimum TIMP based on Region of Peel's Criteria

C*	0.70	(Semi-Detached Residential)
TIMP	71%	

Minimum TIMP/XIMP used in the model

C	0.70
TIMP	71%
XIMP	33%



Note: This schematic is not to scale

Estimating Sheet - TIMP/XIMP for Typical 20ft LOTs

W= Lot Width	20	ft.	6.1 m
D= Lot Depth	28	m	
bs= minimum Back yard set back	7	m	
fs= minimum Front set back	4.5	m	
ss= Minimum side set back	0	m	
dw = driveway Width	3	m	
Porch area=	1.55	sqm	(min. set back for Porch is4m)

Calculation based on lot Fabric

Total Lot Area	170.69	sqm	
Roof Area	100.58	sqm	59%
Porch	1.55	sqm	1%
Drive way	13.50	sqm	8%
Grass Area	55.06	sqm	32%

Total impervious Areas	115.63	sqm
Direct Impervious areas	65.34	sqm

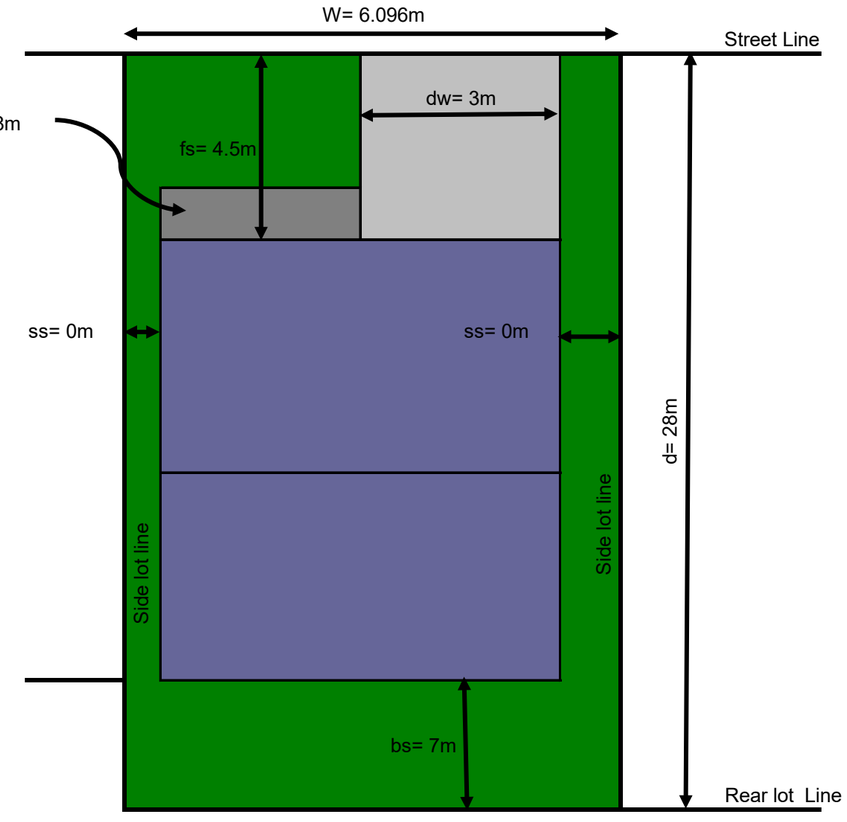
TIMP	70%
XIMP	38%

Minimum TIMP based on Region of Peel's Criteria

C	0.75	(Townhouses)
TIMP	79%	

Minimum TIMP/XIMP used in the model

C	0.75
TIMP	79%
XIMP	38%



Allowable Release Rates and Pond Sizing

PROJECT NO.:5476
PROJECT NAME: Mount Hope
LOCATION: Caledon, Peel

SCHAEFFERS
CONSULTING ENGINEERS

Pre-Development Area: 9.67 ha
West Pond Drainage Area: 11.52 ha
Allowable Release Rates - West Pond

Storm Event	Unit Flow (L/s/ha)	Release Rate (m^3/s)	Required Storage (m^3) [6 hour AES]	Required Storage (m^3) [12 hour AES]	Required Storage (m^3) [4 hour CHI]
2 Year	2.61	0.025	3145	3564	3040
5 Year	4.59	0.044	4270	4671	4557
10 Year	6.13	0.059	5015	5384	5434
25 Year	8.12	0.079	5942	6260	6706
50 Year	9.83	0.095	6632	6897	7569
100 Year	11.65	0.113	7307	7518	8517
Regional		1.152			

Pre-Development Area: 18.89 ha
East Pond Drainage Area 18.55 ha
Allowable Release Rates - East Pond

Storm Event	Unit Flow (L/s/ha)	Release Rate (m^3/s)	Required Storage (m^3) [6 hour AES]	Required Storage (m^3) [12 hour AES]	Required Storage (m^3) [4 hour CHI]
2 Year	2.46	0.046	4646	5271	4469
5 Year	4.30	0.081	6365	6945	6786
10 Year	5.74	0.109	7506	8030	8139
25 Year	7.61	0.144	8946	9370	10148
50 Year	9.21	0.174	10019	10349	11507
100 Year	10.92	0.206	11073	11328	13006
Regional (Hazel)**		0.920	27163		

**Regional Release Rate = Pre-development 7.81ha Regional Flow to Culvert crossing Mount Hope Road

VO Hydrologic Modeling Outputs

#– 5.22ha C=–

#16 3.40ha C=0.51

#16 6.41 ha C=0.51

#16 3.40ha C=0.51

#16 9.99ha C=0.51

#16 7.81 ha C=0.51

#16 0.71 ha C=0.51

12

11

10

9

8

7

6

5

21.02HA TO EAST

4

3

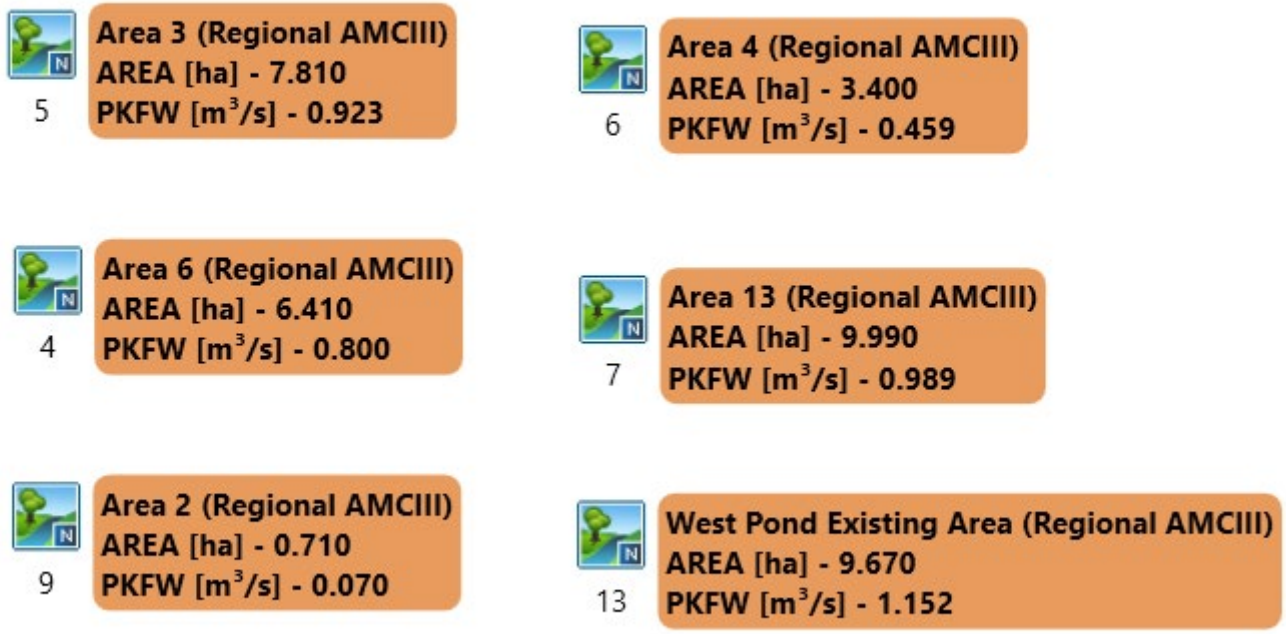
13

9.99HA TO WEST

0.71HA TO SOUTH

1

2



SCHAEFFERS
CONSULTING ENGINEERS

Pre-Development Flows (Regional Storm)
Mount Hope Residential Subdivision

Job #: 2024-5476	Date: February 2026

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================================================================================
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        V  V    I     SS    U   U  AAAAA  L
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         VV     I    SSSSS  UUUUU  A   A  LLLLL

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       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 02-19-2026                          TIME: 09:32:22

USER:



COMMENTS: _____________________________________________________________


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  ** SIMULATION : Hazel                        **
  ***********************************************


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--------------------
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                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.00 |  3.00   13.00 |  6.00   23.00 |  9.00   53.00
                1.00    4.00 |  4.00   17.00 |  7.00   13.00 | 10.00   38.00
                2.00    6.00 |  5.00   13.00 |  8.00   13.00 | 11.00   13.00

--------------------------------------------------------------------------------

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| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   6.41   Curve Number   (CN)= 93.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   7.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.55

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

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0.033	6.00	3.033	13.00	6.033	23.00	9.03	53.00
0.050	6.00	3.050	13.00	6.050	23.00	9.05	53.00
0.067	6.00	3.067	13.00	6.067	23.00	9.07	53.00
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.100	6.00	3.100	13.00	6.100	23.00	9.10	53.00
0.117	6.00	3.117	13.00	6.117	23.00	9.12	53.00
0.133	6.00	3.133	13.00	6.133	23.00	9.13	53.00
0.150	6.00	3.150	13.00	6.150	23.00	9.15	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.183	6.00	3.183	13.00	6.183	23.00	9.18	53.00
0.200	6.00	3.200	13.00	6.200	23.00	9.20	53.00
0.217	6.00	3.217	13.00	6.217	23.00	9.22	53.00
0.233	6.00	3.233	13.00	6.233	23.00	9.23	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.267	6.00	3.267	13.00	6.267	23.00	9.27	53.00
0.283	6.00	3.283	13.00	6.283	23.00	9.28	53.00
0.300	6.00	3.300	13.00	6.300	23.00	9.30	53.00
0.317	6.00	3.317	13.00	6.317	23.00	9.32	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.350	6.00	3.350	13.00	6.350	23.00	9.35	53.00
0.367	6.00	3.367	13.00	6.367	23.00	9.37	53.00
0.383	6.00	3.383	13.00	6.383	23.00	9.38	53.00
0.400	6.00	3.400	13.00	6.400	23.00	9.40	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.433	6.00	3.433	13.00	6.433	23.00	9.43	53.00
0.450	6.00	3.450	13.00	6.450	23.00	9.45	53.00
0.467	6.00	3.467	13.00	6.467	23.00	9.47	53.00
0.483	6.00	3.483	13.00	6.483	23.00	9.48	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
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0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.683	6.00	3.683	13.00	6.683	23.00	9.68	53.00
0.700	6.00	3.700	13.00	6.700	23.00	9.70	53.00
0.717	6.00	3.717	13.00	6.717	23.00	9.72	53.00
0.733	6.00	3.733	13.00	6.733	23.00	9.73	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.767	6.00	3.767	13.00	6.767	23.00	9.77	53.00
0.783	6.00	3.783	13.00	6.783	23.00	9.78	53.00
0.800	6.00	3.800	13.00	6.800	23.00	9.80	53.00
0.817	6.00	3.817	13.00	6.817	23.00	9.82	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.850	6.00	3.850	13.00	6.850	23.00	9.85	53.00
0.867	6.00	3.867	13.00	6.867	23.00	9.87	53.00
0.883	6.00	3.883	13.00	6.883	23.00	9.88	53.00
0.900	6.00	3.900	13.00	6.900	23.00	9.90	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
0.933	6.00	3.933	13.00	6.933	23.00	9.93	53.00
0.950	6.00	3.950	13.00	6.950	23.00	9.95	53.00
0.967	6.00	3.967	13.00	6.967	23.00	9.97	53.00
0.983	6.00	3.983	13.00	6.983	23.00	9.98	53.00
1.000	6.00	4.000	13.00	7.000	22.98	10.00	52.98
1.017	4.00	4.017	17.00	7.017	13.00	10.02	38.00
1.033	4.00	4.033	17.00	7.033	13.00	10.03	38.00

1.050	4.00	4.050	17.00	7.050	13.00	10.05	38.00	2.150	6.00	5.150	13.00	8.150	13.00	11.15	13.00
1.067	4.00	4.067	17.00	7.067	13.00	10.07	38.00	2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00	2.183	6.00	5.183	13.00	8.183	13.00	11.18	13.00
1.100	4.00	4.100	17.00	7.100	13.00	10.10	38.00	2.200	6.00	5.200	13.00	8.200	13.00	11.20	13.00
1.117	4.00	4.117	17.00	7.117	13.00	10.12	38.00	2.217	6.00	5.217	13.00	8.217	13.00	11.22	13.00
1.133	4.00	4.133	17.00	7.133	13.00	10.13	38.00	2.233	6.00	5.233	13.00	8.233	13.00	11.23	13.00
1.150	4.00	4.150	17.00	7.150	13.00	10.15	38.00	2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00	2.267	6.00	5.267	13.00	8.267	13.00	11.27	13.00
1.183	4.00	4.183	17.00	7.183	13.00	10.18	38.00	2.283	6.00	5.283	13.00	8.283	13.00	11.28	13.00
1.200	4.00	4.200	17.00	7.200	13.00	10.20	38.00	2.300	6.00	5.300	13.00	8.300	13.00	11.30	13.00
1.217	4.00	4.217	17.00	7.217	13.00	10.22	38.00	2.317	6.00	5.317	13.00	8.317	13.00	11.32	13.00
1.233	4.00	4.233	17.00	7.233	13.00	10.23	38.00	2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00	2.350	6.00	5.350	13.00	8.350	13.00	11.35	13.00
1.267	4.00	4.267	17.00	7.267	13.00	10.27	38.00	2.367	6.00	5.367	13.00	8.367	13.00	11.37	13.00
1.283	4.00	4.283	17.00	7.283	13.00	10.28	38.00	2.383	6.00	5.383	13.00	8.383	13.00	11.38	13.00
1.300	4.00	4.300	17.00	7.300	13.00	10.30	38.00	2.400	6.00	5.400	13.00	8.400	13.00	11.40	13.00
1.317	4.00	4.317	17.00	7.317	13.00	10.32	38.00	2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00	2.433	6.00	5.433	13.00	8.433	13.00	11.43	13.00
1.350	4.00	4.350	17.00	7.350	13.00	10.35	38.00	2.450	6.00	5.450	13.00	8.450	13.00	11.45	13.00
1.367	4.00	4.367	17.00	7.367	13.00	10.37	38.00	2.467	6.00	5.467	13.00	8.467	13.00	11.47	13.00
1.383	4.00	4.383	17.00	7.383	13.00	10.38	38.00	2.483	6.00	5.483	13.00	8.483	13.00	11.48	13.00
1.400	4.00	4.400	17.00	7.400	13.00	10.40	38.00	2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00	2.517	6.00	5.517	13.00	8.517	13.00	11.52	13.00
1.433	4.00	4.433	17.00	7.433	13.00	10.43	38.00	2.533	6.00	5.533	13.00	8.533	13.00	11.53	13.00
1.450	4.00	4.450	17.00	7.450	13.00	10.45	38.00	2.550	6.00	5.550	13.00	8.550	13.00	11.55	13.00
1.467	4.00	4.467	17.00	7.467	13.00	10.47	38.00	2.567	6.00	5.567	13.00	8.567	13.00	11.57	13.00
1.483	4.00	4.483	17.00	7.483	13.00	10.48	38.00	2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00	2.600	6.00	5.600	13.00	8.600	13.00	11.60	13.00
1.517	4.00	4.517	17.00	7.517	13.00	10.52	38.00	2.617	6.00	5.617	13.00	8.617	13.00	11.62	13.00
1.533	4.00	4.533	17.00	7.533	13.00	10.53	38.00	2.633	6.00	5.633	13.00	8.633	13.00	11.63	13.00
1.550	4.00	4.550	17.00	7.550	13.00	10.55	38.00	2.650	6.00	5.650	13.00	8.650	13.00	11.65	13.00
1.567	4.00	4.567	17.00	7.567	13.00	10.57	38.00	2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00	2.683	6.00	5.683	13.00	8.683	13.00	11.68	13.00
1.600	4.00	4.600	17.00	7.600	13.00	10.60	38.00	2.700	6.00	5.700	13.00	8.700	13.00	11.70	13.00
1.617	4.00	4.617	17.00	7.617	13.00	10.62	38.00	2.717	6.00	5.717	13.00	8.717	13.00	11.72	13.00
1.633	4.00	4.633	17.00	7.633	13.00	10.63	38.00	2.733	6.00	5.733	13.00	8.733	13.00	11.73	13.00
1.650	4.00	4.650	17.00	7.650	13.00	10.65	38.00	2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00	2.767	6.00	5.767	13.00	8.767	13.00	11.77	13.00
1.683	4.00	4.683	17.00	7.683	13.00	10.68	38.00	2.783	6.00	5.783	13.00	8.783	13.00	11.78	13.00
1.700	4.00	4.700	17.00	7.700	13.00	10.70	38.00	2.800	6.00	5.800	13.00	8.800	13.00	11.80	13.00
1.717	4.00	4.717	17.00	7.717	13.00	10.72	38.00	2.817	6.00	5.817	13.00	8.817	13.00	11.82	13.00
1.733	4.00	4.733	17.00	7.733	13.00	10.73	38.00	2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00	2.850	6.00	5.850	13.00	8.850	13.00	11.85	13.00
1.767	4.00	4.767	17.00	7.767	13.00	10.77	38.00	2.867	6.00	5.867	13.00	8.867	13.00	11.87	13.00
1.783	4.00	4.783	17.00	7.783	13.00	10.78	38.00	2.883	6.00	5.883	13.00	8.883	13.00	11.88	13.00
1.800	4.00	4.800	17.00	7.800	13.00	10.80	38.00	2.900	6.00	5.900	13.00	8.900	13.00	11.90	13.00
1.817	4.00	4.817	17.00	7.817	13.00	10.82	38.00	2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00	2.933	6.00	5.933	13.00	8.933	13.00	11.93	13.00
1.850	4.00	4.850	17.00	7.850	13.00	10.85	38.00	2.950	6.00	5.950	13.00	8.950	13.00	11.95	13.00
1.867	4.00	4.867	17.00	7.867	13.00	10.87	38.00	2.967	6.00	5.967	13.00	8.967	13.00	11.97	13.00
1.883	4.00	4.883	17.00	7.883	13.00	10.88	38.00	2.983	6.00	5.983	13.00	8.983	13.00	11.98	13.00
1.900	4.00	4.900	17.00	7.900	13.00	10.90	38.00	3.000	6.00	6.000	13.01	9.000	13.08	12.00	13.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00								
1.933	4.00	4.933	17.00	7.933	13.00	10.93	38.00								
1.950	4.00	4.950	17.00	7.950	13.00	10.95	38.00								
1.967	4.00	4.967	17.00	7.967	13.00	10.97	38.00								
1.983	4.00	4.983	17.00	7.983	13.00	10.98	38.00								
2.000	4.00	5.000	17.00	8.000	13.00	11.00	37.99								
2.017	6.00	5.017	13.00	8.017	13.00	11.02	13.00								
2.033	6.00	5.033	13.00	8.033	13.00	11.03	13.00								
2.050	6.00	5.050	13.00	8.050	13.00	11.05	13.00								
2.067	6.00	5.067	13.00	8.067	13.00	11.07	13.00								
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00								
2.100	6.00	5.100	13.00	8.100	13.00	11.10	13.00								
2.117	6.00	5.117	13.00	8.117	13.00	11.12	13.00								
2.133	6.00	5.133	13.00	8.133	13.00	11.13	13.00								

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     Unit Hyd Qpeak  (cms)=   0.445

     PEAK FLOW       (cms)=   0.800 (i)
     TIME TO PEAK    (hrs)=  10.367
     RUNOFF VOLUME    (mm)= 187.513
     TOTAL RAINFALL   (mm)= 212.001
     RUNOFF COEFFICIENT   =   0.884

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
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| NASHYD (0005)| Area (ha)= 7.81 Curve Number (CN)= 93.0
|ID= 1 DT= 1.0 min | Ia (mm)= 7.00 # of Linear Res.(N)= 3.00
---------- U.H. Tp(hrs)= 0.67

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	6.00	3.017	13.00	6.017	23.00	9.02	53.00
0.033	6.00	3.033	13.00	6.033	23.00	9.03	53.00
0.050	6.00	3.050	13.00	6.050	23.00	9.05	53.00
0.067	6.00	3.067	13.00	6.067	23.00	9.07	53.00
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.100	6.00	3.100	13.00	6.100	23.00	9.10	53.00
0.117	6.00	3.117	13.00	6.117	23.00	9.12	53.00
0.133	6.00	3.133	13.00	6.133	23.00	9.13	53.00
0.150	6.00	3.150	13.00	6.150	23.00	9.15	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.183	6.00	3.183	13.00	6.183	23.00	9.18	53.00
0.200	6.00	3.200	13.00	6.200	23.00	9.20	53.00
0.217	6.00	3.217	13.00	6.217	23.00	9.22	53.00
0.233	6.00	3.233	13.00	6.233	23.00	9.23	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.267	6.00	3.267	13.00	6.267	23.00	9.27	53.00
0.283	6.00	3.283	13.00	6.283	23.00	9.28	53.00
0.300	6.00	3.300	13.00	6.300	23.00	9.30	53.00
0.317	6.00	3.317	13.00	6.317	23.00	9.32	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.350	6.00	3.350	13.00	6.350	23.00	9.35	53.00
0.367	6.00	3.367	13.00	6.367	23.00	9.37	53.00
0.383	6.00	3.383	13.00	6.383	23.00	9.38	53.00
0.400	6.00	3.400	13.00	6.400	23.00	9.40	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.433	6.00	3.433	13.00	6.433	23.00	9.43	53.00
0.450	6.00	3.450	13.00	6.450	23.00	9.45	53.00
0.467	6.00	3.467	13.00	6.467	23.00	9.47	53.00
0.483	6.00	3.483	13.00	6.483	23.00	9.48	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.517	6.00	3.517	13.00	6.517	23.00	9.52	53.00
0.533	6.00	3.533	13.00	6.533	23.00	9.53	53.00
0.550	6.00	3.550	13.00	6.550	23.00	9.55	53.00
0.567	6.00	3.567	13.00	6.567	23.00	9.57	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.600	6.00	3.600	13.00	6.600	23.00	9.60	53.00
0.617	6.00	3.617	13.00	6.617	23.00	9.62	53.00
0.633	6.00	3.633	13.00	6.633	23.00	9.63	53.00
0.650	6.00	3.650	13.00	6.650	23.00	9.65	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.683	6.00	3.683	13.00	6.683	23.00	9.68	53.00
0.700	6.00	3.700	13.00	6.700	23.00	9.70	53.00
0.717	6.00	3.717	13.00	6.717	23.00	9.72	53.00
0.733	6.00	3.733	13.00	6.733	23.00	9.73	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.767	6.00	3.767	13.00	6.767	23.00	9.77	53.00
0.783	6.00	3.783	13.00	6.783	23.00	9.78	53.00
0.800	6.00	3.800	13.00	6.800	23.00	9.80	53.00
0.817	6.00	3.817	13.00	6.817	23.00	9.82	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.850	6.00	3.850	13.00	6.850	23.00	9.85	53.00
0.867	6.00	3.867	13.00	6.867	23.00	9.87	53.00
0.883	6.00	3.883	13.00	6.883	23.00	9.88	53.00
0.900	6.00	3.900	13.00	6.900	23.00	9.90	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
0.933	6.00	3.933	13.00	6.933	23.00	9.93	53.00
0.950	6.00	3.950	13.00	6.950	23.00	9.95	53.00
0.967	6.00	3.967	13.00	6.967	23.00	9.97	53.00
0.983	6.00	3.983	13.00	6.983	23.00	9.98	53.00
1.000	6.00	4.000	13.00	7.000	22.98	10.00	52.98
1.017	4.00	4.017	17.00	7.017	13.00	10.02	38.00
1.033	4.00	4.033	17.00	7.033	13.00	10.03	38.00
1.050	4.00	4.050	17.00	7.050	13.00	10.05	38.00
1.067	4.00	4.067	17.00	7.067	13.00	10.07	38.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.100	4.00	4.100	17.00	7.100	13.00	10.10	38.00
1.117	4.00	4.117	17.00	7.117	13.00	10.12	38.00
1.133	4.00	4.133	17.00	7.133	13.00	10.13	38.00
1.150	4.00	4.150	17.00	7.150	13.00	10.15	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.183	4.00	4.183	17.00	7.183	13.00	10.18	38.00
1.200	4.00	4.200	17.00	7.200	13.00	10.20	38.00
1.217	4.00	4.217	17.00	7.217	13.00	10.22	38.00
1.233	4.00	4.233	17.00	7.233	13.00	10.23	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.267	4.00	4.267	17.00	7.267	13.00	10.27	38.00
1.283	4.00	4.283	17.00	7.283	13.00	10.28	38.00
1.300	4.00	4.300	17.00	7.300	13.00	10.30	38.00
1.317	4.00	4.317	17.00	7.317	13.00	10.32	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.350	4.00	4.350	17.00	7.350	13.00	10.35	38.00
1.367	4.00	4.367	17.00	7.367	13.00	10.37	38.00
1.383	4.00	4.383	17.00	7.383	13.00	10.38	38.00
1.400	4.00	4.400	17.00	7.400	13.00	10.40	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.433	4.00	4.433	17.00	7.433	13.00	10.43	38.00
1.450	4.00	4.450	17.00	7.450	13.00	10.45	38.00
1.467	4.00	4.467	17.00	7.467	13.00	10.47	38.00
1.483	4.00	4.483	17.00	7.483	13.00	10.48	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.517	4.00	4.517	17.00	7.517	13.00	10.52	38.00
1.533	4.00	4.533	17.00	7.533	13.00	10.53	38.00
1.550	4.00	4.550	17.00	7.550	13.00	10.55	38.00
1.567	4.00	4.567	17.00	7.567	13.00	10.57	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.600	4.00	4.600	17.00	7.600	13.00	10.60	38.00
1.617	4.00	4.617	17.00	7.617	13.00	10.62	38.00
1.633	4.00	4.633	17.00	7.633	13.00	10.63	38.00
1.650	4.00	4.650	17.00	7.650	13.00	10.65	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.683	4.00	4.683	17.00	7.683	13.00	10.68	38.00
1.700	4.00	4.700	17.00	7.700	13.00	10.70	38.00
1.717	4.00	4.717	17.00	7.717	13.00	10.72	38.00
1.733	4.00	4.733	17.00	7.733	13.00	10.73	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.767	4.00	4.767	17.00	7.767	13.00	10.77	38.00
1.783	4.00	4.783	17.00	7.783	13.00	10.78	38.00
1.800	4.00	4.800	17.00	7.800	13.00	10.80	38.00
1.817	4.00	4.817	17.00	7.817	13.00	10.82	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.850	4.00	4.850	17.00	7.850	13.00	10.85	38.00
1.867	4.00	4.867	17.00	7.867	13.00	10.87	38.00
1.883	4.00	4.883	17.00	7.883	13.00	10.88	38.00
1.900	4.00	4.900	17.00	7.900	13.00	10.90	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
1.933	4.00	4.933	17.00	7.933	13.00	10.93	38.00
1.950	4.00	4.950	17.00	7.950	13.00	10.95	38.00
1.967	4.00	4.967	17.00	7.967	13.00	10.97	38.00
1.983	4.00	4.983	17.00	7.983	13.00	10.98	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	37.99
2.017	6.00	5.017	13.00	8.017	13.00	11.02	13.00
2.033	6.00	5.033	13.00	8.033	13.00	11.03	13.00

2.050	6.00	5.050	13.00	8.050	13.00	11.05	13.00
2.067	6.00	5.067	13.00	8.067	13.00	11.07	13.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.100	6.00	5.100	13.00	8.100	13.00	11.10	13.00
2.117	6.00	5.117	13.00	8.117	13.00	11.12	13.00
2.133	6.00	5.133	13.00	8.133	13.00	11.13	13.00
2.150	6.00	5.150	13.00	8.150	13.00	11.15	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.183	6.00	5.183	13.00	8.183	13.00	11.18	13.00
2.200	6.00	5.200	13.00	8.200	13.00	11.20	13.00
2.217	6.00	5.217	13.00	8.217	13.00	11.22	13.00
2.233	6.00	5.233	13.00	8.233	13.00	11.23	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.267	6.00	5.267	13.00	8.267	13.00	11.27	13.00
2.283	6.00	5.283	13.00	8.283	13.00	11.28	13.00
2.300	6.00	5.300	13.00	8.300	13.00	11.30	13.00
2.317	6.00	5.317	13.00	8.317	13.00	11.32	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.350	6.00	5.350	13.00	8.350	13.00	11.35	13.00
2.367	6.00	5.367	13.00	8.367	13.00	11.37	13.00
2.383	6.00	5.383	13.00	8.383	13.00	11.38	13.00
2.400	6.00	5.400	13.00	8.400	13.00	11.40	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.433	6.00	5.433	13.00	8.433	13.00	11.43	13.00
2.450	6.00	5.450	13.00	8.450	13.00	11.45	13.00
2.467	6.00	5.467	13.00	8.467	13.00	11.47	13.00
2.483	6.00	5.483	13.00	8.483	13.00	11.48	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.517	6.00	5.517	13.00	8.517	13.00	11.52	13.00
2.533	6.00	5.533	13.00	8.533	13.00	11.53	13.00
2.550	6.00	5.550	13.00	8.550	13.00	11.55	13.00
2.567	6.00	5.567	13.00	8.567	13.00	11.57	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.600	6.00	5.600	13.00	8.600	13.00	11.60	13.00
2.617	6.00	5.617	13.00	8.617	13.00	11.62	13.00
2.633	6.00	5.633	13.00	8.633	13.00	11.63	13.00
2.650	6.00	5.650	13.00	8.650	13.00	11.65	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.683	6.00	5.683	13.00	8.683	13.00	11.68	13.00
2.700	6.00	5.700	13.00	8.700	13.00	11.70	13.00
2.717	6.00	5.717	13.00	8.717	13.00	11.72	13.00
2.733	6.00	5.733	13.00	8.733	13.00	11.73	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.767	6.00	5.767	13.00	8.767	13.00	11.77	13.00
2.783	6.00	5.783	13.00	8.783	13.00	11.78	13.00
2.800	6.00	5.800	13.00	8.800	13.00	11.80	13.00
2.817	6.00	5.817	13.00	8.817	13.00	11.82	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.850	6.00	5.850	13.00	8.850	13.00	11.85	13.00
2.867	6.00	5.867	13.00	8.867	13.00	11.87	13.00
2.883	6.00	5.883	13.00	8.883	13.00	11.88	13.00
2.900	6.00	5.900	13.00	8.900	13.00	11.90	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
2.933	6.00	5.933	13.00	8.933	13.00	11.93	13.00
2.950	6.00	5.950	13.00	8.950	13.00	11.95	13.00
2.967	6.00	5.967	13.00	8.967	13.00	11.97	13.00
2.983	6.00	5.983	13.00	8.983	13.00	11.98	13.00
3.000	6.00	6.000	13.01	9.000	13.08	12.00	13.00

Unit Hyd Qpeak (cms)= 0.445

PEAK FLOW (cms)= 0.923 (i)
TIME TO PEAK (hrs)= 10.583
RUNOFF VOLUME (mm)= 187.513
TOTAL RAINFALL (mm)= 212.001
RUNOFF COEFFICIENT = 0.884

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0006)	Area (ha)=	3.40	Curve Number (CN)= 93.0
ID= 1 DT= 1.0 min	Ia (mm)=	7.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.40	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	6.00	3.017	13.00	6.017	23.00	9.02	53.00
0.033	6.00	3.033	13.00	6.033	23.00	9.03	53.00
0.050	6.00	3.050	13.00	6.050	23.00	9.05	53.00
0.067	6.00	3.067	13.00	6.067	23.00	9.07	53.00
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.100	6.00	3.100	13.00	6.100	23.00	9.10	53.00
0.117	6.00	3.117	13.00	6.117	23.00	9.12	53.00
0.133	6.00	3.133	13.00	6.133	23.00	9.13	53.00
0.150	6.00	3.150	13.00	6.150	23.00	9.15	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.183	6.00	3.183	13.00	6.183	23.00	9.18	53.00
0.200	6.00	3.200	13.00	6.200	23.00	9.20	53.00
0.217	6.00	3.217	13.00	6.217	23.00	9.22	53.00
0.233	6.00	3.233	13.00	6.233	23.00	9.23	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.267	6.00	3.267	13.00	6.267	23.00	9.27	53.00
0.283	6.00	3.283	13.00	6.283	23.00	9.28	53.00
0.300	6.00	3.300	13.00	6.300	23.00	9.30	53.00
0.317	6.00	3.317	13.00	6.317	23.00	9.32	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.350	6.00	3.350	13.00	6.350	23.00	9.35	53.00
0.367	6.00	3.367	13.00	6.367	23.00	9.37	53.00
0.383	6.00	3.383	13.00	6.383	23.00	9.38	53.00
0.400	6.00	3.400	13.00	6.400	23.00	9.40	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.433	6.00	3.433	13.00	6.433	23.00	9.43	53.00
0.450	6.00	3.450	13.00	6.450	23.00	9.45	53.00
0.467	6.00	3.467	13.00	6.467	23.00	9.47	53.00
0.483	6.00	3.483	13.00	6.483	23.00	9.48	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.517	6.00	3.517	13.00	6.517	23.00	9.52	53.00
0.533	6.00	3.533	13.00	6.533	23.00	9.53	53.00
0.550	6.00	3.550	13.00	6.550	23.00	9.55	53.00
0.567	6.00	3.567	13.00	6.567	23.00	9.57	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.600	6.00	3.600	13.00	6.600	23.00	9.60	53.00
0.617	6.00	3.617	13.00	6.617	23.00	9.62	53.00
0.633	6.00	3.633	13.00	6.633	23.00	9.63	53.00
0.650	6.00	3.650	13.00	6.650	23.00	9.65	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.683	6.00	3.683	13.00	6.683	23.00	9.68	53.00
0.700	6.00	3.700	13.00	6.700	23.00	9.70	53.00
0.717	6.00	3.717	13.00	6.717	23.00	9.72	53.00
0.733	6.00	3.733	13.00	6.733	23.00	9.73	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.767	6.00	3.767	13.00	6.767	23.00	9.77	53.00
0.783	6.00	3.783	13.00	6.783	23.00	9.78	53.00
0.800	6.00	3.800	13.00	6.800	23.00	9.80	53.00
0.817	6.00	3.817	13.00	6.817	23.00	9.82	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00

0.850	6.00	3.850	13.00	6.850	23.00	9.85	53.00		1.950	4.00	4.950	17.00	7.950	13.00	10.95	38.00
0.867	6.00	3.867	13.00	6.867	23.00	9.87	53.00		1.967	4.00	4.967	17.00	7.967	13.00	10.97	38.00
0.883	6.00	3.883	13.00	6.883	23.00	9.88	53.00		1.983	4.00	4.983	17.00	7.983	13.00	10.98	38.00
0.900	6.00	3.900	13.00	6.900	23.00	9.90	53.00		2.000	4.00	5.000	17.00	8.000	13.00	11.00	37.99
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00		2.017	6.00	5.017	13.00	8.017	13.00	11.02	13.00
0.933	6.00	3.933	13.00	6.933	23.00	9.93	53.00		2.033	6.00	5.033	13.00	8.033	13.00	11.03	13.00
0.950	6.00	3.950	13.00	6.950	23.00	9.95	53.00		2.050	6.00	5.050	13.00	8.050	13.00	11.05	13.00
0.967	6.00	3.967	13.00	6.967	23.00	9.97	53.00		2.067	6.00	5.067	13.00	8.067	13.00	11.07	13.00
0.983	6.00	3.983	13.00	6.983	23.00	9.98	53.00		2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
1.000	6.00	4.000	13.00	7.000	22.98	10.00	52.98		2.100	6.00	5.100	13.00	8.100	13.00	11.10	13.00
1.017	4.00	4.017	17.00	7.017	13.00	10.02	38.00		2.117	6.00	5.117	13.00	8.117	13.00	11.12	13.00
1.033	4.00	4.033	17.00	7.033	13.00	10.03	38.00		2.133	6.00	5.133	13.00	8.133	13.00	11.13	13.00
1.050	4.00	4.050	17.00	7.050	13.00	10.05	38.00		2.150	6.00	5.150	13.00	8.150	13.00	11.15	13.00
1.067	4.00	4.067	17.00	7.067	13.00	10.07	38.00		2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00		2.183	6.00	5.183	13.00	8.183	13.00	11.18	13.00
1.100	4.00	4.100	17.00	7.100	13.00	10.10	38.00		2.200	6.00	5.200	13.00	8.200	13.00	11.20	13.00
1.117	4.00	4.117	17.00	7.117	13.00	10.12	38.00		2.217	6.00	5.217	13.00	8.217	13.00	11.22	13.00
1.133	4.00	4.133	17.00	7.133	13.00	10.13	38.00		2.233	6.00	5.233	13.00	8.233	13.00	11.23	13.00
1.150	4.00	4.150	17.00	7.150	13.00	10.15	38.00		2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00		2.267	6.00	5.267	13.00	8.267	13.00	11.27	13.00
1.183	4.00	4.183	17.00	7.183	13.00	10.18	38.00		2.283	6.00	5.283	13.00	8.283	13.00	11.28	13.00
1.200	4.00	4.200	17.00	7.200	13.00	10.20	38.00		2.300	6.00	5.300	13.00	8.300	13.00	11.30	13.00
1.217	4.00	4.217	17.00	7.217	13.00	10.22	38.00		2.317	6.00	5.317	13.00	8.317	13.00	11.32	13.00
1.233	4.00	4.233	17.00	7.233	13.00	10.23	38.00		2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00		2.350	6.00	5.350	13.00	8.350	13.00	11.35	13.00
1.267	4.00	4.267	17.00	7.267	13.00	10.27	38.00		2.367	6.00	5.367	13.00	8.367	13.00	11.37	13.00
1.283	4.00	4.283	17.00	7.283	13.00	10.28	38.00		2.383	6.00	5.383	13.00	8.383	13.00	11.38	13.00
1.300	4.00	4.300	17.00	7.300	13.00	10.30	38.00		2.400	6.00	5.400	13.00	8.400	13.00	11.40	13.00
1.317	4.00	4.317	17.00	7.317	13.00	10.32	38.00		2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00		2.433	6.00	5.433	13.00	8.433	13.00	11.43	13.00
1.350	4.00	4.350	17.00	7.350	13.00	10.35	38.00		2.450	6.00	5.450	13.00	8.450	13.00	11.45	13.00
1.367	4.00	4.367	17.00	7.367	13.00	10.37	38.00		2.467	6.00	5.467	13.00	8.467	13.00	11.47	13.00
1.383	4.00	4.383	17.00	7.383	13.00	10.38	38.00		2.483	6.00	5.483	13.00	8.483	13.00	11.48	13.00
1.400	4.00	4.400	17.00	7.400	13.00	10.40	38.00		2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00		2.517	6.00	5.517	13.00	8.517	13.00	11.52	13.00
1.433	4.00	4.433	17.00	7.433	13.00	10.43	38.00		2.533	6.00	5.533	13.00	8.533	13.00	11.53	13.00
1.450	4.00	4.450	17.00	7.450	13.00	10.45	38.00		2.550	6.00	5.550	13.00	8.550	13.00	11.55	13.00
1.467	4.00	4.467	17.00	7.467	13.00	10.47	38.00		2.567	6.00	5.567	13.00	8.567	13.00	11.57	13.00
1.483	4.00	4.483	17.00	7.483	13.00	10.48	38.00		2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00		2.600	6.00	5.600	13.00	8.600	13.00	11.60	13.00
1.517	4.00	4.517	17.00	7.517	13.00	10.52	38.00		2.617	6.00	5.617	13.00	8.617	13.00	11.62	13.00
1.533	4.00	4.533	17.00	7.533	13.00	10.53	38.00		2.633	6.00	5.633	13.00	8.633	13.00	11.63	13.00
1.550	4.00	4.550	17.00	7.550	13.00	10.55	38.00		2.650	6.00	5.650	13.00	8.650	13.00	11.65	13.00
1.567	4.00	4.567	17.00	7.567	13.00	10.57	38.00		2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00		2.683	6.00	5.683	13.00	8.683	13.00	11.68	13.00
1.600	4.00	4.600	17.00	7.600	13.00	10.60	38.00		2.700	6.00	5.700	13.00	8.700	13.00	11.70	13.00
1.617	4.00	4.617	17.00	7.617	13.00	10.62	38.00		2.717	6.00	5.717	13.00	8.717	13.00	11.72	13.00
1.633	4.00	4.633	17.00	7.633	13.00	10.63	38.00		2.733	6.00	5.733	13.00	8.733	13.00	11.73	13.00
1.650	4.00	4.650	17.00	7.650	13.00	10.65	38.00		2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00		2.767	6.00	5.767	13.00	8.767	13.00	11.77	13.00
1.683	4.00	4.683	17.00	7.683	13.00	10.68	38.00		2.783	6.00	5.783	13.00	8.783	13.00	11.78	13.00
1.700	4.00	4.700	17.00	7.700	13.00	10.70	38.00		2.800	6.00	5.800	13.00	8.800	13.00	11.80	13.00
1.717	4.00	4.717	17.00	7.717	13.00	10.72	38.00		2.817	6.00	5.817	13.00	8.817	13.00	11.82	13.00
1.733	4.00	4.733	17.00	7.733	13.00	10.73	38.00		2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00		2.850	6.00	5.850	13.00	8.850	13.00	11.85	13.00
1.767	4.00	4.767	17.00	7.767	13.00	10.77	38.00		2.867	6.00	5.867	13.00	8.867	13.00	11.87	13.00
1.783	4.00	4.783	17.00	7.783	13.00	10.78	38.00		2.883	6.00	5.883	13.00	8.883	13.00	11.88	13.00
1.800	4.00	4.800	17.00	7.800	13.00	10.80	38.00		2.900	6.00	5.900	13.00	8.900	13.00	11.90	13.00
1.817	4.00	4.817	17.00	7.817	13.00	10.82	38.00		2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00		2.933	6.00	5.933	13.00	8.933	13.00	11.93	13.00
1.850	4.00	4.850	17.00	7.850	13.00	10.85	38.00		2.950	6.00	5.950	13.00	8.950	13.00	11.95	13.00
1.867	4.00	4.867	17.00	7.867	13.00	10.87	38.00		2.967	6.00	5.967	13.00	8.967	13.00	11.97	13.00
1.883	4.00	4.883	17.00	7.883	13.00	10.88	38.00		2.983	6.00	5.983	13.00	8.983	13.00	11.98	13.00
1.900	4.00	4.900	17.00	7.900	13.00	10.90	38.00		3.000	6.00	6.000	13.01	9.000	13.08	12.00	13.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00									
1.933	4.00	4.933	17.00	7.933	13.00	10.93	38.00									

Unit Hyd Qpeak (cms)= 0.325

PEAK FLOW (cms)= 0.459 (i)
TIME TO PEAK (hrs)= 10.150
RUNOFF VOLUME (mm)= 187.513
TOTAL RAINFALL (mm)= 212.001
RUNOFF COEFFICIENT = 0.884

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0007)	Area (ha)=	9.99	Curve Number (CN)=	93.0	
ID= 1 DT= 1.0 min	Ia (mm)=	7.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	1.25			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	6.00	3.017	13.00	6.017	23.00	9.02	53.00
0.033	6.00	3.033	13.00	6.033	23.00	9.03	53.00
0.050	6.00	3.050	13.00	6.050	23.00	9.05	53.00
0.067	6.00	3.067	13.00	6.067	23.00	9.07	53.00
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.100	6.00	3.100	13.00	6.100	23.00	9.10	53.00
0.117	6.00	3.117	13.00	6.117	23.00	9.12	53.00
0.133	6.00	3.133	13.00	6.133	23.00	9.13	53.00
0.150	6.00	3.150	13.00	6.150	23.00	9.15	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.183	6.00	3.183	13.00	6.183	23.00	9.18	53.00
0.200	6.00	3.200	13.00	6.200	23.00	9.20	53.00
0.217	6.00	3.217	13.00	6.217	23.00	9.22	53.00
0.233	6.00	3.233	13.00	6.233	23.00	9.23	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.267	6.00	3.267	13.00	6.267	23.00	9.27	53.00
0.283	6.00	3.283	13.00	6.283	23.00	9.28	53.00
0.300	6.00	3.300	13.00	6.300	23.00	9.30	53.00
0.317	6.00	3.317	13.00	6.317	23.00	9.32	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.350	6.00	3.350	13.00	6.350	23.00	9.35	53.00
0.367	6.00	3.367	13.00	6.367	23.00	9.37	53.00
0.383	6.00	3.383	13.00	6.383	23.00	9.38	53.00
0.400	6.00	3.400	13.00	6.400	23.00	9.40	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.433	6.00	3.433	13.00	6.433	23.00	9.43	53.00
0.450	6.00	3.450	13.00	6.450	23.00	9.45	53.00
0.467	6.00	3.467	13.00	6.467	23.00	9.47	53.00
0.483	6.00	3.483	13.00	6.483	23.00	9.48	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.517	6.00	3.517	13.00	6.517	23.00	9.52	53.00
0.533	6.00	3.533	13.00	6.533	23.00	9.53	53.00
0.550	6.00	3.550	13.00	6.550	23.00	9.55	53.00
0.567	6.00	3.567	13.00	6.567	23.00	9.57	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.600	6.00	3.600	13.00	6.600	23.00	9.60	53.00
0.617	6.00	3.617	13.00	6.617	23.00	9.62	53.00
0.633	6.00	3.633	13.00	6.633	23.00	9.63	53.00
0.650	6.00	3.650	13.00	6.650	23.00	9.65	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.683	6.00	3.683	13.00	6.683	23.00	9.68	53.00
0.700	6.00	3.700	13.00	6.700	23.00	9.70	53.00
0.717	6.00	3.717	13.00	6.717	23.00	9.72	53.00
0.733	6.00	3.733	13.00	6.733	23.00	9.73	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.767	6.00	3.767	13.00	6.767	23.00	9.77	53.00
0.783	6.00	3.783	13.00	6.783	23.00	9.78	53.00
0.800	6.00	3.800	13.00	6.800	23.00	9.80	53.00
0.817	6.00	3.817	13.00	6.817	23.00	9.82	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.850	6.00	3.850	13.00	6.850	23.00	9.85	53.00
0.867	6.00	3.867	13.00	6.867	23.00	9.87	53.00
0.883	6.00	3.883	13.00	6.883	23.00	9.88	53.00
0.900	6.00	3.900	13.00	6.900	23.00	9.90	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
0.933	6.00	3.933	13.00	6.933	23.00	9.93	53.00
0.950	6.00	3.950	13.00	6.950	23.00	9.95	53.00
0.967	6.00	3.967	13.00	6.967	23.00	9.97	53.00
0.983	6.00	3.983	13.00	6.983	23.00	9.98	53.00
1.000	6.00	4.000	13.00	7.000	22.98	10.00	52.98
1.017	4.00	4.017	17.00	7.017	13.00	10.02	38.00
1.033	4.00	4.033	17.00	7.033	13.00	10.03	38.00
1.050	4.00	4.050	17.00	7.050	13.00	10.05	38.00
1.067	4.00	4.067	17.00	7.067	13.00	10.07	38.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.100	4.00	4.100	17.00	7.100	13.00	10.10	38.00
1.117	4.00	4.117	17.00	7.117	13.00	10.12	38.00
1.133	4.00	4.133	17.00	7.133	13.00	10.13	38.00
1.150	4.00	4.150	17.00	7.150	13.00	10.15	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.183	4.00	4.183	17.00	7.183	13.00	10.18	38.00
1.200	4.00	4.200	17.00	7.200	13.00	10.20	38.00
1.217	4.00	4.217	17.00	7.217	13.00	10.22	38.00
1.233	4.00	4.233	17.00	7.233	13.00	10.23	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.267	4.00	4.267	17.00	7.267	13.00	10.27	38.00
1.283	4.00	4.283	17.00	7.283	13.00	10.28	38.00
1.300	4.00	4.300	17.00	7.300	13.00	10.30	38.00
1.317	4.00	4.317	17.00	7.317	13.00	10.32	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.350	4.00	4.350	17.00	7.350	13.00	10.35	38.00
1.367	4.00	4.367	17.00	7.367	13.00	10.37	38.00
1.383	4.00	4.383	17.00	7.383	13.00	10.38	38.00
1.400	4.00	4.400	17.00	7.400	13.00	10.40	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.433	4.00	4.433	17.00	7.433	13.00	10.43	38.00
1.450	4.00	4.450	17.00	7.450	13.00	10.45	38.00
1.467	4.00	4.467	17.00	7.467	13.00	10.47	38.00
1.483	4.00	4.483	17.00	7.483	13.00	10.48	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.517	4.00	4.517	17.00	7.517	13.00	10.52	38.00
1.533	4.00	4.533	17.00	7.533	13.00	10.53	38.00
1.550	4.00	4.550	17.00	7.550	13.00	10.55	38.00
1.567	4.00	4.567	17.00	7.567	13.00	10.57	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.600	4.00	4.600	17.00	7.600	13.00	10.60	38.00
1.617	4.00	4.617	17.00	7.617	13.00	10.62	38.00
1.633	4.00	4.633	17.00	7.633	13.00	10.63	38.00
1.650	4.00	4.650	17.00	7.650	13.00	10.65	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.683	4.00	4.683	17.00	7.683	13.00	10.68	38.00
1.700	4.00	4.700	17.00	7.700	13.00	10.70	38.00
1.717	4.00	4.717	17.00	7.717	13.00	10.72	38.00
1.733	4.00	4.733	17.00	7.733	13.00	10.73	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.767	4.00	4.767	17.00	7.767	13.00	10.77	38.00
1.783	4.00	4.783	17.00	7.783	13.00	10.78	38.00
1.800	4.00	4.800	17.00	7.800	13.00	10.80	38.00
1.817	4.00	4.817	17.00	7.817	13.00	10.82	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00

1.850	4.00	4.850	17.00	7.850	13.00	10.85	38.00
1.867	4.00	4.867	17.00	7.867	13.00	10.87	38.00
1.883	4.00	4.883	17.00	7.883	13.00	10.88	38.00
1.900	4.00	4.900	17.00	7.900	13.00	10.90	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
1.933	4.00	4.933	17.00	7.933	13.00	10.93	38.00
1.950	4.00	4.950	17.00	7.950	13.00	10.95	38.00
1.967	4.00	4.967	17.00	7.967	13.00	10.97	38.00
1.983	4.00	4.983	17.00	7.983	13.00	10.98	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	37.99
2.017	6.00	5.017	13.00	8.017	13.00	11.02	13.00
2.033	6.00	5.033	13.00	8.033	13.00	11.03	13.00
2.050	6.00	5.050	13.00	8.050	13.00	11.05	13.00
2.067	6.00	5.067	13.00	8.067	13.00	11.07	13.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.100	6.00	5.100	13.00	8.100	13.00	11.10	13.00
2.117	6.00	5.117	13.00	8.117	13.00	11.12	13.00
2.133	6.00	5.133	13.00	8.133	13.00	11.13	13.00
2.150	6.00	5.150	13.00	8.150	13.00	11.15	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.183	6.00	5.183	13.00	8.183	13.00	11.18	13.00
2.200	6.00	5.200	13.00	8.200	13.00	11.20	13.00
2.217	6.00	5.217	13.00	8.217	13.00	11.22	13.00
2.233	6.00	5.233	13.00	8.233	13.00	11.23	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.267	6.00	5.267	13.00	8.267	13.00	11.27	13.00
2.283	6.00	5.283	13.00	8.283	13.00	11.28	13.00
2.300	6.00	5.300	13.00	8.300	13.00	11.30	13.00
2.317	6.00	5.317	13.00	8.317	13.00	11.32	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.350	6.00	5.350	13.00	8.350	13.00	11.35	13.00
2.367	6.00	5.367	13.00	8.367	13.00	11.37	13.00
2.383	6.00	5.383	13.00	8.383	13.00	11.38	13.00
2.400	6.00	5.400	13.00	8.400	13.00	11.40	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.433	6.00	5.433	13.00	8.433	13.00	11.43	13.00
2.450	6.00	5.450	13.00	8.450	13.00	11.45	13.00
2.467	6.00	5.467	13.00	8.467	13.00	11.47	13.00
2.483	6.00	5.483	13.00	8.483	13.00	11.48	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.517	6.00	5.517	13.00	8.517	13.00	11.52	13.00
2.533	6.00	5.533	13.00	8.533	13.00	11.53	13.00
2.550	6.00	5.550	13.00	8.550	13.00	11.55	13.00
2.567	6.00	5.567	13.00	8.567	13.00	11.57	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.600	6.00	5.600	13.00	8.600	13.00	11.60	13.00
2.617	6.00	5.617	13.00	8.617	13.00	11.62	13.00
2.633	6.00	5.633	13.00	8.633	13.00	11.63	13.00
2.650	6.00	5.650	13.00	8.650	13.00	11.65	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.683	6.00	5.683	13.00	8.683	13.00	11.68	13.00
2.700	6.00	5.700	13.00	8.700	13.00	11.70	13.00
2.717	6.00	5.717	13.00	8.717	13.00	11.72	13.00
2.733	6.00	5.733	13.00	8.733	13.00	11.73	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.767	6.00	5.767	13.00	8.767	13.00	11.77	13.00
2.783	6.00	5.783	13.00	8.783	13.00	11.78	13.00
2.800	6.00	5.800	13.00	8.800	13.00	11.80	13.00
2.817	6.00	5.817	13.00	8.817	13.00	11.82	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.850	6.00	5.850	13.00	8.850	13.00	11.85	13.00
2.867	6.00	5.867	13.00	8.867	13.00	11.87	13.00
2.883	6.00	5.883	13.00	8.883	13.00	11.88	13.00
2.900	6.00	5.900	13.00	8.900	13.00	11.90	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
2.933	6.00	5.933	13.00	8.933	13.00	11.93	13.00
2.950	6.00	5.950	13.00	8.950	13.00	11.95	13.00
2.967	6.00	5.967	13.00	8.967	13.00	11.97	13.00
2.983	6.00	5.983	13.00	8.983	13.00	11.98	13.00
3.000	6.00	6.000	13.01	9.000	13.08	12.00	13.00

Unit Hyd Qpeak (cms)= 0.305

PEAK FLOW (cms)= 0.989 (i)
TIME TO PEAK (hrs)= 11.367
RUNOFF VOLUME (mm)= 187.179
TOTAL RAINFALL (mm)= 212.001
RUNOFF COEFFICIENT = 0.883

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0009)	Area (ha)=	0.71	Curve Number (CN)=	93.0	
ID= 1 DT= 1.0 min	Ia (mm)=	7.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	1.25			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	6.00	3.017	13.00	6.017	23.00	9.02	53.00
0.033	6.00	3.033	13.00	6.033	23.00	9.03	53.00
0.050	6.00	3.050	13.00	6.050	23.00	9.05	53.00
0.067	6.00	3.067	13.00	6.067	23.00	9.07	53.00
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.100	6.00	3.100	13.00	6.100	23.00	9.10	53.00
0.117	6.00	3.117	13.00	6.117	23.00	9.12	53.00
0.133	6.00	3.133	13.00	6.133	23.00	9.13	53.00
0.150	6.00	3.150	13.00	6.150	23.00	9.15	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.183	6.00	3.183	13.00	6.183	23.00	9.18	53.00
0.200	6.00	3.200	13.00	6.200	23.00	9.20	53.00
0.217	6.00	3.217	13.00	6.217	23.00	9.22	53.00
0.233	6.00	3.233	13.00	6.233	23.00	9.23	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.267	6.00	3.267	13.00	6.267	23.00	9.27	53.00
0.283	6.00	3.283	13.00	6.283	23.00	9.28	53.00
0.300	6.00	3.300	13.00	6.300	23.00	9.30	53.00
0.317	6.00	3.317	13.00	6.317	23.00	9.32	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.350	6.00	3.350	13.00	6.350	23.00	9.35	53.00
0.367	6.00	3.367	13.00	6.367	23.00	9.37	53.00
0.383	6.00	3.383	13.00	6.383	23.00	9.38	53.00
0.400	6.00	3.400	13.00	6.400	23.00	9.40	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.433	6.00	3.433	13.00	6.433	23.00	9.43	53.00
0.450	6.00	3.450	13.00	6.450	23.00	9.45	53.00
0.467	6.00	3.467	13.00	6.467	23.00	9.47	53.00
0.483	6.00	3.483	13.00	6.483	23.00	9.48	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.517	6.00	3.517	13.00	6.517	23.00	9.52	53.00
0.533	6.00	3.533	13.00	6.533	23.00	9.53	53.00
0.550	6.00	3.550	13.00	6.550	23.00	9.55	53.00
0.567	6.00	3.567	13.00	6.567	23.00	9.57	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.600	6.00	3.600	13.00	6.600	23.00	9.60	53.00
0.617	6.00	3.617	13.00	6.617	23.00	9.62	53.00
0.633	6.00	3.633	13.00	6.633	23.00	9.63	53.00

0.650	6.00	3.650	13.00	6.650	23.00	9.65	53.00		1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00	
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00		1.767	4.00	4.767	17.00	7.767	13.00	10.77	38.00	
0.683	6.00	3.683	13.00	6.683	23.00	9.68	53.00		1.783	4.00	4.783	17.00	7.783	13.00	10.78	38.00	
0.700	6.00	3.700	13.00	6.700	23.00	9.70	53.00		1.800	4.00	4.800	17.00	7.800	13.00	10.80	38.00	
0.717	6.00	3.717	13.00	6.717	23.00	9.72	53.00		1.817	4.00	4.817	17.00	7.817	13.00	10.82	38.00	
0.733	6.00	3.733	13.00	6.733	23.00	9.73	53.00		1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00	
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00		1.850	4.00	4.850	17.00	7.850	13.00	10.85	38.00	
0.767	6.00	3.767	13.00	6.767	23.00	9.77	53.00		1.867	4.00	4.867	17.00	7.867	13.00	10.87	38.00	
0.783	6.00	3.783	13.00	6.783	23.00	9.78	53.00		1.883	4.00	4.883	17.00	7.883	13.00	10.88	38.00	
0.800	6.00	3.800	13.00	6.800	23.00	9.80	53.00		1.900	4.00	4.900	17.00	7.900	13.00	10.90	38.00	
0.817	6.00	3.817	13.00	6.817	23.00	9.82	53.00		1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00	
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00		1.933	4.00	4.933	17.00	7.933	13.00	10.93	38.00	
0.850	6.00	3.850	13.00	6.850	23.00	9.85	53.00		1.950	4.00	4.950	17.00	7.950	13.00	10.95	38.00	
0.867	6.00	3.867	13.00	6.867	23.00	9.87	53.00		1.967	4.00	4.967	17.00	7.967	13.00	10.97	38.00	
0.883	6.00	3.883	13.00	6.883	23.00	9.88	53.00		1.983	4.00	4.983	17.00	7.983	13.00	10.98	38.00	
0.900	6.00	3.900	13.00	6.900	23.00	9.90	53.00		2.000	4.00	5.000	17.00	8.000	13.00	11.00	37.99	
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00		2.017	6.00	5.017	13.00	8.017	13.00	11.02	13.00	
0.933	6.00	3.933	13.00	6.933	23.00	9.93	53.00		2.033	6.00	5.033	13.00	8.033	13.00	11.03	13.00	
0.950	6.00	3.950	13.00	6.950	23.00	9.95	53.00		2.050	6.00	5.050	13.00	8.050	13.00	11.05	13.00	
0.967	6.00	3.967	13.00	6.967	23.00	9.97	53.00		2.067	6.00	5.067	13.00	8.067	13.00	11.07	13.00	
0.983	6.00	3.983	13.00	6.983	23.00	9.98	53.00		2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00	
1.000	6.00	4.000	13.00	7.000	22.98	10.00	52.98		2.100	6.00	5.100	13.00	8.100	13.00	11.10	13.00	
1.017	4.00	4.017	17.00	7.017	13.00	10.02	38.00		2.117	6.00	5.117	13.00	8.117	13.00	11.12	13.00	
1.033	4.00	4.033	17.00	7.033	13.00	10.03	38.00		2.133	6.00	5.133	13.00	8.133	13.00	11.13	13.00	
1.050	4.00	4.050	17.00	7.050	13.00	10.05	38.00		2.150	6.00	5.150	13.00	8.150	13.00	11.15	13.00	
1.067	4.00	4.067	17.00	7.067	13.00	10.07	38.00		2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00	
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00		2.183	6.00	5.183	13.00	8.183	13.00	11.18	13.00	
1.100	4.00	4.100	17.00	7.100	13.00	10.10	38.00		2.200	6.00	5.200	13.00	8.200	13.00	11.20	13.00	
1.117	4.00	4.117	17.00	7.117	13.00	10.12	38.00		2.217	6.00	5.217	13.00	8.217	13.00	11.22	13.00	
1.133	4.00	4.133	17.00	7.133	13.00	10.13	38.00		2.233	6.00	5.233	13.00	8.233	13.00	11.23	13.00	
1.150	4.00	4.150	17.00	7.150	13.00	10.15	38.00		2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00	
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00		2.267	6.00	5.267	13.00	8.267	13.00	11.27	13.00	
1.183	4.00	4.183	17.00	7.183	13.00	10.18	38.00		2.283	6.00	5.283	13.00	8.283	13.00	11.28	13.00	
1.200	4.00	4.200	17.00	7.200	13.00	10.20	38.00		2.300	6.00	5.300	13.00	8.300	13.00	11.30	13.00	
1.217	4.00	4.217	17.00	7.217	13.00	10.22	38.00		2.317	6.00	5.317	13.00	8.317	13.00	11.32	13.00	
1.233	4.00	4.233	17.00	7.233	13.00	10.23	38.00		2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00	
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00		2.350	6.00	5.350	13.00	8.350	13.00	11.35	13.00	
1.267	4.00	4.267	17.00	7.267	13.00	10.27	38.00		2.367	6.00	5.367	13.00	8.367	13.00	11.37	13.00	
1.283	4.00	4.283	17.00	7.283	13.00	10.28	38.00		2.383	6.00	5.383	13.00	8.383	13.00	11.38	13.00	
1.300	4.00	4.300	17.00	7.300	13.00	10.30	38.00		2.400	6.00	5.400	13.00	8.400	13.00	11.40	13.00	
1.317	4.00	4.317	17.00	7.317	13.00	10.32	38.00		2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00	
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00		2.433	6.00	5.433	13.00	8.433	13.00	11.43	13.00	
1.350	4.00	4.350	17.00	7.350	13.00	10.35	38.00		2.450	6.00	5.450	13.00	8.450	13.00	11.45	13.00	
1.367	4.00	4.367	17.00	7.367	13.00	10.37	38.00		2.467	6.00	5.467	13.00	8.467	13.00	11.47	13.00	
1.383	4.00	4.383	17.00	7.383	13.00	10.38	38.00		2.483	6.00	5.483	13.00	8.483	13.00	11.48	13.00	
1.400	4.00	4.400	17.00	7.400	13.00	10.40	38.00		2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00	
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00		2.517	6.00	5.517	13.00	8.517	13.00	11.52	13.00	
1.433	4.00	4.433	17.00	7.433	13.00	10.43	38.00		2.533	6.00	5.533	13.00	8.533	13.00	11.53	13.00	
1.450	4.00	4.450	17.00	7.450	13.00	10.45	38.00		2.550	6.00	5.550	13.00	8.550	13.00	11.55	13.00	
1.467	4.00	4.467	17.00	7.467	13.00	10.47	38.00		2.567	6.00	5.567	13.00	8.567	13.00	11.57	13.00	
1.483	4.00	4.483	17.00	7.483	13.00	10.48	38.00		2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00	
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00		2.600	6.00	5.600	13.00	8.600	13.00	11.60	13.00	
1.517	4.00	4.517	17.00	7.517	13.00	10.52	38.00		2.617	6.00	5.617	13.00	8.617	13.00	11.62	13.00	
1.533	4.00	4.533	17.00	7.533	13.00	10.53	38.00		2.633	6.00	5.633	13.00	8.633	13.00	11.63	13.00	
1.550	4.00	4.550	17.00	7.550	13.00	10.55	38.00		2.650	6.00	5.650	13.00	8.650	13.00	11.65	13.00	
1.567	4.00	4.567	17.00	7.567	13.00	10.57	38.00		2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00	
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00		2.683	6.00	5.683	13.00	8.683	13.00	11.68	13.00	
1.600	4.00	4.600	17.00	7.600	13.00	10.60	38.00		2.700	6.00	5.700	13.00	8.700	13.00	11.70	13.00	
1.617	4.00	4.617	17.00	7.617	13.00	10.62	38.00		2.717	6.00	5.717	13.00	8.717	13.00	11.72	13.00	
1.633	4.00	4.633	17.00	7.633	13.00	10.63	38.00		2.733	6.00	5.733	13.00	8.733	13.00	11.73	13.00	
1.650	4.00	4.650	17.00	7.650	13.00	10.65	38.00		2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00	
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00		2.767	6.00	5.767	13.00	8.767	13.00	11.77	13.00	
1.683	4.00	4.683	17.00	7.683	13.00	10.68	38.00		2.783	6.00	5.783	13.00	8.783	13.00	11.78	13.00	
1.700	4.00	4.700	17.00	7.700	13.00	10.70	38.00		2.800	6.00	5.800	13.00	8.800	13.00	11.80	13.00	
1.717	4.00	4.717	17.00	7.717	13.00	10.72	38.00		2.817	6.00	5.817	13.00	8.817	13.00	11.82	13.00	
1.733	4.00	4.733	17.00	7.733	13.00	10.73	38.00		2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00	

2.850	6.00	5.850	13.00	8.850	13.00	11.85	13.00
2.867	6.00	5.867	13.00	8.867	13.00	11.87	13.00
2.883	6.00	5.883	13.00	8.883	13.00	11.88	13.00
2.900	6.00	5.900	13.00	8.900	13.00	11.90	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
2.933	6.00	5.933	13.00	8.933	13.00	11.93	13.00
2.950	6.00	5.950	13.00	8.950	13.00	11.95	13.00
2.967	6.00	5.967	13.00	8.967	13.00	11.97	13.00
2.983	6.00	5.983	13.00	8.983	13.00	11.98	13.00
3.000	6.00	6.000	13.01	9.000	13.08	12.00	13.00

Unit Hyd Qpeak (cms)= 0.022

PEAK FLOW (cms)= 0.070 (i)
TIME TO PEAK (hrs)= 11.367
RUNOFF VOLUME (mm)= 187.178
TOTAL RAINFALL (mm)= 212.001
RUNOFF COEFFICIENT = 0.883

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0013)	Area (ha)=	9.67	Curve Number (CN)=	93.0	
ID= 1 DT= 1.0 min	Ia (mm)=	7.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.65			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	6.00	3.017	13.00	6.017	23.00	9.02	53.00
0.033	6.00	3.033	13.00	6.033	23.00	9.03	53.00
0.050	6.00	3.050	13.00	6.050	23.00	9.05	53.00
0.067	6.00	3.067	13.00	6.067	23.00	9.07	53.00
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.100	6.00	3.100	13.00	6.100	23.00	9.10	53.00
0.117	6.00	3.117	13.00	6.117	23.00	9.12	53.00
0.133	6.00	3.133	13.00	6.133	23.00	9.13	53.00
0.150	6.00	3.150	13.00	6.150	23.00	9.15	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.183	6.00	3.183	13.00	6.183	23.00	9.18	53.00
0.200	6.00	3.200	13.00	6.200	23.00	9.20	53.00
0.217	6.00	3.217	13.00	6.217	23.00	9.22	53.00
0.233	6.00	3.233	13.00	6.233	23.00	9.23	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.267	6.00	3.267	13.00	6.267	23.00	9.27	53.00
0.283	6.00	3.283	13.00	6.283	23.00	9.28	53.00
0.300	6.00	3.300	13.00	6.300	23.00	9.30	53.00
0.317	6.00	3.317	13.00	6.317	23.00	9.32	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.350	6.00	3.350	13.00	6.350	23.00	9.35	53.00
0.367	6.00	3.367	13.00	6.367	23.00	9.37	53.00
0.383	6.00	3.383	13.00	6.383	23.00	9.38	53.00
0.400	6.00	3.400	13.00	6.400	23.00	9.40	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.433	6.00	3.433	13.00	6.433	23.00	9.43	53.00
0.450	6.00	3.450	13.00	6.450	23.00	9.45	53.00
0.467	6.00	3.467	13.00	6.467	23.00	9.47	53.00
0.483	6.00	3.483	13.00	6.483	23.00	9.48	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.517	6.00	3.517	13.00	6.517	23.00	9.52	53.00
0.533	6.00	3.533	13.00	6.533	23.00	9.53	53.00
0.550	6.00	3.550	13.00	6.550	23.00	9.55	53.00
0.567	6.00	3.567	13.00	6.567	23.00	9.57	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.600	6.00	3.600	13.00	6.600	23.00	9.60	53.00
0.617	6.00	3.617	13.00	6.617	23.00	9.62	53.00
0.633	6.00	3.633	13.00	6.633	23.00	9.63	53.00
0.650	6.00	3.650	13.00	6.650	23.00	9.65	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.683	6.00	3.683	13.00	6.683	23.00	9.68	53.00
0.700	6.00	3.700	13.00	6.700	23.00	9.70	53.00
0.717	6.00	3.717	13.00	6.717	23.00	9.72	53.00
0.733	6.00	3.733	13.00	6.733	23.00	9.73	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.767	6.00	3.767	13.00	6.767	23.00	9.77	53.00
0.783	6.00	3.783	13.00	6.783	23.00	9.78	53.00
0.800	6.00	3.800	13.00	6.800	23.00	9.80	53.00
0.817	6.00	3.817	13.00	6.817	23.00	9.82	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.850	6.00	3.850	13.00	6.850	23.00	9.85	53.00
0.867	6.00	3.867	13.00	6.867	23.00	9.87	53.00
0.883	6.00	3.883	13.00	6.883	23.00	9.88	53.00
0.900	6.00	3.900	13.00	6.900	23.00	9.90	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
0.933	6.00	3.933	13.00	6.933	23.00	9.93	53.00
0.950	6.00	3.950	13.00	6.950	23.00	9.95	53.00
0.967	6.00	3.967	13.00	6.967	23.00	9.97	53.00
0.983	6.00	3.983	13.00	6.983	23.00	9.98	53.00
1.000	6.00	4.000	13.00	7.000	22.98	10.00	52.98
1.017	4.00	4.017	17.00	7.017	13.00	10.02	38.00
1.033	4.00	4.033	17.00	7.033	13.00	10.03	38.00
1.050	4.00	4.050	17.00	7.050	13.00	10.05	38.00
1.067	4.00	4.067	17.00	7.067	13.00	10.07	38.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.100	4.00	4.100	17.00	7.100	13.00	10.10	38.00
1.117	4.00	4.117	17.00	7.117	13.00	10.12	38.00
1.133	4.00	4.133	17.00	7.133	13.00	10.13	38.00
1.150	4.00	4.150	17.00	7.150	13.00	10.15	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.183	4.00	4.183	17.00	7.183	13.00	10.18	38.00
1.200	4.00	4.200	17.00	7.200	13.00	10.20	38.00
1.217	4.00	4.217	17.00	7.217	13.00	10.22	38.00
1.233	4.00	4.233	17.00	7.233	13.00	10.23	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.267	4.00	4.267	17.00	7.267	13.00	10.27	38.00
1.283	4.00	4.283	17.00	7.283	13.00	10.28	38.00
1.300	4.00	4.300	17.00	7.300	13.00	10.30	38.00
1.317	4.00	4.317	17.00	7.317	13.00	10.32	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.350	4.00	4.350	17.00	7.350	13.00	10.35	38.00
1.367	4.00	4.367	17.00	7.367	13.00	10.37	38.00
1.383	4.00	4.383	17.00	7.383	13.00	10.38	38.00
1.400	4.00	4.400	17.00	7.400	13.00	10.40	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.433	4.00	4.433	17.00	7.433	13.00	10.43	38.00
1.450	4.00	4.450	17.00	7.450	13.00	10.45	38.00
1.467	4.00	4.467	17.00	7.467	13.00	10.47	38.00
1.483	4.00	4.483	17.00	7.483	13.00	10.48	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.517	4.00	4.517	17.00	7.517	13.00	10.52	38.00
1.533	4.00	4.533	17.00	7.533	13.00	10.53	38.00
1.550	4.00	4.550	17.00	7.550	13.00	10.55	38.00
1.567	4.00	4.567	17.00	7.567	13.00	10.57	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.600	4.00	4.600	17.00	7.600	13.00	10.60	38.00
1.617	4.00	4.617	17.00	7.617	13.00	10.62	38.00
1.633	4.00	4.633	17.00	7.633	13.00	10.63	38.00

1.650	4.00	4.650	17.00	7.650	13.00	10.65	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.683	4.00	4.683	17.00	7.683	13.00	10.68	38.00
1.700	4.00	4.700	17.00	7.700	13.00	10.70	38.00
1.717	4.00	4.717	17.00	7.717	13.00	10.72	38.00
1.733	4.00	4.733	17.00	7.733	13.00	10.73	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.767	4.00	4.767	17.00	7.767	13.00	10.77	38.00
1.783	4.00	4.783	17.00	7.783	13.00	10.78	38.00
1.800	4.00	4.800	17.00	7.800	13.00	10.80	38.00
1.817	4.00	4.817	17.00	7.817	13.00	10.82	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.850	4.00	4.850	17.00	7.850	13.00	10.85	38.00
1.867	4.00	4.867	17.00	7.867	13.00	10.87	38.00
1.883	4.00	4.883	17.00	7.883	13.00	10.88	38.00
1.900	4.00	4.900	17.00	7.900	13.00	10.90	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
1.933	4.00	4.933	17.00	7.933	13.00	10.93	38.00
1.950	4.00	4.950	17.00	7.950	13.00	10.95	38.00
1.967	4.00	4.967	17.00	7.967	13.00	10.97	38.00
1.983	4.00	4.983	17.00	7.983	13.00	10.98	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	37.99
2.017	6.00	5.017	13.00	8.017	13.00	11.02	13.00
2.033	6.00	5.033	13.00	8.033	13.00	11.03	13.00
2.050	6.00	5.050	13.00	8.050	13.00	11.05	13.00
2.067	6.00	5.067	13.00	8.067	13.00	11.07	13.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.100	6.00	5.100	13.00	8.100	13.00	11.10	13.00
2.117	6.00	5.117	13.00	8.117	13.00	11.12	13.00
2.133	6.00	5.133	13.00	8.133	13.00	11.13	13.00
2.150	6.00	5.150	13.00	8.150	13.00	11.15	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.183	6.00	5.183	13.00	8.183	13.00	11.18	13.00
2.200	6.00	5.200	13.00	8.200	13.00	11.20	13.00
2.217	6.00	5.217	13.00	8.217	13.00	11.22	13.00
2.233	6.00	5.233	13.00	8.233	13.00	11.23	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.267	6.00	5.267	13.00	8.267	13.00	11.27	13.00
2.283	6.00	5.283	13.00	8.283	13.00	11.28	13.00
2.300	6.00	5.300	13.00	8.300	13.00	11.30	13.00
2.317	6.00	5.317	13.00	8.317	13.00	11.32	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.350	6.00	5.350	13.00	8.350	13.00	11.35	13.00
2.367	6.00	5.367	13.00	8.367	13.00	11.37	13.00
2.383	6.00	5.383	13.00	8.383	13.00	11.38	13.00
2.400	6.00	5.400	13.00	8.400	13.00	11.40	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.433	6.00	5.433	13.00	8.433	13.00	11.43	13.00
2.450	6.00	5.450	13.00	8.450	13.00	11.45	13.00
2.467	6.00	5.467	13.00	8.467	13.00	11.47	13.00
2.483	6.00	5.483	13.00	8.483	13.00	11.48	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.517	6.00	5.517	13.00	8.517	13.00	11.52	13.00
2.533	6.00	5.533	13.00	8.533	13.00	11.53	13.00
2.550	6.00	5.550	13.00	8.550	13.00	11.55	13.00
2.567	6.00	5.567	13.00	8.567	13.00	11.57	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.600	6.00	5.600	13.00	8.600	13.00	11.60	13.00
2.617	6.00	5.617	13.00	8.617	13.00	11.62	13.00
2.633	6.00	5.633	13.00	8.633	13.00	11.63	13.00
2.650	6.00	5.650	13.00	8.650	13.00	11.65	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.683	6.00	5.683	13.00	8.683	13.00	11.68	13.00
2.700	6.00	5.700	13.00	8.700	13.00	11.70	13.00
2.717	6.00	5.717	13.00	8.717	13.00	11.72	13.00
2.733	6.00	5.733	13.00	8.733	13.00	11.73	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.767	6.00	5.767	13.00	8.767	13.00	11.77	13.00
2.783	6.00	5.783	13.00	8.783	13.00	11.78	13.00
2.800	6.00	5.800	13.00	8.800	13.00	11.80	13.00
2.817	6.00	5.817	13.00	8.817	13.00	11.82	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.850	6.00	5.850	13.00	8.850	13.00	11.85	13.00
2.867	6.00	5.867	13.00	8.867	13.00	11.87	13.00
2.883	6.00	5.883	13.00	8.883	13.00	11.88	13.00
2.900	6.00	5.900	13.00	8.900	13.00	11.90	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
2.933	6.00	5.933	13.00	8.933	13.00	11.93	13.00
2.950	6.00	5.950	13.00	8.950	13.00	11.95	13.00
2.967	6.00	5.967	13.00	8.967	13.00	11.97	13.00
2.983	6.00	5.983	13.00	8.983	13.00	11.98	13.00
3.000	6.00	6.000	13.01	9.000	13.08	12.00	13.00

```
     Unit Hyd Qpeak  (cms)=   0.568

     PEAK FLOW       (cms)=   1.152 (i)
     TIME TO PEAK    (hrs)=  10.533
     RUNOFF VOLUME    (mm)= 187.513
     TOTAL RAINFALL   (mm)= 212.001
     RUNOFF COEFFICIENT   =   0.884

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 FINISH
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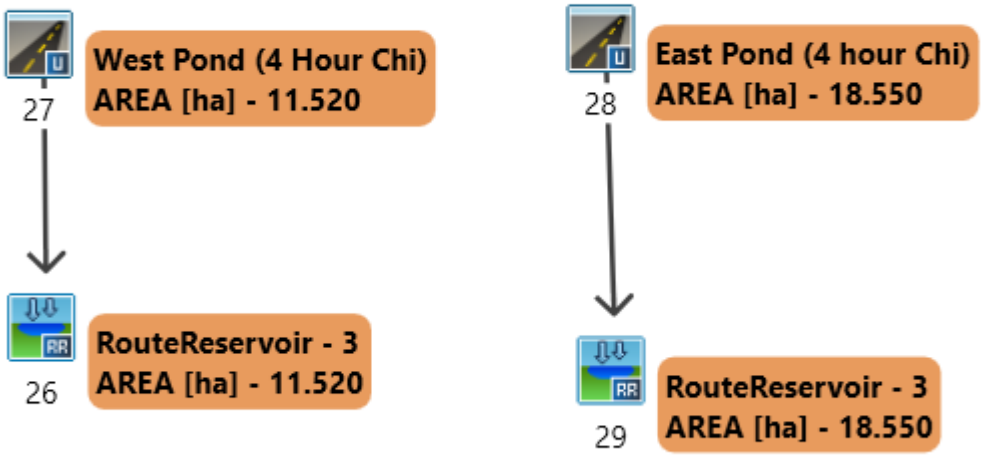

SCHAEFFERS
CONSULTING ENGINEERS

4 Hour Chicago
Mount Hope Residential Subdivision

Job #: 2024-5476 | Date: February 2026

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================================================================================
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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 02-19-2026                          TIME: 09:36:15

USER:



COMMENTS: _____________________________________________________________


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  ***********************************************
  ** SIMULATION : 1 - 2yr 4hr 10min Chicago     **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1070.000
| Ptotal= 34.22 mm |                          B=   7.850
--------------------                          C=   0.876
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    1.53 |  1.00   19.60 |  2.00    4.48 |  3.00    1.89
                0.17    1.81 |  1.17   85.72 |  2.17    3.65 |  3.17    1.73
                0.33    2.22 |  1.33   26.59 |  2.33    3.08 |  3.33    1.59
                0.50    2.87 |  1.50   12.64 |  2.50    2.66 |  3.50    1.47
                0.67    4.06 |  1.67    7.99 |  2.67    2.34 |  3.67    1.37
                0.83    6.86 |  1.83    5.76 |  2.83    2.10 |  3.83    1.29


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--------------------
| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=  11.52
|ID= 1 DT= 1.0 min |   Total Imp(%)=  81.00   Dir. Conn.(%)=  67.00
--------------------

                                    IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=           9.33          2.19
     Dep. Storage     (mm)=           1.00          1.50
     Average Slope     (%)=           1.00          2.00
     Length            (m)=         277.13         40.00
     Mannings n             =         0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.

                                ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.017    1.53 | 1.017   19.60 | 2.017    4.48 |  3.02    1.89
     0.033    1.53 | 1.033   19.60 | 2.033    4.48 |  3.03    1.89
     0.050    1.53 | 1.050   19.60 | 2.050    4.48 |  3.05    1.89
     0.067    1.53 | 1.067   19.60 | 2.067    4.48 |  3.07    1.89
     0.083    1.53 | 1.083   19.60 | 2.083    4.48 |  3.08    1.89
     0.100    1.53 | 1.100   19.60 | 2.100    4.48 |  3.10    1.89
     0.117    1.53 | 1.117   19.60 | 2.117    4.48 |  3.12    1.89
     0.133    1.53 | 1.133   19.60 | 2.133    4.48 |  3.13    1.89
     0.150    1.53 | 1.150   19.60 | 2.150    4.48 |  3.15    1.89
     0.167    1.53 | 1.167   19.60 | 2.167    4.48 |  3.17    1.89
     0.183    1.81 | 1.183   85.72 | 2.183    3.65 |  3.18    1.73
     0.200    1.81 | 1.200   85.72 | 2.200    3.65 |  3.20    1.73
     0.217    1.81 | 1.217   85.72 | 2.217    3.65 |  3.22    1.73
     0.233    1.81 | 1.233   85.72 | 2.233    3.65 |  3.23    1.73
     0.250    1.81 | 1.250   85.72 | 2.250    3.65 |  3.25    1.73
     0.267    1.81 | 1.267   85.72 | 2.267    3.65 |  3.27    1.73
     0.283    1.81 | 1.283   85.72 | 2.283    3.65 |  3.28    1.73
     0.300    1.81 | 1.300   85.72 | 2.300    3.65 |  3.30    1.73
     0.317    1.81 | 1.317   85.72 | 2.317    3.65 |  3.32    1.73
     0.333    1.81 | 1.333   85.72 | 2.333    3.65 |  3.33    1.73
     0.350    2.22 | 1.350   26.59 | 2.350    3.08 |  3.35    1.59
     0.367    2.22 | 1.367   26.59 | 2.367    3.08 |  3.37    1.59
     0.383    2.22 | 1.383   26.59 | 2.383    3.08 |  3.38    1.59
     0.400    2.22 | 1.400   26.59 | 2.400    3.08 |  3.40    1.59
     0.417    2.22 | 1.417   26.59 | 2.417    3.08 |  3.42    1.59
     0.433    2.22 | 1.433   26.59 | 2.433    3.08 |  3.43    1.59
     0.450    2.22 | 1.450   26.59 | 2.450    3.08 |  3.45    1.59
     0.467    2.22 | 1.467   26.59 | 2.467    3.08 |  3.47    1.59
     0.483    2.22 | 1.483   26.59 | 2.483    3.08 |  3.48    1.59
     0.500    2.22 | 1.500   26.59 | 2.500    3.08 |  3.50    1.59
     0.517    2.87 | 1.517   12.64 | 2.517    2.66 |  3.52    1.47
     0.533    2.87 | 1.533   12.64 | 2.533    2.66 |  3.53    1.47
     0.550    2.87 | 1.550   12.64 | 2.550    2.66 |  3.55    1.47
     0.567    2.87 | 1.567   12.64 | 2.567    2.66 |  3.57    1.47
     0.583    2.87 | 1.583   12.64 | 2.583    2.66 |  3.58    1.47
     0.600    2.87 | 1.600   12.64 | 2.600    2.66 |  3.60    1.47
     0.617    2.87 | 1.617   12.64 | 2.617    2.66 |  3.62    1.47
     0.633    2.87 | 1.633   12.64 | 2.633    2.66 |  3.63    1.47
     0.650    2.87 | 1.650   12.64 | 2.650    2.66 |  3.65    1.47
     0.667    2.87 | 1.667   12.64 | 2.667    2.66 |  3.67    1.47
     0.683    4.06 | 1.683    7.99 | 2.683    2.34 |  3.68    1.37
     0.700    4.06 | 1.700    7.99 | 2.700    2.34 |  3.70    1.37
     0.717    4.06 | 1.717    7.99 | 2.717    2.34 |  3.72    1.37
     0.733    4.06 | 1.733    7.99 | 2.733    2.34 |  3.73    1.37
     0.750    4.06 | 1.750    7.99 | 2.750    2.34 |  3.75    1.37
     0.767    4.06 | 1.767    7.99 | 2.767    2.34 |  3.77    1.37
     0.783    4.06 | 1.783    7.99 | 2.783    2.34 |  3.78    1.37
     0.800    4.06 | 1.800    7.99 | 2.800    2.34 |  3.80    1.37
     0.817    4.06 | 1.817    7.99 | 2.817    2.34 |  3.82    1.37
     0.833    4.06 | 1.833    7.99 | 2.833    2.34 |  3.83    1.37
```

0.850	6.86	1.850	5.76	2.850	2.10	3.85	1.29
0.867	6.86	1.867	5.76	2.867	2.10	3.87	1.29
0.883	6.86	1.883	5.76	2.883	2.10	3.88	1.29
0.900	6.86	1.900	5.76	2.900	2.10	3.90	1.29
0.917	6.86	1.917	5.76	2.917	2.10	3.92	1.29
0.933	6.86	1.933	5.76	2.933	2.10	3.93	1.29
0.950	6.86	1.950	5.76	2.950	2.10	3.95	1.29
0.967	6.86	1.967	5.76	2.967	2.10	3.97	1.29
0.983	6.86	1.983	5.76	2.983	2.10	3.98	1.29
1.000	6.86	2.000	5.76	3.000	2.10	4.00	1.29

Max.Eff.Inten.(mm/hr)=	85.72	79.89		
over (min)	5.00	10.00		
Storage Coeff. (min)=	5.01 (ii)	9.54 (ii)		
Unit Hyd. Tpeak (min)=	5.00	10.00		
Unit Hyd. peak (cms)=	0.23	0.12		
			TOTALS	
PEAK FLOW (cms)=	1.54	0.31	1.762 (iii)	
TIME TO PEAK (hrs)=	1.35	1.45	1.37	
RUNOFF VOLUME (mm)=	33.22	18.80	28.46	
TOTAL RAINFALL (mm)=	34.22	34.22	34.22	
RUNOFF COEFFICIENT =	0.97	0.55	0.83	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0026)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5440
	0.0190	0.2190	0.0790	0.6710
	0.0250	0.3040	0.0950	0.7570
	0.0440	0.4560	0.1130	0.8520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0027)	11.520	1.762	1.37	28.46
OUTFLOW: ID= 1 (0026)	11.520	0.025	4.10	17.73

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.42
TIME SHIFT OF PEAK FLOW (min)=164.00
MAXIMUM STORAGE USED (ha.m.)= 0.3040

CALIB	Area (ha)= 18.55		
STANDHYD (0028)	Total Imp(%)= 72.00	Dir. Conn.(%)= 54.00	
ID= 1 DT= 1.0 min			
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	13.36	5.19	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	351.66	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.53	1.017	19.60	2.017	4.48	3.02	1.89
0.033	1.53	1.033	19.60	2.033	4.48	3.03	1.89
0.050	1.53	1.050	19.60	2.050	4.48	3.05	1.89
0.067	1.53	1.067	19.60	2.067	4.48	3.07	1.89
0.083	1.53	1.083	19.60	2.083	4.48	3.08	1.89
0.100	1.53	1.100	19.60	2.100	4.48	3.10	1.89
0.117	1.53	1.117	19.60	2.117	4.48	3.12	1.89
0.133	1.53	1.133	19.60	2.133	4.48	3.13	1.89
0.150	1.53	1.150	19.60	2.150	4.48	3.15	1.89
0.167	1.53	1.167	19.60	2.167	4.48	3.17	1.89
0.183	1.81	1.183	85.72	2.183	3.65	3.18	1.73
0.200	1.81	1.200	85.72	2.200	3.65	3.20	1.73
0.217	1.81	1.217	85.72	2.217	3.65	3.22	1.73
0.233	1.81	1.233	85.72	2.233	3.65	3.23	1.73
0.250	1.81	1.250	85.72	2.250	3.65	3.25	1.73
0.267	1.81	1.267	85.72	2.267	3.65	3.27	1.73
0.283	1.81	1.283	85.72	2.283	3.65	3.28	1.73
0.300	1.81	1.300	85.72	2.300	3.65	3.30	1.73
0.317	1.81	1.317	85.72	2.317	3.65	3.32	1.73
0.333	1.81	1.333	85.72	2.333	3.65	3.33	1.73
0.350	2.22	1.350	26.59	2.350	3.08	3.35	1.59
0.367	2.22	1.367	26.59	2.367	3.08	3.37	1.59
0.383	2.22	1.383	26.59	2.383	3.08	3.38	1.59
0.400	2.22	1.400	26.59	2.400	3.08	3.40	1.59
0.417	2.22	1.417	26.59	2.417	3.08	3.42	1.59
0.433	2.22	1.433	26.59	2.433	3.08	3.43	1.59
0.450	2.22	1.450	26.59	2.450	3.08	3.45	1.59
0.467	2.22	1.467	26.59	2.467	3.08	3.47	1.59
0.483	2.22	1.483	26.59	2.483	3.08	3.48	1.59
0.500	2.22	1.500	26.59	2.500	3.08	3.50	1.59
0.517	2.87	1.517	12.64	2.517	2.66	3.52	1.47
0.533	2.87	1.533	12.64	2.533	2.66	3.53	1.47
0.550	2.87	1.550	12.64	2.550	2.66	3.55	1.47
0.567	2.87	1.567	12.64	2.567	2.66	3.57	1.47
0.583	2.87	1.583	12.64	2.583	2.66	3.58	1.47
0.600	2.87	1.600	12.64	2.600	2.66	3.60	1.47
0.617	2.87	1.617	12.64	2.617	2.66	3.62	1.47
0.633	2.87	1.633	12.64	2.633	2.66	3.63	1.47
0.650	2.87	1.650	12.64	2.650	2.66	3.65	1.47
0.667	2.87	1.667	12.64	2.667	2.66	3.67	1.47
0.683	4.06	1.683	7.99	2.683	2.34	3.68	1.37
0.700	4.06	1.700	7.99	2.700	2.34	3.70	1.37
0.717	4.06	1.717	7.99	2.717	2.34	3.72	1.37
0.733	4.06	1.733	7.99	2.733	2.34	3.73	1.37
0.750	4.06	1.750	7.99	2.750	2.34	3.75	1.37
0.767	4.06	1.767	7.99	2.767	2.34	3.77	1.37
0.783	4.06	1.783	7.99	2.783	2.34	3.78	1.37
0.800	4.06	1.800	7.99	2.800	2.34	3.80	1.37
0.817	4.06	1.817	7.99	2.817	2.34	3.82	1.37
0.833	4.06	1.833	7.99	2.833	2.34	3.83	1.37
0.850	6.86	1.850	5.76	2.850	2.10	3.85	1.29
0.867	6.86	1.867	5.76	2.867	2.10	3.87	1.29
0.883	6.86	1.883	5.76	2.883	2.10	3.88	1.29
0.900	6.86	1.900	5.76	2.900	2.10	3.90	1.29
0.917	6.86	1.917	5.76	2.917	2.10	3.92	1.29
0.933	6.86	1.933	5.76	2.933	2.10	3.93	1.29
0.950	6.86	1.950	5.76	2.950	2.10	3.95	1.29
0.967	6.86	1.967	5.76	2.967	2.10	3.97	1.29
0.983	6.86	1.983	5.76	2.983	2.10	3.98	1.29
1.000	6.86	2.000	5.76	3.000	2.10	4.00	1.29

Max.Eff.Inten.(mm/hr)=	85.72	73.16
over (min)	6.00	12.00

Storage Coeff. (min)=	5.78 (ii)	11.55 (ii)		
Unit Hyd. Tpeak (min)=	6.00	12.00		
Unit Hyd. peak (cms)=	0.19	0.10		
			TOTALS	
PEAK FLOW (cms)=	1.89	0.60	2.302 (iii)	
TIME TO PEAK (hrs)=	1.37	1.50	1.38	
RUNOFF VOLUME (mm)=	33.22	18.31	26.36	
TOTAL RAINFALL (mm)=	34.22	34.22	34.22	
RUNOFF COEFFICIENT =	0.97	0.53	0.77	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0029)|	OVERFLOW IS OFF			
IN= 2---> OUT= 1 |				
DT= 1.0 min |	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8140
	0.0280	0.3250	0.1440	1.0160
	0.0460	0.4470	0.1740	1.1510
	0.0810	0.6790	0.2060	1.3010

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0028)	18.550	2.302	1.38	26.36
OUTFLOW: ID= 1 (0029)	18.550	0.046	4.10	16.85

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.00
TIME SHIFT OF PEAK FLOW (min)=163.00
MAXIMUM STORAGE USED (ha.m.)= 0.4471

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

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Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\b6a9aff5-a4a6-4581-b3eb-3ab0950089dd\scenari
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DATE: 02-19-2026 TIME: 09:36:15

USER:

COMMENTS: _____

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  ***********************************************
  ** SIMULATION : 2 - 5yr 4hr 10min Chicago     **
  ***********************************************
```

CHICAGO STORM |	IDF curve parameters: A=1593.000
Ptotal= 49.55 mm |	B= 11.000
	C= 0.879

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.35	1.00	30.47	2.00	7.17	3.00	2.93
0.17	2.80	1.17	109.68	2.17	5.81	3.17	2.67
0.33	3.46	1.33	40.71	2.33	4.87	3.33	2.45
0.50	4.52	1.50	20.28	2.50	4.19	3.50	2.26
0.67	6.48	1.67	12.91	2.67	3.67	3.67	2.10
0.83	11.07	1.83	9.28	2.83	3.26	3.83	1.96

CALIB |		
STANDHYD (0027)|	Area (ha)= 11.52	
ID= 1 DT= 1.0 min |	Total Imp(%)= 81.00	Dir. Conn.(%)= 67.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.33	2.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.35	1.017	30.47	2.017	7.17	3.02	2.93
0.033	2.35	1.033	30.47	2.033	7.17	3.03	2.93
0.050	2.35	1.050	30.47	2.050	7.17	3.05	2.93
0.067	2.35	1.067	30.47	2.067	7.17	3.07	2.93
0.083	2.35	1.083	30.47	2.083	7.17	3.08	2.93
0.100	2.35	1.100	30.47	2.100	7.17	3.10	2.93
0.117	2.35	1.117	30.47	2.117	7.17	3.12	2.93
0.133	2.35	1.133	30.47	2.133	7.17	3.13	2.93
0.150	2.35	1.150	30.47	2.150	7.17	3.15	2.93
0.167	2.35	1.167	30.47	2.167	7.17	3.17	2.93
0.183	2.80	1.183	109.68	2.183	5.81	3.18	2.67
0.200	2.80	1.200	109.68	2.200	5.81	3.20	2.67

0.217	2.80	1.217	109.68	2.217	5.81	3.22	2.67
0.233	2.80	1.233	109.68	2.233	5.81	3.23	2.67
0.250	2.80	1.250	109.68	2.250	5.81	3.25	2.67
0.267	2.80	1.267	109.68	2.267	5.81	3.27	2.67
0.283	2.80	1.283	109.68	2.283	5.81	3.28	2.67
0.300	2.80	1.300	109.68	2.300	5.81	3.30	2.67
0.317	2.80	1.317	109.68	2.317	5.81	3.32	2.67
0.333	2.80	1.333	109.68	2.333	5.81	3.33	2.67
0.350	3.46	1.350	40.71	2.350	4.87	3.35	2.45
0.367	3.46	1.367	40.71	2.367	4.87	3.37	2.45
0.383	3.46	1.383	40.71	2.383	4.87	3.38	2.45
0.400	3.46	1.400	40.71	2.400	4.87	3.40	2.45
0.417	3.46	1.417	40.71	2.417	4.87	3.42	2.45
0.433	3.46	1.433	40.71	2.433	4.87	3.43	2.45
0.450	3.46	1.450	40.71	2.450	4.87	3.45	2.45
0.467	3.46	1.467	40.71	2.467	4.87	3.47	2.45
0.483	3.46	1.483	40.71	2.483	4.87	3.48	2.45
0.500	3.46	1.500	40.71	2.500	4.87	3.50	2.45
0.517	4.52	1.517	20.28	2.517	4.19	3.52	2.26
0.533	4.52	1.533	20.28	2.533	4.19	3.53	2.26
0.550	4.52	1.550	20.28	2.550	4.19	3.55	2.26
0.567	4.52	1.567	20.28	2.567	4.19	3.57	2.26
0.583	4.52	1.583	20.28	2.583	4.19	3.58	2.26
0.600	4.52	1.600	20.28	2.600	4.19	3.60	2.26
0.617	4.52	1.617	20.28	2.617	4.19	3.62	2.26
0.633	4.52	1.633	20.28	2.633	4.19	3.63	2.26
0.650	4.52	1.650	20.28	2.650	4.19	3.65	2.26
0.667	4.52	1.667	20.28	2.667	4.19	3.67	2.26
0.683	6.48	1.683	12.91	2.683	3.67	3.68	2.10
0.700	6.48	1.700	12.91	2.700	3.67	3.70	2.10
0.717	6.48	1.717	12.91	2.717	3.67	3.72	2.10
0.733	6.48	1.733	12.91	2.733	3.67	3.73	2.10
0.750	6.48	1.750	12.91	2.750	3.67	3.75	2.10
0.767	6.48	1.767	12.91	2.767	3.67	3.77	2.10
0.783	6.48	1.783	12.91	2.783	3.67	3.78	2.10
0.800	6.48	1.800	12.91	2.800	3.67	3.80	2.10
0.817	6.48	1.817	12.91	2.817	3.67	3.82	2.10
0.833	6.48	1.833	12.91	2.833	3.67	3.83	2.10
0.850	11.07	1.850	9.28	2.850	3.26	3.85	1.96
0.867	11.07	1.867	9.28	2.867	3.26	3.87	1.96
0.883	11.07	1.883	9.28	2.883	3.26	3.88	1.96
0.900	11.07	1.900	9.28	2.900	3.26	3.90	1.96
0.917	11.07	1.917	9.28	2.917	3.26	3.92	1.96
0.933	11.07	1.933	9.28	2.933	3.26	3.93	1.96
0.950	11.07	1.950	9.28	2.950	3.26	3.95	1.96
0.967	11.07	1.967	9.28	2.967	3.26	3.97	1.96
0.983	11.07	1.983	9.28	2.983	3.26	3.98	1.96
1.000	11.07	2.000	9.28	3.000	3.26	4.00	1.96

			TOTALS
Max.Eff.Inten.(mm/hr)=	109.68	122.89	
over (min)	5.00	9.00	
Storage Coeff. (min)=	4.54 (ii)	8.65 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.24	0.13	
PEAK FLOW (cms)=	2.04	0.51	2.451 (iii)
TIME TO PEAK (hrs)=	1.35	1.43	1.37
RUNOFF VOLUME (mm)=	48.55	31.82	43.03
TOTAL RAINFALL (mm)=	49.55	49.55	49.55
RUNOFF COEFFICIENT =	0.98	0.64	0.87

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0026)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 1.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0590	0.5440
0.0190	0.2190	0.0790	0.6710
0.0250	0.3040	0.0950	0.7570
0.0440	0.4560	0.1130	0.8520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0027)	11.520	2.451	1.37	43.03
OUTFLOW: ID= 1 (0026)	11.520	0.044	4.08	27.17

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.79
TIME SHIFT OF PEAK FLOW (min)=163.00
MAXIMUM STORAGE USED (ha.m.)= 0.4556

CALIB	
STANDHYD (0028)	Area (ha)= 18.55
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.35	1.017	30.47	2.017	7.17	3.02	2.93
0.033	2.35	1.033	30.47	2.033	7.17	3.03	2.93
0.050	2.35	1.050	30.47	2.050	7.17	3.05	2.93
0.067	2.35	1.067	30.47	2.067	7.17	3.07	2.93
0.083	2.35	1.083	30.47	2.083	7.17	3.08	2.93
0.100	2.35	1.100	30.47	2.100	7.17	3.10	2.93
0.117	2.35	1.117	30.47	2.117	7.17	3.12	2.93
0.133	2.35	1.133	30.47	2.133	7.17	3.13	2.93
0.150	2.35	1.150	30.47	2.150	7.17	3.15	2.93
0.167	2.35	1.167	30.47	2.167	7.17	3.17	2.93
0.183	2.80	1.183	109.68	2.183	5.81	3.18	2.67
0.200	2.80	1.200	109.68	2.200	5.81	3.20	2.67
0.217	2.80	1.217	109.68	2.217	5.81	3.22	2.67
0.233	2.80	1.233	109.68	2.233	5.81	3.23	2.67
0.250	2.80	1.250	109.68	2.250	5.81	3.25	2.67
0.267	2.80	1.267	109.68	2.267	5.81	3.27	2.67
0.283	2.80	1.283	109.68	2.283	5.81	3.28	2.67
0.300	2.80	1.300	109.68	2.300	5.81	3.30	2.67
0.317	2.80	1.317	109.68	2.317	5.81	3.32	2.67
0.333	2.80	1.333	109.68	2.333	5.81	3.33	2.67
0.350	3.46	1.350	40.71	2.350	4.87	3.35	2.45
0.367	3.46	1.367	40.71	2.367	4.87	3.37	2.45
0.383	3.46	1.383	40.71	2.383	4.87	3.38	2.45
0.400	3.46	1.400	40.71	2.400	4.87	3.40	2.45
0.417	3.46	1.417	40.71	2.417	4.87	3.42	2.45

0.433	3.46	1.433	40.71	2.433	4.87	3.43	2.45
0.450	3.46	1.450	40.71	2.450	4.87	3.45	2.45
0.467	3.46	1.467	40.71	2.467	4.87	3.47	2.45
0.483	3.46	1.483	40.71	2.483	4.87	3.48	2.45
0.500	3.46	1.500	40.71	2.500	4.87	3.50	2.45
0.517	4.52	1.517	20.28	2.517	4.19	3.52	2.26
0.533	4.52	1.533	20.28	2.533	4.19	3.53	2.26
0.550	4.52	1.550	20.28	2.550	4.19	3.55	2.26
0.567	4.52	1.567	20.28	2.567	4.19	3.57	2.26
0.583	4.52	1.583	20.28	2.583	4.19	3.58	2.26
0.600	4.52	1.600	20.28	2.600	4.19	3.60	2.26
0.617	4.52	1.617	20.28	2.617	4.19	3.62	2.26
0.633	4.52	1.633	20.28	2.633	4.19	3.63	2.26
0.650	4.52	1.650	20.28	2.650	4.19	3.65	2.26
0.667	4.52	1.667	20.28	2.667	4.19	3.67	2.26
0.683	6.48	1.683	12.91	2.683	3.67	3.68	2.10
0.700	6.48	1.700	12.91	2.700	3.67	3.70	2.10
0.717	6.48	1.717	12.91	2.717	3.67	3.72	2.10
0.733	6.48	1.733	12.91	2.733	3.67	3.73	2.10
0.750	6.48	1.750	12.91	2.750	3.67	3.75	2.10
0.767	6.48	1.767	12.91	2.767	3.67	3.77	2.10
0.783	6.48	1.783	12.91	2.783	3.67	3.78	2.10
0.800	6.48	1.800	12.91	2.800	3.67	3.80	2.10
0.817	6.48	1.817	12.91	2.817	3.67	3.82	2.10
0.833	6.48	1.833	12.91	2.833	3.67	3.83	2.10
0.850	11.07	1.850	9.28	2.850	3.26	3.85	1.96
0.867	11.07	1.867	9.28	2.867	3.26	3.87	1.96
0.883	11.07	1.883	9.28	2.883	3.26	3.88	1.96
0.900	11.07	1.900	9.28	2.900	3.26	3.90	1.96
0.917	11.07	1.917	9.28	2.917	3.26	3.92	1.96
0.933	11.07	1.933	9.28	2.933	3.26	3.93	1.96
0.950	11.07	1.950	9.28	2.950	3.26	3.95	1.96
0.967	11.07	1.967	9.28	2.967	3.26	3.97	1.96
0.983	11.07	1.983	9.28	2.983	3.26	3.98	1.96
1.000	11.07	2.000	9.28	3.000	3.26	4.00	1.96

Max.Eff.Inten.(mm/hr)=	109.68	113.29	
over (min)	5.00	11.00	
Storage Coeff. (min)=	5.24 (ii)	10.47 (ii)	
Unit Hyd. Tpeak (min)=	5.00	11.00	
Unit Hyd. peak (cms)=	0.22	0.11	
			TOTALS
PEAK FLOW (cms)=	2.56	1.01	3.296 (iii)
TIME TO PEAK (hrs)=	1.35	1.48	1.37
RUNOFF VOLUME (mm)=	48.55	31.16	40.55
TOTAL RAINFALL (mm)=	49.55	49.55	49.55
RUNOFF COEFFICIENT =	0.98	0.63	0.82

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0029)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8140
	0.0280	0.3250	0.1440	1.0160
	0.0460	0.4470	0.1740	1.1510
	0.0810	0.6790	0.2060	1.3010

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0028)	18.550	3.296	1.37	40.55
OUTFLOW: ID= 1 (0029)	18.550	0.081	4.07	27.44

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.46
TIME SHIFT OF PEAK FLOW (min)=162.00
MAXIMUM STORAGE USED (ha.m.)= 0.6787

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      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\4a66d985-2378-41ca-888b-60634dbaf842\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\4a66d985-2378-41ca-888b-60634dbaf842\scenari

DATE: 02-19-2026 TIME: 09:36:15

USER:

COMMENTS: _____

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  ************************************************
  ** SIMULATION : 3 - 10yr 4hr 10min Chicago    **
  ************************************************
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CHICAGO STORM	IDF curve parameters: A=2221.000
Ptotal= 58.62 mm	B= 12.000
	C= 0.908

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.39	1.00	37.17	2.00	8.06	3.00	3.05

0.17	2.89	1.17	134.16	2.17	6.42	3.17	2.75
0.33	3.65	1.33	50.03	2.33	5.30	3.33	2.50
0.50	4.89	1.50	24.37	2.50	4.50	3.50	2.29
0.67	7.23	1.67	15.14	2.67	3.89	3.67	2.11
0.83	12.87	1.83	10.64	2.83	3.42	3.83	1.96

CALIB	
STANDHYD (0027)	Area (ha)= 11.52
ID= 1 DT= 1.0 min	Total Imp(%)= 81.00 Dir. Conn.(%)= 67.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.33	2.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.39	1.017	37.17	2.017	8.06	3.02	3.05
0.033	2.39	1.033	37.17	2.033	8.06	3.03	3.05
0.050	2.39	1.050	37.17	2.050	8.06	3.05	3.05
0.067	2.39	1.067	37.17	2.067	8.06	3.07	3.05
0.083	2.39	1.083	37.17	2.083	8.06	3.08	3.05
0.100	2.39	1.100	37.17	2.100	8.06	3.10	3.05
0.117	2.39	1.117	37.17	2.117	8.06	3.12	3.05
0.133	2.39	1.133	37.17	2.133	8.06	3.13	3.05
0.150	2.39	1.150	37.17	2.150	8.06	3.15	3.05
0.167	2.39	1.167	37.17	2.167	8.06	3.17	3.05
0.183	2.89	1.183	134.16	2.183	6.42	3.18	2.75
0.200	2.89	1.200	134.16	2.200	6.42	3.20	2.75
0.217	2.89	1.217	134.16	2.217	6.42	3.22	2.75
0.233	2.89	1.233	134.16	2.233	6.42	3.23	2.75
0.250	2.89	1.250	134.16	2.250	6.42	3.25	2.75
0.267	2.89	1.267	134.16	2.267	6.42	3.27	2.75
0.283	2.89	1.283	134.16	2.283	6.42	3.28	2.75
0.300	2.89	1.300	134.16	2.300	6.42	3.30	2.75
0.317	2.89	1.317	134.16	2.317	6.42	3.32	2.75
0.333	2.89	1.333	134.16	2.333	6.42	3.33	2.75
0.350	3.65	1.350	50.04	2.350	5.30	3.35	2.50
0.367	3.65	1.367	50.03	2.367	5.30	3.37	2.50
0.383	3.65	1.383	50.03	2.383	5.30	3.38	2.50
0.400	3.65	1.400	50.03	2.400	5.30	3.40	2.50
0.417	3.65	1.417	50.03	2.417	5.30	3.42	2.50
0.433	3.65	1.433	50.03	2.433	5.30	3.43	2.50
0.450	3.65	1.450	50.03	2.450	5.30	3.45	2.50
0.467	3.65	1.467	50.03	2.467	5.30	3.47	2.50
0.483	3.65	1.483	50.03	2.483	5.30	3.48	2.50
0.500	3.65	1.500	50.03	2.500	5.30	3.50	2.50
0.517	4.89	1.517	24.37	2.517	4.50	3.52	2.29
0.533	4.89	1.533	24.37	2.533	4.50	3.53	2.29
0.550	4.89	1.550	24.37	2.550	4.50	3.55	2.29
0.567	4.89	1.567	24.37	2.567	4.50	3.57	2.29
0.583	4.89	1.583	24.37	2.583	4.50	3.58	2.29
0.600	4.89	1.600	24.37	2.600	4.50	3.60	2.29
0.617	4.89	1.617	24.37	2.617	4.50	3.62	2.29
0.633	4.89	1.633	24.37	2.633	4.50	3.63	2.29
0.650	4.89	1.650	24.37	2.650	4.50	3.65	2.29
0.667	4.89	1.667	24.37	2.667	4.50	3.67	2.29
0.683	7.23	1.683	15.14	2.683	3.89	3.68	2.11
0.700	7.23	1.700	15.14	2.700	3.89	3.70	2.11
0.717	7.23	1.717	15.14	2.717	3.89	3.72	2.11
0.733	7.23	1.733	15.14	2.733	3.89	3.73	2.11
0.750	7.23	1.750	15.14	2.750	3.89	3.75	2.11
0.767	7.23	1.767	15.14	2.767	3.89	3.77	2.11
0.783	7.23	1.783	15.14	2.783	3.89	3.78	2.11
0.800	7.23	1.800	15.14	2.800	3.89	3.80	2.11
0.817	7.23	1.817	15.14	2.817	3.89	3.82	2.11
0.833	7.23	1.833	15.14	2.833	3.89	3.83	2.11
0.850	12.87	1.850	10.64	2.850	3.42	3.85	1.96
0.867	12.87	1.867	10.64	2.867	3.42	3.87	1.96
0.883	12.87	1.883	10.64	2.883	3.42	3.88	1.96
0.900	12.87	1.900	10.64	2.900	3.42	3.90	1.96
0.917	12.87	1.917	10.64	2.917	3.42	3.92	1.96
0.933	12.87	1.933	10.64	2.933	3.42	3.93	1.96
0.950	12.87	1.950	10.64	2.950	3.42	3.95	1.96
0.967	12.87	1.967	10.64	2.967	3.42	3.97	1.96
0.983	12.87	1.983	10.64	2.983	3.42	3.98	1.96
1.000	12.87	2.000	10.64	3.000	3.42	4.00	1.96

				TOTALS
Max.Eff.Inten.(mm/hr)=		134.16	161.71	
over (min)		5.00	8.00	
Storage Coeff. (min)=		4.19 (ii)	7.98 (ii)	
Unit Hyd. Tpeak (min)=		5.00	8.00	
Unit Hyd. peak (cms)=		0.25	0.14	
PEAK FLOW	(cms)=	2.54	0.69	3.138 (iii)
TIME TO PEAK	(hrs)=	1.35	1.42	1.35
RUNOFF VOLUME	(mm)=	57.62	39.91	51.77
TOTAL RAINFALL	(mm)=	58.62	58.62	58.62
RUNOFF COEFFICIENT	=	0.98	0.68	0.88

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0026)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 1.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0590	0.5440
0.0190	0.2190	0.0790	0.6710
0.0250	0.3040	0.0950	0.7570
0.0440	0.4560	0.1130	0.8520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0027)	11.520	3.138	1.35	51.77
OUTFLOW: ID= 1 (0026)	11.520	0.059	4.03	33.39

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.88
TIME SHIFT OF PEAK FLOW (min)=161.00
MAXIMUM STORAGE USED (ha.m.)= 0.5433

CALIB	
STANDHYD (0028)	Area (ha)= 18.55
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.39	1.017	37.17	2.017	8.06	3.02	3.05
0.033	2.39	1.033	37.17	2.033	8.06	3.03	3.05
0.050	2.39	1.050	37.17	2.050	8.06	3.05	3.05
0.067	2.39	1.067	37.17	2.067	8.06	3.07	3.05
0.083	2.39	1.083	37.17	2.083	8.06	3.08	3.05
0.100	2.39	1.100	37.17	2.100	8.06	3.10	3.05
0.117	2.39	1.117	37.17	2.117	8.06	3.12	3.05
0.133	2.39	1.133	37.17	2.133	8.06	3.13	3.05
0.150	2.39	1.150	37.17	2.150	8.06	3.15	3.05
0.167	2.39	1.167	37.17	2.167	8.06	3.17	3.05
0.183	2.89	1.183	134.16	2.183	6.42	3.18	2.75
0.200	2.89	1.200	134.16	2.200	6.42	3.20	2.75
0.217	2.89	1.217	134.16	2.217	6.42	3.22	2.75
0.233	2.89	1.233	134.16	2.233	6.42	3.23	2.75
0.250	2.89	1.250	134.16	2.250	6.42	3.25	2.75
0.267	2.89	1.267	134.16	2.267	6.42	3.27	2.75
0.283	2.89	1.283	134.16	2.283	6.42	3.28	2.75
0.300	2.89	1.300	134.16	2.300	6.42	3.30	2.75
0.317	2.89	1.317	134.16	2.317	6.42	3.32	2.75
0.333	2.89	1.333	134.16	2.333	6.42	3.33	2.75
0.350	3.65	1.350	50.04	2.350	5.30	3.35	2.50
0.367	3.65	1.367	50.03	2.367	5.30	3.37	2.50
0.383	3.65	1.383	50.03	2.383	5.30	3.38	2.50
0.400	3.65	1.400	50.03	2.400	5.30	3.40	2.50
0.417	3.65	1.417	50.03	2.417	5.30	3.42	2.50
0.433	3.65	1.433	50.03	2.433	5.30	3.43	2.50
0.450	3.65	1.450	50.03	2.450	5.30	3.45	2.50
0.467	3.65	1.467	50.03	2.467	5.30	3.47	2.50
0.483	3.65	1.483	50.03	2.483	5.30	3.48	2.50
0.500	3.65	1.500	50.03	2.500	5.30	3.50	2.50
0.517	4.89	1.517	24.37	2.517	4.50	3.52	2.29
0.533	4.89	1.533	24.37	2.533	4.50	3.53	2.29
0.550	4.89	1.550	24.37	2.550	4.50	3.55	2.29
0.567	4.89	1.567	24.37	2.567	4.50	3.57	2.29
0.583	4.89	1.583	24.37	2.583	4.50	3.58	2.29
0.600	4.89	1.600	24.37	2.600	4.50	3.60	2.29
0.617	4.89	1.617	24.37	2.617	4.50	3.62	2.29
0.633	4.89	1.633	24.37	2.633	4.50	3.63	2.29
0.650	4.89	1.650	24.37	2.650	4.50	3.65	2.29
0.667	4.89	1.667	24.37	2.667	4.50	3.67	2.29
0.683	7.23	1.683	15.14	2.683	3.89	3.68	2.11
0.700	7.23	1.700	15.14	2.700	3.89	3.70	2.11
0.717	7.23	1.717	15.14	2.717	3.89	3.72	2.11
0.733	7.23	1.733	15.14	2.733	3.89	3.73	2.11
0.750	7.23	1.750	15.14	2.750	3.89	3.75	2.11
0.767	7.23	1.767	15.14	2.767	3.89	3.77	2.11
0.783	7.23	1.783	15.14	2.783	3.89	3.78	2.11
0.800	7.23	1.800	15.14	2.800	3.89	3.80	2.11
0.817	7.23	1.817	15.14	2.817	3.89	3.82	2.11
0.833	7.23	1.833	15.14	2.833	3.89	3.83	2.11
0.850	12.87	1.850	10.64	2.850	3.42	3.85	1.96
0.867	12.87	1.867	10.64	2.867	3.42	3.87	1.96
0.883	12.87	1.883	10.64	2.883	3.42	3.88	1.96
0.900	12.87	1.900	10.64	2.900	3.42	3.90	1.96
0.917	12.87	1.917	10.64	2.917	3.42	3.92	1.96
0.933	12.87	1.933	10.64	2.933	3.42	3.93	1.96
0.950	12.87	1.950	10.64	2.950	3.42	3.95	1.96
0.967	12.87	1.967	10.64	2.967	3.42	3.97	1.96
0.983	12.87	1.983	10.64	2.983	3.42	3.98	1.96
1.000	12.87	2.000	10.64	3.000	3.42	4.00	1.96

				TOTALS
Max.Eff.Inten.	(mm/hr)=	134.16	149.55	
over	(min)	5.00	10.00	
Storage Coeff.	(min)=	4.83 (ii)	9.66 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	10.00	
Unit Hyd. peak	(cms)=	0.23	0.12	
PEAK FLOW	(cms)=	3.19	1.38	4.285 (iii)
TIME TO PEAK	(hrs)=	1.35	1.45	1.37
RUNOFF VOLUME	(mm)=	57.61	39.18	49.13
TOTAL RAINFALL	(mm)=	58.62	58.62	58.62
RUNOFF COEFFICIENT	=	0.98	0.67	0.84

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0029)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8140
	0.0280	0.3250	0.1440	1.0160
	0.0460	0.4470	0.1740	1.1510
	0.0810	0.6790	0.2060	1.3010

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0028)	18.550	4.285	1.37	49.13
OUTFLOW: ID= 1 (0029)	18.550	0.109	3.83	34.33

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.54
TIME SHIFT OF PEAK FLOW (min)=148.00
MAXIMUM STORAGE USED (ha.m.)= 0.8140

V V I SSSSS U U A L (v 6.2.2015)
V V I SS U U A A L
V V I SS U U AAAAA L
V V I SS U U A A L
VV I SSSSS UUUUU A A LLLLL

OOO TTTTT TTTTT H H Y Y M M OOO TM
O O T T H H Y Y MM MM O O
O O T T H H Y M M O O
OOO T T H H Y M M OOO

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\6da715ed-a052-49b9-ad2b-3e48e2c8e1cc\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\6da715ed-a052-49b9-ad2b-3e48e2c8e1cc\scenari

DATE: 02-19-2026 TIME: 09:36:15

USER:

COMMENTS: _____

** SIMULATION : 4 - 25yr 4hr 10min Chicago **

| CHICAGO STORM | Ptotal= 71.59 mm |

IDF curve parameters: A=3158.000
B= 15.000
C= 0.933
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.68	1.00	47.76	2.00	10.11	3.00	3.51
0.17	3.31	1.17	156.47	2.17	7.92	3.17	3.13
0.33	4.28	1.33	63.86	2.33	6.44	3.33	2.81
0.50	5.90	1.50	31.72	2.50	5.38	3.50	2.55
0.67	9.00	1.67	19.56	2.67	4.59	3.67	2.33
0.83	16.53	1.83	13.56	2.83	3.99	3.83	2.15

| CALIB | STANDHYD (0027) | ID= 1 DT= 1.0 min |

Area (ha)= 11.52
Total Imp(%)= 81.00 Dir. Conn.(%)= 67.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.33	2.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.68	1.017	47.75	2.017	10.11	3.02	3.51
0.033	2.68	1.033	47.76	2.033	10.11	3.03	3.51
0.050	2.68	1.050	47.76	2.050	10.11	3.05	3.51
0.067	2.68	1.067	47.76	2.067	10.11	3.07	3.51
0.083	2.68	1.083	47.76	2.083	10.11	3.08	3.51
0.100	2.68	1.100	47.76	2.100	10.11	3.10	3.51
0.117	2.68	1.117	47.76	2.117	10.11	3.12	3.51
0.133	2.68	1.133	47.76	2.133	10.11	3.13	3.51
0.150	2.68	1.150	47.76	2.150	10.11	3.15	3.51
0.167	2.68	1.167	47.76	2.167	10.11	3.17	3.51
0.183	3.31	1.183	156.47	2.183	7.92	3.18	3.13
0.200	3.31	1.200	156.47	2.200	7.92	3.20	3.13
0.217	3.31	1.217	156.47	2.217	7.92	3.22	3.13
0.233	3.31	1.233	156.47	2.233	7.92	3.23	3.13
0.250	3.31	1.250	156.47	2.250	7.92	3.25	3.13
0.267	3.31	1.267	156.47	2.267	7.92	3.27	3.13
0.283	3.31	1.283	156.47	2.283	7.92	3.28	3.13
0.300	3.31	1.300	156.47	2.300	7.92	3.30	3.13
0.317	3.31	1.317	156.47	2.317	7.92	3.32	3.13
0.333	3.31	1.333	156.47	2.333	7.92	3.33	3.13
0.350	4.28	1.350	63.87	2.350	6.44	3.35	2.81
0.367	4.28	1.367	63.86	2.367	6.44	3.37	2.81
0.383	4.28	1.383	63.86	2.383	6.44	3.38	2.81
0.400	4.28	1.400	63.86	2.400	6.44	3.40	2.81
0.417	4.28	1.417	63.86	2.417	6.44	3.42	2.81
0.433	4.28	1.433	63.86	2.433	6.44	3.43	2.81
0.450	4.28	1.450	63.86	2.450	6.44	3.45	2.81
0.467	4.28	1.467	63.86	2.467	6.44	3.47	2.81
0.483	4.28	1.483	63.86	2.483	6.44	3.48	2.81
0.500	4.28	1.500	63.86	2.500	6.44	3.50	2.81
0.517	5.90	1.517	31.72	2.517	5.38	3.52	2.55
0.533	5.90	1.533	31.72	2.533	5.38	3.53	2.55
0.550	5.90	1.550	31.72	2.550	5.38	3.55	2.55
0.567	5.90	1.567	31.72	2.567	5.38	3.57	2.55
0.583	5.90	1.583	31.72	2.583	5.38	3.58	2.55
0.600	5.90	1.600	31.72	2.600	5.38	3.60	2.55
0.617	5.90	1.617	31.72	2.617	5.38	3.62	2.55
0.633	5.90	1.633	31.72	2.633	5.38	3.63	2.55
0.650	5.90	1.650	31.72	2.650	5.38	3.65	2.55
0.667	5.90	1.667	31.72	2.667	5.38	3.67	2.55
0.683	9.00	1.683	19.56	2.683	4.59	3.68	2.33
0.700	9.00	1.700	19.56	2.700	4.59	3.70	2.33
0.717	9.00	1.717	19.56	2.717	4.59	3.72	2.33
0.733	9.00	1.733	19.56	2.733	4.59	3.73	2.33
0.750	9.00	1.750	19.56	2.750	4.59	3.75	2.33
0.767	9.00	1.767	19.56	2.767	4.59	3.77	2.33
0.783	9.00	1.783	19.56	2.783	4.59	3.78	2.33
0.800	9.00	1.800	19.56	2.800	4.59	3.80	2.33
0.817	9.00	1.817	19.56	2.817	4.59	3.82	2.33
0.833	9.00	1.833	19.56	2.833	4.59	3.83	2.33
0.850	16.53	1.850	13.56	2.850	3.99	3.85	2.15
0.867	16.53	1.867	13.56	2.867	3.99	3.87	2.15
0.883	16.53	1.883	13.56	2.883	3.99	3.88	2.15
0.900	16.53	1.900	13.56	2.900	3.99	3.90	2.15
0.917	16.53	1.917	13.56	2.917	3.99	3.92	2.15
0.933	16.53	1.933	13.56	2.933	3.99	3.93	2.15
0.950	16.53	1.950	13.56	2.950	3.99	3.95	2.15
0.967	16.53	1.967	13.56	2.967	3.99	3.97	2.15
0.983	16.53	1.983	13.56	2.983	3.99	3.98	2.15
1.000	16.53	2.000	13.56	3.000	3.99	4.00	2.15

Max.Eff.Inten.	(mm/hr)=	156.47	202.88	
over	(min)	5.00	8.00	
Storage Coeff.	(min)=	3.94 (ii)	7.50 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	8.00	
Unit Hyd. peak	(cms)=	0.26	0.15	
				TOTALS
PEAK FLOW	(cms)=	3.02	0.90	3.804 (iii)

TIME TO PEAK (hrs)=	1.35	1.42	1.35
RUNOFF VOLUME (mm)=	70.59	51.82	64.39
TOTAL RAINFALL (mm)=	71.59	71.59	71.59
RUNOFF COEFFICIENT =	0.99	0.72	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0026)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5440
	0.0190	0.2190	0.0790	0.6710
	0.0250	0.3040	0.0950	0.7570
	0.0440	0.4560	0.1130	0.8520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0027)	11.520	3.804	1.35	64.39
OUTFLOW: ID= 1 (0026)	11.520	0.079	3.73	42.85

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.08
TIME SHIFT OF PEAK FLOW (min)=143.00
MAXIMUM STORAGE USED (ha.m.)= 0.6707

CALIB		
STANDHYD (0028)	Area (ha)= 18.55	
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00	Dir. Conn.(%)= 54.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	13.36	5.19
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	351.66	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.68	1.017	47.75	2.017	10.11	3.02	3.51
0.033	2.68	1.033	47.76	2.033	10.11	3.03	3.51
0.050	2.68	1.050	47.76	2.050	10.11	3.05	3.51
0.067	2.68	1.067	47.76	2.067	10.11	3.07	3.51
0.083	2.68	1.083	47.76	2.083	10.11	3.08	3.51
0.100	2.68	1.100	47.76	2.100	10.11	3.10	3.51
0.117	2.68	1.117	47.76	2.117	10.11	3.12	3.51
0.133	2.68	1.133	47.76	2.133	10.11	3.13	3.51
0.150	2.68	1.150	47.76	2.150	10.11	3.15	3.51
0.167	2.68	1.167	47.76	2.167	10.11	3.17	3.51
0.183	3.31	1.183	156.47	2.183	7.92	3.18	3.13
0.200	3.31	1.200	156.47	2.200	7.92	3.20	3.13
0.217	3.31	1.217	156.47	2.217	7.92	3.22	3.13
0.233	3.31	1.233	156.47	2.233	7.92	3.23	3.13
0.250	3.31	1.250	156.47	2.250	7.92	3.25	3.13
0.267	3.31	1.267	156.47	2.267	7.92	3.27	3.13
0.283	3.31	1.283	156.47	2.283	7.92	3.28	3.13
0.300	3.31	1.300	156.47	2.300	7.92	3.30	3.13
0.317	3.31	1.317	156.47	2.317	7.92	3.32	3.13
0.333	3.31	1.333	156.47	2.333	7.92	3.33	3.13
0.350	4.28	1.350	63.87	2.350	6.44	3.35	2.81
0.367	4.28	1.367	63.86	2.367	6.44	3.37	2.81
0.383	4.28	1.383	63.86	2.383	6.44	3.38	2.81
0.400	4.28	1.400	63.86	2.400	6.44	3.40	2.81
0.417	4.28	1.417	63.86	2.417	6.44	3.42	2.81
0.433	4.28	1.433	63.86	2.433	6.44	3.43	2.81
0.450	4.28	1.450	63.86	2.450	6.44	3.45	2.81
0.467	4.28	1.467	63.86	2.467	6.44	3.47	2.81
0.483	4.28	1.483	63.86	2.483	6.44	3.48	2.81
0.500	4.28	1.500	63.86	2.500	6.44	3.50	2.81
0.517	5.90	1.517	31.72	2.517	5.38	3.52	2.55
0.533	5.90	1.533	31.72	2.533	5.38	3.53	2.55
0.550	5.90	1.550	31.72	2.550	5.38	3.55	2.55
0.567	5.90	1.567	31.72	2.567	5.38	3.57	2.55
0.583	5.90	1.583	31.72	2.583	5.38	3.58	2.55
0.600	5.90	1.600	31.72	2.600	5.38	3.60	2.55
0.617	5.90	1.617	31.72	2.617	5.38	3.62	2.55
0.633	5.90	1.633	31.72	2.633	5.38	3.63	2.55
0.650	5.90	1.650	31.72	2.650	5.38	3.65	2.55
0.667	5.90	1.667	31.72	2.667	5.38	3.67	2.55
0.683	9.00	1.683	19.56	2.683	4.59	3.68	2.33
0.700	9.00	1.700	19.56	2.700	4.59	3.70	2.33
0.717	9.00	1.717	19.56	2.717	4.59	3.72	2.33
0.733	9.00	1.733	19.56	2.733	4.59	3.73	2.33
0.750	9.00	1.750	19.56	2.750	4.59	3.75	2.33
0.767	9.00	1.767	19.56	2.767	4.59	3.77	2.33
0.783	9.00	1.783	19.56	2.783	4.59	3.78	2.33
0.800	9.00	1.800	19.56	2.800	4.59	3.80	2.33
0.817	9.00	1.817	19.56	2.817	4.59	3.82	2.33
0.833	9.00	1.833	19.56	2.833	4.59	3.83	2.33
0.850	16.53	1.850	13.56	2.850	3.99	3.85	2.15
0.867	16.53	1.867	13.56	2.867	3.99	3.87	2.15
0.883	16.53	1.883	13.56	2.883	3.99	3.88	2.15
0.900	16.53	1.900	13.56	2.900	3.99	3.90	2.15
0.917	16.53	1.917	13.56	2.917	3.99	3.92	2.15
0.933	16.53	1.933	13.56	2.933	3.99	3.93	2.15
0.950	16.53	1.950	13.56	2.950	3.99	3.95	2.15
0.967	16.53	1.967	13.56	2.967	3.99	3.97	2.15
0.983	16.53	1.983	13.56	2.983	3.99	3.98	2.15
1.000	16.53	2.000	13.56	3.000	3.99	4.00	2.15

Max.Eff.Inten.(mm/hr)=	156.47	188.24	
over (min)	5.00	10.00	
Storage Coeff. (min)=	4.54 (ii)	9.08 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.24	0.12	
			TOTALS
PEAK FLOW (cms)=	3.80	1.81	5.261 (iii)
TIME TO PEAK (hrs)=	1.35	1.45	1.37
RUNOFF VOLUME (mm)=	70.59	50.99	61.57
TOTAL RAINFALL (mm)=	71.59	71.59	71.59
RUNOFF COEFFICIENT =	0.99	0.71	0.86

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1090     0.8140
                         0.0280     0.3250   |   0.1440     1.0160
                         0.0460     0.4470   |   0.1740     1.1510
                         0.0810     0.6790   |   0.2060     1.3010

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)    18.550     5.261      1.37      61.57
   OUTFLOW: ID= 1 (  0029)    18.550     0.144      3.55      44.62

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.73
                  TIME SHIFT OF PEAK FLOW         (min)=131.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.0148

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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-
9c16-43e17470752a\273671b1-6c39-410b-aab0-e217d9e2f420\scenari
  Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-
9c16-43e17470752a\273671b1-6c39-410b-aab0-e217d9e2f420\scenari


DATE: 02-19-2026                          TIME: 09:36:15

USER:



COMMENTS: _____________________________________________________________

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  ***********************************************
  ** SIMULATION : 5 - 50yr 4hr 10min Chicago    **
  ***********************************************

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| CHICAGO STORM    |    IDF curve parameters: A=3886.000
| Ptotal= 80.32 mm |                          B=  16.000
--------------------                          C=   0.950
                          used in:   INTENSITY =  A / (t + B)^C

                          Duration of storm  =  4.00 hrs
                          Storm time step    = 10.00 min
                          Time to peak ratio =  0.33

     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.00    2.76 |  1.00   54.62 |  2.00   11.20 |  3.00    3.68
     0.17    3.46 |  1.17  176.19 |  2.17    8.68 |  3.17    3.25
     0.33    4.54 |  1.33   73.10 |  2.33    6.99 |  3.33    2.91
     0.50    6.37 |  1.50   36.22 |  2.50    5.78 |  3.50    2.62
     0.67    9.92 |  1.67   22.14 |  2.67    4.89 |  3.67    2.38
     0.83   18.63 |  1.83   15.18 |  2.83    4.21 |  3.83    2.18

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| CALIB            |
| STANDHYD (  0027)|   Area    (ha)=  11.52
|ID= 1 DT= 1.0 min |   Total Imp(%)=  81.00   Dir. Conn.(%)=  67.00
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                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.33         2.19
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     277.13        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
    0.017    2.76 | 1.017   54.62 | 2.017   11.20 |  3.02    3.68
    0.033    2.76 | 1.033   54.62 | 2.033   11.20 |  3.03    3.68
    0.050    2.76 | 1.050   54.62 | 2.050   11.20 |  3.05    3.68
    0.067    2.76 | 1.067   54.62 | 2.067   11.20 |  3.07    3.68
    0.083    2.76 | 1.083   54.62 | 2.083   11.20 |  3.08    3.68
    0.100    2.76 | 1.100   54.62 | 2.100   11.20 |  3.10    3.68
    0.117    2.76 | 1.117   54.62 | 2.117   11.20 |  3.12    3.68
    0.133    2.76 | 1.133   54.62 | 2.133   11.20 |  3.13    3.68
    0.150    2.76 | 1.150   54.62 | 2.150   11.20 |  3.15    3.68
    0.167    2.76 | 1.167   54.62 | 2.167   11.20 |  3.17    3.68
    0.183    3.46 | 1.183  176.19 | 2.183    8.68 |  3.18    3.25
    0.200    3.46 | 1.200  176.19 | 2.200    8.68 |  3.20    3.25
    0.217    3.46 | 1.217  176.19 | 2.217    8.68 |  3.22    3.25
    0.233    3.46 | 1.233  176.19 | 2.233    8.68 |  3.23    3.25
    0.250    3.46 | 1.250  176.19 | 2.250    8.68 |  3.25    3.25
    0.267    3.46 | 1.267  176.19 | 2.267    8.68 |  3.27    3.25
    0.283    3.46 | 1.283  176.19 | 2.283    8.68 |  3.28    3.25
    0.300    3.46 | 1.300  176.19 | 2.300    8.68 |  3.30    3.25
    0.317    3.46 | 1.317  176.19 | 2.317    8.68 |  3.32    3.25
    0.333    3.46 | 1.333  176.19 | 2.333    8.68 |  3.33    3.25
    0.350    4.54 | 1.350   73.11 | 2.350    6.99 |  3.35    2.91
    0.367    4.54 | 1.367   73.10 | 2.367    6.99 |  3.37    2.91
    0.383    4.54 | 1.383   73.10 | 2.383    6.99 |  3.38    2.91
    0.400    4.54 | 1.400   73.10 | 2.400    6.99 |  3.40    2.91
    0.417    4.54 | 1.417   73.10 | 2.417    6.99 |  3.42    2.91
    0.433    4.54 | 1.433   73.10 | 2.433    6.99 |  3.43    2.91
    0.450    4.54 | 1.450   73.10 | 2.450    6.99 |  3.45    2.91
    0.467    4.54 | 1.467   73.10 | 2.467    6.99 |  3.47    2.91
    0.483    4.54 | 1.483   73.10 | 2.483    6.99 |  3.48    2.91
    0.500    4.54 | 1.500   73.10 | 2.500    6.99 |  3.50    2.91
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0.517	6.37	1.517	36.22	2.517	5.78	3.52	2.62
0.533	6.37	1.533	36.22	2.533	5.78	3.53	2.62
0.550	6.37	1.550	36.22	2.550	5.78	3.55	2.62
0.567	6.37	1.567	36.22	2.567	5.78	3.57	2.62
0.583	6.37	1.583	36.22	2.583	5.78	3.58	2.62
0.600	6.37	1.600	36.22	2.600	5.78	3.60	2.62
0.617	6.37	1.617	36.22	2.617	5.78	3.62	2.62
0.633	6.37	1.633	36.22	2.633	5.78	3.63	2.62
0.650	6.37	1.650	36.22	2.650	5.78	3.65	2.62
0.667	6.37	1.667	36.22	2.667	5.78	3.67	2.62
0.683	9.92	1.683	22.14	2.683	4.89	3.68	2.38
0.700	9.92	1.700	22.14	2.700	4.89	3.70	2.38
0.717	9.92	1.717	22.14	2.717	4.89	3.72	2.38
0.733	9.92	1.733	22.14	2.733	4.89	3.73	2.38
0.750	9.92	1.750	22.14	2.750	4.89	3.75	2.38
0.767	9.92	1.767	22.14	2.767	4.89	3.77	2.38
0.783	9.92	1.783	22.14	2.783	4.89	3.78	2.38
0.800	9.92	1.800	22.14	2.800	4.89	3.80	2.38
0.817	9.92	1.817	22.14	2.817	4.89	3.82	2.38
0.833	9.92	1.833	22.14	2.833	4.89	3.83	2.38
0.850	18.63	1.850	15.18	2.850	4.21	3.85	2.18
0.867	18.63	1.867	15.18	2.867	4.21	3.87	2.18
0.883	18.63	1.883	15.18	2.883	4.21	3.88	2.18
0.900	18.63	1.900	15.18	2.900	4.21	3.90	2.18
0.917	18.63	1.917	15.18	2.917	4.21	3.92	2.18
0.933	18.63	1.933	15.18	2.933	4.21	3.93	2.18
0.950	18.63	1.950	15.18	2.950	4.21	3.95	2.18
0.967	18.63	1.967	15.18	2.967	4.21	3.97	2.18
0.983	18.63	1.983	15.18	2.983	4.21	3.98	2.18
1.000	18.63	2.000	15.18	3.000	4.21	4.00	2.18

Max.Eff.Inten.(mm/hr)=	176.19	237.14		
over (min)	5.00	8.00		
Storage Coeff. (min)=	3.75 (ii)	7.15 (ii)		
Unit Hyd. Tpeak (min)=	5.00	8.00		
Unit Hyd. peak (cms)=	0.27	0.15		
			TOTALS	
PEAK FLOW (cms)=	3.43	1.07	4.374 (iii)	
TIME TO PEAK (hrs)=	1.35	1.42	1.35	
RUNOFF VOLUME (mm)=	79.32	59.97	72.94	
TOTAL RAINFALL (mm)=	80.32	80.32	80.32	
RUNOFF COEFFICIENT =	0.99	0.75	0.91	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0026)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5440
	0.0190	0.2190	0.0790	0.6710
	0.0250	0.3040	0.0950	0.7570
	0.0440	0.4560	0.1130	0.8520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0027)	11.520	4.374	1.35	72.94
OUTFLOW: ID= 1 (0026)	11.520	0.095	3.48	49.56

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.17
TIME SHIFT OF PEAK FLOW (min)=128.00
MAXIMUM STORAGE USED (ha.m.)= 0.7569

CALIB			
STANDHYD (0028)	Area (ha)= 18.55		
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00	Dir. Conn.(%)= 54.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	13.36	5.19	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	351.66	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.76	1.017	54.62	2.017	11.20	3.02	3.68
0.033	2.76	1.033	54.62	2.033	11.20	3.03	3.68
0.050	2.76	1.050	54.62	2.050	11.20	3.05	3.68
0.067	2.76	1.067	54.62	2.067	11.20	3.07	3.68
0.083	2.76	1.083	54.62	2.083	11.20	3.08	3.68
0.100	2.76	1.100	54.62	2.100	11.20	3.10	3.68
0.117	2.76	1.117	54.62	2.117	11.20	3.12	3.68
0.133	2.76	1.133	54.62	2.133	11.20	3.13	3.68
0.150	2.76	1.150	54.62	2.150	11.20	3.15	3.68
0.167	2.76	1.167	54.62	2.167	11.20	3.17	3.68
0.183	3.46	1.183	176.19	2.183	8.68	3.18	3.25
0.200	3.46	1.200	176.19	2.200	8.68	3.20	3.25
0.217	3.46	1.217	176.19	2.217	8.68	3.22	3.25
0.233	3.46	1.233	176.19	2.233	8.68	3.23	3.25
0.250	3.46	1.250	176.19	2.250	8.68	3.25	3.25
0.267	3.46	1.267	176.19	2.267	8.68	3.27	3.25
0.283	3.46	1.283	176.19	2.283	8.68	3.28	3.25
0.300	3.46	1.300	176.19	2.300	8.68	3.30	3.25
0.317	3.46	1.317	176.19	2.317	8.68	3.32	3.25
0.333	3.46	1.333	176.19	2.333	8.68	3.33	3.25
0.350	4.54	1.350	73.11	2.350	6.99	3.35	2.91
0.367	4.54	1.367	73.10	2.367	6.99	3.37	2.91
0.383	4.54	1.383	73.10	2.383	6.99	3.38	2.91
0.400	4.54	1.400	73.10	2.400	6.99	3.40	2.91
0.417	4.54	1.417	73.10	2.417	6.99	3.42	2.91
0.433	4.54	1.433	73.10	2.433	6.99	3.43	2.91
0.450	4.54	1.450	73.10	2.450	6.99	3.45	2.91
0.467	4.54	1.467	73.10	2.467	6.99	3.47	2.91
0.483	4.54	1.483	73.10	2.483	6.99	3.48	2.91
0.500	4.54	1.500	73.10	2.500	6.99	3.50	2.91
0.517	6.37	1.517	36.22	2.517	5.78	3.52	2.62
0.533	6.37	1.533	36.22	2.533	5.78	3.53	2.62
0.550	6.37	1.550	36.22	2.550	5.78	3.55	2.62
0.567	6.37	1.567	36.22	2.567	5.78	3.57	2.62
0.583	6.37	1.583	36.22	2.583	5.78	3.58	2.62
0.600	6.37	1.600	36.22	2.600	5.78	3.60	2.62
0.617	6.37	1.617	36.22	2.617	5.78	3.62	2.62
0.633	6.37	1.633	36.22	2.633	5.78	3.63	2.62
0.650	6.37	1.650	36.22	2.650	5.78	3.65	2.62
0.667	6.37	1.667	36.22	2.667	5.78	3.67	2.62
0.683	9.92	1.683	22.14	2.683	4.89	3.68	2.38
0.700	9.92	1.700	22.14	2.700	4.89	3.70	2.38
0.717	9.92	1.717	22.14	2.717	4.89	3.72	2.38

0.733	9.92	1.733	22.14	2.733	4.89	3.73	2.38
0.750	9.92	1.750	22.14	2.750	4.89	3.75	2.38
0.767	9.92	1.767	22.14	2.767	4.89	3.77	2.38
0.783	9.92	1.783	22.14	2.783	4.89	3.78	2.38
0.800	9.92	1.800	22.14	2.800	4.89	3.80	2.38
0.817	9.92	1.817	22.14	2.817	4.89	3.82	2.38
0.833	9.92	1.833	22.14	2.833	4.89	3.83	2.38
0.850	18.63	1.850	15.18	2.850	4.21	3.85	2.18
0.867	18.63	1.867	15.18	2.867	4.21	3.87	2.18
0.883	18.63	1.883	15.18	2.883	4.21	3.88	2.18
0.900	18.63	1.900	15.18	2.900	4.21	3.90	2.18
0.917	18.63	1.917	15.18	2.917	4.21	3.92	2.18
0.933	18.63	1.933	15.18	2.933	4.21	3.93	2.18
0.950	18.63	1.950	15.18	2.950	4.21	3.95	2.18
0.967	18.63	1.967	15.18	2.967	4.21	3.97	2.18
0.983	18.63	1.983	15.18	2.983	4.21	3.98	2.18
1.000	18.63	2.000	15.18	3.000	4.21	4.00	2.18

Max.Eff.Inten.(mm/hr)=	176.19	220.44	
over (min)	5.00	9.00	
Storage Coeff. (min)=	4.33 (ii)	8.66 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.25	0.13	
			TOTALS
PEAK FLOW (cms)=	4.33	2.18	6.191 (iii)
TIME TO PEAK (hrs)=	1.35	1.43	1.37
RUNOFF VOLUME (mm)=	79.32	59.10	70.02
TOTAL RAINFALL (mm)=	80.32	80.32	80.32
RUNOFF COEFFICIENT =	0.99	0.74	0.87

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0029)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8140
	0.0280	0.3250	0.1440	1.0160
	0.0460	0.4470	0.1740	1.1510
	0.0810	0.6790	0.2060	1.3010

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0028)	18.550	6.191	1.37	70.02
OUTFLOW: ID= 1 (0029)	18.550	0.174	3.33	51.81

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.81
TIME SHIFT OF PEAK FLOW (min)=118.00
MAXIMUM STORAGE USED (ha.m.)= 1.1508

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V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL
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 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\f819989b-9a10-4d6b-a8fe-1eb227593ce3\scenari

DATE: 02-19-2026 TIME: 09:36:16

USER:

COMMENTS: _____

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**********************************************
** SIMULATION : 6 - 100yr 4hr 10min Chicago   **
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CHICAGO STORM	IDF curve parameters: A=4688.000
Ptotal= 89.87 mm	B= 17.000
	C= 0.962

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.89	1.00	62.12	2.00	12.48	3.00	3.91
0.17	3.67	1.17	196.54	2.17	9.60	3.17	3.44
0.33	4.88	1.33	83.09	2.33	7.66	3.33	3.05
0.50	6.96	1.50	41.25	2.50	6.29	3.50	2.73
0.67	11.02	1.67	25.07	2.67	5.28	3.67	2.47
0.83	21.03	1.83	17.06	2.83	4.51	3.83	2.24

CALIB		
STANDHYD (0027)	Area (ha)= 11.52	
ID= 1 DT= 1.0 min	Total Imp(%)= 81.00	Dir. Conn.(%)= 67.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.33	2.19
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	277.13	40.00

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.89	1.017	62.12	2.017	12.48	3.02	3.91
0.033	2.89	1.033	62.12	2.033	12.48	3.03	3.91
0.050	2.89	1.050	62.12	2.050	12.48	3.05	3.91
0.067	2.89	1.067	62.12	2.067	12.48	3.07	3.91
0.083	2.89	1.083	62.12	2.083	12.48	3.08	3.91
0.100	2.89	1.100	62.12	2.100	12.48	3.10	3.91
0.117	2.89	1.117	62.12	2.117	12.48	3.12	3.91
0.133	2.89	1.133	62.12	2.133	12.48	3.13	3.91
0.150	2.89	1.150	62.12	2.150	12.48	3.15	3.91
0.167	2.89	1.167	62.12	2.167	12.48	3.17	3.91
0.183	3.67	1.183	196.53	2.183	9.60	3.18	3.44
0.200	3.67	1.200	196.54	2.200	9.60	3.20	3.44
0.217	3.67	1.217	196.54	2.217	9.60	3.22	3.44
0.233	3.67	1.233	196.54	2.233	9.60	3.23	3.44
0.250	3.67	1.250	196.54	2.250	9.60	3.25	3.44
0.267	3.67	1.267	196.54	2.267	9.60	3.27	3.44
0.283	3.67	1.283	196.54	2.283	9.60	3.28	3.44
0.300	3.67	1.300	196.54	2.300	9.60	3.30	3.44
0.317	3.67	1.317	196.54	2.317	9.60	3.32	3.44
0.333	3.67	1.333	196.54	2.333	9.60	3.33	3.44
0.350	4.88	1.350	83.10	2.350	7.66	3.35	3.05
0.367	4.88	1.367	83.09	2.367	7.66	3.37	3.05
0.383	4.88	1.383	83.09	2.383	7.66	3.38	3.05
0.400	4.88	1.400	83.09	2.400	7.66	3.40	3.05
0.417	4.88	1.417	83.09	2.417	7.66	3.42	3.05
0.433	4.88	1.433	83.09	2.433	7.66	3.43	3.05
0.450	4.88	1.450	83.09	2.450	7.66	3.45	3.05
0.467	4.88	1.467	83.09	2.467	7.66	3.47	3.05
0.483	4.88	1.483	83.09	2.483	7.66	3.48	3.05
0.500	4.88	1.500	83.09	2.500	7.66	3.50	3.05
0.517	6.96	1.517	41.25	2.517	6.29	3.52	2.73
0.533	6.96	1.533	41.25	2.533	6.29	3.53	2.73
0.550	6.96	1.550	41.25	2.550	6.29	3.55	2.73
0.567	6.96	1.567	41.25	2.567	6.29	3.57	2.73
0.583	6.96	1.583	41.25	2.583	6.29	3.58	2.73
0.600	6.96	1.600	41.25	2.600	6.29	3.60	2.73
0.617	6.96	1.617	41.25	2.617	6.29	3.62	2.73
0.633	6.96	1.633	41.25	2.633	6.29	3.63	2.73
0.650	6.96	1.650	41.25	2.650	6.29	3.65	2.73
0.667	6.96	1.667	41.25	2.667	6.29	3.67	2.73
0.683	11.02	1.683	25.07	2.683	5.28	3.68	2.47
0.700	11.02	1.700	25.07	2.700	5.28	3.70	2.47
0.717	11.02	1.717	25.07	2.717	5.28	3.72	2.47
0.733	11.02	1.733	25.07	2.733	5.28	3.73	2.47
0.750	11.02	1.750	25.07	2.750	5.28	3.75	2.47
0.767	11.02	1.767	25.07	2.767	5.28	3.77	2.47
0.783	11.02	1.783	25.07	2.783	5.28	3.78	2.47
0.800	11.02	1.800	25.07	2.800	5.28	3.80	2.47
0.817	11.02	1.817	25.07	2.817	5.28	3.82	2.47
0.833	11.02	1.833	25.07	2.833	5.28	3.83	2.47
0.850	21.03	1.850	17.06	2.850	4.51	3.85	2.24
0.867	21.03	1.867	17.06	2.867	4.51	3.87	2.24
0.883	21.03	1.883	17.06	2.883	4.51	3.88	2.24
0.900	21.03	1.900	17.06	2.900	4.51	3.90	2.24
0.917	21.03	1.917	17.06	2.917	4.51	3.92	2.24
0.933	21.03	1.933	17.06	2.933	4.51	3.93	2.24
0.950	21.03	1.950	17.06	2.950	4.51	3.95	2.24
0.967	21.03	1.967	17.06	2.967	4.51	3.97	2.24
0.983	21.03	1.983	17.06	2.983	4.51	3.98	2.24
1.000	21.03	2.000	17.06	3.000	4.51	4.00	2.24

Max.Eff.Inten.(mm/hr)=	196.54	273.32	
over (min)	5.00	7.00	
Storage Coeff. (min)=	3.59 (ii)	6.85 (ii)	
Unit Hyd. Tpeak (min)=	5.00	7.00	
Unit Hyd. peak (cms)=	0.28	0.16	
			TOTALS
PEAK FLOW (cms)=	3.85	1.26	5.029 (iii)
TIME TO PEAK (hrs)=	1.35	1.40	1.35
RUNOFF VOLUME (mm)=	88.87	69.00	82.31
TOTAL RAINFALL (mm)=	89.87	89.87	89.87
RUNOFF COEFFICIENT =	0.99	0.77	0.92

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0026) / IN= 2---> OUT= 1 / DT= 1.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5440
	0.0190	0.2190	0.0790	0.6710
	0.0250	0.3040	0.0950	0.7570
	0.0440	0.4560	0.1130	0.8520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0027)	11.520	5.029	1.35	82.31
OUTFLOW: ID= 1 (0026)	11.520	0.113	3.32	57.15

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.25
TIME SHIFT OF PEAK FLOW (min)=118.00
MAXIMUM STORAGE USED (ha.m.)= 0.8517

CALIB
STANDHYD (0028) | Area (ha)= 18.55
ID= 1 DT= 1.0 min | Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.89	1.017	62.12	2.017	12.48	3.02	3.91
0.033	2.89	1.033	62.12	2.033	12.48	3.03	3.91
0.050	2.89	1.050	62.12	2.050	12.48	3.05	3.91
0.067	2.89	1.067	62.12	2.067	12.48	3.07	3.91
0.083	2.89	1.083	62.12	2.083	12.48	3.08	3.91

0.100	2.89	1.100	62.12	2.100	12.48	3.10	3.91
0.117	2.89	1.117	62.12	2.117	12.48	3.12	3.91
0.133	2.89	1.133	62.12	2.133	12.48	3.13	3.91
0.150	2.89	1.150	62.12	2.150	12.48	3.15	3.91
0.167	2.89	1.167	62.12	2.167	12.48	3.17	3.91
0.183	3.67	1.183	196.53	2.183	9.60	3.18	3.44
0.200	3.67	1.200	196.54	2.200	9.60	3.20	3.44
0.217	3.67	1.217	196.54	2.217	9.60	3.22	3.44
0.233	3.67	1.233	196.54	2.233	9.60	3.23	3.44
0.250	3.67	1.250	196.54	2.250	9.60	3.25	3.44
0.267	3.67	1.267	196.54	2.267	9.60	3.27	3.44
0.283	3.67	1.283	196.54	2.283	9.60	3.28	3.44
0.300	3.67	1.300	196.54	2.300	9.60	3.30	3.44
0.317	3.67	1.317	196.54	2.317	9.60	3.32	3.44
0.333	3.67	1.333	196.54	2.333	9.60	3.33	3.44
0.350	4.88	1.350	83.10	2.350	7.66	3.35	3.05
0.367	4.88	1.367	83.09	2.367	7.66	3.37	3.05
0.383	4.88	1.383	83.09	2.383	7.66	3.38	3.05
0.400	4.88	1.400	83.09	2.400	7.66	3.40	3.05
0.417	4.88	1.417	83.09	2.417	7.66	3.42	3.05
0.433	4.88	1.433	83.09	2.433	7.66	3.43	3.05
0.450	4.88	1.450	83.09	2.450	7.66	3.45	3.05
0.467	4.88	1.467	83.09	2.467	7.66	3.47	3.05
0.483	4.88	1.483	83.09	2.483	7.66	3.48	3.05
0.500	4.88	1.500	83.09	2.500	7.66	3.50	3.05
0.517	6.96	1.517	41.25	2.517	6.29	3.52	2.73
0.533	6.96	1.533	41.25	2.533	6.29	3.53	2.73
0.550	6.96	1.550	41.25	2.550	6.29	3.55	2.73
0.567	6.96	1.567	41.25	2.567	6.29	3.57	2.73
0.583	6.96	1.583	41.25	2.583	6.29	3.58	2.73
0.600	6.96	1.600	41.25	2.600	6.29	3.60	2.73
0.617	6.96	1.617	41.25	2.617	6.29	3.62	2.73
0.633	6.96	1.633	41.25	2.633	6.29	3.63	2.73
0.650	6.96	1.650	41.25	2.650	6.29	3.65	2.73
0.667	6.96	1.667	41.25	2.667	6.29	3.67	2.73
0.683	11.02	1.683	25.07	2.683	5.28	3.68	2.47
0.700	11.02	1.700	25.07	2.700	5.28	3.70	2.47
0.717	11.02	1.717	25.07	2.717	5.28	3.72	2.47
0.733	11.02	1.733	25.07	2.733	5.28	3.73	2.47
0.750	11.02	1.750	25.07	2.750	5.28	3.75	2.47
0.767	11.02	1.767	25.07	2.767	5.28	3.77	2.47
0.783	11.02	1.783	25.07	2.783	5.28	3.78	2.47
0.800	11.02	1.800	25.07	2.800	5.28	3.80	2.47
0.817	11.02	1.817	25.07	2.817	5.28	3.82	2.47
0.833	11.02	1.833	25.07	2.833	5.28	3.83	2.47
0.850	21.03	1.850	17.06	2.850	4.51	3.85	2.24
0.867	21.03	1.867	17.06	2.867	4.51	3.87	2.24
0.883	21.03	1.883	17.06	2.883	4.51	3.88	2.24
0.900	21.03	1.900	17.06	2.900	4.51	3.90	2.24
0.917	21.03	1.917	17.06	2.917	4.51	3.92	2.24
0.933	21.03	1.933	17.06	2.933	4.51	3.93	2.24
0.950	21.03	1.950	17.06	2.950	4.51	3.95	2.24
0.967	21.03	1.967	17.06	2.967	4.51	3.97	2.24
0.983	21.03	1.983	17.06	2.983	4.51	3.98	2.24
1.000	21.03	2.000	17.06	3.000	4.51	4.00	2.24

Max.Eff.Inten.(mm/hr)=	196.54	254.50	
over (min)	5.00	9.00	
Storage Coeff. (min)=	4.15 (ii)	8.29 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.25	0.13	
			TOTALS
PEAK FLOW (cms)=	4.88	2.56	7.085 (iii)
TIME TO PEAK (hrs)=	1.35	1.43	1.37
RUNOFF VOLUME (mm)=	88.87	68.07	79.30
TOTAL RAINFALL (mm)=	89.87	89.87	89.87

RUNOFF COEFFICIENT =	0.99	0.76	0.88

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0029)|	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min |	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8140
	0.0280	0.3250	0.1440	1.0160
	0.0460	0.4470	0.1740	1.1510
	0.0810	0.6790	0.2060	1.3010

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0028)	18.550	7.085	1.37	79.30
OUTFLOW: ID= 1 (0029)	18.550	0.206	3.20	59.80

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.91
TIME SHIFT OF PEAK FLOW (min)=110.00
MAXIMUM STORAGE USED (ha.m.)= 1.3006

FINISH

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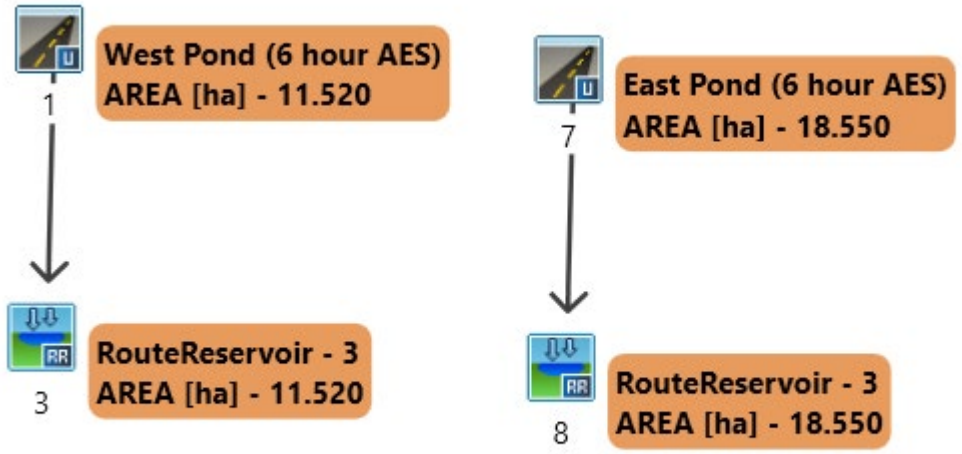

SCHAEFFERS
CONSULTING ENGINEERS

6 Hour AES
Mount Hope Residential Subdivision

Job #: 2024-5476	Date: February 2026

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================================================================================
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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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9c16-43e17470752a\2ea46f81-1a5b-4a98-9542-f71be73a89a7\scenari
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DATE: 02-19-2026                          TIME: 09:39:01

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : 1 - 2 Year 6 Hour AES (Bloor, **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\hliu\AppD
|                  |              ata\Local\Temp\
|                  |              c59d9569-0537-4e45-83da-c6e2d9da4656\f7343972
| Ptotal= 36.00 mm |    Comments: 2 Year 6 Hour AES (Bloor, TRCA)
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  1.75   12.24 |  3.50    5.04 |  5.25    0.72
                0.25    0.72 |  2.00   12.24 |  3.75    2.88 |  5.50    0.72
                0.50    0.72 |  2.25   33.12 |  4.00    2.88 |  5.75    0.72
                0.75    0.72 |  2.50   33.12 |  4.25    1.44 |  6.00    0.72
                1.00    0.72 |  2.75    9.36 |  4.50    1.44 |
                1.25    4.32 |  3.00    9.36 |  4.75    0.72 |
                1.50    4.32 |  3.25    5.04 |  5.00    0.72 |

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| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  11.52
|ID= 1 DT= 1.0 min |   Total Imp(%)=  81.00   Dir. Conn.(%)=  67.00
--------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          9.33          2.19
     Dep. Storage     (mm)=          1.00          1.50
     Average Slope     (%)=          1.00          2.00
     Length            (m)=        277.13         40.00
     Mannings n           =         0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.017    0.00 | 1.583    4.32 | 3.150    9.36 |  4.72    1.44
     0.033    0.00 | 1.600    4.32 | 3.167    9.36 |  4.73    1.44
     0.050    0.00 | 1.617    4.32 | 3.183    9.36 |  4.75    1.44
     0.067    0.00 | 1.633    4.32 | 3.200    9.36 |  4.77    0.72
     0.083    0.00 | 1.650    4.32 | 3.217    9.36 |  4.78    0.72
     0.100    0.00 | 1.667    4.32 | 3.233    9.36 |  4.80    0.72
     0.117    0.00 | 1.683    4.32 | 3.250    9.36 |  4.82    0.72
     0.133    0.00 | 1.700    4.32 | 3.267    5.04 |  4.83    0.72
     0.150    0.00 | 1.717    4.32 | 3.283    5.04 |  4.85    0.72
     0.167    0.00 | 1.733    4.32 | 3.300    5.04 |  4.87    0.72
     0.183    0.00 | 1.750    4.32 | 3.317    5.04 |  4.88    0.72
     0.200    0.00 | 1.767   12.24 | 3.333    5.04 |  4.90    0.72
     0.217    0.00 | 1.783   12.24 | 3.350    5.04 |  4.92    0.72
     0.233    0.00 | 1.800   12.24 | 3.367    5.04 |  4.93    0.72
     0.250    0.00 | 1.817   12.24 | 3.383    5.04 |  4.95    0.72
     0.267    0.72 | 1.833   12.24 | 3.400    5.04 |  4.97    0.72
     0.283    0.72 | 1.850   12.24 | 3.417    5.04 |  4.98    0.72
     0.300    0.72 | 1.867   12.24 | 3.433    5.04 |  5.00    0.72
     0.317    0.72 | 1.883   12.24 | 3.450    5.04 |  5.02    0.72
     0.333    0.72 | 1.900   12.24 | 3.467    5.04 |  5.03    0.72
     0.350    0.72 | 1.917   12.24 | 3.483    5.04 |  5.05    0.72
     0.367    0.72 | 1.933   12.24 | 3.500    5.04 |  5.07    0.72
     0.383    0.72 | 1.950   12.24 | 3.517    5.04 |  5.08    0.72
     0.400    0.72 | 1.967   12.24 | 3.533    5.04 |  5.10    0.72
     0.417    0.72 | 1.983   12.24 | 3.550    5.04 |  5.12    0.72
     0.433    0.72 | 2.000   12.24 | 3.567    5.04 |  5.13    0.72
     0.450    0.72 | 2.017   12.24 | 3.583    5.04 |  5.15    0.72
     0.467    0.72 | 2.033   12.24 | 3.600    5.04 |  5.17    0.72
     0.483    0.72 | 2.050   12.24 | 3.617    5.04 |  5.18    0.72
     0.500    0.72 | 2.067   12.24 | 3.633    5.04 |  5.20    0.72
     0.517    0.72 | 2.083   12.24 | 3.650    5.04 |  5.22    0.72
     0.533    0.72 | 2.100   12.24 | 3.667    5.04 |  5.23    0.72
     0.550    0.72 | 2.117   12.24 | 3.683    5.04 |  5.25    0.72
     0.567    0.72 | 2.133   12.24 | 3.700    5.04 |  5.27    0.72
     0.583    0.72 | 2.150   12.24 | 3.717    5.04 |  5.28    0.72
     0.600    0.72 | 2.167   12.24 | 3.733    5.04 |  5.30    0.72
     0.617    0.72 | 2.183   12.24 | 3.750    5.04 |  5.32    0.72
     0.633    0.72 | 2.200   12.24 | 3.767    2.88 |  5.33    0.72
     0.650    0.72 | 2.217   12.24 | 3.783    2.88 |  5.35    0.72
     0.667    0.72 | 2.233   12.24 | 3.800    2.88 |  5.37    0.72
     0.683    0.72 | 2.250   12.24 | 3.817    2.88 |  5.38    0.72
     0.700    0.72 | 2.267   33.12 | 3.833    2.88 |  5.40    0.72
     0.717    0.72 | 2.283   33.12 | 3.850    2.88 |  5.42    0.72
     0.733    0.72 | 2.300   33.12 | 3.867    2.88 |  5.43    0.72
     0.750    0.72 | 2.317   33.12 | 3.883    2.88 |  5.45    0.72
     0.767    0.72 | 2.333   33.12 | 3.900    2.88 |  5.47    0.72
     0.783    0.72 | 2.350   33.12 | 3.917    2.88 |  5.48    0.72
     0.800    0.72 | 2.367   33.12 | 3.933    2.88 |  5.50    0.72
     0.817    0.72 | 2.383   33.12 | 3.950    2.88 |  5.52    0.72
     0.833    0.72 | 2.400   33.12 | 3.967    2.88 |  5.53    0.72
     0.850    0.72 | 2.417   33.12 | 3.983    2.88 |  5.55    0.72
     0.867    0.72 | 2.433   33.12 | 4.000    2.88 |  5.57    0.72
```

0.883	0.72	2.450	33.12	4.017	2.88	5.58	0.72
0.900	0.72	2.467	33.12	4.033	2.88	5.60	0.72
0.917	0.72	2.483	33.12	4.050	2.88	5.62	0.72
0.933	0.72	2.500	33.12	4.067	2.88	5.63	0.72
0.950	0.72	2.517	33.12	4.083	2.88	5.65	0.72
0.967	0.72	2.533	33.12	4.100	2.88	5.67	0.72
0.983	0.72	2.550	33.12	4.117	2.88	5.68	0.72
1.000	0.72	2.567	33.12	4.133	2.88	5.70	0.72
1.017	0.72	2.583	33.12	4.150	2.88	5.72	0.72
1.033	0.72	2.600	33.12	4.167	2.88	5.73	0.72
1.050	0.72	2.617	33.12	4.183	2.88	5.75	0.72
1.067	0.72	2.633	33.12	4.200	2.88	5.77	0.72
1.083	0.72	2.650	33.12	4.217	2.88	5.78	0.72
1.100	0.72	2.667	33.12	4.233	2.88	5.80	0.72
1.117	0.72	2.683	33.12	4.250	2.88	5.82	0.72
1.133	0.72	2.700	33.12	4.267	1.44	5.83	0.72
1.150	0.72	2.717	33.12	4.283	1.44	5.85	0.72
1.167	0.72	2.733	33.12	4.300	1.44	5.87	0.72
1.183	0.72	2.750	33.12	4.317	1.44	5.88	0.72
1.200	0.72	2.767	9.36	4.333	1.44	5.90	0.72
1.217	0.72	2.783	9.36	4.350	1.44	5.92	0.72
1.233	0.72	2.800	9.36	4.367	1.44	5.93	0.72
1.250	0.72	2.817	9.36	4.383	1.44	5.95	0.72
1.267	4.32	2.833	9.36	4.400	1.44	5.97	0.72
1.283	4.32	2.850	9.36	4.417	1.44	5.98	0.72
1.300	4.32	2.867	9.36	4.433	1.44	6.00	0.72
1.317	4.32	2.883	9.36	4.450	1.44	6.02	0.72
1.333	4.32	2.900	9.36	4.467	1.44	6.03	0.72
1.350	4.32	2.917	9.36	4.483	1.44	6.05	0.72
1.367	4.32	2.933	9.36	4.500	1.44	6.07	0.72
1.383	4.32	2.950	9.36	4.517	1.44	6.08	0.72
1.400	4.32	2.967	9.36	4.533	1.44	6.10	0.72
1.417	4.32	2.983	9.36	4.550	1.44	6.12	0.72
1.433	4.32	3.000	9.36	4.567	1.44	6.13	0.72
1.450	4.32	3.017	9.36	4.583	1.44	6.15	0.72
1.467	4.32	3.033	9.36	4.600	1.44	6.17	0.72
1.483	4.32	3.050	9.36	4.617	1.44	6.18	0.72
1.500	4.32	3.067	9.36	4.633	1.44	6.20	0.72
1.517	4.32	3.083	9.36	4.650	1.44	6.22	0.72
1.533	4.32	3.100	9.36	4.667	1.44	6.23	0.72
1.550	4.32	3.117	9.36	4.683	1.44	6.25	0.72
1.567	4.32	3.133	9.36	4.700	1.44		

Max.Eff.Inten.(mm/hr)=	33.12	40.66	
over (min)	7.00	14.00	
Storage Coeff. (min)=	7.33 (ii)	13.96 (ii)	
Unit Hyd. Tpeak (min)=	7.00	14.00	
Unit Hyd. peak (cms)=	0.16	0.08	
			TOTALS
PEAK FLOW (cms)=	0.70	0.19	0.876 (iii)
TIME TO PEAK (hrs)=	2.75	2.83	2.75
RUNOFF VOLUME (mm)=	35.00	20.26	30.13
TOTAL RAINFALL (mm)=	36.00	36.00	36.00
RUNOFF COEFFICIENT =	0.97	0.56	0.84

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0003)	OVERFLOW IS OFF
IN= 2---> OUT= 1	

DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5020
	0.0190	0.2190	0.0790	0.5950
	0.0250	0.3150	0.0950	0.6640
	0.0440	0.4270	0.1130	0.7310

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	11.520	0.876	2.75	30.13
OUTFLOW: ID= 1 (0003)	11.520	0.025	5.15	18.17

PEAK FLOW REDUCTION [Qout/Qin](%)= 2.85
TIME SHIFT OF PEAK FLOW (min)=144.00
MAXIMUM STORAGE USED (ha.m.)= 0.3149

CALIB	
STANDHYD (0007)	Area (ha)= 18.55
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.583	4.32	3.150	9.36	4.72	1.44
0.033	0.00	1.600	4.32	3.167	9.36	4.73	1.44
0.050	0.00	1.617	4.32	3.183	9.36	4.75	1.44
0.067	0.00	1.633	4.32	3.200	9.36	4.77	0.72
0.083	0.00	1.650	4.32	3.217	9.36	4.78	0.72
0.100	0.00	1.667	4.32	3.233	9.36	4.80	0.72
0.117	0.00	1.683	4.32	3.250	9.36	4.82	0.72
0.133	0.00	1.700	4.32	3.267	5.04	4.83	0.72
0.150	0.00	1.717	4.32	3.283	5.04	4.85	0.72
0.167	0.00	1.733	4.32	3.300	5.04	4.87	0.72
0.183	0.00	1.750	4.32	3.317	5.04	4.88	0.72
0.200	0.00	1.767	12.24	3.333	5.04	4.90	0.72
0.217	0.00	1.783	12.24	3.350	5.04	4.92	0.72
0.233	0.00	1.800	12.24	3.367	5.04	4.93	0.72
0.250	0.00	1.817	12.24	3.383	5.04	4.95	0.72
0.267	0.72	1.833	12.24	3.400	5.04	4.97	0.72
0.283	0.72	1.850	12.24	3.417	5.04	4.98	0.72
0.300	0.72	1.867	12.24	3.433	5.04	5.00	0.72
0.317	0.72	1.883	12.24	3.450	5.04	5.02	0.72
0.333	0.72	1.900	12.24	3.467	5.04	5.03	0.72
0.350	0.72	1.917	12.24	3.483	5.04	5.05	0.72
0.367	0.72	1.933	12.24	3.500	5.04	5.07	0.72
0.383	0.72	1.950	12.24	3.517	5.04	5.08	0.72
0.400	0.72	1.967	12.24	3.533	5.04	5.10	0.72
0.417	0.72	1.983	12.24	3.550	5.04	5.12	0.72
0.433	0.72	2.000	12.24	3.567	5.04	5.13	0.72
0.450	0.72	2.017	12.24	3.583	5.04	5.15	0.72
0.467	0.72	2.033	12.24	3.600	5.04	5.17	0.72
0.483	0.72	2.050	12.24	3.617	5.04	5.18	0.72
0.500	0.72	2.067	12.24	3.633	5.04	5.20	0.72
0.517	0.72	2.083	12.24	3.650	5.04	5.22	0.72

0.533	0.72	2.100	12.24	3.667	5.04	5.23	0.72
0.550	0.72	2.117	12.24	3.683	5.04	5.25	0.72
0.567	0.72	2.133	12.24	3.700	5.04	5.27	0.72
0.583	0.72	2.150	12.24	3.717	5.04	5.28	0.72
0.600	0.72	2.167	12.24	3.733	5.04	5.30	0.72
0.617	0.72	2.183	12.24	3.750	5.04	5.32	0.72
0.633	0.72	2.200	12.24	3.767	2.88	5.33	0.72
0.650	0.72	2.217	12.24	3.783	2.88	5.35	0.72
0.667	0.72	2.233	12.24	3.800	2.88	5.37	0.72
0.683	0.72	2.250	12.24	3.817	2.88	5.38	0.72
0.700	0.72	2.267	33.12	3.833	2.88	5.40	0.72
0.717	0.72	2.283	33.12	3.850	2.88	5.42	0.72
0.733	0.72	2.300	33.12	3.867	2.88	5.43	0.72
0.750	0.72	2.317	33.12	3.883	2.88	5.45	0.72
0.767	0.72	2.333	33.12	3.900	2.88	5.47	0.72
0.783	0.72	2.350	33.12	3.917	2.88	5.48	0.72
0.800	0.72	2.367	33.12	3.933	2.88	5.50	0.72
0.817	0.72	2.383	33.12	3.950	2.88	5.52	0.72
0.833	0.72	2.400	33.12	3.967	2.88	5.53	0.72
0.850	0.72	2.417	33.12	3.983	2.88	5.55	0.72
0.867	0.72	2.433	33.12	4.000	2.88	5.57	0.72
0.883	0.72	2.450	33.12	4.017	2.88	5.58	0.72
0.900	0.72	2.467	33.12	4.033	2.88	5.60	0.72
0.917	0.72	2.483	33.12	4.050	2.88	5.62	0.72
0.933	0.72	2.500	33.12	4.067	2.88	5.63	0.72
0.950	0.72	2.517	33.12	4.083	2.88	5.65	0.72
0.967	0.72	2.533	33.12	4.100	2.88	5.67	0.72
0.983	0.72	2.550	33.12	4.117	2.88	5.68	0.72
1.000	0.72	2.567	33.12	4.133	2.88	5.70	0.72
1.017	0.72	2.583	33.12	4.150	2.88	5.72	0.72
1.033	0.72	2.600	33.12	4.167	2.88	5.73	0.72
1.050	0.72	2.617	33.12	4.183	2.88	5.75	0.72
1.067	0.72	2.633	33.12	4.200	2.88	5.77	0.72
1.083	0.72	2.650	33.12	4.217	2.88	5.78	0.72
1.100	0.72	2.667	33.12	4.233	2.88	5.80	0.72
1.117	0.72	2.683	33.12	4.250	2.88	5.82	0.72
1.133	0.72	2.700	33.12	4.267	1.44	5.83	0.72
1.150	0.72	2.717	33.12	4.283	1.44	5.85	0.72
1.167	0.72	2.733	33.12	4.300	1.44	5.87	0.72
1.183	0.72	2.750	33.12	4.317	1.44	5.88	0.72
1.200	0.72	2.767	9.36	4.333	1.44	5.90	0.72
1.217	0.72	2.783	9.36	4.350	1.44	5.92	0.72
1.233	0.72	2.800	9.36	4.367	1.44	5.93	0.72
1.250	0.72	2.817	9.36	4.383	1.44	5.95	0.72
1.267	4.32	2.833	9.36	4.400	1.44	5.97	0.72
1.283	4.32	2.850	9.36	4.417	1.44	5.98	0.72
1.300	4.32	2.867	9.36	4.433	1.44	6.00	0.72
1.317	4.32	2.883	9.36	4.450	1.44	6.02	0.72
1.333	4.32	2.900	9.36	4.467	1.44	6.03	0.72
1.350	4.32	2.917	9.36	4.483	1.44	6.05	0.72
1.367	4.32	2.933	9.36	4.500	1.44	6.07	0.72
1.383	4.32	2.950	9.36	4.517	1.44	6.08	0.72
1.400	4.32	2.967	9.36	4.533	1.44	6.10	0.72
1.417	4.32	2.983	9.36	4.550	1.44	6.12	0.72
1.433	4.32	3.000	9.36	4.567	1.44	6.13	0.72
1.450	4.32	3.017	9.36	4.583	1.44	6.15	0.72
1.467	4.32	3.033	9.36	4.600	1.44	6.17	0.72
1.483	4.32	3.050	9.36	4.617	1.44	6.18	0.72
1.500	4.32	3.067	9.36	4.633	1.44	6.20	0.72
1.517	4.32	3.083	9.36	4.650	1.44	6.22	0.72
1.533	4.32	3.100	9.36	4.667	1.44	6.23	0.72
1.550	4.32	3.117	9.36	4.683	1.44	6.25	0.72
1.567	4.32	3.133	9.36	4.700	1.44		

Max.Eff.Inten.(mm/hr)=	33.12	37.61
over (min)	8.00	17.00

Storage Coeff. (min)=	8.45 (ii)	16.90 (ii)	
Unit Hyd. Tpeak (min)=	8.00	17.00	
Unit Hyd. peak (cms)=	0.14	0.07	
			TOTALS
PEAK FLOW (cms)=	0.89	0.38	1.242 (iii)
TIME TO PEAK (hrs)=	2.75	2.88	2.77
RUNOFF VOLUME (mm)=	35.00	19.74	27.98
TOTAL RAINFALL (mm)=	36.00	36.00	36.00
RUNOFF COEFFICIENT =	0.97	0.55	0.78

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0008)| IN= 2---> OUT= 1 | DT= 1.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.7510
	0.0280	0.3250	0.1440	0.8950
	0.0460	0.4650	0.1740	1.0020
	0.0810	0.6370	0.2060	1.1080

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	18.550	1.242	2.77	27.98
OUTFLOW: ID= 1 (0008)	18.550	0.046	5.12	17.43

PEAK FLOW REDUCTION [Qout/Qin](%)= 3.70
TIME SHIFT OF PEAK FLOW (min)=141.00
MAXIMUM STORAGE USED (ha.m.)= 0.4649

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\b9a53dfd-44ce-452a-beb7-43cab20a37ac\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\b9a53dfd-44ce-452a-beb7-43cab20a37ac\scenari

DATE: 02-19-2026 TIME: 09:39:01

USER:

COMMENTS: _____

****
** SIMULATION : 2 - 5 Year 6 Hour AES (Bloor, **
****

READ STORM	Filename: C:\Users\hliu\AppData\Local\Temp\c59d9569-0537-4e45-83da-c6e2d9da4656\73a232f7
Ptotal= 47.81 mm	Comments: 5 Year 6 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.75	16.25	3.50	6.69	5.25	0.96
0.25	0.96	2.00	16.25	3.75	3.82	5.50	0.96
0.50	0.96	2.25	43.98	4.00	3.82	5.75	0.96
0.75	0.96	2.50	43.98	4.25	1.91	6.00	0.96
1.00	0.96	2.75	12.43	4.50	1.91		
1.25	5.74	3.00	12.43	4.75	0.96		
1.50	5.74	3.25	6.69	5.00	0.96		

CALIB	
STANDHYD (0001)	Area (ha)= 11.52
ID= 1 DT= 1.0 min	Total Imp(%)= 81.00 Dir. Conn.(%)= 67.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.33	2.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.583	5.74	3.150	12.43	4.72	1.91
0.033	0.00	1.600	5.74	3.167	12.43	4.73	1.91
0.050	0.00	1.617	5.74	3.183	12.43	4.75	1.91
0.067	0.00	1.633	5.74	3.200	12.43	4.77	0.96
0.083	0.00	1.650	5.74	3.217	12.43	4.78	0.96
0.100	0.00	1.667	5.74	3.233	12.43	4.80	0.96
0.117	0.00	1.683	5.74	3.250	12.43	4.82	0.96
0.133	0.00	1.700	5.74	3.267	6.69	4.83	0.96
0.150	0.00	1.717	5.74	3.283	6.69	4.85	0.96
0.167	0.00	1.733	5.74	3.300	6.69	4.87	0.96
0.183	0.00	1.750	5.74	3.317	6.69	4.88	0.96
0.200	0.00	1.767	16.25	3.333	6.69	4.90	0.96
0.217	0.00	1.783	16.25	3.350	6.69	4.92	0.96
0.233	0.00	1.800	16.25	3.367	6.69	4.93	0.96
0.250	0.00	1.817	16.25	3.383	6.69	4.95	0.96
0.267	0.96	1.833	16.25	3.400	6.69	4.97	0.96
0.283	0.96	1.850	16.25	3.417	6.69	4.98	0.96
0.300	0.96	1.867	16.25	3.433	6.69	5.00	0.96
0.317	0.96	1.883	16.25	3.450	6.69	5.02	0.96
0.333	0.96	1.900	16.25	3.467	6.69	5.03	0.96
0.350	0.96	1.917	16.25	3.483	6.69	5.05	0.96
0.367	0.96	1.933	16.25	3.500	6.69	5.07	0.96
0.383	0.96	1.950	16.25	3.517	6.69	5.08	0.96
0.400	0.96	1.967	16.25	3.533	6.69	5.10	0.96
0.417	0.96	1.983	16.25	3.550	6.69	5.12	0.96
0.433	0.96	2.000	16.25	3.567	6.69	5.13	0.96
0.450	0.96	2.017	16.25	3.583	6.69	5.15	0.96
0.467	0.96	2.033	16.25	3.600	6.69	5.17	0.96
0.483	0.96	2.050	16.25	3.617	6.69	5.18	0.96
0.500	0.96	2.067	16.25	3.633	6.69	5.20	0.96
0.517	0.96	2.083	16.25	3.650	6.69	5.22	0.96
0.533	0.96	2.100	16.25	3.667	6.69	5.23	0.96
0.550	0.96	2.117	16.25	3.683	6.69	5.25	0.96
0.567	0.96	2.133	16.25	3.700	6.69	5.27	0.96
0.583	0.96	2.150	16.25	3.717	6.69	5.28	0.96
0.600	0.96	2.167	16.25	3.733	6.69	5.30	0.96
0.617	0.96	2.183	16.25	3.750	6.69	5.32	0.96
0.633	0.96	2.200	16.25	3.767	3.82	5.33	0.96
0.650	0.96	2.217	16.25	3.783	3.82	5.35	0.96
0.667	0.96	2.233	16.25	3.800	3.82	5.37	0.96
0.683	0.96	2.250	16.25	3.817	3.82	5.38	0.96
0.700	0.96	2.267	43.98	3.833	3.82	5.40	0.96
0.717	0.96	2.283	43.98	3.850	3.82	5.42	0.96
0.733	0.96	2.300	43.98	3.867	3.82	5.43	0.96
0.750	0.96	2.317	43.98	3.883	3.82	5.45	0.96
0.767	0.96	2.333	43.98	3.900	3.82	5.47	0.96
0.783	0.96	2.350	43.98	3.917	3.82	5.48	0.96
0.800	0.96	2.367	43.98	3.933	3.82	5.50	0.96
0.817	0.96	2.383	43.98	3.950	3.82	5.52	0.96
0.833	0.96	2.400	43.98	3.967	3.82	5.53	0.96
0.850	0.96	2.417	43.98	3.983	3.82	5.55	0.96
0.867	0.96	2.433	43.98	4.000	3.82	5.57	0.96
0.883	0.96	2.450	43.98	4.017	3.82	5.58	0.96
0.900	0.96	2.467	43.98	4.033	3.82	5.60	0.96
0.917	0.96	2.483	43.98	4.050	3.82	5.62	0.96
0.933	0.96	2.500	43.98	4.067	3.82	5.63	0.96
0.950	0.96	2.517	43.98	4.083	3.82	5.65	0.96
0.967	0.96	2.533	43.98	4.100	3.82	5.67	0.96
0.983	0.96	2.550	43.98	4.117	3.82	5.68	0.96
1.000	0.96	2.567	43.98	4.133	3.82	5.70	0.96
1.017	0.96	2.583	43.98	4.150	3.82	5.72	0.96
1.033	0.96	2.600	43.98	4.167	3.82	5.73	0.96
1.050	0.96	2.617	43.98	4.183	3.82	5.75	0.96
1.067	0.96	2.633	43.98	4.200	3.82	5.77	0.96
1.083	0.96	2.650	43.98	4.217	3.82	5.78	0.96
1.100	0.96	2.667	43.98	4.233	3.82	5.80	0.96
1.117	0.96	2.683	43.98	4.250	3.82	5.82	0.96
1.133	0.96	2.700	43.98	4.267	1.91	5.83	0.96
1.150	0.96	2.717	43.98	4.283	1.91	5.85	0.96
1.167	0.96	2.733	43.98	4.300	1.91	5.87	0.96
1.183	0.96	2.750	43.98	4.317	1.91	5.88	0.96
1.200	0.96	2.767	12.43	4.333	1.91	5.90	0.96
1.217	0.96	2.783	12.43	4.350	1.91	5.92	0.96
1.233	0.96	2.800	12.43	4.367	1.91	5.93	0.96
1.250	0.96	2.817	12.43	4.383	1.91	5.95	0.96
1.267	5.74	2.833	12.43	4.400	1.91	5.97	0.96
1.283	5.74	2.850	12.43	4.417	1.91	5.98	0.96
1.300	5.74	2.867	12.43	4.433	1.91	6.00	0.96
1.317	5.74	2.883	12.43	4.450	1.91	6.02	0.96
1.333	5.74	2.900	12.43	4.467	1.91	6.03	0.96

1.350	5.74	2.917	12.43	4.483	1.91	6.05	0.96
1.367	5.74	2.933	12.43	4.500	1.91	6.07	0.96
1.383	5.74	2.950	12.43	4.517	1.91	6.08	0.96
1.400	5.74	2.967	12.43	4.533	1.91	6.10	0.96
1.417	5.74	2.983	12.43	4.550	1.91	6.12	0.96
1.433	5.74	3.000	12.43	4.567	1.91	6.13	0.96
1.450	5.74	3.017	12.43	4.583	1.91	6.15	0.96
1.467	5.74	3.033	12.43	4.600	1.91	6.17	0.96
1.483	5.74	3.050	12.43	4.617	1.91	6.18	0.96
1.500	5.74	3.067	12.43	4.633	1.91	6.20	0.96
1.517	5.74	3.083	12.43	4.650	1.91	6.22	0.96
1.533	5.74	3.100	12.43	4.667	1.91	6.23	0.96
1.550	5.74	3.117	12.43	4.683	1.91	6.25	0.96
1.567	5.74	3.133	12.43	4.700	1.91		

Max.Eff.Inten.(mm/hr)=	43.98	59.63		
over (min)	7.00	13.00		
Storage Coeff. (min)=	6.54 (ii)	12.46 (ii)		
Unit Hyd. Tpeak (min)=	7.00	13.00		
Unit Hyd. peak (cms)=	0.17	0.09		
				TOTALS
PEAK FLOW (cms)=	0.93	0.29		1.217 (iii)
TIME TO PEAK (hrs)=	2.75	2.82		2.75
RUNOFF VOLUME (mm)=	46.81	30.29		41.36
TOTAL RAINFALL (mm)=	47.81	47.81		47.81
RUNOFF COEFFICIENT =	0.98	0.63		0.87

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0003)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5020
	0.0190	0.2190	0.0790	0.5950
	0.0250	0.3150	0.0950	0.6640
	0.0440	0.4270	0.1130	0.7310

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	11.520	1.217	2.75	41.36
OUTFLOW: ID= 1 (0003)	11.520	0.044	4.93	25.51

PEAK FLOW REDUCTION [Qout/Qin](%)= 3.62
TIME SHIFT OF PEAK FLOW (min)=131.00
MAXIMUM STORAGE USED (ha.m.)= 0.4274

CALIB				
STANDHYD (0007)	Area (ha)= 18.55			
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00	Dir. Conn.(%)= 54.00		
	IMPERVIOUS	PERVIOUS (i)		
Surface Area (ha)=	13.36	5.19		
Dep. Storage (mm)=	1.00	1.50		
Average Slope (%)=	1.00	2.00		
Length (m)=	351.66	40.00		
Mannings n =	0.013	0.250		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.583	5.74	3.150	12.43	4.72	1.91
0.033	0.00	1.600	5.74	3.167	12.43	4.73	1.91
0.050	0.00	1.617	5.74	3.183	12.43	4.75	1.91
0.067	0.00	1.633	5.74	3.200	12.43	4.77	0.96
0.083	0.00	1.650	5.74	3.217	12.43	4.78	0.96
0.100	0.00	1.667	5.74	3.233	12.43	4.80	0.96
0.117	0.00	1.683	5.74	3.250	12.43	4.82	0.96
0.133	0.00	1.700	5.74	3.267	6.69	4.83	0.96
0.150	0.00	1.717	5.74	3.283	6.69	4.85	0.96
0.167	0.00	1.733	5.74	3.300	6.69	4.87	0.96
0.183	0.00	1.750	5.74	3.317	6.69	4.88	0.96
0.200	0.00	1.767	16.25	3.333	6.69	4.90	0.96
0.217	0.00	1.783	16.25	3.350	6.69	4.92	0.96
0.233	0.00	1.800	16.25	3.367	6.69	4.93	0.96
0.250	0.00	1.817	16.25	3.383	6.69	4.95	0.96
0.267	0.96	1.833	16.25	3.400	6.69	4.97	0.96
0.283	0.96	1.850	16.25	3.417	6.69	4.98	0.96
0.300	0.96	1.867	16.25	3.433	6.69	5.00	0.96
0.317	0.96	1.883	16.25	3.450	6.69	5.02	0.96
0.333	0.96	1.900	16.25	3.467	6.69	5.03	0.96
0.350	0.96	1.917	16.25	3.483	6.69	5.05	0.96
0.367	0.96	1.933	16.25	3.500	6.69	5.07	0.96
0.383	0.96	1.950	16.25	3.517	6.69	5.08	0.96
0.400	0.96	1.967	16.25	3.533	6.69	5.10	0.96
0.417	0.96	1.983	16.25	3.550	6.69	5.12	0.96
0.433	0.96	2.000	16.25	3.567	6.69	5.13	0.96
0.450	0.96	2.017	16.25	3.583	6.69	5.15	0.96
0.467	0.96	2.033	16.25	3.600	6.69	5.17	0.96
0.483	0.96	2.050	16.25	3.617	6.69	5.18	0.96
0.500	0.96	2.067	16.25	3.633	6.69	5.20	0.96
0.517	0.96	2.083	16.25	3.650	6.69	5.22	0.96
0.533	0.96	2.100	16.25	3.667	6.69	5.23	0.96
0.550	0.96	2.117	16.25	3.683	6.69	5.25	0.96
0.567	0.96	2.133	16.25	3.700	6.69	5.27	0.96
0.583	0.96	2.150	16.25	3.717	6.69	5.28	0.96
0.600	0.96	2.167	16.25	3.733	6.69	5.30	0.96
0.617	0.96	2.183	16.25	3.750	6.69	5.32	0.96
0.633	0.96	2.200	16.25	3.767	3.82	5.33	0.96
0.650	0.96	2.217	16.25	3.783	3.82	5.35	0.96
0.667	0.96	2.233	16.25	3.800	3.82	5.37	0.96
0.683	0.96	2.250	16.25	3.817	3.82	5.38	0.96
0.700	0.96	2.267	43.98	3.833	3.82	5.40	0.96
0.717	0.96	2.283	43.98	3.850	3.82	5.42	0.96
0.733	0.96	2.300	43.98	3.867	3.82	5.43	0.96
0.750	0.96	2.317	43.98	3.883	3.82	5.45	0.96
0.767	0.96	2.333	43.98	3.900	3.82	5.47	0.96
0.783	0.96	2.350	43.98	3.917	3.82	5.48	0.96
0.800	0.96	2.367	43.98	3.933	3.82	5.50	0.96
0.817	0.96	2.383	43.98	3.950	3.82	5.52	0.96
0.833	0.96	2.400	43.98	3.967	3.82	5.53	0.96
0.850	0.96	2.417	43.98	3.983	3.82	5.55	0.96
0.867	0.96	2.433	43.98	4.000	3.82	5.57	0.96
0.883	0.96	2.450	43.98	4.017	3.82	5.58	0.96
0.900	0.96	2.467	43.98	4.033	3.82	5.60	0.96
0.917	0.96	2.483	43.98	4.050	3.82	5.62	0.96
0.933	0.96	2.500	43.98	4.067	3.82	5.63	0.96
0.950	0.96	2.517	43.98	4.083	3.82	5.65	0.96
0.967	0.96	2.533	43.98	4.100	3.82	5.67	0.96
0.983	0.96	2.550	43.98	4.117	3.82	5.68	0.96

1.000	0.96	2.567	43.98	4.133	3.82	5.70	0.96
1.017	0.96	2.583	43.98	4.150	3.82	5.72	0.96
1.033	0.96	2.600	43.98	4.167	3.82	5.73	0.96
1.050	0.96	2.617	43.98	4.183	3.82	5.75	0.96
1.067	0.96	2.633	43.98	4.200	3.82	5.77	0.96
1.083	0.96	2.650	43.98	4.217	3.82	5.78	0.96
1.100	0.96	2.667	43.98	4.233	3.82	5.80	0.96
1.117	0.96	2.683	43.98	4.250	3.82	5.82	0.96
1.133	0.96	2.700	43.98	4.267	1.91	5.83	0.96
1.150	0.96	2.717	43.98	4.283	1.91	5.85	0.96
1.167	0.96	2.733	43.98	4.300	1.91	5.87	0.96
1.183	0.96	2.750	43.98	4.317	1.91	5.88	0.96
1.200	0.96	2.767	12.43	4.333	1.91	5.90	0.96
1.217	0.96	2.783	12.43	4.350	1.91	5.92	0.96
1.233	0.96	2.800	12.43	4.367	1.91	5.93	0.96
1.250	0.96	2.817	12.43	4.383	1.91	5.95	0.96
1.267	5.74	2.833	12.43	4.400	1.91	5.97	0.96
1.283	5.74	2.850	12.43	4.417	1.91	5.98	0.96
1.300	5.74	2.867	12.43	4.433	1.91	6.00	0.96
1.317	5.74	2.883	12.43	4.450	1.91	6.02	0.96
1.333	5.74	2.900	12.43	4.467	1.91	6.03	0.96
1.350	5.74	2.917	12.43	4.483	1.91	6.05	0.96
1.367	5.74	2.933	12.43	4.500	1.91	6.07	0.96
1.383	5.74	2.950	12.43	4.517	1.91	6.08	0.96
1.400	5.74	2.967	12.43	4.533	1.91	6.10	0.96
1.417	5.74	2.983	12.43	4.550	1.91	6.12	0.96
1.433	5.74	3.000	12.43	4.567	1.91	6.13	0.96
1.450	5.74	3.017	12.43	4.583	1.91	6.15	0.96
1.467	5.74	3.033	12.43	4.600	1.91	6.17	0.96
1.483	5.74	3.050	12.43	4.617	1.91	6.18	0.96
1.500	5.74	3.067	12.43	4.633	1.91	6.20	0.96
1.517	5.74	3.083	12.43	4.650	1.91	6.22	0.96
1.533	5.74	3.100	12.43	4.667	1.91	6.23	0.96
1.550	5.74	3.117	12.43	4.683	1.91	6.25	0.96
1.567	5.74	3.133	12.43	4.700	1.91		

Max.Eff.Inten.(mm/hr)=	43.98	55.42	
over (min)	8.00	16.00	
Storage Coeff. (min)=	7.55 (ii)	15.08 (ii)	
Unit Hyd. Tpeak (min)=	8.00	16.00	
Unit Hyd. peak (cms)=	0.15	0.07	
			TOTALS
PEAK FLOW (cms)=	1.20	0.60	1.763 (iii)
TIME TO PEAK (hrs)=	2.75	2.85	2.77
RUNOFF VOLUME (mm)=	46.81	29.65	38.92
TOTAL RAINFALL (mm)=	47.81	47.81	47.81
RUNOFF COEFFICIENT =	0.98	0.62	0.81

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0008)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.7510
	0.0280	0.3250	0.1440	0.8950
	0.0460	0.4650	0.1740	1.0020
	0.0810	0.6370	0.2060	1.1080

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	18.550	1.763	2.77	38.92
OUTFLOW: ID= 1 (0008)	18.550	0.081	4.92	25.63

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.59
TIME SHIFT OF PEAK FLOW (min)=129.00
MAXIMUM STORAGE USED (ha.m.)= 0.6368

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\c5298c90-9b33-4559-99e4-1b311aee77e6\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\c5298c90-9b33-4559-99e4-1b311aee77e6\scenari

DATE: 02-19-2026 TIME: 09:39:01

USER:

COMMENTS: _____

** SIMULATION : 3 - 10 Year 6 Hour AES (Bloor **

READ STORM	Filename: C:\Users\hliu\AppData\Local\Temp\c59d9569-0537-4e45-83da-c6e2d9da4656\60d5df96
Ptotal= 55.69 mm	Comments: 10 Year 6 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.75	18.94	3.50	7.80	5.25	1.11
0.25	1.11	2.00	18.94	3.75	4.46	5.50	1.11
0.50	1.11	2.25	51.24	4.00	4.46	5.75	1.11
0.75	1.11	2.50	51.24	4.25	2.23	6.00	1.11

1.00	1.11	2.75	14.48	4.50	2.23		
1.25	6.68	3.00	14.48	4.75	1.11		
1.50	6.68	3.25	7.80	5.00	1.11		

CALIB			
STANDHYD (0001)	Area (ha)= 11.52		
ID= 1 DT= 1.0 min	Total Imp(%)= 81.00	Dir. Conn.(%)= 67.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.33	2.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.583	6.68	3.150	14.48	4.72	2.23
0.033	0.00	1.600	6.68	3.167	14.48	4.73	2.23
0.050	0.00	1.617	6.68	3.183	14.48	4.75	2.23
0.067	0.00	1.633	6.68	3.200	14.48	4.77	1.11
0.083	0.00	1.650	6.68	3.217	14.48	4.78	1.11
0.100	0.00	1.667	6.68	3.233	14.48	4.80	1.11
0.117	0.00	1.683	6.68	3.250	14.48	4.82	1.11
0.133	0.00	1.700	6.68	3.267	7.80	4.83	1.11
0.150	0.00	1.717	6.68	3.283	7.80	4.85	1.11
0.167	0.00	1.733	6.68	3.300	7.80	4.87	1.11
0.183	0.00	1.750	6.68	3.317	7.80	4.88	1.11
0.200	0.00	1.767	18.94	3.333	7.80	4.90	1.11
0.217	0.00	1.783	18.94	3.350	7.80	4.92	1.11
0.233	0.00	1.800	18.94	3.367	7.80	4.93	1.11
0.250	0.00	1.817	18.94	3.383	7.80	4.95	1.11
0.267	1.11	1.833	18.94	3.400	7.80	4.97	1.11
0.283	1.11	1.850	18.94	3.417	7.80	4.98	1.11
0.300	1.11	1.867	18.94	3.433	7.80	5.00	1.11
0.317	1.11	1.883	18.94	3.450	7.80	5.02	1.11
0.333	1.11	1.900	18.94	3.467	7.80	5.03	1.11
0.350	1.11	1.917	18.94	3.483	7.80	5.05	1.11
0.367	1.11	1.933	18.94	3.500	7.80	5.07	1.11
0.383	1.11	1.950	18.94	3.517	7.80	5.08	1.11
0.400	1.11	1.967	18.94	3.533	7.80	5.10	1.11
0.417	1.11	1.983	18.94	3.550	7.80	5.12	1.11
0.433	1.11	2.000	18.94	3.567	7.80	5.13	1.11
0.450	1.11	2.017	18.94	3.583	7.80	5.15	1.11
0.467	1.11	2.033	18.94	3.600	7.80	5.17	1.11
0.483	1.11	2.050	18.94	3.617	7.80	5.18	1.11
0.500	1.11	2.067	18.94	3.633	7.80	5.20	1.11
0.517	1.11	2.083	18.94	3.650	7.80	5.22	1.11
0.533	1.11	2.100	18.94	3.667	7.80	5.23	1.11
0.550	1.11	2.117	18.94	3.683	7.80	5.25	1.11
0.567	1.11	2.133	18.94	3.700	7.80	5.27	1.11
0.583	1.11	2.150	18.94	3.717	7.80	5.28	1.11
0.600	1.11	2.167	18.94	3.733	7.80	5.30	1.11
0.617	1.11	2.183	18.94	3.750	7.80	5.32	1.11
0.633	1.11	2.200	18.94	3.767	4.46	5.33	1.11
0.650	1.11	2.217	18.94	3.783	4.46	5.35	1.11
0.667	1.11	2.233	18.94	3.800	4.46	5.37	1.11
0.683	1.11	2.250	18.94	3.817	4.46	5.38	1.11
0.700	1.11	2.267	51.24	3.833	4.46	5.40	1.11
0.717	1.11	2.283	51.24	3.850	4.46	5.42	1.11
0.733	1.11	2.300	51.24	3.867	4.46	5.43	1.11
0.750	1.11	2.317	51.24	3.883	4.46	5.45	1.11
0.767	1.11	2.333	51.24	3.900	4.46	5.47	1.11
0.783	1.11	2.350	51.24	3.917	4.46	5.48	1.11
0.800	1.11	2.367	51.24	3.933	4.46	5.50	1.11
0.817	1.11	2.383	51.24	3.950	4.46	5.52	1.11
0.833	1.11	2.400	51.24	3.967	4.46	5.53	1.11
0.850	1.11	2.417	51.24	3.983	4.46	5.55	1.11
0.867	1.11	2.433	51.24	4.000	4.46	5.57	1.11
0.883	1.11	2.450	51.24	4.017	4.46	5.58	1.11
0.900	1.11	2.467	51.24	4.033	4.46	5.60	1.11
0.917	1.11	2.483	51.24	4.050	4.46	5.62	1.11
0.933	1.11	2.500	51.24	4.067	4.46	5.63	1.11
0.950	1.11	2.517	51.24	4.083	4.46	5.65	1.11
0.967	1.11	2.533	51.24	4.100	4.46	5.67	1.11
0.983	1.11	2.550	51.24	4.117	4.46	5.68	1.11
1.000	1.11	2.567	51.24	4.133	4.46	5.70	1.11
1.017	1.11	2.583	51.24	4.150	4.46	5.72	1.11
1.033	1.11	2.600	51.24	4.167	4.46	5.73	1.11
1.050	1.11	2.617	51.24	4.183	4.46	5.75	1.11
1.067	1.11	2.633	51.24	4.200	4.46	5.77	1.11
1.083	1.11	2.650	51.24	4.217	4.46	5.78	1.11
1.100	1.11	2.667	51.24	4.233	4.46	5.80	1.11
1.117	1.11	2.683	51.24	4.250	4.46	5.82	1.11
1.133	1.11	2.700	51.24	4.267	2.23	5.83	1.11
1.150	1.11	2.717	51.24	4.283	2.23	5.85	1.11
1.167	1.11	2.733	51.24	4.300	2.23	5.87	1.11
1.183	1.11	2.750	51.24	4.317	2.23	5.88	1.11
1.200	1.11	2.767	14.48	4.333	2.23	5.90	1.11
1.217	1.11	2.783	14.48	4.350	2.23	5.92	1.11
1.233	1.11	2.800	14.48	4.367	2.23	5.93	1.11
1.250	1.11	2.817	14.48	4.383	2.23	5.95	1.11
1.267	6.68	2.833	14.48	4.400	2.23	5.97	1.11
1.283	6.68	2.850	14.48	4.417	2.23	5.98	1.11
1.300	6.68	2.867	14.48	4.433	2.23	6.00	1.11
1.317	6.68	2.883	14.48	4.450	2.23	6.02	1.11
1.333	6.68	2.900	14.48	4.467	2.23	6.03	1.11
1.350	6.68	2.917	14.48	4.483	2.23	6.05	1.11
1.367	6.68	2.933	14.48	4.500	2.23	6.07	1.11
1.383	6.68	2.950	14.48	4.517	2.23	6.08	1.11
1.400	6.68	2.967	14.48	4.533	2.23	6.10	1.11
1.417	6.68	2.983	14.48	4.550	2.23	6.12	1.11
1.433	6.68	3.000	14.48	4.567	2.23	6.13	1.11
1.450	6.68	3.017	14.48	4.583	2.23	6.15	1.11
1.467	6.68	3.033	14.48	4.600	2.23	6.17	1.11
1.483	6.68	3.050	14.48	4.617	2.23	6.18	1.11
1.500	6.68	3.067	14.48	4.633	2.23	6.20	1.11
1.517	6.68	3.083	14.48	4.650	2.23	6.22	1.11
1.533	6.68	3.100	14.48	4.667	2.23	6.23	1.11
1.550	6.68	3.117	14.48	4.683	2.23	6.25	1.11
1.567	6.68	3.133	14.48	4.700	2.23		

Max.Eff.Inten.(mm/hr)=	51.24	72.56		
over (min)	6.00	12.00		
Storage Coeff. (min)=	6.15 (ii)	11.72 (ii)		
Unit Hyd. Tpeak (min)=	6.00	12.00		
Unit Hyd. peak (cms)=	0.19	0.10		
			TOTALS	
PEAK FLOW (cms)=	1.09	0.37	1.451 (iii)	
TIME TO PEAK (hrs)=	2.75	2.80	2.75	
RUNOFF VOLUME (mm)=	54.69	37.28	48.94	
TOTAL RAINFALL (mm)=	55.69	55.69	55.69	
RUNOFF COEFFICIENT =	0.98	0.67	0.88	

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       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0590     0.5020
                         0.0190     0.2190   |   0.0790     0.5950
                         0.0250     0.3150   |   0.0950     0.6640
                         0.0440     0.4270   |   0.1130     0.7310

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     11.520     1.451      2.75      48.94
   OUTFLOW: ID= 1 (  0003)     11.520     0.059      4.87      31.05

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.06
                  TIME SHIFT OF PEAK FLOW         (min)=127.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5017

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=  18.55
|ID= 1 DT= 1.0 min |   Total Imp(%)=  72.00   Dir. Conn.(%)=  54.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      13.36         5.19
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     351.66        40.00
     Mannings n            =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    0.00 | 1.583    6.68 | 3.150   14.48 |  4.72    2.23
               0.033    0.00 | 1.600    6.68 | 3.167   14.48 |  4.73    2.23
               0.050    0.00 | 1.617    6.68 | 3.183   14.48 |  4.75    2.23
               0.067    0.00 | 1.633    6.68 | 3.200   14.48 |  4.77    1.11
               0.083    0.00 | 1.650    6.68 | 3.217   14.48 |  4.78    1.11
               0.100    0.00 | 1.667    6.68 | 3.233   14.48 |  4.80    1.11
               0.117    0.00 | 1.683    6.68 | 3.250   14.48 |  4.82    1.11
               0.133    0.00 | 1.700    6.68 | 3.267    7.80 |  4.83    1.11
               0.150    0.00 | 1.717    6.68 | 3.283    7.80 |  4.85    1.11
               0.167    0.00 | 1.733    6.68 | 3.300    7.80 |  4.87    1.11
               0.183    0.00 | 1.750    6.68 | 3.317    7.80 |  4.88    1.11
               0.200    0.00 | 1.767   18.94 | 3.333    7.80 |  4.90    1.11
               0.217    0.00 | 1.783   18.94 | 3.350    7.80 |  4.92    1.11
               0.233    0.00 | 1.800   18.94 | 3.367    7.80 |  4.93    1.11
               0.250    0.00 | 1.817   18.94 | 3.383    7.80 |  4.95    1.11
               0.267    1.11 | 1.833   18.94 | 3.400    7.80 |  4.97    1.11
               0.283    1.11 | 1.850   18.94 | 3.417    7.80 |  4.98    1.11
               0.300    1.11 | 1.867   18.94 | 3.433    7.80 |  5.00    1.11
               0.317    1.11 | 1.883   18.94 | 3.450    7.80 |  5.02    1.11
               0.333    1.11 | 1.900   18.94 | 3.467    7.80 |  5.03    1.11
               0.350    1.11 | 1.917   18.94 | 3.483    7.80 |  5.05    1.11
               0.367    1.11 | 1.933   18.94 | 3.500    7.80 |  5.07    1.11
               0.383    1.11 | 1.950   18.94 | 3.517    7.80 |  5.08    1.11
               0.400    1.11 | 1.967   18.94 | 3.533    7.80 |  5.10    1.11
               0.417    1.11 | 1.983   18.94 | 3.550    7.80 |  5.12    1.11
               0.433    1.11 | 2.000   18.94 | 3.567    7.80 |  5.13    1.11
               0.450    1.11 | 2.017   18.94 | 3.583    7.80 |  5.15    1.11
               0.467    1.11 | 2.033   18.94 | 3.600    7.80 |  5.17    1.11
               0.483    1.11 | 2.050   18.94 | 3.617    7.80 |  5.18    1.11
               0.500    1.11 | 2.067   18.94 | 3.633    7.80 |  5.20    1.11
               0.517    1.11 | 2.083   18.94 | 3.650    7.80 |  5.22    1.11
               0.533    1.11 | 2.100   18.94 | 3.667    7.80 |  5.23    1.11
               0.550    1.11 | 2.117   18.94 | 3.683    7.80 |  5.25    1.11
               0.567    1.11 | 2.133   18.94 | 3.700    7.80 |  5.27    1.11
               0.583    1.11 | 2.150   18.94 | 3.717    7.80 |  5.28    1.11
               0.600    1.11 | 2.167   18.94 | 3.733    7.80 |  5.30    1.11
               0.617    1.11 | 2.183   18.94 | 3.750    7.80 |  5.32    1.11
               0.633    1.11 | 2.200   18.94 | 3.767    4.46 |  5.33    1.11
               0.650    1.11 | 2.217   18.94 | 3.783    4.46 |  5.35    1.11
               0.667    1.11 | 2.233   18.94 | 3.800    4.46 |  5.37    1.11
               0.683    1.11 | 2.250   18.94 | 3.817    4.46 |  5.38    1.11
               0.700    1.11 | 2.267   51.24 | 3.833    4.46 |  5.40    1.11
               0.717    1.11 | 2.283   51.24 | 3.850    4.46 |  5.42    1.11
               0.733    1.11 | 2.300   51.24 | 3.867    4.46 |  5.43    1.11
               0.750    1.11 | 2.317   51.24 | 3.883    4.46 |  5.45    1.11
               0.767    1.11 | 2.333   51.24 | 3.900    4.46 |  5.47    1.11
               0.783    1.11 | 2.350   51.24 | 3.917    4.46 |  5.48    1.11
               0.800    1.11 | 2.367   51.24 | 3.933    4.46 |  5.50    1.11
               0.817    1.11 | 2.383   51.24 | 3.950    4.46 |  5.52    1.11
               0.833    1.11 | 2.400   51.24 | 3.967    4.46 |  5.53    1.11
               0.850    1.11 | 2.417   51.24 | 3.983    4.46 |  5.55    1.11
               0.867    1.11 | 2.433   51.24 | 4.000    4.46 |  5.57    1.11
               0.883    1.11 | 2.450   51.24 | 4.017    4.46 |  5.58    1.11
               0.900    1.11 | 2.467   51.24 | 4.033    4.46 |  5.60    1.11
               0.917    1.11 | 2.483   51.24 | 4.050    4.46 |  5.62    1.11
               0.933    1.11 | 2.500   51.24 | 4.067    4.46 |  5.63    1.11
               0.950    1.11 | 2.517   51.24 | 4.083    4.46 |  5.65    1.11
               0.967    1.11 | 2.533   51.24 | 4.100    4.46 |  5.67    1.11
               0.983    1.11 | 2.550   51.24 | 4.117    4.46 |  5.68    1.11
               1.000    1.11 | 2.567   51.24 | 4.133    4.46 |  5.70    1.11
               1.017    1.11 | 2.583   51.24 | 4.150    4.46 |  5.72    1.11
               1.033    1.11 | 2.600   51.24 | 4.167    4.46 |  5.73    1.11
               1.050    1.11 | 2.617   51.24 | 4.183    4.46 |  5.75    1.11
               1.067    1.11 | 2.633   51.24 | 4.200    4.46 |  5.77    1.11
               1.083    1.11 | 2.650   51.24 | 4.217    4.46 |  5.78    1.11
               1.100    1.11 | 2.667   51.24 | 4.233    4.46 |  5.80    1.11
               1.117    1.11 | 2.683   51.24 | 4.250    4.46 |  5.82    1.11
               1.133    1.11 | 2.700   51.24 | 4.267    2.23 |  5.83    1.11
               1.150    1.11 | 2.717   51.24 | 4.283    2.23 |  5.85    1.11
               1.167    1.11 | 2.733   51.24 | 4.300    2.23 |  5.87    1.11
               1.183    1.11 | 2.750   51.24 | 4.317    2.23 |  5.88    1.11
               1.200    1.11 | 2.767   14.48 | 4.333    2.23 |  5.90    1.11
               1.217    1.11 | 2.783   14.48 | 4.350    2.23 |  5.92    1.11
               1.233    1.11 | 2.800   14.48 | 4.367    2.23 |  5.93    1.11
               1.250    1.11 | 2.817   14.48 | 4.383    2.23 |  5.95    1.11
               1.267    6.68 | 2.833   14.48 | 4.400    2.23 |  5.97    1.11
               1.283    6.68 | 2.850   14.48 | 4.417    2.23 |  5.98    1.11
               1.300    6.68 | 2.867   14.48 | 4.433    2.23 |  6.00    1.11
               1.317    6.68 | 2.883   14.48 | 4.450    2.23 |  6.02    1.11
               1.333    6.68 | 2.900   14.48 | 4.467    2.23 |  6.03    1.11
               1.350    6.68 | 2.917   14.48 | 4.483    2.23 |  6.05    1.11
               1.367    6.68 | 2.933   14.48 | 4.500    2.23 |  6.07    1.11
               1.383    6.68 | 2.950   14.48 | 4.517    2.23 |  6.08    1.11
               1.400    6.68 | 2.967   14.48 | 4.533    2.23 |  6.10    1.11
               1.417    6.68 | 2.983   14.48 | 4.550    2.23 |  6.12    1.11
               1.433    6.68 | 3.000   14.48 | 4.567    2.23 |  6.13    1.11
               1.450    6.68 | 3.017   14.48 | 4.583    2.23 |  6.15    1.11
```

1.467	6.68	3.033	14.48	4.600	2.23	6.17	1.11
1.483	6.68	3.050	14.48	4.617	2.23	6.18	1.11
1.500	6.68	3.067	14.48	4.633	2.23	6.20	1.11
1.517	6.68	3.083	14.48	4.650	2.23	6.22	1.11
1.533	6.68	3.100	14.48	4.667	2.23	6.23	1.11
1.550	6.68	3.117	14.48	4.683	2.23	6.25	1.11
1.567	6.68	3.133	14.48	4.700	2.23		

				TOTALS
Max.Eff.Inten.(mm/hr)=	51.24	67.61		
over (min)	7.00	15.00		
Storage Coeff. (min)=	7.10 (ii)	14.19 (ii)		
Unit Hyd. Tpeak (min)=	7.00	15.00		
Unit Hyd. peak (cms)=	0.16	0.08		
PEAK FLOW (cms)=	1.40	0.76		2.127 (iii)
TIME TO PEAK (hrs)=	2.75	2.83		2.77
RUNOFF VOLUME (mm)=	54.69	36.56		46.35
TOTAL RAINFALL (mm)=	55.69	55.69		55.69
RUNOFF COEFFICIENT =	0.98	0.66		0.83

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0008)		OVERFLOW IS OFF			
IN= 2---> OUT= 1					
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
	0.0000	0.0000	0.1090	0.7510	
	0.0280	0.3250	0.1440	0.8950	
	0.0460	0.4650	0.1740	1.0020	
	0.0810	0.6370	0.2060	1.1080	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0007)	18.550	2.127	2.77	46.35
OUTFLOW: ID= 1 (	0008)	18.550	0.109	4.85	31.68

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.12
TIME SHIFT OF PEAK FLOW (min)=125.00
MAXIMUM STORAGE USED (ha.m.)= 0.7510

```
V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\9226d4fb-cf75-4aa6-b62b-24aee9e30b9a\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\9226d4fb-cf75-4aa6-b62b-24aee9e30b9a\scenari

DATE: 02-19-2026 TIME: 09:39:01

USER:

COMMENTS: _____

** SIMULATION : 4 - 25 Year 6 Hour AES (Bloor **

READ STORM	Filename: C:\Users\hliu\AppData\Local\Temp\c59d9569-0537-4e45-83da-c6e2d9da4656\cdef06ff
Ptotal= 65.59 mm	Comments: 25 Year 6 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.75	22.30	3.50	9.18	5.25	1.31
0.25	1.31	2.00	22.30	3.75	5.25	5.50	1.31
0.50	1.31	2.25	60.35	4.00	5.25	5.75	1.31
0.75	1.31	2.50	60.35	4.25	2.62	6.00	1.31
1.00	1.31	2.75	17.06	4.50	2.62		
1.25	7.87	3.00	17.06	4.75	1.31		
1.50	7.87	3.25	9.18	5.00	1.31		

CALIB	
STANDHYD (0001)|	Area (ha)= 11.52
ID= 1 DT= 1.0 min	Total Imp(%)= 81.00 Dir. Conn.(%)= 67.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.33	2.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.583	7.87	3.150	17.06	4.72	2.62
0.033	0.00	1.600	7.87	3.167	17.06	4.73	2.62
0.050	0.00	1.617	7.87	3.183	17.06	4.75	2.62
0.067	0.00	1.633	7.87	3.200	17.06	4.77	1.31

0.083	0.00	1.650	7.87	3.217	17.06	4.78	1.31
0.100	0.00	1.667	7.87	3.233	17.06	4.80	1.31
0.117	0.00	1.683	7.87	3.250	17.06	4.82	1.31
0.133	0.00	1.700	7.87	3.267	9.18	4.83	1.31
0.150	0.00	1.717	7.87	3.283	9.18	4.85	1.31
0.167	0.00	1.733	7.87	3.300	9.18	4.87	1.31
0.183	0.00	1.750	7.87	3.317	9.18	4.88	1.31
0.200	0.00	1.767	22.30	3.333	9.18	4.90	1.31
0.217	0.00	1.783	22.30	3.350	9.18	4.92	1.31
0.233	0.00	1.800	22.30	3.367	9.18	4.93	1.31
0.250	0.00	1.817	22.30	3.383	9.18	4.95	1.31
0.267	1.31	1.833	22.30	3.400	9.18	4.97	1.31
0.283	1.31	1.850	22.30	3.417	9.18	4.98	1.31
0.300	1.31	1.867	22.30	3.433	9.18	5.00	1.31
0.317	1.31	1.883	22.30	3.450	9.18	5.02	1.31
0.333	1.31	1.900	22.30	3.467	9.18	5.03	1.31
0.350	1.31	1.917	22.30	3.483	9.18	5.05	1.31
0.367	1.31	1.933	22.30	3.500	9.18	5.07	1.31
0.383	1.31	1.950	22.30	3.517	9.18	5.08	1.31
0.400	1.31	1.967	22.30	3.533	9.18	5.10	1.31
0.417	1.31	1.983	22.30	3.550	9.18	5.12	1.31
0.433	1.31	2.000	22.30	3.567	9.18	5.13	1.31
0.450	1.31	2.017	22.30	3.583	9.18	5.15	1.31
0.467	1.31	2.033	22.30	3.600	9.18	5.17	1.31
0.483	1.31	2.050	22.30	3.617	9.18	5.18	1.31
0.500	1.31	2.067	22.30	3.633	9.18	5.20	1.31
0.517	1.31	2.083	22.30	3.650	9.18	5.22	1.31
0.533	1.31	2.100	22.30	3.667	9.18	5.23	1.31
0.550	1.31	2.117	22.30	3.683	9.18	5.25	1.31
0.567	1.31	2.133	22.30	3.700	9.18	5.27	1.31
0.583	1.31	2.150	22.30	3.717	9.18	5.28	1.31
0.600	1.31	2.167	22.30	3.733	9.18	5.30	1.31
0.617	1.31	2.183	22.30	3.750	9.18	5.32	1.31
0.633	1.31	2.200	22.30	3.767	5.25	5.33	1.31
0.650	1.31	2.217	22.30	3.783	5.25	5.35	1.31
0.667	1.31	2.233	22.30	3.800	5.25	5.37	1.31
0.683	1.31	2.250	22.30	3.817	5.25	5.38	1.31
0.700	1.31	2.267	60.35	3.833	5.25	5.40	1.31
0.717	1.31	2.283	60.35	3.850	5.25	5.42	1.31
0.733	1.31	2.300	60.35	3.867	5.25	5.43	1.31
0.750	1.31	2.317	60.35	3.883	5.25	5.45	1.31
0.767	1.31	2.333	60.35	3.900	5.25	5.47	1.31
0.783	1.31	2.350	60.35	3.917	5.25	5.48	1.31
0.800	1.31	2.367	60.35	3.933	5.25	5.50	1.31
0.817	1.31	2.383	60.35	3.950	5.25	5.52	1.31
0.833	1.31	2.400	60.35	3.967	5.25	5.53	1.31
0.850	1.31	2.417	60.35	3.983	5.25	5.55	1.31
0.867	1.31	2.433	60.35	4.000	5.25	5.57	1.31
0.883	1.31	2.450	60.35	4.017	5.25	5.58	1.31
0.900	1.31	2.467	60.35	4.033	5.25	5.60	1.31
0.917	1.31	2.483	60.35	4.050	5.25	5.62	1.31
0.933	1.31	2.500	60.35	4.067	5.25	5.63	1.31
0.950	1.31	2.517	60.35	4.083	5.25	5.65	1.31
0.967	1.31	2.533	60.35	4.100	5.25	5.67	1.31
0.983	1.31	2.550	60.35	4.117	5.25	5.68	1.31
1.000	1.31	2.567	60.35	4.133	5.25	5.70	1.31
1.017	1.31	2.583	60.35	4.150	5.25	5.72	1.31
1.033	1.31	2.600	60.35	4.167	5.25	5.73	1.31
1.050	1.31	2.617	60.35	4.183	5.25	5.75	1.31
1.067	1.31	2.633	60.35	4.200	5.25	5.77	1.31
1.083	1.31	2.650	60.35	4.217	5.25	5.78	1.31
1.100	1.31	2.667	60.35	4.233	5.25	5.80	1.31
1.117	1.31	2.683	60.35	4.250	5.25	5.82	1.31
1.133	1.31	2.700	60.35	4.267	2.62	5.83	1.31
1.150	1.31	2.717	60.35	4.283	2.62	5.85	1.31
1.167	1.31	2.733	60.35	4.300	2.62	5.87	1.31
1.183	1.31	2.750	60.35	4.317	2.62	5.88	1.31
1.200	1.31	2.767	17.06	4.333	2.62	5.90	1.31
1.217	1.31	2.783	17.06	4.350	2.62	5.92	1.31
1.233	1.31	2.800	17.06	4.367	2.62	5.93	1.31
1.250	1.31	2.817	17.06	4.383	2.62	5.95	1.31
1.267	7.87	2.833	17.06	4.400	2.62	5.97	1.31
1.283	7.87	2.850	17.06	4.417	2.62	5.98	1.31
1.300	7.87	2.867	17.06	4.433	2.62	6.00	1.31
1.317	7.87	2.883	17.06	4.450	2.62	6.02	1.31
1.333	7.87	2.900	17.06	4.467	2.62	6.03	1.31
1.350	7.87	2.917	17.06	4.483	2.62	6.05	1.31
1.367	7.87	2.933	17.06	4.500	2.62	6.07	1.31
1.383	7.87	2.950	17.06	4.517	2.62	6.08	1.31
1.400	7.87	2.967	17.06	4.533	2.62	6.10	1.31
1.417	7.87	2.983	17.06	4.550	2.62	6.12	1.31
1.433	7.87	3.000	17.06	4.567	2.62	6.13	1.31
1.450	7.87	3.017	17.06	4.583	2.62	6.15	1.31
1.467	7.87	3.033	17.06	4.600	2.62	6.17	1.31
1.483	7.87	3.050	17.06	4.617	2.62	6.18	1.31
1.500	7.87	3.067	17.06	4.633	2.62	6.20	1.31
1.517	7.87	3.083	17.06	4.650	2.62	6.22	1.31
1.533	7.87	3.100	17.06	4.667	2.62	6.23	1.31
1.550	7.87	3.117	17.06	4.683	2.62	6.25	1.31
1.567	7.87	3.133	17.06	4.700	2.62		

Max.Eff.Inten.(mm/hr)=	60.35	88.93	
over (min)	6.00	11.00	
Storage Coeff. (min)=	5.76 (ii)	10.98 (ii)	
Unit Hyd. Tpeak (min)=	6.00	11.00	
Unit Hyd. peak (cms)=	0.19	0.10	
			TOTALS
PEAK FLOW (cms)=	1.29	0.47	1.748 (iii)
TIME TO PEAK (hrs)=	2.75	2.78	2.75
RUNOFF VOLUME (mm)=	64.59	46.27	58.55
TOTAL RAINFALL (mm)=	65.59	65.59	65.59
RUNOFF COEFFICIENT =	0.98	0.71	0.89

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0003)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5020
	0.0190	0.2190	0.0790	0.5950
	0.0250	0.3150	0.0950	0.6640
	0.0440	0.4270	0.1130	0.7310

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	11.520	1.748	2.75	58.55
OUTFLOW: ID= 1 (0003)	11.520	0.079	4.82	38.51

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.51
TIME SHIFT OF PEAK FLOW (min)=124.00
MAXIMUM STORAGE USED (ha.m.)= 0.5943

| CALIB | | |

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--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1090      0.7510
                         0.0280     0.3250   |   0.1440      0.8950
                         0.0460     0.4650   |   0.1740      1.0020
                         0.0810     0.6370   |   0.2060      1.1080

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)    18.550     2.593      2.77      55.80
   OUTFLOW: ID= 1 (  0008)    18.550     0.144      4.75      39.66

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.55
                  TIME SHIFT OF PEAK FLOW         (min)=119.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8948

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-
9c16-43e17470752a\e6c8e4a9-286a-4047-9732-1832099514ae\scenari
  Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-
9c16-43e17470752a\e6c8e4a9-286a-4047-9732-1832099514ae\scenari


DATE: 02-19-2026                          TIME: 09:39:01

USER:



COMMENTS: _____________________________________________________________


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  ***********************************************
  ** SIMULATION : 5 - 50 Year 6 Hour AES (Bloor **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\hliu\AppD
|                  |              ata\Local\Temp\
|                  |              c59d9569-0537-4e45-83da-c6e2d9da4656\21c40be3
| Ptotal= 73.00 mm |    Comments: 50 Year 6 Hour AES (Bloor, TRCA)
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	1.75	24.82	3.50	10.22	5.25	1.46
0.25	1.46	2.00	24.82	3.75	5.84	5.50	1.46
0.50	1.46	2.25	67.16	4.00	5.84	5.75	1.46
0.75	1.46	2.50	67.16	4.25	2.92	6.00	1.46
1.00	1.46	2.75	18.98	4.50	2.92		
1.25	8.76	3.00	18.98	4.75	1.46		
1.50	8.76	3.25	10.22	5.00	1.46		

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| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=  11.52
|ID= 1 DT= 1.0 min |   Total Imp(%)=  81.00   Dir. Conn.(%)=  67.00
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                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.33         2.19
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     277.13        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
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TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.583	8.76	3.150	18.98	4.72	2.92
0.033	0.00	1.600	8.76	3.167	18.98	4.73	2.92
0.050	0.00	1.617	8.76	3.183	18.98	4.75	2.92
0.067	0.00	1.633	8.76	3.200	18.98	4.77	1.46
0.083	0.00	1.650	8.76	3.217	18.98	4.78	1.46
0.100	0.00	1.667	8.76	3.233	18.98	4.80	1.46
0.117	0.00	1.683	8.76	3.250	18.98	4.82	1.46
0.133	0.00	1.700	8.76	3.267	10.22	4.83	1.46
0.150	0.00	1.717	8.76	3.283	10.22	4.85	1.46
0.167	0.00	1.733	8.76	3.300	10.22	4.87	1.46
0.183	0.00	1.750	8.76	3.317	10.22	4.88	1.46
0.200	0.00	1.767	24.82	3.333	10.22	4.90	1.46
0.217	0.00	1.783	24.82	3.350	10.22	4.92	1.46
0.233	0.00	1.800	24.82	3.367	10.22	4.93	1.46
0.250	0.00	1.817	24.82	3.383	10.22	4.95	1.46
0.267	1.46	1.833	24.82	3.400	10.22	4.97	1.46
0.283	1.46	1.850	24.82	3.417	10.22	4.98	1.46
0.300	1.46	1.867	24.82	3.433	10.22	5.00	1.46
0.317	1.46	1.883	24.82	3.450	10.22	5.02	1.46
0.333	1.46	1.900	24.82	3.467	10.22	5.03	1.46
0.350	1.46	1.917	24.82	3.483	10.22	5.05	1.46
0.367	1.46	1.933	24.82	3.500	10.22	5.07	1.46
0.383	1.46	1.950	24.82	3.517	10.22	5.08	1.46
0.400	1.46	1.967	24.82	3.533	10.22	5.10	1.46
0.417	1.46	1.983	24.82	3.550	10.22	5.12	1.46
0.433	1.46	2.000	24.82	3.567	10.22	5.13	1.46
0.450	1.46	2.017	24.82	3.583	10.22	5.15	1.46
0.467	1.46	2.033	24.82	3.600	10.22	5.17	1.46
0.483	1.46	2.050	24.82	3.617	10.22	5.18	1.46
0.500	1.46	2.067	24.82	3.633	10.22	5.20	1.46
0.517	1.46	2.083	24.82	3.650	10.22	5.22	1.46
0.533	1.46	2.100	24.82	3.667	10.22	5.23	1.46

0.550	1.46	2.117	24.82	3.683	10.22	5.25	1.46
0.567	1.46	2.133	24.82	3.700	10.22	5.27	1.46
0.583	1.46	2.150	24.82	3.717	10.22	5.28	1.46
0.600	1.46	2.167	24.82	3.733	10.22	5.30	1.46
0.617	1.46	2.183	24.82	3.750	10.22	5.32	1.46
0.633	1.46	2.200	24.82	3.767	5.84	5.33	1.46
0.650	1.46	2.217	24.82	3.783	5.84	5.35	1.46
0.667	1.46	2.233	24.82	3.800	5.84	5.37	1.46
0.683	1.46	2.250	24.82	3.817	5.84	5.38	1.46
0.700	1.46	2.267	67.16	3.833	5.84	5.40	1.46
0.717	1.46	2.283	67.16	3.850	5.84	5.42	1.46
0.733	1.46	2.300	67.16	3.867	5.84	5.43	1.46
0.750	1.46	2.317	67.16	3.883	5.84	5.45	1.46
0.767	1.46	2.333	67.16	3.900	5.84	5.47	1.46
0.783	1.46	2.350	67.16	3.917	5.84	5.48	1.46
0.800	1.46	2.367	67.16	3.933	5.84	5.50	1.46
0.817	1.46	2.383	67.16	3.950	5.84	5.52	1.46
0.833	1.46	2.400	67.16	3.967	5.84	5.53	1.46
0.850	1.46	2.417	67.16	3.983	5.84	5.55	1.46
0.867	1.46	2.433	67.16	4.000	5.84	5.57	1.46
0.883	1.46	2.450	67.16	4.017	5.84	5.58	1.46
0.900	1.46	2.467	67.16	4.033	5.84	5.60	1.46
0.917	1.46	2.483	67.16	4.050	5.84	5.62	1.46
0.933	1.46	2.500	67.16	4.067	5.84	5.63	1.46
0.950	1.46	2.517	67.16	4.083	5.84	5.65	1.46
0.967	1.46	2.533	67.16	4.100	5.84	5.67	1.46
0.983	1.46	2.550	67.16	4.117	5.84	5.68	1.46
1.000	1.46	2.567	67.16	4.133	5.84	5.70	1.46
1.017	1.46	2.583	67.16	4.150	5.84	5.72	1.46
1.033	1.46	2.600	67.16	4.167	5.84	5.73	1.46
1.050	1.46	2.617	67.16	4.183	5.84	5.75	1.46
1.067	1.46	2.633	67.16	4.200	5.84	5.77	1.46
1.083	1.46	2.650	67.16	4.217	5.84	5.78	1.46
1.100	1.46	2.667	67.16	4.233	5.84	5.80	1.46
1.117	1.46	2.683	67.16	4.250	5.84	5.82	1.46
1.133	1.46	2.700	67.16	4.267	2.92	5.83	1.46
1.150	1.46	2.717	67.16	4.283	2.92	5.85	1.46
1.167	1.46	2.733	67.16	4.300	2.92	5.87	1.46
1.183	1.46	2.750	67.16	4.317	2.92	5.88	1.46
1.200	1.46	2.767	18.99	4.333	2.92	5.90	1.46
1.217	1.46	2.783	18.98	4.350	2.92	5.92	1.46
1.233	1.46	2.800	18.98	4.367	2.92	5.93	1.46
1.250	1.46	2.817	18.98	4.383	2.92	5.95	1.46
1.267	8.76	2.833	18.98	4.400	2.92	5.97	1.46
1.283	8.76	2.850	18.98	4.417	2.92	5.98	1.46
1.300	8.76	2.867	18.98	4.433	2.92	6.00	1.46
1.317	8.76	2.883	18.98	4.450	2.92	6.02	1.46
1.333	8.76	2.900	18.98	4.467	2.92	6.03	1.46
1.350	8.76	2.917	18.98	4.483	2.92	6.05	1.46
1.367	8.76	2.933	18.98	4.500	2.92	6.07	1.46
1.383	8.76	2.950	18.98	4.517	2.92	6.08	1.46
1.400	8.76	2.967	18.98	4.533	2.92	6.10	1.46
1.417	8.76	2.983	18.98	4.550	2.92	6.12	1.46
1.433	8.76	3.000	18.98	4.567	2.92	6.13	1.46
1.450	8.76	3.017	18.98	4.583	2.92	6.15	1.46
1.467	8.76	3.033	18.98	4.600	2.92	6.17	1.46
1.483	8.76	3.050	18.98	4.617	2.92	6.18	1.46
1.500	8.76	3.067	18.98	4.633	2.92	6.20	1.46
1.517	8.76	3.083	18.98	4.650	2.92	6.22	1.46
1.533	8.76	3.100	18.98	4.667	2.92	6.23	1.46
1.550	8.76	3.117	18.98	4.683	2.92	6.25	1.46
1.567	8.76	3.133	18.98	4.700	2.92		

Max.Eff.Inten.(mm/hr)=	67.16	101.22
over (min)	6.00	11.00
Storage Coeff. (min)=	5.52 (ii)	10.52 (ii)

Unit Hyd. Tpeak (min)=	6.00	11.00	
Unit Hyd. peak (cms)=	0.20	0.11	
			TOTALS
PEAK FLOW (cms)=	1.43	0.54	1.967 (iii)
TIME TO PEAK (hrs)=	2.75	2.78	2.75
RUNOFF VOLUME (mm)=	72.00	53.13	65.77
TOTAL RAINFALL (mm)=	73.00	73.00	73.00
RUNOFF COEFFICIENT =	0.99	0.73	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0003)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 1.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0590	0.5020
0.0190	0.2190	0.0790	0.5950
0.0250	0.3150	0.0950	0.6640
0.0440	0.4270	0.1130	0.7310

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	11.520	1.967	2.75	65.77
OUTFLOW: ID= 1 (0003)	11.520	0.095	4.75	44.38

PEAK FLOW REDUCTION [Qout/Qin](%)= 4.82
TIME SHIFT OF PEAK FLOW (min)=120.00
MAXIMUM STORAGE USED (ha.m.)= 0.6633

CALIB	
STANDHYD (0007)	Area (ha)= 18.55
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.583	8.76	3.150	18.98	4.72	2.92
0.033	0.00	1.600	8.76	3.167	18.98	4.73	2.92
0.050	0.00	1.617	8.76	3.183	18.98	4.75	2.92
0.067	0.00	1.633	8.76	3.200	18.98	4.77	1.46
0.083	0.00	1.650	8.76	3.217	18.98	4.78	1.46
0.100	0.00	1.667	8.76	3.233	18.98	4.80	1.46
0.117	0.00	1.683	8.76	3.250	18.98	4.82	1.46
0.133	0.00	1.700	8.76	3.267	10.22	4.83	1.46
0.150	0.00	1.717	8.76	3.283	10.22	4.85	1.46
0.167	0.00	1.733	8.76	3.300	10.22	4.87	1.46
0.183	0.00	1.750	8.76	3.317	10.22	4.88	1.46

0.200	0.00	1.767	24.82	3.333	10.22	4.90	1.46
0.217	0.00	1.783	24.82	3.350	10.22	4.92	1.46
0.233	0.00	1.800	24.82	3.367	10.22	4.93	1.46
0.250	0.00	1.817	24.82	3.383	10.22	4.95	1.46
0.267	1.46	1.833	24.82	3.400	10.22	4.97	1.46
0.283	1.46	1.850	24.82	3.417	10.22	4.98	1.46
0.300	1.46	1.867	24.82	3.433	10.22	5.00	1.46
0.317	1.46	1.883	24.82	3.450	10.22	5.02	1.46
0.333	1.46	1.900	24.82	3.467	10.22	5.03	1.46
0.350	1.46	1.917	24.82	3.483	10.22	5.05	1.46
0.367	1.46	1.933	24.82	3.500	10.22	5.07	1.46
0.383	1.46	1.950	24.82	3.517	10.22	5.08	1.46
0.400	1.46	1.967	24.82	3.533	10.22	5.10	1.46
0.417	1.46	1.983	24.82	3.550	10.22	5.12	1.46
0.433	1.46	2.000	24.82	3.567	10.22	5.13	1.46
0.450	1.46	2.017	24.82	3.583	10.22	5.15	1.46
0.467	1.46	2.033	24.82	3.600	10.22	5.17	1.46
0.483	1.46	2.050	24.82	3.617	10.22	5.18	1.46
0.500	1.46	2.067	24.82	3.633	10.22	5.20	1.46
0.517	1.46	2.083	24.82	3.650	10.22	5.22	1.46
0.533	1.46	2.100	24.82	3.667	10.22	5.23	1.46
0.550	1.46	2.117	24.82	3.683	10.22	5.25	1.46
0.567	1.46	2.133	24.82	3.700	10.22	5.27	1.46
0.583	1.46	2.150	24.82	3.717	10.22	5.28	1.46
0.600	1.46	2.167	24.82	3.733	10.22	5.30	1.46
0.617	1.46	2.183	24.82	3.750	10.22	5.32	1.46
0.633	1.46	2.200	24.82	3.767	5.84	5.33	1.46
0.650	1.46	2.217	24.82	3.783	5.84	5.35	1.46
0.667	1.46	2.233	24.82	3.800	5.84	5.37	1.46
0.683	1.46	2.250	24.82	3.817	5.84	5.38	1.46
0.700	1.46	2.267	67.16	3.833	5.84	5.40	1.46
0.717	1.46	2.283	67.16	3.850	5.84	5.42	1.46
0.733	1.46	2.300	67.16	3.867	5.84	5.43	1.46
0.750	1.46	2.317	67.16	3.883	5.84	5.45	1.46
0.767	1.46	2.333	67.16	3.900	5.84	5.47	1.46
0.783	1.46	2.350	67.16	3.917	5.84	5.48	1.46
0.800	1.46	2.367	67.16	3.933	5.84	5.50	1.46
0.817	1.46	2.383	67.16	3.950	5.84	5.52	1.46
0.833	1.46	2.400	67.16	3.967	5.84	5.53	1.46
0.850	1.46	2.417	67.16	3.983	5.84	5.55	1.46
0.867	1.46	2.433	67.16	4.000	5.84	5.57	1.46
0.883	1.46	2.450	67.16	4.017	5.84	5.58	1.46
0.900	1.46	2.467	67.16	4.033	5.84	5.60	1.46
0.917	1.46	2.483	67.16	4.050	5.84	5.62	1.46
0.933	1.46	2.500	67.16	4.067	5.84	5.63	1.46
0.950	1.46	2.517	67.16	4.083	5.84	5.65	1.46
0.967	1.46	2.533	67.16	4.100	5.84	5.67	1.46
0.983	1.46	2.550	67.16	4.117	5.84	5.68	1.46
1.000	1.46	2.567	67.16	4.133	5.84	5.70	1.46
1.017	1.46	2.583	67.16	4.150	5.84	5.72	1.46
1.033	1.46	2.600	67.16	4.167	5.84	5.73	1.46
1.050	1.46	2.617	67.16	4.183	5.84	5.75	1.46
1.067	1.46	2.633	67.16	4.200	5.84	5.77	1.46
1.083	1.46	2.650	67.16	4.217	5.84	5.78	1.46
1.100	1.46	2.667	67.16	4.233	5.84	5.80	1.46
1.117	1.46	2.683	67.16	4.250	5.84	5.82	1.46
1.133	1.46	2.700	67.16	4.267	2.92	5.83	1.46
1.150	1.46	2.717	67.16	4.283	2.92	5.85	1.46
1.167	1.46	2.733	67.16	4.300	2.92	5.87	1.46
1.183	1.46	2.750	67.16	4.317	2.92	5.88	1.46
1.200	1.46	2.767	18.99	4.333	2.92	5.90	1.46
1.217	1.46	2.783	18.98	4.350	2.92	5.92	1.46
1.233	1.46	2.800	18.98	4.367	2.92	5.93	1.46
1.250	1.46	2.817	18.98	4.383	2.92	5.95	1.46
1.267	8.76	2.833	18.98	4.400	2.92	5.97	1.46
1.283	8.76	2.850	18.98	4.417	2.92	5.98	1.46
1.300	8.76	2.867	18.98	4.433	2.92	6.00	1.46
1.317	8.76	2.883	18.98	4.450	2.92	6.02	1.46
1.333	8.76	2.900	18.98	4.467	2.92	6.03	1.46
1.350	8.76	2.917	18.98	4.483	2.92	6.05	1.46
1.367	8.76	2.933	18.98	4.500	2.92	6.07	1.46
1.383	8.76	2.950	18.98	4.517	2.92	6.08	1.46
1.400	8.76	2.967	18.98	4.533	2.92	6.10	1.46
1.417	8.76	2.983	18.98	4.550	2.92	6.12	1.46
1.433	8.76	3.000	18.98	4.567	2.92	6.13	1.46
1.450	8.76	3.017	18.98	4.583	2.92	6.15	1.46
1.467	8.76	3.033	18.98	4.600	2.92	6.17	1.46
1.483	8.76	3.050	18.98	4.617	2.92	6.18	1.46
1.500	8.76	3.067	18.98	4.633	2.92	6.20	1.46
1.517	8.76	3.083	18.98	4.650	2.92	6.22	1.46
1.533	8.76	3.100	18.98	4.667	2.92	6.23	1.46
1.550	8.76	3.117	18.98	4.683	2.92	6.25	1.46
1.567	8.76	3.133	18.98	4.700	2.92		

Max.Eff.Inten.(mm/hr)=	67.16	94.66	
over (min)	6.00	13.00	
Storage Coeff. (min)=	6.37 (ii)	12.73 (ii)	
Unit Hyd. Tpeak (min)=	6.00	13.00	
Unit Hyd. peak (cms)=	0.18	0.09	
			TOTALS
PEAK FLOW (cms)=	1.85	1.13	2.953 (iii)
TIME TO PEAK (hrs)=	2.75	2.82	2.75
RUNOFF VOLUME (mm)=	72.00	52.29	62.94
TOTAL RAINFALL (mm)=	73.00	73.00	73.00
RUNOFF COEFFICIENT =	0.99	0.72	0.86

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0008)		OVERFLOW IS OFF			
IN= 2---> OUT= 1					
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.7510
	0.0280	0.3250	0.1440	0.8950
	0.0460	0.4650	0.1740	1.0020
	0.0810	0.6370	0.2060	1.1080

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	18.550	2.953	2.75	62.94
OUTFLOW: ID= 1 (0008)	18.550	0.174	4.60	45.87

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.90
TIME SHIFT OF PEAK FLOW (min)=111.00
MAXIMUM STORAGE USED (ha.m.)= 1.0022

FINISH

```
      V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-
9c16-43e17470752a\7571f103-ea84-462a-9f46-1fe3353d3d41\scenari
  Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-
9c16-43e17470752a\7571f103-ea84-462a-9f46-1fe3353d3d41\scenari


DATE: 02-19-2026                          TIME: 09:39:01

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : 6 - 100 Year 6 Hour AES (Bloo **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\hliu\AppD
|                  |              ata\Local\Temp\
|                  |              c59d9569-0537-4e45-83da-c6e2d9da4656\c2d84ca1
| Ptotal= 80.31 mm |    Comments: 100 Year 6 Hour AES (Bloor, TRCA)
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  1.75   27.30 |  3.50   11.24 |  5.25    1.61
                0.25    1.61 |  2.00   27.30 |  3.75    6.42 |  5.50    1.61
                0.50    1.61 |  2.25   73.88 |  4.00    6.42 |  5.75    1.61
                0.75    1.61 |  2.50   73.88 |  4.25    3.21 |  6.00    1.61
                1.00    1.61 |  2.75   20.88 |  4.50    3.21 |
                1.25    9.64 |  3.00   20.88 |  4.75    1.61 |
                1.50    9.64 |  3.25   11.24 |  5.00    1.61 |

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=  11.52
|ID= 1 DT= 1.0 min |   Total Imp(%)=  81.00   Dir. Conn.(%)=  67.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.33         2.19
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     277.13        40.00
     Mannings n             =     0.013        0.250

    NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                    ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.017    0.00 | 1.583    9.64 | 3.150   20.88 |  4.72    3.21
     0.033    0.00 | 1.600    9.64 | 3.167   20.88 |  4.73    3.21
     0.050    0.00 | 1.617    9.64 | 3.183   20.88 |  4.75    3.21
     0.067    0.00 | 1.633    9.64 | 3.200   20.88 |  4.77    1.61
     0.083    0.00 | 1.650    9.64 | 3.217   20.88 |  4.78    1.61
     0.100    0.00 | 1.667    9.64 | 3.233   20.88 |  4.80    1.61
     0.117    0.00 | 1.683    9.64 | 3.250   20.88 |  4.82    1.61
     0.133    0.00 | 1.700    9.64 | 3.267   11.24 |  4.83    1.61
     0.150    0.00 | 1.717    9.64 | 3.283   11.24 |  4.85    1.61
     0.167    0.00 | 1.733    9.64 | 3.300   11.24 |  4.87    1.61
     0.183    0.00 | 1.750    9.64 | 3.317   11.24 |  4.88    1.61
     0.200    0.00 | 1.767   27.30 | 3.333   11.24 |  4.90    1.61
     0.217    0.00 | 1.783   27.30 | 3.350   11.24 |  4.92    1.61
     0.233    0.00 | 1.800   27.30 | 3.367   11.24 |  4.93    1.61
     0.250    0.00 | 1.817   27.30 | 3.383   11.24 |  4.95    1.61
     0.267    1.61 | 1.833   27.30 | 3.400   11.24 |  4.97    1.61
     0.283    1.61 | 1.850   27.30 | 3.417   11.24 |  4.98    1.61
     0.300    1.61 | 1.867   27.30 | 3.433   11.24 |  5.00    1.61
     0.317    1.61 | 1.883   27.30 | 3.450   11.24 |  5.02    1.61
     0.333    1.61 | 1.900   27.30 | 3.467   11.24 |  5.03    1.61
     0.350    1.61 | 1.917   27.30 | 3.483   11.24 |  5.05    1.61
     0.367    1.61 | 1.933   27.30 | 3.500   11.24 |  5.07    1.61
     0.383    1.61 | 1.950   27.30 | 3.517   11.24 |  5.08    1.61
     0.400    1.61 | 1.967   27.30 | 3.533   11.24 |  5.10    1.61
     0.417    1.61 | 1.983   27.30 | 3.550   11.24 |  5.12    1.61
     0.433    1.61 | 2.000   27.30 | 3.567   11.24 |  5.13    1.61
     0.450    1.61 | 2.017   27.30 | 3.583   11.24 |  5.15    1.61
     0.467    1.61 | 2.033   27.30 | 3.600   11.24 |  5.17    1.61
     0.483    1.61 | 2.050   27.30 | 3.617   11.24 |  5.18    1.61
     0.500    1.61 | 2.067   27.30 | 3.633   11.24 |  5.20    1.61
     0.517    1.61 | 2.083   27.30 | 3.650   11.24 |  5.22    1.61
     0.533    1.61 | 2.100   27.30 | 3.667   11.24 |  5.23    1.61
     0.550    1.61 | 2.117   27.30 | 3.683   11.24 |  5.25    1.61
     0.567    1.61 | 2.133   27.30 | 3.700   11.24 |  5.27    1.61
     0.583    1.61 | 2.150   27.30 | 3.717   11.24 |  5.28    1.61
     0.600    1.61 | 2.167   27.30 | 3.733   11.24 |  5.30    1.61
     0.617    1.61 | 2.183   27.30 | 3.750   11.24 |  5.32    1.61
     0.633    1.61 | 2.200   27.30 | 3.767    6.42 |  5.33    1.61
     0.650    1.61 | 2.217   27.30 | 3.783    6.42 |  5.35    1.61
     0.667    1.61 | 2.233   27.30 | 3.800    6.42 |  5.37    1.61
     0.683    1.61 | 2.250   27.30 | 3.817    6.42 |  5.38    1.61
     0.700    1.61 | 2.267   73.88 | 3.833    6.42 |  5.40    1.61
     0.717    1.61 | 2.283   73.88 | 3.850    6.42 |  5.42    1.61
     0.733    1.61 | 2.300   73.88 | 3.867    6.42 |  5.43    1.61
     0.750    1.61 | 2.317   73.88 | 3.883    6.42 |  5.45    1.61
     0.767    1.61 | 2.333   73.88 | 3.900    6.42 |  5.47    1.61
     0.783    1.61 | 2.350   73.88 | 3.917    6.42 |  5.48    1.61
     0.800    1.61 | 2.367   73.88 | 3.933    6.42 |  5.50    1.61
     0.817    1.61 | 2.383   73.88 | 3.950    6.42 |  5.52    1.61
     0.833    1.61 | 2.400   73.88 | 3.967    6.42 |  5.53    1.61
     0.850    1.61 | 2.417   73.88 | 3.983    6.42 |  5.55    1.61
     0.867    1.61 | 2.433   73.88 | 4.000    6.42 |  5.57    1.61
     0.883    1.61 | 2.450   73.88 | 4.017    6.42 |  5.58    1.61
     0.900    1.61 | 2.467   73.88 | 4.033    6.42 |  5.60    1.61
     0.917    1.61 | 2.483   73.88 | 4.050    6.42 |  5.62    1.61
```

0.933	1.61	2.500	73.88	4.067	6.42	5.63	1.61
0.950	1.61	2.517	73.88	4.083	6.42	5.65	1.61
0.967	1.61	2.533	73.88	4.100	6.42	5.67	1.61
0.983	1.61	2.550	73.88	4.117	6.42	5.68	1.61
1.000	1.61	2.567	73.88	4.133	6.42	5.70	1.61
1.017	1.61	2.583	73.88	4.150	6.42	5.72	1.61
1.033	1.61	2.600	73.88	4.167	6.42	5.73	1.61
1.050	1.61	2.617	73.88	4.183	6.42	5.75	1.61
1.067	1.61	2.633	73.88	4.200	6.42	5.77	1.61
1.083	1.61	2.650	73.88	4.217	6.42	5.78	1.61
1.100	1.61	2.667	73.88	4.233	6.42	5.80	1.61
1.117	1.61	2.683	73.88	4.250	6.42	5.82	1.61
1.133	1.61	2.700	73.88	4.267	3.21	5.83	1.61
1.150	1.61	2.717	73.88	4.283	3.21	5.85	1.61
1.167	1.61	2.733	73.88	4.300	3.21	5.87	1.61
1.183	1.61	2.750	73.88	4.317	3.21	5.88	1.61
1.200	1.61	2.767	20.89	4.333	3.21	5.90	1.61
1.217	1.61	2.783	20.88	4.350	3.21	5.92	1.61
1.233	1.61	2.800	20.88	4.367	3.21	5.93	1.61
1.250	1.61	2.817	20.88	4.383	3.21	5.95	1.61
1.267	9.64	2.833	20.88	4.400	3.21	5.97	1.61
1.283	9.64	2.850	20.88	4.417	3.21	5.98	1.61
1.300	9.64	2.867	20.88	4.433	3.21	6.00	1.61
1.317	9.64	2.883	20.88	4.450	3.21	6.02	1.61
1.333	9.64	2.900	20.88	4.467	3.21	6.03	1.61
1.350	9.64	2.917	20.88	4.483	3.21	6.05	1.61
1.367	9.64	2.933	20.88	4.500	3.21	6.07	1.61
1.383	9.64	2.950	20.88	4.517	3.21	6.08	1.61
1.400	9.64	2.967	20.88	4.533	3.21	6.10	1.61
1.417	9.64	2.983	20.88	4.550	3.21	6.12	1.61
1.433	9.64	3.000	20.88	4.567	3.21	6.13	1.61
1.450	9.64	3.017	20.88	4.583	3.21	6.15	1.61
1.467	9.64	3.033	20.88	4.600	3.21	6.17	1.61
1.483	9.64	3.050	20.88	4.617	3.21	6.18	1.61
1.500	9.64	3.067	20.88	4.633	3.21	6.20	1.61
1.517	9.64	3.083	20.88	4.650	3.21	6.22	1.61
1.533	9.64	3.100	20.88	4.667	3.21	6.23	1.61
1.550	9.64	3.117	20.88	4.683	3.21	6.25	1.61
1.567	9.64	3.133	20.88	4.700	3.21		

Max.Eff.Inten.(mm/hr)=	73.88	113.35	
over (min)	5.00	11.00	
Storage Coeff. (min)=	5.32 (ii)	10.13 (ii)	
Unit Hyd. Tpeak (min)=	5.00	11.00	
Unit Hyd. peak (cms)=	0.22	0.11	
			TOTALS
PEAK FLOW (cms)=	1.58	0.61	2.185 (iii)
TIME TO PEAK (hrs)=	2.75	2.78	2.75
RUNOFF VOLUME (mm)=	79.31	59.96	72.93
TOTAL RAINFALL (mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT =	0.99	0.75	0.91

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0003)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5020
	0.0190	0.2190	0.0790	0.5950
	0.0250	0.3150	0.0950	0.6640
	0.0440	0.4270	0.1130	0.7310

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0001)	11.520	2.185	2.75	72.93
OUTFLOW: ID= 1 (0003)	11.520	0.113	4.57	50.39

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.17
TIME SHIFT OF PEAK FLOW (min)=109.00
MAXIMUM STORAGE USED (ha.m.)= 0.7308

CALIB	
STANDHYD (0007)	Area (ha)= 18.55
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	1.583	9.64	3.150	20.88	4.72	3.21
0.033	0.00	1.600	9.64	3.167	20.88	4.73	3.21
0.050	0.00	1.617	9.64	3.183	20.88	4.75	3.21
0.067	0.00	1.633	9.64	3.200	20.88	4.77	1.61
0.083	0.00	1.650	9.64	3.217	20.88	4.78	1.61
0.100	0.00	1.667	9.64	3.233	20.88	4.80	1.61
0.117	0.00	1.683	9.64	3.250	20.88	4.82	1.61
0.133	0.00	1.700	9.64	3.267	11.24	4.83	1.61
0.150	0.00	1.717	9.64	3.283	11.24	4.85	1.61
0.167	0.00	1.733	9.64	3.300	11.24	4.87	1.61
0.183	0.00	1.750	9.64	3.317	11.24	4.88	1.61
0.200	0.00	1.767	27.30	3.333	11.24	4.90	1.61
0.217	0.00	1.783	27.30	3.350	11.24	4.92	1.61
0.233	0.00	1.800	27.30	3.367	11.24	4.93	1.61
0.250	0.00	1.817	27.30	3.383	11.24	4.95	1.61
0.267	1.61	1.833	27.30	3.400	11.24	4.97	1.61
0.283	1.61	1.850	27.30	3.417	11.24	4.98	1.61
0.300	1.61	1.867	27.30	3.433	11.24	5.00	1.61
0.317	1.61	1.883	27.30	3.450	11.24	5.02	1.61
0.333	1.61	1.900	27.30	3.467	11.24	5.03	1.61
0.350	1.61	1.917	27.30	3.483	11.24	5.05	1.61
0.367	1.61	1.933	27.30	3.500	11.24	5.07	1.61
0.383	1.61	1.950	27.30	3.517	11.24	5.08	1.61
0.400	1.61	1.967	27.30	3.533	11.24	5.10	1.61
0.417	1.61	1.983	27.30	3.550	11.24	5.12	1.61
0.433	1.61	2.000	27.30	3.567	11.24	5.13	1.61
0.450	1.61	2.017	27.30	3.583	11.24	5.15	1.61
0.467	1.61	2.033	27.30	3.600	11.24	5.17	1.61
0.483	1.61	2.050	27.30	3.617	11.24	5.18	1.61
0.500	1.61	2.067	27.30	3.633	11.24	5.20	1.61
0.517	1.61	2.083	27.30	3.650	11.24	5.22	1.61
0.533	1.61	2.100	27.30	3.667	11.24	5.23	1.61
0.550	1.61	2.117	27.30	3.683	11.24	5.25	1.61
0.567	1.61	2.133	27.30	3.700	11.24	5.27	1.61

0.583	1.61	2.150	27.30	3.717	11.24	5.28	1.61
0.600	1.61	2.167	27.30	3.733	11.24	5.30	1.61
0.617	1.61	2.183	27.30	3.750	11.24	5.32	1.61
0.633	1.61	2.200	27.30	3.767	6.42	5.33	1.61
0.650	1.61	2.217	27.30	3.783	6.42	5.35	1.61
0.667	1.61	2.233	27.30	3.800	6.42	5.37	1.61
0.683	1.61	2.250	27.30	3.817	6.42	5.38	1.61
0.700	1.61	2.267	73.88	3.833	6.42	5.40	1.61
0.717	1.61	2.283	73.88	3.850	6.42	5.42	1.61
0.733	1.61	2.300	73.88	3.867	6.42	5.43	1.61
0.750	1.61	2.317	73.88	3.883	6.42	5.45	1.61
0.767	1.61	2.333	73.88	3.900	6.42	5.47	1.61
0.783	1.61	2.350	73.88	3.917	6.42	5.48	1.61
0.800	1.61	2.367	73.88	3.933	6.42	5.50	1.61
0.817	1.61	2.383	73.88	3.950	6.42	5.52	1.61
0.833	1.61	2.400	73.88	3.967	6.42	5.53	1.61
0.850	1.61	2.417	73.88	3.983	6.42	5.55	1.61
0.867	1.61	2.433	73.88	4.000	6.42	5.57	1.61
0.883	1.61	2.450	73.88	4.017	6.42	5.58	1.61
0.900	1.61	2.467	73.88	4.033	6.42	5.60	1.61
0.917	1.61	2.483	73.88	4.050	6.42	5.62	1.61
0.933	1.61	2.500	73.88	4.067	6.42	5.63	1.61
0.950	1.61	2.517	73.88	4.083	6.42	5.65	1.61
0.967	1.61	2.533	73.88	4.100	6.42	5.67	1.61
0.983	1.61	2.550	73.88	4.117	6.42	5.68	1.61
1.000	1.61	2.567	73.88	4.133	6.42	5.70	1.61
1.017	1.61	2.583	73.88	4.150	6.42	5.72	1.61
1.033	1.61	2.600	73.88	4.167	6.42	5.73	1.61
1.050	1.61	2.617	73.88	4.183	6.42	5.75	1.61
1.067	1.61	2.633	73.88	4.200	6.42	5.77	1.61
1.083	1.61	2.650	73.88	4.217	6.42	5.78	1.61
1.100	1.61	2.667	73.88	4.233	6.42	5.80	1.61
1.117	1.61	2.683	73.88	4.250	6.42	5.82	1.61
1.133	1.61	2.700	73.88	4.267	3.21	5.83	1.61
1.150	1.61	2.717	73.88	4.283	3.21	5.85	1.61
1.167	1.61	2.733	73.88	4.300	3.21	5.87	1.61
1.183	1.61	2.750	73.88	4.317	3.21	5.88	1.61
1.200	1.61	2.767	20.89	4.333	3.21	5.90	1.61
1.217	1.61	2.783	20.88	4.350	3.21	5.92	1.61
1.233	1.61	2.800	20.88	4.367	3.21	5.93	1.61
1.250	1.61	2.817	20.88	4.383	3.21	5.95	1.61
1.267	9.64	2.833	20.88	4.400	3.21	5.97	1.61
1.283	9.64	2.850	20.88	4.417	3.21	5.98	1.61
1.300	9.64	2.867	20.88	4.433	3.21	6.00	1.61
1.317	9.64	2.883	20.88	4.450	3.21	6.02	1.61
1.333	9.64	2.900	20.88	4.467	3.21	6.03	1.61
1.350	9.64	2.917	20.88	4.483	3.21	6.05	1.61
1.367	9.64	2.933	20.88	4.500	3.21	6.07	1.61
1.383	9.64	2.950	20.88	4.517	3.21	6.08	1.61
1.400	9.64	2.967	20.88	4.533	3.21	6.10	1.61
1.417	9.64	2.983	20.88	4.550	3.21	6.12	1.61
1.433	9.64	3.000	20.88	4.567	3.21	6.13	1.61
1.450	9.64	3.017	20.88	4.583	3.21	6.15	1.61
1.467	9.64	3.033	20.88	4.600	3.21	6.17	1.61
1.483	9.64	3.050	20.88	4.617	3.21	6.18	1.61
1.500	9.64	3.067	20.88	4.633	3.21	6.20	1.61
1.517	9.64	3.083	20.88	4.650	3.21	6.22	1.61
1.533	9.64	3.100	20.88	4.667	3.21	6.23	1.61
1.550	9.64	3.117	20.88	4.683	3.21	6.25	1.61
1.567	9.64	3.133	20.88	4.700	3.21		

Max.Eff.Inten.(mm/hr)=	73.88	106.13
over (min)	6.00	13.00
Storage Coeff. (min)=	6.13 (ii)	12.26 (ii)
Unit Hyd. Tpeak (min)=	6.00	13.00
Unit Hyd. peak (cms)=	0.19	0.09

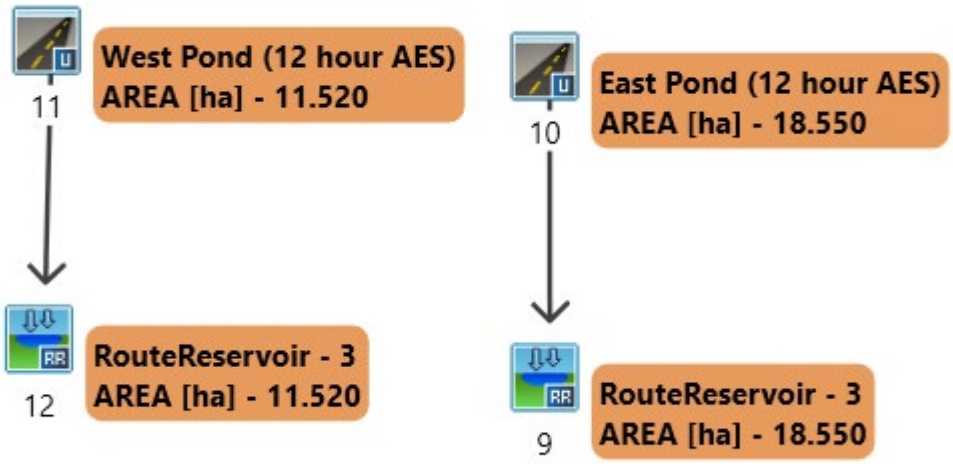
			TOTALS
PEAK FLOW (cms)=	2.04	1.29	3.298 (iii)
TIME TO PEAK (hrs)=	2.75	2.80	2.75
RUNOFF VOLUME (mm)=	79.31	59.09	70.01
TOTAL RAINFALL (mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT =	0.99	0.74	0.87

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0008)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.7510
	0.0280	0.3250	0.1440	0.8950
	0.0460	0.4650	0.1740	1.0020
	0.0810	0.6370	0.2060	1.1080

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	18.550	3.298	2.75	70.01
OUTFLOW: ID= 1 (0008)	18.550	0.206	4.53	52.14

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.24
TIME SHIFT OF PEAK FLOW (min)=107.00
MAXIMUM STORAGE USED (ha.m.)= 1.1077



SCHAEFFERS
CONSULTING ENGINEERS

12 Hour AES
Mount Hope Residential Subdivision

Job #: 2024-5476	Date: February 2026

```
V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

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DATE: 02-19-2026 TIME: 09:56:03

USER:

COMMENTS: _____

** SIMULATION : 1- 2 Year 12 Hour AES (Bloor, **

READ STORM	Filename: C:\Users\hliu\AppData\Local\Temp\15d7e5d8-ec85-4e6b-a747-1f5e44151366\d63f8597
Ptotal= 42.00 mm	Comments: 2 Year 12 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	7.14	6.50	2.94	9.75	0.42
0.25	0.42	3.50	7.14	6.75	2.94	10.00	0.42
0.50	0.42	3.75	7.14	7.00	2.94	10.25	0.42
0.75	0.42	4.00	7.14	7.25	1.68	10.50	0.42
1.00	0.42	4.25	19.32	7.50	1.68	10.75	0.42
1.25	0.42	4.50	19.32	7.75	1.68	11.00	0.42
1.50	0.42	4.75	19.32	8.00	1.68	11.25	0.42
1.75	0.42	5.00	19.32	8.25	0.84	11.50	0.42
2.00	0.42	5.25	5.46	8.50	0.84	11.75	0.42
2.25	2.52	5.50	5.46	8.75	0.84	12.00	0.42
2.50	2.52	5.75	5.46	9.00	0.84		
2.75	2.52	6.00	5.46	9.25	0.42		
3.00	2.52	6.25	2.94	9.50	0.42		

CALIB	
STANDHYD (0010)	Area (ha)= 18.55
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	2.52	6.150	5.46	9.22	0.84
0.033	0.00	3.100	2.52	6.167	5.46	9.23	0.84
0.050	0.00	3.117	2.52	6.183	5.46	9.25	0.84
0.067	0.00	3.133	2.52	6.200	5.46	9.27	0.42
0.083	0.00	3.150	2.52	6.217	5.46	9.28	0.42
0.100	0.00	3.167	2.52	6.233	5.46	9.30	0.42
0.117	0.00	3.183	2.52	6.250	5.46	9.32	0.42
0.133	0.00	3.200	2.52	6.267	2.94	9.33	0.42
0.150	0.00	3.217	2.52	6.283	2.94	9.35	0.42
0.167	0.00	3.233	2.52	6.300	2.94	9.37	0.42
0.183	0.00	3.250	2.52	6.317	2.94	9.38	0.42
0.200	0.00	3.267	7.14	6.333	2.94	9.40	0.42
0.217	0.00	3.283	7.14	6.350	2.94	9.42	0.42
0.233	0.00	3.300	7.14	6.367	2.94	9.43	0.42
0.250	0.00	3.317	7.14	6.383	2.94	9.45	0.42
0.267	0.42	3.333	7.14	6.400	2.94	9.47	0.42
0.283	0.42	3.350	7.14	6.417	2.94	9.48	0.42
0.300	0.42	3.367	7.14	6.433	2.94	9.50	0.42
0.317	0.42	3.383	7.14	6.450	2.94	9.52	0.42
0.333	0.42	3.400	7.14	6.467	2.94	9.53	0.42
0.350	0.42	3.417	7.14	6.483	2.94	9.55	0.42
0.367	0.42	3.433	7.14	6.500	2.94	9.57	0.42
0.383	0.42	3.450	7.14	6.517	2.94	9.58	0.42
0.400	0.42	3.467	7.14	6.533	2.94	9.60	0.42
0.417	0.42	3.483	7.14	6.550	2.94	9.62	0.42
0.433	0.42	3.500	7.14	6.567	2.94	9.63	0.42
0.450	0.42	3.517	7.14	6.583	2.94	9.65	0.42
0.467	0.42	3.533	7.14	6.600	2.94	9.67	0.42
0.483	0.42	3.550	7.14	6.617	2.94	9.68	0.42
0.500	0.42	3.567	7.14	6.633	2.94	9.70	0.42
0.517	0.42	3.583	7.14	6.650	2.94	9.72	0.42
0.533	0.42	3.600	7.14	6.667	2.94	9.73	0.42
0.550	0.42	3.617	7.14	6.683	2.94	9.75	0.42
0.567	0.42	3.633	7.14	6.700	2.94	9.77	0.42
0.583	0.42	3.650	7.14	6.717	2.94	9.78	0.42
0.600	0.42	3.667	7.14	6.733	2.94	9.80	0.42
0.617	0.42	3.683	7.14	6.750	2.94	9.82	0.42
0.633	0.42	3.700	7.14	6.767	2.94	9.83	0.42
0.650	0.42	3.717	7.14	6.783	2.94	9.85	0.42
0.667	0.42	3.733	7.14	6.800	2.94	9.87	0.42
0.683	0.42	3.750	7.14	6.817	2.94	9.88	0.42
0.700	0.42	3.767	7.14	6.833	2.94	9.90	0.42
0.717	0.42	3.783	7.14	6.850	2.94	9.92	0.42
0.733	0.42	3.800	7.14	6.867	2.94	9.93	0.42
0.750	0.42	3.817	7.14	6.883	2.94	9.95	0.42
0.767	0.42	3.833	7.14	6.900	2.94	9.97	0.42

0.783	0.42	3.850	7.14	6.917	2.94	9.98	0.42	1.883	0.42	4.950	19.32	8.017	1.68	11.08	0.42
0.800	0.42	3.867	7.14	6.933	2.94	10.00	0.42	1.900	0.42	4.967	19.32	8.033	1.68	11.10	0.42
0.817	0.42	3.883	7.14	6.950	2.94	10.02	0.42	1.917	0.42	4.983	19.32	8.050	1.68	11.12	0.42
0.833	0.42	3.900	7.14	6.967	2.94	10.03	0.42	1.933	0.42	5.000	19.32	8.067	1.68	11.13	0.42
0.850	0.42	3.917	7.14	6.983	2.94	10.05	0.42	1.950	0.42	5.017	19.32	8.083	1.68	11.15	0.42
0.867	0.42	3.933	7.14	7.000	2.94	10.07	0.42	1.967	0.42	5.033	19.32	8.100	1.68	11.17	0.42
0.883	0.42	3.950	7.14	7.017	2.94	10.08	0.42	1.983	0.42	5.050	19.32	8.117	1.68	11.18	0.42
0.900	0.42	3.967	7.14	7.033	2.94	10.10	0.42	2.000	0.42	5.067	19.32	8.133	1.68	11.20	0.42
0.917	0.42	3.983	7.14	7.050	2.94	10.12	0.42	2.017	0.42	5.083	19.32	8.150	1.68	11.22	0.42
0.933	0.42	4.000	7.14	7.067	2.94	10.13	0.42	2.033	0.42	5.100	19.32	8.167	1.68	11.23	0.42
0.950	0.42	4.017	7.14	7.083	2.94	10.15	0.42	2.050	0.42	5.117	19.32	8.183	1.68	11.25	0.42
0.967	0.42	4.033	7.14	7.100	2.94	10.17	0.42	2.067	0.42	5.133	19.32	8.200	1.68	11.27	0.42
0.983	0.42	4.050	7.14	7.117	2.94	10.18	0.42	2.083	0.42	5.150	19.32	8.217	1.68	11.28	0.42
1.000	0.42	4.067	7.14	7.133	2.94	10.20	0.42	2.100	0.42	5.167	19.32	8.233	1.68	11.30	0.42
1.017	0.42	4.083	7.14	7.150	2.94	10.22	0.42	2.117	0.42	5.183	19.32	8.250	1.68	11.32	0.42
1.033	0.42	4.100	7.14	7.167	2.94	10.23	0.42	2.133	0.42	5.200	19.32	8.267	0.84	11.33	0.42
1.050	0.42	4.117	7.14	7.183	2.94	10.25	0.42	2.150	0.42	5.217	19.32	8.283	0.84	11.35	0.42
1.067	0.42	4.133	7.14	7.200	2.94	10.27	0.42	2.167	0.42	5.233	19.32	8.300	0.84	11.37	0.42
1.083	0.42	4.150	7.14	7.217	2.94	10.28	0.42	2.183	0.42	5.250	19.31	8.317	0.84	11.38	0.42
1.100	0.42	4.167	7.14	7.233	2.94	10.30	0.42	2.200	0.42	5.267	5.46	8.333	0.84	11.40	0.42
1.117	0.42	4.183	7.14	7.250	2.94	10.32	0.42	2.217	0.42	5.283	5.46	8.350	0.84	11.42	0.42
1.133	0.42	4.200	7.14	7.267	1.68	10.33	0.42	2.233	0.42	5.300	5.46	8.367	0.84	11.43	0.42
1.150	0.42	4.217	7.14	7.283	1.68	10.35	0.42	2.250	0.42	5.317	5.46	8.383	0.84	11.45	0.42
1.167	0.42	4.233	7.14	7.300	1.68	10.37	0.42	2.267	2.52	5.333	5.46	8.400	0.84	11.47	0.42
1.183	0.42	4.250	7.14	7.317	1.68	10.38	0.42	2.283	2.52	5.350	5.46	8.417	0.84	11.48	0.42
1.200	0.42	4.267	19.32	7.333	1.68	10.40	0.42	2.300	2.52	5.367	5.46	8.433	0.84	11.50	0.42
1.217	0.42	4.283	19.32	7.350	1.68	10.42	0.42	2.317	2.52	5.383	5.46	8.450	0.84	11.52	0.42
1.233	0.42	4.300	19.32	7.367	1.68	10.43	0.42	2.333	2.52	5.400	5.46	8.467	0.84	11.53	0.42
1.250	0.42	4.317	19.32	7.383	1.68	10.45	0.42	2.350	2.52	5.417	5.46	8.483	0.84	11.55	0.42
1.267	0.42	4.333	19.32	7.400	1.68	10.47	0.42	2.367	2.52	5.433	5.46	8.500	0.84	11.57	0.42
1.283	0.42	4.350	19.32	7.417	1.68	10.48	0.42	2.383	2.52	5.450	5.46	8.517	0.84	11.58	0.42
1.300	0.42	4.367	19.32	7.433	1.68	10.50	0.42	2.400	2.52	5.467	5.46	8.533	0.84	11.60	0.42
1.317	0.42	4.383	19.32	7.450	1.68	10.52	0.42	2.417	2.52	5.483	5.46	8.550	0.84	11.62	0.42
1.333	0.42	4.400	19.32	7.467	1.68	10.53	0.42	2.433	2.52	5.500	5.46	8.567	0.84	11.63	0.42
1.350	0.42	4.417	19.32	7.483	1.68	10.55	0.42	2.450	2.52	5.517	5.46	8.583	0.84	11.65	0.42
1.367	0.42	4.433	19.32	7.500	1.68	10.57	0.42	2.467	2.52	5.533	5.46	8.600	0.84	11.67	0.42
1.383	0.42	4.450	19.32	7.517	1.68	10.58	0.42	2.483	2.52	5.550	5.46	8.617	0.84	11.68	0.42
1.400	0.42	4.467	19.32	7.533	1.68	10.60	0.42	2.500	2.52	5.567	5.46	8.633	0.84	11.70	0.42
1.417	0.42	4.483	19.32	7.550	1.68	10.62	0.42	2.517	2.52	5.583	5.46	8.650	0.84	11.72	0.42
1.433	0.42	4.500	19.32	7.567	1.68	10.63	0.42	2.533	2.52	5.600	5.46	8.667	0.84	11.73	0.42
1.450	0.42	4.517	19.32	7.583	1.68	10.65	0.42	2.550	2.52	5.617	5.46	8.683	0.84	11.75	0.42
1.467	0.42	4.533	19.32	7.600	1.68	10.67	0.42	2.567	2.52	5.633	5.46	8.700	0.84	11.77	0.42
1.483	0.42	4.550	19.32	7.617	1.68	10.68	0.42	2.583	2.52	5.650	5.46	8.717	0.84	11.78	0.42
1.500	0.42	4.567	19.32	7.633	1.68	10.70	0.42	2.600	2.52	5.667	5.46	8.733	0.84	11.80	0.42
1.517	0.42	4.583	19.32	7.650	1.68	10.72	0.42	2.617	2.52	5.683	5.46	8.750	0.84	11.82	0.42
1.533	0.42	4.600	19.32	7.667	1.68	10.73	0.42	2.633	2.52	5.700	5.46	8.767	0.84	11.83	0.42
1.550	0.42	4.617	19.32	7.683	1.68	10.75	0.42	2.650	2.52	5.717	5.46	8.783	0.84	11.85	0.42
1.567	0.42	4.633	19.32	7.700	1.68	10.77	0.42	2.667	2.52	5.733	5.46	8.800	0.84	11.87	0.42
1.583	0.42	4.650	19.32	7.717	1.68	10.78	0.42	2.683	2.52	5.750	5.46	8.817	0.84	11.88	0.42
1.600	0.42	4.667	19.32	7.733	1.68	10.80	0.42	2.700	2.52	5.767	5.46	8.833	0.84	11.90	0.42
1.617	0.42	4.683	19.32	7.750	1.68	10.82	0.42	2.717	2.52	5.783	5.46	8.850	0.84	11.92	0.42
1.633	0.42	4.700	19.32	7.767	1.68	10.83	0.42	2.733	2.52	5.800	5.46	8.867	0.84	11.93	0.42
1.650	0.42	4.717	19.32	7.783	1.68	10.85	0.42	2.750	2.52	5.817	5.46	8.883	0.84	11.95	0.42
1.667	0.42	4.733	19.32	7.800	1.68	10.87	0.42	2.767	2.52	5.833	5.46	8.900	0.84	11.97	0.42
1.683	0.42	4.750	19.32	7.817	1.68	10.88	0.42	2.783	2.52	5.850	5.46	8.917	0.84	11.98	0.42
1.700	0.42	4.767	19.32	7.833	1.68	10.90	0.42	2.800	2.52	5.867	5.46	8.933	0.84	12.00	0.42
1.717	0.42	4.783	19.32	7.850	1.68	10.92	0.42	2.817	2.52	5.883	5.46	8.950	0.84	12.02	0.42
1.733	0.42	4.800	19.32	7.867	1.68	10.93	0.42	2.833	2.52	5.900	5.46	8.967	0.84	12.03	0.42
1.750	0.42	4.817	19.32	7.883	1.68	10.95	0.42	2.850	2.52	5.917	5.46	8.983	0.84	12.05	0.42
1.767	0.42	4.833	19.32	7.900	1.68	10.97	0.42	2.867	2.52	5.933	5.46	9.000	0.84	12.07	0.42
1.783	0.42	4.850	19.32	7.917	1.68	10.98	0.42	2.883	2.52	5.950	5.46	9.017	0.84	12.08	0.42
1.800	0.42	4.867	19.32	7.933	1.68	11.00	0.42	2.900	2.52	5.967	5.46	9.033	0.84	12.10	0.42
1.817	0.42	4.883	19.32	7.950	1.68	11.02	0.42	2.917	2.52	5.983	5.46	9.050	0.84	12.12	0.42
1.833	0.42	4.900	19.32	7.967	1.68	11.03	0.42	2.933	2.52	6.000	5.46	9.067	0.84	12.13	0.42
1.850	0.42	4.917	19.32	7.983	1.68	11.05	0.42	2.950	2.52	6.017	5.46	9.083	0.84	12.15	0.42
1.867	0.42	4.933	19.32	8.000	1.68	11.07	0.42	2.967	2.52	6.033	5.46	9.100	0.84	12.17	0.42

2.983	2.52	6.050	5.46	9.117	0.84	12.18	0.42
3.000	2.52	6.067	5.46	9.133	0.84	12.20	0.42
3.017	2.52	6.083	5.46	9.150	0.84	12.22	0.42
3.033	2.52	6.100	5.46	9.167	0.84	12.23	0.42
3.050	2.52	6.117	5.46	9.183	0.84	12.25	0.42
3.067	2.52	6.133	5.46	9.200	0.84		

Max.Eff.Inten.(mm/hr)=	19.32	23.65	
over (min)	10.00	24.00	
Storage Coeff. (min)=	10.49 (ii)	23.05 (ii)	
Unit Hyd. Tpeak (min)=	10.00	24.00	
Unit Hyd. peak (cms)=	0.11	0.05	
			TOTALS
PEAK FLOW (cms)=	0.54	0.28	0.803 (iii)
TIME TO PEAK (hrs)=	5.25	5.38	5.27
RUNOFF VOLUME (mm)=	40.99	24.68	33.50
TOTAL RAINFALL (mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT =	0.98	0.59	0.80

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0009)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8030
	0.0280	0.3250	0.1440	0.9370
	0.0460	0.5280	0.1740	1.0350
	0.0810	0.6940	0.2060	1.1340

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	18.550	0.803	5.27	33.50
OUTFLOW: ID= 1 (0009)	18.550	0.046	8.97	19.34

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.72
TIME SHIFT OF PEAK FLOW (min)=222.00
MAXIMUM STORAGE USED (ha.m.)= 0.5271

CALIB		
STANDHYD (0011)	Area (ha)= 11.52	
ID= 1 DT= 1.0 min	Total Imp(%)= 81.00	Dir. Conn.(%)= 67.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.33	2.19
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	1.00	2.00
Length (m)=	277.13	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	2.52	6.150	5.46	9.22	0.84
0.033	0.00	3.100	2.52	6.167	5.46	9.23	0.84
0.050	0.00	3.117	2.52	6.183	5.46	9.25	0.84
0.067	0.00	3.133	2.52	6.200	5.46	9.27	0.42
0.083	0.00	3.150	2.52	6.217	5.46	9.28	0.42
0.100	0.00	3.167	2.52	6.233	5.46	9.30	0.42
0.117	0.00	3.183	2.52	6.250	5.46	9.32	0.42
0.133	0.00	3.200	2.52	6.267	2.94	9.33	0.42
0.150	0.00	3.217	2.52	6.283	2.94	9.35	0.42
0.167	0.00	3.233	2.52	6.300	2.94	9.37	0.42
0.183	0.00	3.250	2.52	6.317	2.94	9.38	0.42
0.200	0.00	3.267	7.14	6.333	2.94	9.40	0.42
0.217	0.00	3.283	7.14	6.350	2.94	9.42	0.42
0.233	0.00	3.300	7.14	6.367	2.94	9.43	0.42
0.250	0.00	3.317	7.14	6.383	2.94	9.45	0.42
0.267	0.42	3.333	7.14	6.400	2.94	9.47	0.42
0.283	0.42	3.350	7.14	6.417	2.94	9.48	0.42
0.300	0.42	3.367	7.14	6.433	2.94	9.50	0.42
0.317	0.42	3.383	7.14	6.450	2.94	9.52	0.42
0.333	0.42	3.400	7.14	6.467	2.94	9.53	0.42
0.350	0.42	3.417	7.14	6.483	2.94	9.55	0.42
0.367	0.42	3.433	7.14	6.500	2.94	9.57	0.42
0.383	0.42	3.450	7.14	6.517	2.94	9.58	0.42
0.400	0.42	3.467	7.14	6.533	2.94	9.60	0.42
0.417	0.42	3.483	7.14	6.550	2.94	9.62	0.42
0.433	0.42	3.500	7.14	6.567	2.94	9.63	0.42
0.450	0.42	3.517	7.14	6.583	2.94	9.65	0.42
0.467	0.42	3.533	7.14	6.600	2.94	9.67	0.42
0.483	0.42	3.550	7.14	6.617	2.94	9.68	0.42
0.500	0.42	3.567	7.14	6.633	2.94	9.70	0.42
0.517	0.42	3.583	7.14	6.650	2.94	9.72	0.42
0.533	0.42	3.600	7.14	6.667	2.94	9.73	0.42
0.550	0.42	3.617	7.14	6.683	2.94	9.75	0.42
0.567	0.42	3.633	7.14	6.700	2.94	9.77	0.42
0.583	0.42	3.650	7.14	6.717	2.94	9.78	0.42
0.600	0.42	3.667	7.14	6.733	2.94	9.80	0.42
0.617	0.42	3.683	7.14	6.750	2.94	9.82	0.42
0.633	0.42	3.700	7.14	6.767	2.94	9.83	0.42
0.650	0.42	3.717	7.14	6.783	2.94	9.85	0.42
0.667	0.42	3.733	7.14	6.800	2.94	9.87	0.42
0.683	0.42	3.750	7.14	6.817	2.94	9.88	0.42
0.700	0.42	3.767	7.14	6.833	2.94	9.90	0.42
0.717	0.42	3.783	7.14	6.850	2.94	9.92	0.42
0.733	0.42	3.800	7.14	6.867	2.94	9.93	0.42
0.750	0.42	3.817	7.14	6.883	2.94	9.95	0.42
0.767	0.42	3.833	7.14	6.900	2.94	9.97	0.42
0.783	0.42	3.850	7.14	6.917	2.94	9.98	0.42
0.800	0.42	3.867	7.14	6.933	2.94	10.00	0.42
0.817	0.42	3.883	7.14	6.950	2.94	10.02	0.42
0.833	0.42	3.900	7.14	6.967	2.94	10.03	0.42
0.850	0.42	3.917	7.14	6.983	2.94	10.05	0.42
0.867	0.42	3.933	7.14	7.000	2.94	10.07	0.42
0.883	0.42	3.950	7.14	7.017	2.94	10.08	0.42
0.900	0.42	3.967	7.14	7.033	2.94	10.10	0.42
0.917	0.42	3.983	7.14	7.050	2.94	10.12	0.42
0.933	0.42	4.000	7.14	7.067	2.94	10.13	0.42
0.950	0.42	4.017	7.14	7.083	2.94	10.15	0.42
0.967	0.42	4.033	7.14	7.100	2.94	10.17	0.42
0.983	0.42	4.050	7.14	7.117	2.94	10.18	0.42
1.000	0.42	4.067	7.14	7.133	2.94	10.20	0.42
1.017	0.42	4.083	7.14	7.150	2.94	10.22	0.42
1.033	0.42	4.100	7.14	7.167	2.94	10.23	0.42
1.050	0.42	4.117	7.14	7.183	2.94	10.25	0.42
1.067	0.42	4.133	7.14	7.200	2.94	10.27	0.42
1.083	0.42	4.150	7.14	7.217	2.94	10.28	0.42
1.100	0.42	4.167	7.14	7.233	2.94	10.30	0.42
1.117	0.42	4.183	7.14	7.250	2.94	10.32	0.42

1.133	0.42	4.200	7.14	7.267	1.68	10.33	0.42	2.233	0.42	5.300	5.46	8.367	0.84	11.43	0.42
1.150	0.42	4.217	7.14	7.283	1.68	10.35	0.42	2.250	0.42	5.317	5.46	8.383	0.84	11.45	0.42
1.167	0.42	4.233	7.14	7.300	1.68	10.37	0.42	2.267	2.52	5.333	5.46	8.400	0.84	11.47	0.42
1.183	0.42	4.250	7.14	7.317	1.68	10.38	0.42	2.283	2.52	5.350	5.46	8.417	0.84	11.48	0.42
1.200	0.42	4.267	19.32	7.333	1.68	10.40	0.42	2.300	2.52	5.367	5.46	8.433	0.84	11.50	0.42
1.217	0.42	4.283	19.32	7.350	1.68	10.42	0.42	2.317	2.52	5.383	5.46	8.450	0.84	11.52	0.42
1.233	0.42	4.300	19.32	7.367	1.68	10.43	0.42	2.333	2.52	5.400	5.46	8.467	0.84	11.53	0.42
1.250	0.42	4.317	19.32	7.383	1.68	10.45	0.42	2.350	2.52	5.417	5.46	8.483	0.84	11.55	0.42
1.267	0.42	4.333	19.32	7.400	1.68	10.47	0.42	2.367	2.52	5.433	5.46	8.500	0.84	11.57	0.42
1.283	0.42	4.350	19.32	7.417	1.68	10.48	0.42	2.383	2.52	5.450	5.46	8.517	0.84	11.58	0.42
1.300	0.42	4.367	19.32	7.433	1.68	10.50	0.42	2.400	2.52	5.467	5.46	8.533	0.84	11.60	0.42
1.317	0.42	4.383	19.32	7.450	1.68	10.52	0.42	2.417	2.52	5.483	5.46	8.550	0.84	11.62	0.42
1.333	0.42	4.400	19.32	7.467	1.68	10.53	0.42	2.433	2.52	5.500	5.46	8.567	0.84	11.63	0.42
1.350	0.42	4.417	19.32	7.483	1.68	10.55	0.42	2.450	2.52	5.517	5.46	8.583	0.84	11.65	0.42
1.367	0.42	4.433	19.32	7.500	1.68	10.57	0.42	2.467	2.52	5.533	5.46	8.600	0.84	11.67	0.42
1.383	0.42	4.450	19.32	7.517	1.68	10.58	0.42	2.483	2.52	5.550	5.46	8.617	0.84	11.68	0.42
1.400	0.42	4.467	19.32	7.533	1.68	10.60	0.42	2.500	2.52	5.567	5.46	8.633	0.84	11.70	0.42
1.417	0.42	4.483	19.32	7.550	1.68	10.62	0.42	2.517	2.52	5.583	5.46	8.650	0.84	11.72	0.42
1.433	0.42	4.500	19.32	7.567	1.68	10.63	0.42	2.533	2.52	5.600	5.46	8.667	0.84	11.73	0.42
1.450	0.42	4.517	19.32	7.583	1.68	10.65	0.42	2.550	2.52	5.617	5.46	8.683	0.84	11.75	0.42
1.467	0.42	4.533	19.32	7.600	1.68	10.67	0.42	2.567	2.52	5.633	5.46	8.700	0.84	11.77	0.42
1.483	0.42	4.550	19.32	7.617	1.68	10.68	0.42	2.583	2.52	5.650	5.46	8.717	0.84	11.78	0.42
1.500	0.42	4.567	19.32	7.633	1.68	10.70	0.42	2.600	2.52	5.667	5.46	8.733	0.84	11.80	0.42
1.517	0.42	4.583	19.32	7.650	1.68	10.72	0.42	2.617	2.52	5.683	5.46	8.750	0.84	11.82	0.42
1.533	0.42	4.600	19.32	7.667	1.68	10.73	0.42	2.633	2.52	5.700	5.46	8.767	0.84	11.83	0.42
1.550	0.42	4.617	19.32	7.683	1.68	10.75	0.42	2.650	2.52	5.717	5.46	8.783	0.84	11.85	0.42
1.567	0.42	4.633	19.32	7.700	1.68	10.77	0.42	2.667	2.52	5.733	5.46	8.800	0.84	11.87	0.42
1.583	0.42	4.650	19.32	7.717	1.68	10.78	0.42	2.683	2.52	5.750	5.46	8.817	0.84	11.88	0.42
1.600	0.42	4.667	19.32	7.733	1.68	10.80	0.42	2.700	2.52	5.767	5.46	8.833	0.84	11.90	0.42
1.617	0.42	4.683	19.32	7.750	1.68	10.82	0.42	2.717	2.52	5.783	5.46	8.850	0.84	11.92	0.42
1.633	0.42	4.700	19.32	7.767	1.68	10.83	0.42	2.733	2.52	5.800	5.46	8.867	0.84	11.93	0.42
1.650	0.42	4.717	19.32	7.783	1.68	10.85	0.42	2.750	2.52	5.817	5.46	8.883	0.84	11.95	0.42
1.667	0.42	4.733	19.32	7.800	1.68	10.87	0.42	2.767	2.52	5.833	5.46	8.900	0.84	11.97	0.42
1.683	0.42	4.750	19.32	7.817	1.68	10.88	0.42	2.783	2.52	5.850	5.46	8.917	0.84	11.98	0.42
1.700	0.42	4.767	19.32	7.833	1.68	10.90	0.42	2.800	2.52	5.867	5.46	8.933	0.84	12.00	0.42
1.717	0.42	4.783	19.32	7.850	1.68	10.92	0.42	2.817	2.52	5.883	5.46	8.950	0.84	12.02	0.42
1.733	0.42	4.800	19.32	7.867	1.68	10.93	0.42	2.833	2.52	5.900	5.46	8.967	0.84	12.03	0.42
1.750	0.42	4.817	19.32	7.883	1.68	10.95	0.42	2.850	2.52	5.917	5.46	8.983	0.84	12.05	0.42
1.767	0.42	4.833	19.32	7.900	1.68	10.97	0.42	2.867	2.52	5.933	5.46	9.000	0.84	12.07	0.42
1.783	0.42	4.850	19.32	7.917	1.68	10.98	0.42	2.883	2.52	5.950	5.46	9.017	0.84	12.08	0.42
1.800	0.42	4.867	19.32	7.933	1.68	11.00	0.42	2.900	2.52	5.967	5.46	9.033	0.84	12.10	0.42
1.817	0.42	4.883	19.32	7.950	1.68	11.02	0.42	2.917	2.52	5.983	5.46	9.050	0.84	12.12	0.42
1.833	0.42	4.900	19.32	7.967	1.68	11.03	0.42	2.933	2.52	6.000	5.46	9.067	0.84	12.13	0.42
1.850	0.42	4.917	19.32	7.983	1.68	11.05	0.42	2.950	2.52	6.017	5.46	9.083	0.84	12.15	0.42
1.867	0.42	4.933	19.32	8.000	1.68	11.07	0.42	2.967	2.52	6.033	5.46	9.100	0.84	12.17	0.42
1.883	0.42	4.950	19.32	8.017	1.68	11.08	0.42	2.983	2.52	6.050	5.46	9.117	0.84	12.18	0.42
1.900	0.42	4.967	19.32	8.033	1.68	11.10	0.42	3.000	2.52	6.067	5.46	9.133	0.84	12.20	0.42
1.917	0.42	4.983	19.32	8.050	1.68	11.12	0.42	3.017	2.52	6.083	5.46	9.150	0.84	12.22	0.42
1.933	0.42	5.000	19.32	8.067	1.68	11.13	0.42	3.033	2.52	6.100	5.46	9.167	0.84	12.23	0.42
1.950	0.42	5.017	19.32	8.083	1.68	11.15	0.42	3.050	2.52	6.117	5.46	9.183	0.84	12.25	0.42
1.967	0.42	5.033	19.32	8.100	1.68	11.17	0.42	3.067	2.52	6.133	5.46	9.200	0.84		
1.983	0.42	5.050	19.32	8.117	1.68	11.18	0.42								
2.000	0.42	5.067	19.32	8.133	1.68	11.20	0.42								
2.017	0.42	5.083	19.32	8.150	1.68	11.22	0.42								
2.033	0.42	5.100	19.32	8.167	1.68	11.23	0.42								
2.050	0.42	5.117	19.32	8.183	1.68	11.25	0.42								
2.067	0.42	5.133	19.32	8.200	1.68	11.27	0.42								
2.083	0.42	5.150	19.32	8.217	1.68	11.28	0.42								
2.100	0.42	5.167	19.32	8.233	1.68	11.30	0.42								
2.117	0.42	5.183	19.32	8.250	1.68	11.32	0.42								
2.133	0.42	5.200	19.32	8.267	0.84	11.33	0.42								
2.150	0.42	5.217	19.32	8.283	0.84	11.35	0.42								
2.167	0.42	5.233	19.32	8.300	0.84	11.37	0.42								
2.183	0.42	5.250	19.31	8.317	0.84	11.38	0.42								
2.200	0.42	5.267	5.46	8.333	0.84	11.40	0.42								
2.217	0.42	5.283	5.46	8.350	0.84	11.42	0.42								

Max.Eff.Inten.(mm/hr)=	19.32	25.64	
over (min)	9.00	18.00	
Storage Coeff. (min)=	9.09 (ii)	17.32 (ii)	
Unit Hyd. Tpeak (min)=	9.00	18.00	
Unit Hyd. peak (cms)=	0.12	0.06	
			TOTALS
PEAK FLOW (cms)=	0.41	0.14	0.548 (iii)
TIME TO PEAK (hrs)=	5.25	5.32	5.25
RUNOFF VOLUME (mm)=	41.00	25.27	35.81
TOTAL RAINFALL (mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT =	0.98	0.60	0.85

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

```
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0012)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |  0.0590      0.5390
                         0.0190     0.2190   |  0.0790      0.6270
                         0.0250     0.3570   |  0.0950      0.6900
                         0.0440     0.4680   |  0.1130      0.7520

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0011)    11.520     0.548      5.25      35.81
   OUTFLOW: ID= 1 (  0012)    11.520     0.025      9.32      19.41

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.55
                  TIME SHIFT OF PEAK FLOW         (min)=244.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3566

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-
9c16-43e17470752a\78018256-0192-4d2d-9911-057f1372c2e7\scenari
  Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-
9c16-43e17470752a\78018256-0192-4d2d-9911-057f1372c2e7\scenari


DATE: 02-19-2026                          TIME: 09:56:03

USER:



COMMENTS: _____________________________________________________________


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  ***********************************************
  ** SIMULATION : 2- 5 Year 12 Hour AES (Bloor, **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\hliu\AppD
|                  |              ata\Local\Temp\
|                  |              15d7e5d8-ec85-4e6b-a747-1f5e44151366\0976c6c6
| Ptotal= 54.38 mm |    Comments: 5 Year 12 Hour AES (Bloor, TRCA)
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs  mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  3.25    9.25 |  6.50    3.81 |  9.75    0.54
                0.25    0.54 |  3.50    9.25 |  6.75    3.81 | 10.00    0.54
                0.50    0.54 |  3.75    9.25 |  7.00    3.81 | 10.25    0.54
                0.75    0.54 |  4.00    9.25 |  7.25    2.18 | 10.50    0.54
                1.00    0.54 |  4.25   25.02 |  7.50    2.18 | 10.75    0.54
                1.25    0.54 |  4.50   25.02 |  7.75    2.18 | 11.00    0.54
                1.50    0.54 |  4.75   25.02 |  8.00    2.18 | 11.25    0.54
                1.75    0.54 |  5.00   25.02 |  8.25    1.09 | 11.50    0.54
                2.00    0.54 |  5.25    7.07 |  8.50    1.09 | 11.75    0.54
                2.25    3.26 |  5.50    7.07 |  8.75    1.09 | 12.00    0.54
                2.50    3.26 |  5.75    7.07 |  9.00    1.09 |
                2.75    3.26 |  6.00    7.07 |  9.25    0.54 |
                3.00    3.26 |  6.25    3.81 |  9.50    0.54 |

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--------------------
| CALIB            |
| STANDHYD (  0010)|   Area     (ha)=  18.55
|ID= 1 DT= 1.0 min |   Total Imp(%)=  72.00   Dir. Conn.(%)=  54.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       13.36          5.19
     Dep. Storage     (mm)=        1.00          1.50
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      351.66         40.00
     Mannings n            =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs  mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    0.00 | 3.083    3.26 | 6.150    7.07 |  9.22    1.09
               0.033    0.00 | 3.100    3.26 | 6.167    7.07 |  9.23    1.09
               0.050    0.00 | 3.117    3.26 | 6.183    7.07 |  9.25    1.09
               0.067    0.00 | 3.133    3.26 | 6.200    7.07 |  9.27    0.54
               0.083    0.00 | 3.150    3.26 | 6.217    7.07 |  9.28    0.54
               0.100    0.00 | 3.167    3.26 | 6.233    7.07 |  9.30    0.54
               0.117    0.00 | 3.183    3.26 | 6.250    7.06 |  9.32    0.54
               0.133    0.00 | 3.200    3.26 | 6.267    3.81 |  9.33    0.54
               0.150    0.00 | 3.217    3.26 | 6.283    3.81 |  9.35    0.54
               0.167    0.00 | 3.233    3.26 | 6.300    3.81 |  9.37    0.54
               0.183    0.00 | 3.250    3.26 | 6.317    3.81 |  9.38    0.54
               0.200    0.00 | 3.267    9.25 | 6.333    3.81 |  9.40    0.54
               0.217    0.00 | 3.283    9.25 | 6.350    3.81 |  9.42    0.54
               0.233    0.00 | 3.300    9.25 | 6.367    3.81 |  9.43    0.54
               0.250    0.00 | 3.317    9.25 | 6.383    3.81 |  9.45    0.54
               0.267    0.54 | 3.333    9.25 | 6.400    3.81 |  9.47    0.54
               0.283    0.54 | 3.350    9.25 | 6.417    3.81 |  9.48    0.54
               0.300    0.54 | 3.367    9.25 | 6.433    3.81 |  9.50    0.54
               0.317    0.54 | 3.383    9.25 | 6.450    3.81 |  9.52    0.54
               0.333    0.54 | 3.400    9.25 | 6.467    3.81 |  9.53    0.54
```

0.350	0.54	3.417	9.25	6.483	3.81	9.55	0.54	1.450	0.54	4.517	25.02	7.583	2.18	10.65	0.54
0.367	0.54	3.433	9.25	6.500	3.81	9.57	0.54	1.467	0.54	4.533	25.02	7.600	2.18	10.67	0.54
0.383	0.54	3.450	9.25	6.517	3.81	9.58	0.54	1.483	0.54	4.550	25.02	7.617	2.18	10.68	0.54
0.400	0.54	3.467	9.25	6.533	3.81	9.60	0.54	1.500	0.54	4.567	25.02	7.633	2.18	10.70	0.54
0.417	0.54	3.483	9.25	6.550	3.81	9.62	0.54	1.517	0.54	4.583	25.02	7.650	2.18	10.72	0.54
0.433	0.54	3.500	9.25	6.567	3.81	9.63	0.54	1.533	0.54	4.600	25.02	7.667	2.18	10.73	0.54
0.450	0.54	3.517	9.25	6.583	3.81	9.65	0.54	1.550	0.54	4.617	25.02	7.683	2.18	10.75	0.54
0.467	0.54	3.533	9.25	6.600	3.81	9.67	0.54	1.567	0.54	4.633	25.02	7.700	2.18	10.77	0.54
0.483	0.54	3.550	9.25	6.617	3.81	9.68	0.54	1.583	0.54	4.650	25.02	7.717	2.18	10.78	0.54
0.500	0.54	3.567	9.25	6.633	3.81	9.70	0.54	1.600	0.54	4.667	25.02	7.733	2.18	10.80	0.54
0.517	0.54	3.583	9.25	6.650	3.81	9.72	0.54	1.617	0.54	4.683	25.02	7.750	2.18	10.82	0.54
0.533	0.54	3.600	9.25	6.667	3.81	9.73	0.54	1.633	0.54	4.700	25.02	7.767	2.18	10.83	0.54
0.550	0.54	3.617	9.25	6.683	3.81	9.75	0.54	1.650	0.54	4.717	25.02	7.783	2.18	10.85	0.54
0.567	0.54	3.633	9.25	6.700	3.81	9.77	0.54	1.667	0.54	4.733	25.02	7.800	2.18	10.87	0.54
0.583	0.54	3.650	9.25	6.717	3.81	9.78	0.54	1.683	0.54	4.750	25.02	7.817	2.18	10.88	0.54
0.600	0.54	3.667	9.25	6.733	3.81	9.80	0.54	1.700	0.54	4.767	25.02	7.833	2.18	10.90	0.54
0.617	0.54	3.683	9.25	6.750	3.81	9.82	0.54	1.717	0.54	4.783	25.02	7.850	2.18	10.92	0.54
0.633	0.54	3.700	9.25	6.767	3.81	9.83	0.54	1.733	0.54	4.800	25.02	7.867	2.18	10.93	0.54
0.650	0.54	3.717	9.25	6.783	3.81	9.85	0.54	1.750	0.54	4.817	25.02	7.883	2.18	10.95	0.54
0.667	0.54	3.733	9.25	6.800	3.81	9.87	0.54	1.767	0.54	4.833	25.02	7.900	2.18	10.97	0.54
0.683	0.54	3.750	9.25	6.817	3.81	9.88	0.54	1.783	0.54	4.850	25.02	7.917	2.18	10.98	0.54
0.700	0.54	3.767	9.25	6.833	3.81	9.90	0.54	1.800	0.54	4.867	25.02	7.933	2.18	11.00	0.54
0.717	0.54	3.783	9.25	6.850	3.81	9.92	0.54	1.817	0.54	4.883	25.02	7.950	2.18	11.02	0.54
0.733	0.54	3.800	9.25	6.867	3.81	9.93	0.54	1.833	0.54	4.900	25.02	7.967	2.18	11.03	0.54
0.750	0.54	3.817	9.25	6.883	3.81	9.95	0.54	1.850	0.54	4.917	25.02	7.983	2.18	11.05	0.54
0.767	0.54	3.833	9.25	6.900	3.81	9.97	0.54	1.867	0.54	4.933	25.02	8.000	2.18	11.07	0.54
0.783	0.54	3.850	9.25	6.917	3.81	9.98	0.54	1.883	0.54	4.950	25.02	8.017	2.18	11.08	0.54
0.800	0.54	3.867	9.25	6.933	3.81	10.00	0.54	1.900	0.54	4.967	25.02	8.033	2.18	11.10	0.54
0.817	0.54	3.883	9.25	6.950	3.81	10.02	0.54	1.917	0.54	4.983	25.02	8.050	2.18	11.12	0.54
0.833	0.54	3.900	9.25	6.967	3.81	10.03	0.54	1.933	0.54	5.000	25.02	8.067	2.18	11.13	0.54
0.850	0.54	3.917	9.25	6.983	3.81	10.05	0.54	1.950	0.54	5.017	25.02	8.083	2.18	11.15	0.54
0.867	0.54	3.933	9.25	7.000	3.81	10.07	0.54	1.967	0.54	5.033	25.02	8.100	2.18	11.17	0.54
0.883	0.54	3.950	9.25	7.017	3.81	10.08	0.54	1.983	0.54	5.050	25.02	8.117	2.18	11.18	0.54
0.900	0.54	3.967	9.25	7.033	3.81	10.10	0.54	2.000	0.54	5.067	25.02	8.133	2.18	11.20	0.54
0.917	0.54	3.983	9.25	7.050	3.81	10.12	0.54	2.017	0.54	5.083	25.02	8.150	2.18	11.22	0.54
0.933	0.54	4.000	9.25	7.067	3.81	10.13	0.54	2.033	0.54	5.100	25.02	8.167	2.18	11.23	0.54
0.950	0.54	4.017	9.25	7.083	3.81	10.15	0.54	2.050	0.54	5.117	25.02	8.183	2.18	11.25	0.54
0.967	0.54	4.033	9.25	7.100	3.81	10.17	0.54	2.067	0.54	5.133	25.02	8.200	2.18	11.27	0.54
0.983	0.54	4.050	9.25	7.117	3.81	10.18	0.54	2.083	0.54	5.150	25.02	8.217	2.18	11.28	0.54
1.000	0.54	4.067	9.25	7.133	3.81	10.20	0.54	2.100	0.54	5.167	25.02	8.233	2.18	11.30	0.54
1.017	0.54	4.083	9.25	7.150	3.81	10.22	0.54	2.117	0.54	5.183	25.02	8.250	2.18	11.32	0.54
1.033	0.54	4.100	9.25	7.167	3.81	10.23	0.54	2.133	0.54	5.200	25.02	8.267	1.09	11.33	0.54
1.050	0.54	4.117	9.25	7.183	3.81	10.25	0.54	2.150	0.54	5.217	25.02	8.283	1.09	11.35	0.54
1.067	0.54	4.133	9.25	7.200	3.81	10.27	0.54	2.167	0.54	5.233	25.02	8.300	1.09	11.37	0.54
1.083	0.54	4.150	9.25	7.217	3.81	10.28	0.54	2.183	0.54	5.250	25.01	8.317	1.09	11.38	0.54
1.100	0.54	4.167	9.25	7.233	3.81	10.30	0.54	2.200	0.54	5.267	7.07	8.333	1.09	11.40	0.54
1.117	0.54	4.183	9.25	7.250	3.81	10.32	0.54	2.217	0.54	5.283	7.07	8.350	1.09	11.42	0.54
1.133	0.54	4.200	9.25	7.267	2.18	10.33	0.54	2.233	0.54	5.300	7.07	8.367	1.09	11.43	0.54
1.150	0.54	4.217	9.25	7.283	2.18	10.35	0.54	2.250	0.54	5.317	7.07	8.383	1.09	11.45	0.54
1.167	0.54	4.233	9.25	7.300	2.18	10.37	0.54	2.267	3.26	5.333	7.07	8.400	1.09	11.47	0.54
1.183	0.54	4.250	9.25	7.317	2.18	10.38	0.54	2.283	3.26	5.350	7.07	8.417	1.09	11.48	0.54
1.200	0.54	4.267	25.02	7.333	2.18	10.40	0.54	2.300	3.26	5.367	7.07	8.433	1.09	11.50	0.54
1.217	0.54	4.283	25.02	7.350	2.18	10.42	0.54	2.317	3.26	5.383	7.07	8.450	1.09	11.52	0.54
1.233	0.54	4.300	25.02	7.367	2.18	10.43	0.54	2.333	3.26	5.400	7.07	8.467	1.09	11.53	0.54
1.250	0.54	4.317	25.02	7.383	2.18	10.45	0.54	2.350	3.26	5.417	7.07	8.483	1.09	11.55	0.54
1.267	0.54	4.333	25.02	7.400	2.18	10.47	0.54	2.367	3.26	5.433	7.07	8.500	1.09	11.57	0.54
1.283	0.54	4.350	25.02	7.417	2.18	10.48	0.54	2.383	3.26	5.450	7.07	8.517	1.09	11.58	0.54
1.300	0.54	4.367	25.02	7.433	2.18	10.50	0.54	2.400	3.26	5.467	7.07	8.533	1.09	11.60	0.54
1.317	0.54	4.383	25.02	7.450	2.18	10.52	0.54	2.417	3.26	5.483	7.07	8.550	1.09	11.62	0.54
1.333	0.54	4.400	25.02	7.467	2.18	10.53	0.54	2.433	3.26	5.500	7.07	8.567	1.09	11.63	0.54
1.350	0.54	4.417	25.02	7.483	2.18	10.55	0.54	2.450	3.26	5.517	7.07	8.583	1.09	11.65	0.54
1.367	0.54	4.433	25.02	7.500	2.18	10.57	0.54	2.467	3.26	5.533	7.07	8.600	1.09	11.67	0.54
1.383	0.54	4.450	25.02	7.517	2.18	10.58	0.54	2.483	3.26	5.550	7.07	8.617	1.09	11.68	0.54
1.400	0.54	4.467	25.02	7.533	2.18	10.60	0.54	2.500	3.26	5.567	7.07	8.633	1.09	11.70	0.54
1.417	0.54	4.483	25.02	7.550	2.18	10.62	0.54	2.517	3.26	5.583	7.07	8.650	1.09	11.72	0.54
1.433	0.54	4.500	25.02	7.567	2.18	10.63	0.54	2.533	3.26	5.600	7.07	8.667	1.09	11.73	0.54

2.550	3.26	5.617	7.07	8.683	1.09	11.75	0.54
2.567	3.26	5.633	7.07	8.700	1.09	11.77	0.54
2.583	3.26	5.650	7.07	8.717	1.09	11.78	0.54
2.600	3.26	5.667	7.07	8.733	1.09	11.80	0.54
2.617	3.26	5.683	7.07	8.750	1.09	11.82	0.54
2.633	3.26	5.700	7.07	8.767	1.09	11.83	0.54
2.650	3.26	5.717	7.07	8.783	1.09	11.85	0.54
2.667	3.26	5.733	7.07	8.800	1.09	11.87	0.54
2.683	3.26	5.750	7.07	8.817	1.09	11.88	0.54
2.700	3.26	5.767	7.07	8.833	1.09	11.90	0.54
2.717	3.26	5.783	7.07	8.850	1.09	11.92	0.54
2.733	3.26	5.800	7.07	8.867	1.09	11.93	0.54
2.750	3.26	5.817	7.07	8.883	1.09	11.95	0.54
2.767	3.26	5.833	7.07	8.900	1.09	11.97	0.54
2.783	3.26	5.850	7.07	8.917	1.09	11.98	0.54
2.800	3.26	5.867	7.07	8.933	1.09	12.00	0.54
2.817	3.26	5.883	7.07	8.950	1.09	12.02	0.54
2.833	3.26	5.900	7.07	8.967	1.09	12.03	0.54
2.850	3.26	5.917	7.07	8.983	1.09	12.05	0.54
2.867	3.26	5.933	7.07	9.000	1.09	12.07	0.54
2.883	3.26	5.950	7.07	9.017	1.09	12.08	0.54
2.900	3.26	5.967	7.07	9.033	1.09	12.10	0.54
2.917	3.26	5.983	7.07	9.050	1.09	12.12	0.54
2.933	3.26	6.000	7.07	9.067	1.09	12.13	0.54
2.950	3.26	6.017	7.07	9.083	1.09	12.15	0.54
2.967	3.26	6.033	7.07	9.100	1.09	12.17	0.54
2.983	3.26	6.050	7.07	9.117	1.09	12.18	0.54
3.000	3.26	6.067	7.07	9.133	1.09	12.20	0.54
3.017	3.26	6.083	7.07	9.150	1.09	12.22	0.54
3.033	3.26	6.100	7.07	9.167	1.09	12.23	0.54
3.050	3.26	6.117	7.07	9.183	1.09	12.25	0.54
3.067	3.26	6.133	7.07	9.200	1.09		

Max.Eff.Inten.(mm/hr)=	25.02	33.31	
over (min)	9.00	21.00	
Storage Coeff. (min)=	9.46 (ii)	20.41 (ii)	
Unit Hyd. Tpeak (min)=	9.00	21.00	
Unit Hyd. peak (cms)=	0.12	0.05	
			TOTALS
PEAK FLOW (cms)=	0.69	0.41	1.098 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	53.37	35.39	45.11
TOTAL RAINFALL (mm)=	54.38	54.38	54.38
RUNOFF COEFFICIENT =	0.98	0.65	0.83

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0009)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8030
	0.0280	0.3250	0.1440	0.9370
	0.0460	0.5280	0.1740	1.0350
	0.0810	0.6940	0.2060	1.1340

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	18.550	1.098	5.25	45.11
OUTFLOW: ID= 1 (0009)	18.550	0.081	8.52	27.53

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.39
TIME SHIFT OF PEAK FLOW (min)=196.00
MAXIMUM STORAGE USED (ha.m.)= 0.6947

CALIB		
STANDHYD (0011)	Area (ha)=	11.52
ID= 1 DT= 1.0 min	Total Imp(%)=	81.00 Dir. Conn.(%)= 67.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.33	2.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	3.26	6.150	7.07	9.22	1.09
0.033	0.00	3.100	3.26	6.167	7.07	9.23	1.09
0.050	0.00	3.117	3.26	6.183	7.07	9.25	1.09
0.067	0.00	3.133	3.26	6.200	7.07	9.27	0.54
0.083	0.00	3.150	3.26	6.217	7.07	9.28	0.54
0.100	0.00	3.167	3.26	6.233	7.07	9.30	0.54
0.117	0.00	3.183	3.26	6.250	7.06	9.32	0.54
0.133	0.00	3.200	3.26	6.267	3.81	9.33	0.54
0.150	0.00	3.217	3.26	6.283	3.81	9.35	0.54
0.167	0.00	3.233	3.26	6.300	3.81	9.37	0.54
0.183	0.00	3.250	3.26	6.317	3.81	9.38	0.54
0.200	0.00	3.267	9.25	6.333	3.81	9.40	0.54
0.217	0.00	3.283	9.25	6.350	3.81	9.42	0.54
0.233	0.00	3.300	9.25	6.367	3.81	9.43	0.54
0.250	0.00	3.317	9.25	6.383	3.81	9.45	0.54
0.267	0.54	3.333	9.25	6.400	3.81	9.47	0.54
0.283	0.54	3.350	9.25	6.417	3.81	9.48	0.54
0.300	0.54	3.367	9.25	6.433	3.81	9.50	0.54
0.317	0.54	3.383	9.25	6.450	3.81	9.52	0.54
0.333	0.54	3.400	9.25	6.467	3.81	9.53	0.54
0.350	0.54	3.417	9.25	6.483	3.81	9.55	0.54
0.367	0.54	3.433	9.25	6.500	3.81	9.57	0.54
0.383	0.54	3.450	9.25	6.517	3.81	9.58	0.54
0.400	0.54	3.467	9.25	6.533	3.81	9.60	0.54
0.417	0.54	3.483	9.25	6.550	3.81	9.62	0.54
0.433	0.54	3.500	9.25	6.567	3.81	9.63	0.54
0.450	0.54	3.517	9.25	6.583	3.81	9.65	0.54
0.467	0.54	3.533	9.25	6.600	3.81	9.67	0.54
0.483	0.54	3.550	9.25	6.617	3.81	9.68	0.54
0.500	0.54	3.567	9.25	6.633	3.81	9.70	0.54
0.517	0.54	3.583	9.25	6.650	3.81	9.72	0.54
0.533	0.54	3.600	9.25	6.667	3.81	9.73	0.54
0.550	0.54	3.617	9.25	6.683	3.81	9.75	0.54
0.567	0.54	3.633	9.25	6.700	3.81	9.77	0.54
0.583	0.54	3.650	9.25	6.717	3.81	9.78	0.54
0.600	0.54	3.667	9.25	6.733	3.81	9.80	0.54
0.617	0.54	3.683	9.25	6.750	3.81	9.82	0.54
0.633	0.54	3.700	9.25	6.767	3.81	9.83	0.54
0.650	0.54	3.717	9.25	6.783	3.81	9.85	0.54
0.667	0.54	3.733	9.25	6.800	3.81	9.87	0.54
0.683	0.54	3.750	9.25	6.817	3.81	9.88	0.54

0.700	0.54	3.767	9.25	6.833	3.81	9.90	0.54	1.800	0.54	4.867	25.02	7.933	2.18	11.00	0.54
0.717	0.54	3.783	9.25	6.850	3.81	9.92	0.54	1.817	0.54	4.883	25.02	7.950	2.18	11.02	0.54
0.733	0.54	3.800	9.25	6.867	3.81	9.93	0.54	1.833	0.54	4.900	25.02	7.967	2.18	11.03	0.54
0.750	0.54	3.817	9.25	6.883	3.81	9.95	0.54	1.850	0.54	4.917	25.02	7.983	2.18	11.05	0.54
0.767	0.54	3.833	9.25	6.900	3.81	9.97	0.54	1.867	0.54	4.933	25.02	8.000	2.18	11.07	0.54
0.783	0.54	3.850	9.25	6.917	3.81	9.98	0.54	1.883	0.54	4.950	25.02	8.017	2.18	11.08	0.54
0.800	0.54	3.867	9.25	6.933	3.81	10.00	0.54	1.900	0.54	4.967	25.02	8.033	2.18	11.10	0.54
0.817	0.54	3.883	9.25	6.950	3.81	10.02	0.54	1.917	0.54	4.983	25.02	8.050	2.18	11.12	0.54
0.833	0.54	3.900	9.25	6.967	3.81	10.03	0.54	1.933	0.54	5.000	25.02	8.067	2.18	11.13	0.54
0.850	0.54	3.917	9.25	6.983	3.81	10.05	0.54	1.950	0.54	5.017	25.02	8.083	2.18	11.15	0.54
0.867	0.54	3.933	9.25	7.000	3.81	10.07	0.54	1.967	0.54	5.033	25.02	8.100	2.18	11.17	0.54
0.883	0.54	3.950	9.25	7.017	3.81	10.08	0.54	1.983	0.54	5.050	25.02	8.117	2.18	11.18	0.54
0.900	0.54	3.967	9.25	7.033	3.81	10.10	0.54	2.000	0.54	5.067	25.02	8.133	2.18	11.20	0.54
0.917	0.54	3.983	9.25	7.050	3.81	10.12	0.54	2.017	0.54	5.083	25.02	8.150	2.18	11.22	0.54
0.933	0.54	4.000	9.25	7.067	3.81	10.13	0.54	2.033	0.54	5.100	25.02	8.167	2.18	11.23	0.54
0.950	0.54	4.017	9.25	7.083	3.81	10.15	0.54	2.050	0.54	5.117	25.02	8.183	2.18	11.25	0.54
0.967	0.54	4.033	9.25	7.100	3.81	10.17	0.54	2.067	0.54	5.133	25.02	8.200	2.18	11.27	0.54
0.983	0.54	4.050	9.25	7.117	3.81	10.18	0.54	2.083	0.54	5.150	25.02	8.217	2.18	11.28	0.54
1.000	0.54	4.067	9.25	7.133	3.81	10.20	0.54	2.100	0.54	5.167	25.02	8.233	2.18	11.30	0.54
1.017	0.54	4.083	9.25	7.150	3.81	10.22	0.54	2.117	0.54	5.183	25.02	8.250	2.18	11.32	0.54
1.033	0.54	4.100	9.25	7.167	3.81	10.23	0.54	2.133	0.54	5.200	25.02	8.267	1.09	11.33	0.54
1.050	0.54	4.117	9.25	7.183	3.81	10.25	0.54	2.150	0.54	5.217	25.02	8.283	1.09	11.35	0.54
1.067	0.54	4.133	9.25	7.200	3.81	10.27	0.54	2.167	0.54	5.233	25.02	8.300	1.09	11.37	0.54
1.083	0.54	4.150	9.25	7.217	3.81	10.28	0.54	2.183	0.54	5.250	25.01	8.317	1.09	11.38	0.54
1.100	0.54	4.167	9.25	7.233	3.81	10.30	0.54	2.200	0.54	5.267	7.07	8.333	1.09	11.40	0.54
1.117	0.54	4.183	9.25	7.250	3.81	10.32	0.54	2.217	0.54	5.283	7.07	8.350	1.09	11.42	0.54
1.133	0.54	4.200	9.25	7.267	2.18	10.33	0.54	2.233	0.54	5.300	7.07	8.367	1.09	11.43	0.54
1.150	0.54	4.217	9.25	7.283	2.18	10.35	0.54	2.250	0.54	5.317	7.07	8.383	1.09	11.45	0.54
1.167	0.54	4.233	9.25	7.300	2.18	10.37	0.54	2.267	3.26	5.333	7.07	8.400	1.09	11.47	0.54
1.183	0.54	4.250	9.25	7.317	2.18	10.38	0.54	2.283	3.26	5.350	7.07	8.417	1.09	11.48	0.54
1.200	0.54	4.267	25.02	7.333	2.18	10.40	0.54	2.300	3.26	5.367	7.07	8.433	1.09	11.50	0.54
1.217	0.54	4.283	25.02	7.350	2.18	10.42	0.54	2.317	3.26	5.383	7.07	8.450	1.09	11.52	0.54
1.233	0.54	4.300	25.02	7.367	2.18	10.43	0.54	2.333	3.26	5.400	7.07	8.467	1.09	11.53	0.54
1.250	0.54	4.317	25.02	7.383	2.18	10.45	0.54	2.350	3.26	5.417	7.07	8.483	1.09	11.55	0.54
1.267	0.54	4.333	25.02	7.400	2.18	10.47	0.54	2.367	3.26	5.433	7.07	8.500	1.09	11.57	0.54
1.283	0.54	4.350	25.02	7.417	2.18	10.48	0.54	2.383	3.26	5.450	7.07	8.517	1.09	11.58	0.54
1.300	0.54	4.367	25.02	7.433	2.18	10.50	0.54	2.400	3.26	5.467	7.07	8.533	1.09	11.60	0.54
1.317	0.54	4.383	25.02	7.450	2.18	10.52	0.54	2.417	3.26	5.483	7.07	8.550	1.09	11.62	0.54
1.333	0.54	4.400	25.02	7.467	2.18	10.53	0.54	2.433	3.26	5.500	7.07	8.567	1.09	11.63	0.54
1.350	0.54	4.417	25.02	7.483	2.18	10.55	0.54	2.450	3.26	5.517	7.07	8.583	1.09	11.65	0.54
1.367	0.54	4.433	25.02	7.500	2.18	10.57	0.54	2.467	3.26	5.533	7.07	8.600	1.09	11.67	0.54
1.383	0.54	4.450	25.02	7.517	2.18	10.58	0.54	2.483	3.26	5.550	7.07	8.617	1.09	11.68	0.54
1.400	0.54	4.467	25.02	7.533	2.18	10.60	0.54	2.500	3.26	5.567	7.07	8.633	1.09	11.70	0.54
1.417	0.54	4.483	25.02	7.550	2.18	10.62	0.54	2.517	3.26	5.583	7.07	8.650	1.09	11.72	0.54
1.433	0.54	4.500	25.02	7.567	2.18	10.63	0.54	2.533	3.26	5.600	7.07	8.667	1.09	11.73	0.54
1.450	0.54	4.517	25.02	7.583	2.18	10.65	0.54	2.550	3.26	5.617	7.07	8.683	1.09	11.75	0.54
1.467	0.54	4.533	25.02	7.600	2.18	10.67	0.54	2.567	3.26	5.633	7.07	8.700	1.09	11.77	0.54
1.483	0.54	4.550	25.02	7.617	2.18	10.68	0.54	2.583	3.26	5.650	7.07	8.717	1.09	11.78	0.54
1.500	0.54	4.567	25.02	7.633	2.18	10.70	0.54	2.600	3.26	5.667	7.07	8.733	1.09	11.80	0.54
1.517	0.54	4.583	25.02	7.650	2.18	10.72	0.54	2.617	3.26	5.683	7.07	8.750	1.09	11.82	0.54
1.533	0.54	4.600	25.02	7.667	2.18	10.73	0.54	2.633	3.26	5.700	7.07	8.767	1.09	11.83	0.54
1.550	0.54	4.617	25.02	7.683	2.18	10.75	0.54	2.650	3.26	5.717	7.07	8.783	1.09	11.85	0.54
1.567	0.54	4.633	25.02	7.700	2.18	10.77	0.54	2.667	3.26	5.733	7.07	8.800	1.09	11.87	0.54
1.583	0.54	4.650	25.02	7.717	2.18	10.78	0.54	2.683	3.26	5.750	7.07	8.817	1.09	11.88	0.54
1.600	0.54	4.667	25.02	7.733	2.18	10.80	0.54	2.700	3.26	5.767	7.07	8.833	1.09	11.90	0.54
1.617	0.54	4.683	25.02	7.750	2.18	10.82	0.54	2.717	3.26	5.783	7.07	8.850	1.09	11.92	0.54
1.633	0.54	4.700	25.02	7.767	2.18	10.83	0.54	2.733	3.26	5.800	7.07	8.867	1.09	11.93	0.54
1.650	0.54	4.717	25.02	7.783	2.18	10.85	0.54	2.750	3.26	5.817	7.07	8.883	1.09	11.95	0.54
1.667	0.54	4.733	25.02	7.800	2.18	10.87	0.54	2.767	3.26	5.833	7.07	8.900	1.09	11.97	0.54
1.683	0.54	4.750	25.02	7.817	2.18	10.88	0.54	2.783	3.26	5.850	7.07	8.917	1.09	11.98	0.54
1.700	0.54	4.767	25.02	7.833	2.18	10.90	0.54	2.800	3.26	5.867	7.07	8.933	1.09	12.00	0.54
1.717	0.54	4.783	25.02	7.850	2.18	10.92	0.54	2.817	3.26	5.883	7.07	8.950	1.09	12.02	0.54
1.733	0.54	4.800	25.02	7.867	2.18	10.93	0.54	2.833	3.26	5.900	7.07	8.967	1.09	12.03	0.54
1.750	0.54	4.817	25.02	7.883	2.18	10.95	0.54	2.850	3.26	5.917	7.07	8.983	1.09	12.05	0.54
1.767	0.54	4.833	25.02	7.900	2.18	10.97	0.54	2.867	3.26	5.933	7.07	9.000	1.09	12.07	0.54
1.783	0.54	4.850	25.02	7.917	2.18	10.98	0.54	2.883	3.26	5.950	7.07	9.017	1.09	12.08	0.54

2.900	3.26	5.967	7.07	9.033	1.09	12.10	0.54
2.917	3.26	5.983	7.07	9.050	1.09	12.12	0.54
2.933	3.26	6.000	7.07	9.067	1.09	12.13	0.54
2.950	3.26	6.017	7.07	9.083	1.09	12.15	0.54
2.967	3.26	6.033	7.07	9.100	1.09	12.17	0.54
2.983	3.26	6.050	7.07	9.117	1.09	12.18	0.54
3.000	3.26	6.067	7.07	9.133	1.09	12.20	0.54
3.017	3.26	6.083	7.07	9.150	1.09	12.22	0.54
3.033	3.26	6.100	7.07	9.167	1.09	12.23	0.54
3.050	3.26	6.117	7.07	9.183	1.09	12.25	0.54
3.067	3.26	6.133	7.07	9.200	1.09		

			TOTALS
Max.Eff.Inten.(mm/hr)=	25.02	35.79	
over (min)	8.00	16.00	
Storage Coeff. (min)=	8.20 (ii)	15.62 (ii)	
Unit Hyd. Tpeak (min)=	8.00	16.00	
Unit Hyd. peak (cms)=	0.14	0.07	
PEAK FLOW (cms)=	0.54	0.20	0.733 (iii)
TIME TO PEAK (hrs)=	5.25	5.28	5.25
RUNOFF VOLUME (mm)=	53.37	36.10	47.68
TOTAL RAINFALL (mm)=	54.38	54.38	54.38
RUNOFF COEFFICIENT =	0.98	0.66	0.88

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0012)|	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5390
	0.0190	0.2190	0.0790	0.6270
	0.0250	0.3570	0.0950	0.6900
	0.0440	0.4680	0.1130	0.7520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0011)	11.520	0.733	5.25	47.68
OUTFLOW: ID= 1 (0012)	11.520	0.044	8.55	26.28

PEAK FLOW REDUCTION [Qout/Qin](%)= 5.99
TIME SHIFT OF PEAK FLOW (min)=198.00
MAXIMUM STORAGE USED (ha.m.)= 0.4672

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\412d868f-8249-48b6-b5f9-f6a6aa677fc4\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\412d868f-8249-48b6-b5f9-f6a6aa677fc4\scenari

DATE: 02-19-2026 TIME: 09:56:03

USER:

COMMENTS: _____

** SIMULATION : 3 - 10 Year 12 Hour AES (Bloo **

READ STORM |	Filename: C:\Users\hliu\AppData\Local\Temp\15d7e5d8-ec85-4e6b-a747-1f5e44151366\fdec8b19
Ptotal= 62.71 mm |	Comments: 10 Year 12 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	10.66	6.50	4.39	9.75	0.63
0.25	0.63	3.50	10.66	6.75	4.39	10.00	0.63
0.50	0.63	3.75	10.66	7.00	4.39	10.25	0.63
0.75	0.63	4.00	10.66	7.25	2.51	10.50	0.63
1.00	0.63	4.25	28.84	7.50	2.51	10.75	0.63
1.25	0.63	4.50	28.84	7.75	2.51	11.00	0.63
1.50	0.63	4.75	28.84	8.00	2.51	11.25	0.63
1.75	0.63	5.00	28.84	8.25	1.25	11.50	0.63
2.00	0.63	5.25	8.15	8.50	1.25	11.75	0.63
2.25	3.76	5.50	8.15	8.75	1.25	12.00	0.63
2.50	3.76	5.75	8.15	9.00	1.25		
2.75	3.76	6.00	8.15	9.25	0.63		
3.00	3.76	6.25	4.39	9.50	0.63		

CALIB |	
STANDHYD (0010)|	Area (ha)= 18.55
ID= 1 DT= 1.0 min |	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	3.76	6.150	8.15	9.22	1.25
0.033	0.00	3.100	3.76	6.167	8.15	9.23	1.25
0.050	0.00	3.117	3.76	6.183	8.15	9.25	1.25
0.067	0.00	3.133	3.76	6.200	8.15	9.27	0.63
0.083	0.00	3.150	3.76	6.217	8.15	9.28	0.63
0.100	0.00	3.167	3.76	6.233	8.15	9.30	0.63
0.117	0.00	3.183	3.76	6.250	8.14	9.32	0.63
0.133	0.00	3.200	3.76	6.267	4.39	9.33	0.63
0.150	0.00	3.217	3.76	6.283	4.39	9.35	0.63
0.167	0.00	3.233	3.76	6.300	4.39	9.37	0.63
0.183	0.00	3.250	3.76	6.317	4.39	9.38	0.63
0.200	0.00	3.267	10.66	6.333	4.39	9.40	0.63
0.217	0.00	3.283	10.66	6.350	4.39	9.42	0.63
0.233	0.00	3.300	10.66	6.367	4.39	9.43	0.63
0.250	0.00	3.317	10.66	6.383	4.39	9.45	0.63
0.267	0.63	3.333	10.66	6.400	4.39	9.47	0.63
0.283	0.63	3.350	10.66	6.417	4.39	9.48	0.63
0.300	0.63	3.367	10.66	6.433	4.39	9.50	0.63
0.317	0.63	3.383	10.66	6.450	4.39	9.52	0.63
0.333	0.63	3.400	10.66	6.467	4.39	9.53	0.63
0.350	0.63	3.417	10.66	6.483	4.39	9.55	0.63
0.367	0.63	3.433	10.66	6.500	4.39	9.57	0.63
0.383	0.63	3.450	10.66	6.517	4.39	9.58	0.63
0.400	0.63	3.467	10.66	6.533	4.39	9.60	0.63
0.417	0.63	3.483	10.66	6.550	4.39	9.62	0.63
0.433	0.63	3.500	10.66	6.567	4.39	9.63	0.63
0.450	0.63	3.517	10.66	6.583	4.39	9.65	0.63
0.467	0.63	3.533	10.66	6.600	4.39	9.67	0.63
0.483	0.63	3.550	10.66	6.617	4.39	9.68	0.63
0.500	0.63	3.567	10.66	6.633	4.39	9.70	0.63
0.517	0.63	3.583	10.66	6.650	4.39	9.72	0.63
0.533	0.63	3.600	10.66	6.667	4.39	9.73	0.63
0.550	0.63	3.617	10.66	6.683	4.39	9.75	0.63
0.567	0.63	3.633	10.66	6.700	4.39	9.77	0.63
0.583	0.63	3.650	10.66	6.717	4.39	9.78	0.63
0.600	0.63	3.667	10.66	6.733	4.39	9.80	0.63
0.617	0.63	3.683	10.66	6.750	4.39	9.82	0.63
0.633	0.63	3.700	10.66	6.767	4.39	9.83	0.63
0.650	0.63	3.717	10.66	6.783	4.39	9.85	0.63
0.667	0.63	3.733	10.66	6.800	4.39	9.87	0.63
0.683	0.63	3.750	10.66	6.817	4.39	9.88	0.63
0.700	0.63	3.767	10.66	6.833	4.39	9.90	0.63
0.717	0.63	3.783	10.66	6.850	4.39	9.92	0.63
0.733	0.63	3.800	10.66	6.867	4.39	9.93	0.63
0.750	0.63	3.817	10.66	6.883	4.39	9.95	0.63
0.767	0.63	3.833	10.66	6.900	4.39	9.97	0.63
0.783	0.63	3.850	10.66	6.917	4.39	9.98	0.63
0.800	0.63	3.867	10.66	6.933	4.39	10.00	0.63
0.817	0.63	3.883	10.66	6.950	4.39	10.02	0.63
0.833	0.63	3.900	10.66	6.967	4.39	10.03	0.63
0.850	0.63	3.917	10.66	6.983	4.39	10.05	0.63
0.867	0.63	3.933	10.66	7.000	4.39	10.07	0.63
0.883	0.63	3.950	10.66	7.017	4.39	10.08	0.63
0.900	0.63	3.967	10.66	7.033	4.39	10.10	0.63
0.917	0.63	3.983	10.66	7.050	4.39	10.12	0.63
0.933	0.63	4.000	10.66	7.067	4.39	10.13	0.63
0.950	0.63	4.017	10.66	7.083	4.39	10.15	0.63
0.967	0.63	4.033	10.66	7.100	4.39	10.17	0.63
0.983	0.63	4.050	10.66	7.117	4.39	10.18	0.63
1.000	0.63	4.067	10.66	7.133	4.39	10.20	0.63
1.017	0.63	4.083	10.66	7.150	4.39	10.22	0.63
1.033	0.63	4.100	10.66	7.167	4.39	10.23	0.63
1.050	0.63	4.117	10.66	7.183	4.39	10.25	0.63
1.067	0.63	4.133	10.66	7.200	4.39	10.27	0.63
1.083	0.63	4.150	10.66	7.217	4.39	10.28	0.63
1.100	0.63	4.167	10.66	7.233	4.39	10.30	0.63
1.117	0.63	4.183	10.66	7.250	4.39	10.32	0.63
1.133	0.63	4.200	10.66	7.267	2.51	10.33	0.63
1.150	0.63	4.217	10.66	7.283	2.51	10.35	0.63
1.167	0.63	4.233	10.66	7.300	2.51	10.37	0.63
1.183	0.63	4.250	10.66	7.317	2.51	10.38	0.63
1.200	0.63	4.267	28.84	7.333	2.51	10.40	0.63
1.217	0.63	4.283	28.84	7.350	2.51	10.42	0.63
1.233	0.63	4.300	28.84	7.367	2.51	10.43	0.63
1.250	0.63	4.317	28.84	7.383	2.51	10.45	0.63
1.267	0.63	4.333	28.84	7.400	2.51	10.47	0.63
1.283	0.63	4.350	28.84	7.417	2.51	10.48	0.63
1.300	0.63	4.367	28.84	7.433	2.51	10.50	0.63
1.317	0.63	4.383	28.84	7.450	2.51	10.52	0.63
1.333	0.63	4.400	28.84	7.467	2.51	10.53	0.63
1.350	0.63	4.417	28.84	7.483	2.51	10.55	0.63
1.367	0.63	4.433	28.84	7.500	2.51	10.57	0.63
1.383	0.63	4.450	28.84	7.517	2.51	10.58	0.63
1.400	0.63	4.467	28.84	7.533	2.51	10.60	0.63
1.417	0.63	4.483	28.84	7.550	2.51	10.62	0.63
1.433	0.63	4.500	28.84	7.567	2.51	10.63	0.63
1.450	0.63	4.517	28.84	7.583	2.51	10.65	0.63
1.467	0.63	4.533	28.84	7.600	2.51	10.67	0.63
1.483	0.63	4.550	28.84	7.617	2.51	10.68	0.63
1.500	0.63	4.567	28.84	7.633	2.51	10.70	0.63
1.517	0.63	4.583	28.84	7.650	2.51	10.72	0.63
1.533	0.63	4.600	28.84	7.667	2.51	10.73	0.63
1.550	0.63	4.617	28.84	7.683	2.51	10.75	0.63
1.567	0.63	4.633	28.84	7.700	2.51	10.77	0.63
1.583	0.63	4.650	28.84	7.717	2.51	10.78	0.63
1.600	0.63	4.667	28.84	7.733	2.51	10.80	0.63
1.617	0.63	4.683	28.84	7.750	2.51	10.82	0.63
1.633	0.63	4.700	28.84	7.767	2.51	10.83	0.63
1.650	0.63	4.717	28.84	7.783	2.51	10.85	0.63
1.667	0.63	4.733	28.84	7.800	2.51	10.87	0.63
1.683	0.63	4.750	28.84	7.817	2.51	10.88	0.63
1.700	0.63	4.767	28.84	7.833	2.51	10.90	0.63
1.717	0.63	4.783	28.84	7.850	2.51	10.92	0.63
1.733	0.63	4.800	28.84	7.867	2.51	10.93	0.63
1.750	0.63	4.817	28.84	7.883	2.51	10.95	0.63
1.767	0.63	4.833	28.84	7.900	2.51	10.97	0.63
1.783	0.63	4.850	28.84	7.917	2.51	10.98	0.63
1.800	0.63	4.867	28.84	7.933	2.51	11.00	0.63
1.817	0.63	4.883	28.84	7.950	2.51	11.02	0.63
1.833	0.63	4.900	28.84	7.967	2.51	11.03	0.63
1.850	0.63	4.917	28.84	7.983	2.51	11.05	0.63
1.867	0.63	4.933	28.84	8.000	2.51	11.07	0.63
1.883	0.63	4.950	28.84	8.017	2.51	11.08	0.63
1.900	0.63	4.967	28.84	8.033	2.51	11.10	0.63
1.917	0.63	4.983	28.84	8.050	2.51	11.12	0.63
1.933	0.63	5.000	28.84	8.067	2.51	11.13	0.63
1.950	0.63	5.017	28.84	8.083	2.51	11.15	0.63
1.967	0.63	5.033	28.84	8.100	2.51	11.17	0.63
1.983	0.63	5.050	28.84	8.117	2.51	11.18	0.63
2.000	0.63	5.067	28.84	8.133	2.51	11.20	0.63
2.017	0.63	5.083	28.84	8.150	2.51	11.22	0.63
2.033	0.63	5.100	28.84	8.167	2.51	11.23	0.63
2.050	0.63	5.117	28.84	8.183	2.51	11.25	0.63
2.067	0.63	5.133	28.84	8.200	2.51	11.27	0.63
2.083	0.63	5.150	28.84	8.217	2.51	11.28	0.63
2.100	0.63	5.167	28.84	8.233	2.51	11.30	0.63

2.117	0.63	5.183	28.84	8.250	2.51	11.32	0.63
2.133	0.63	5.200	28.84	8.267	1.25	11.33	0.63
2.150	0.63	5.217	28.84	8.283	1.25	11.35	0.63
2.167	0.63	5.233	28.84	8.300	1.25	11.37	0.63
2.183	0.63	5.250	28.82	8.317	1.25	11.38	0.63
2.200	0.63	5.267	8.15	8.333	1.25	11.40	0.63
2.217	0.63	5.283	8.15	8.350	1.25	11.42	0.63
2.233	0.63	5.300	8.15	8.367	1.25	11.43	0.63
2.250	0.63	5.317	8.15	8.383	1.25	11.45	0.63
2.267	3.76	5.333	8.15	8.400	1.25	11.47	0.63
2.283	3.76	5.350	8.15	8.417	1.25	11.48	0.63
2.300	3.76	5.367	8.15	8.433	1.25	11.50	0.63
2.317	3.76	5.383	8.15	8.450	1.25	11.52	0.63
2.333	3.76	5.400	8.15	8.467	1.25	11.53	0.63
2.350	3.76	5.417	8.15	8.483	1.25	11.55	0.63
2.367	3.76	5.433	8.15	8.500	1.25	11.57	0.63
2.383	3.76	5.450	8.15	8.517	1.25	11.58	0.63
2.400	3.76	5.467	8.15	8.533	1.25	11.60	0.63
2.417	3.76	5.483	8.15	8.550	1.25	11.62	0.63
2.433	3.76	5.500	8.15	8.567	1.25	11.63	0.63
2.450	3.76	5.517	8.15	8.583	1.25	11.65	0.63
2.467	3.76	5.533	8.15	8.600	1.25	11.67	0.63
2.483	3.76	5.550	8.15	8.617	1.25	11.68	0.63
2.500	3.76	5.567	8.15	8.633	1.25	11.70	0.63
2.517	3.76	5.583	8.15	8.650	1.25	11.72	0.63
2.533	3.76	5.600	8.15	8.667	1.25	11.73	0.63
2.550	3.76	5.617	8.15	8.683	1.25	11.75	0.63
2.567	3.76	5.633	8.15	8.700	1.25	11.77	0.63
2.583	3.76	5.650	8.15	8.717	1.25	11.78	0.63
2.600	3.76	5.667	8.15	8.733	1.25	11.80	0.63
2.617	3.76	5.683	8.15	8.750	1.25	11.82	0.63
2.633	3.76	5.700	8.15	8.767	1.25	11.83	0.63
2.650	3.76	5.717	8.15	8.783	1.25	11.85	0.63
2.667	3.76	5.733	8.15	8.800	1.25	11.87	0.63
2.683	3.76	5.750	8.15	8.817	1.25	11.88	0.63
2.700	3.76	5.767	8.15	8.833	1.25	11.90	0.63
2.717	3.76	5.783	8.15	8.850	1.25	11.92	0.63
2.733	3.76	5.800	8.15	8.867	1.25	11.93	0.63
2.750	3.76	5.817	8.15	8.883	1.25	11.95	0.63
2.767	3.76	5.833	8.15	8.900	1.25	11.97	0.63
2.783	3.76	5.850	8.15	8.917	1.25	11.98	0.63
2.800	3.76	5.867	8.15	8.933	1.25	12.00	0.63
2.817	3.76	5.883	8.15	8.950	1.25	12.02	0.63
2.833	3.76	5.900	8.15	8.967	1.25	12.03	0.63
2.850	3.76	5.917	8.15	8.983	1.25	12.05	0.63
2.867	3.76	5.933	8.15	9.000	1.25	12.07	0.63
2.883	3.76	5.950	8.15	9.017	1.25	12.08	0.63
2.900	3.76	5.967	8.15	9.033	1.25	12.10	0.63
2.917	3.76	5.983	8.15	9.050	1.25	12.12	0.63
2.933	3.76	6.000	8.15	9.067	1.25	12.13	0.63
2.950	3.76	6.017	8.15	9.083	1.25	12.15	0.63
2.967	3.76	6.033	8.15	9.100	1.25	12.17	0.63
2.983	3.76	6.050	8.15	9.117	1.25	12.18	0.63
3.000	3.76	6.067	8.15	9.133	1.25	12.20	0.63
3.017	3.76	6.083	8.15	9.150	1.25	12.22	0.63
3.033	3.76	6.100	8.15	9.167	1.25	12.23	0.63
3.050	3.76	6.117	8.15	9.183	1.25	12.25	0.63
3.067	3.76	6.133	8.15	9.200	1.25		

Max.Eff.Inten.(mm/hr)=	28.84	39.85	
over (min)	9.00	18.00	
Storage Coeff. (min)=	8.93 (ii)	17.86 (ii)	
Unit Hyd. Tpeak (min)=	9.00	18.00	
Unit Hyd. peak (cms)=	0.13	0.06	
			TOTALS
PEAK FLOW (cms)=	0.80	0.51	1.310 (iii)
TIME TO PEAK (hrs)=	5.25	5.30	5.25
RUNOFF VOLUME (mm)=	61.70	42.86	53.04
TOTAL RAINFALL (mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT =	0.98	0.68	0.85

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0009)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8030
	0.0280	0.3250	0.1440	0.9370
	0.0460	0.5280	0.1740	1.0350
	0.0810	0.6940	0.2060	1.1340

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	18.550	1.310	5.25	53.04
OUTFLOW: ID= 1 (0009)	18.550	0.109	8.40	33.78

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.32
TIME SHIFT OF PEAK FLOW (min)=189.00
MAXIMUM STORAGE USED (ha.m.)= 0.8030

CALIB			
STANDHYD (0011)	Area (ha)= 11.52		
ID= 1 DT= 1.0 min	Total Imp(%)= 81.00	Dir. Conn.(%)= 67.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	9.33	2.19	
Dep. Storage (mm)=	1.00	1.50	
Average Slope (%)=	1.00	2.00	
Length (m)=	277.13	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	3.76	6.150	8.15	9.22	1.25
0.033	0.00	3.100	3.76	6.167	8.15	9.23	1.25
0.050	0.00	3.117	3.76	6.183	8.15	9.25	1.25
0.067	0.00	3.133	3.76	6.200	8.15	9.27	0.63
0.083	0.00	3.150	3.76	6.217	8.15	9.28	0.63
0.100	0.00	3.167	3.76	6.233	8.15	9.30	0.63
0.117	0.00	3.183	3.76	6.250	8.14	9.32	0.63
0.133	0.00	3.200	3.76	6.267	4.39	9.33	0.63
0.150	0.00	3.217	3.76	6.283	4.39	9.35	0.63
0.167	0.00	3.233	3.76	6.300	4.39	9.37	0.63
0.183	0.00	3.250	3.76	6.317	4.39	9.38	0.63
0.200	0.00	3.267	10.66	6.333	4.39	9.40	0.63
0.217	0.00	3.283	10.66	6.350	4.39	9.42	0.63
0.233	0.00	3.300	10.66	6.367	4.39	9.43	0.63
0.250	0.00	3.317	10.66	6.383	4.39	9.45	0.63

0.267	0.63	3.333	10.66	6.400	4.39	9.47	0.63	1.367	0.63	4.433	28.84	7.500	2.51	10.57	0.63
0.283	0.63	3.350	10.66	6.417	4.39	9.48	0.63	1.383	0.63	4.450	28.84	7.517	2.51	10.58	0.63
0.300	0.63	3.367	10.66	6.433	4.39	9.50	0.63	1.400	0.63	4.467	28.84	7.533	2.51	10.60	0.63
0.317	0.63	3.383	10.66	6.450	4.39	9.52	0.63	1.417	0.63	4.483	28.84	7.550	2.51	10.62	0.63
0.333	0.63	3.400	10.66	6.467	4.39	9.53	0.63	1.433	0.63	4.500	28.84	7.567	2.51	10.63	0.63
0.350	0.63	3.417	10.66	6.483	4.39	9.55	0.63	1.450	0.63	4.517	28.84	7.583	2.51	10.65	0.63
0.367	0.63	3.433	10.66	6.500	4.39	9.57	0.63	1.467	0.63	4.533	28.84	7.600	2.51	10.67	0.63
0.383	0.63	3.450	10.66	6.517	4.39	9.58	0.63	1.483	0.63	4.550	28.84	7.617	2.51	10.68	0.63
0.400	0.63	3.467	10.66	6.533	4.39	9.60	0.63	1.500	0.63	4.567	28.84	7.633	2.51	10.70	0.63
0.417	0.63	3.483	10.66	6.550	4.39	9.62	0.63	1.517	0.63	4.583	28.84	7.650	2.51	10.72	0.63
0.433	0.63	3.500	10.66	6.567	4.39	9.63	0.63	1.533	0.63	4.600	28.84	7.667	2.51	10.73	0.63
0.450	0.63	3.517	10.66	6.583	4.39	9.65	0.63	1.550	0.63	4.617	28.84	7.683	2.51	10.75	0.63
0.467	0.63	3.533	10.66	6.600	4.39	9.67	0.63	1.567	0.63	4.633	28.84	7.700	2.51	10.77	0.63
0.483	0.63	3.550	10.66	6.617	4.39	9.68	0.63	1.583	0.63	4.650	28.84	7.717	2.51	10.78	0.63
0.500	0.63	3.567	10.66	6.633	4.39	9.70	0.63	1.600	0.63	4.667	28.84	7.733	2.51	10.80	0.63
0.517	0.63	3.583	10.66	6.650	4.39	9.72	0.63	1.617	0.63	4.683	28.84	7.750	2.51	10.82	0.63
0.533	0.63	3.600	10.66	6.667	4.39	9.73	0.63	1.633	0.63	4.700	28.84	7.767	2.51	10.83	0.63
0.550	0.63	3.617	10.66	6.683	4.39	9.75	0.63	1.650	0.63	4.717	28.84	7.783	2.51	10.85	0.63
0.567	0.63	3.633	10.66	6.700	4.39	9.77	0.63	1.667	0.63	4.733	28.84	7.800	2.51	10.87	0.63
0.583	0.63	3.650	10.66	6.717	4.39	9.78	0.63	1.683	0.63	4.750	28.84	7.817	2.51	10.88	0.63
0.600	0.63	3.667	10.66	6.733	4.39	9.80	0.63	1.700	0.63	4.767	28.84	7.833	2.51	10.90	0.63
0.617	0.63	3.683	10.66	6.750	4.39	9.82	0.63	1.717	0.63	4.783	28.84	7.850	2.51	10.92	0.63
0.633	0.63	3.700	10.66	6.767	4.39	9.83	0.63	1.733	0.63	4.800	28.84	7.867	2.51	10.93	0.63
0.650	0.63	3.717	10.66	6.783	4.39	9.85	0.63	1.750	0.63	4.817	28.84	7.883	2.51	10.95	0.63
0.667	0.63	3.733	10.66	6.800	4.39	9.87	0.63	1.767	0.63	4.833	28.84	7.900	2.51	10.97	0.63
0.683	0.63	3.750	10.66	6.817	4.39	9.88	0.63	1.783	0.63	4.850	28.84	7.917	2.51	10.98	0.63
0.700	0.63	3.767	10.66	6.833	4.39	9.90	0.63	1.800	0.63	4.867	28.84	7.933	2.51	11.00	0.63
0.717	0.63	3.783	10.66	6.850	4.39	9.92	0.63	1.817	0.63	4.883	28.84	7.950	2.51	11.02	0.63
0.733	0.63	3.800	10.66	6.867	4.39	9.93	0.63	1.833	0.63	4.900	28.84	7.967	2.51	11.03	0.63
0.750	0.63	3.817	10.66	6.883	4.39	9.95	0.63	1.850	0.63	4.917	28.84	7.983	2.51	11.05	0.63
0.767	0.63	3.833	10.66	6.900	4.39	9.97	0.63	1.867	0.63	4.933	28.84	8.000	2.51	11.07	0.63
0.783	0.63	3.850	10.66	6.917	4.39	9.98	0.63	1.883	0.63	4.950	28.84	8.017	2.51	11.08	0.63
0.800	0.63	3.867	10.66	6.933	4.39	10.00	0.63	1.900	0.63	4.967	28.84	8.033	2.51	11.10	0.63
0.817	0.63	3.883	10.66	6.950	4.39	10.02	0.63	1.917	0.63	4.983	28.84	8.050	2.51	11.12	0.63
0.833	0.63	3.900	10.66	6.967	4.39	10.03	0.63	1.933	0.63	5.000	28.84	8.067	2.51	11.13	0.63
0.850	0.63	3.917	10.66	6.983	4.39	10.05	0.63	1.950	0.63	5.017	28.84	8.083	2.51	11.15	0.63
0.867	0.63	3.933	10.66	7.000	4.39	10.07	0.63	1.967	0.63	5.033	28.84	8.100	2.51	11.17	0.63
0.883	0.63	3.950	10.66	7.017	4.39	10.08	0.63	1.983	0.63	5.050	28.84	8.117	2.51	11.18	0.63
0.900	0.63	3.967	10.66	7.033	4.39	10.10	0.63	2.000	0.63	5.067	28.84	8.133	2.51	11.20	0.63
0.917	0.63	3.983	10.66	7.050	4.39	10.12	0.63	2.017	0.63	5.083	28.84	8.150	2.51	11.22	0.63
0.933	0.63	4.000	10.66	7.067	4.39	10.13	0.63	2.033	0.63	5.100	28.84	8.167	2.51	11.23	0.63
0.950	0.63	4.017	10.66	7.083	4.39	10.15	0.63	2.050	0.63	5.117	28.84	8.183	2.51	11.25	0.63
0.967	0.63	4.033	10.66	7.100	4.39	10.17	0.63	2.067	0.63	5.133	28.84	8.200	2.51	11.27	0.63
0.983	0.63	4.050	10.66	7.117	4.39	10.18	0.63	2.083	0.63	5.150	28.84	8.217	2.51	11.28	0.63
1.000	0.63	4.067	10.66	7.133	4.39	10.20	0.63	2.100	0.63	5.167	28.84	8.233	2.51	11.30	0.63
1.017	0.63	4.083	10.66	7.150	4.39	10.22	0.63	2.117	0.63	5.183	28.84	8.250	2.51	11.32	0.63
1.033	0.63	4.100	10.66	7.167	4.39	10.23	0.63	2.133	0.63	5.200	28.84	8.267	1.25	11.33	0.63
1.050	0.63	4.117	10.66	7.183	4.39	10.25	0.63	2.150	0.63	5.217	28.84	8.283	1.25	11.35	0.63
1.067	0.63	4.133	10.66	7.200	4.39	10.27	0.63	2.167	0.63	5.233	28.84	8.300	1.25	11.37	0.63
1.083	0.63	4.150	10.66	7.217	4.39	10.28	0.63	2.183	0.63	5.250	28.82	8.317	1.25	11.38	0.63
1.100	0.63	4.167	10.66	7.233	4.39	10.30	0.63	2.200	0.63	5.267	8.15	8.333	1.25	11.40	0.63
1.117	0.63	4.183	10.66	7.250	4.39	10.32	0.63	2.217	0.63	5.283	8.15	8.350	1.25	11.42	0.63
1.133	0.63	4.200	10.66	7.267	2.51	10.33	0.63	2.233	0.63	5.300	8.15	8.367	1.25	11.43	0.63
1.150	0.63	4.217	10.66	7.283	2.51	10.35	0.63	2.250	0.63	5.317	8.15	8.383	1.25	11.45	0.63
1.167	0.63	4.233	10.66	7.300	2.51	10.37	0.63	2.267	3.76	5.333	8.15	8.400	1.25	11.47	0.63
1.183	0.63	4.250	10.66	7.317	2.51	10.38	0.63	2.283	3.76	5.350	8.15	8.417	1.25	11.48	0.63
1.200	0.63	4.267	28.84	7.333	2.51	10.40	0.63	2.300	3.76	5.367	8.15	8.433	1.25	11.50	0.63
1.217	0.63	4.283	28.84	7.350	2.51	10.42	0.63	2.317	3.76	5.383	8.15	8.450	1.25	11.52	0.63
1.233	0.63	4.300	28.84	7.367	2.51	10.43	0.63	2.333	3.76	5.400	8.15	8.467	1.25	11.53	0.63
1.250	0.63	4.317	28.84	7.383	2.51	10.45	0.63	2.350	3.76	5.417	8.15	8.483	1.25	11.55	0.63
1.267	0.63	4.333	28.84	7.400	2.51	10.47	0.63	2.367	3.76	5.433	8.15	8.500	1.25	11.57	0.63
1.283	0.63	4.350	28.84	7.417	2.51	10.48	0.63	2.383	3.76	5.450	8.15	8.517	1.25	11.58	0.63
1.300	0.63	4.367	28.84	7.433	2.51	10.50	0.63	2.400	3.76	5.467	8.15	8.533	1.25	11.60	0.63
1.317	0.63	4.383	28.84	7.450	2.51	10.52	0.63	2.417	3.76	5.483	8.15	8.550	1.25	11.62	0.63
1.333	0.63	4.400	28.84	7.467	2.51	10.53	0.63	2.433	3.76	5.500	8.15	8.567	1.25	11.63	0.63
1.350	0.63	4.417	28.84	7.483	2.51	10.55	0.63	2.450	3.76	5.517	8.15	8.583	1.25	11.65	0.63

2.467	3.76	5.533	8.15	8.600	1.25	11.67	0.63
2.483	3.76	5.550	8.15	8.617	1.25	11.68	0.63
2.500	3.76	5.567	8.15	8.633	1.25	11.70	0.63
2.517	3.76	5.583	8.15	8.650	1.25	11.72	0.63
2.533	3.76	5.600	8.15	8.667	1.25	11.73	0.63
2.550	3.76	5.617	8.15	8.683	1.25	11.75	0.63
2.567	3.76	5.633	8.15	8.700	1.25	11.77	0.63
2.583	3.76	5.650	8.15	8.717	1.25	11.78	0.63
2.600	3.76	5.667	8.15	8.733	1.25	11.80	0.63
2.617	3.76	5.683	8.15	8.750	1.25	11.82	0.63
2.633	3.76	5.700	8.15	8.767	1.25	11.83	0.63
2.650	3.76	5.717	8.15	8.783	1.25	11.85	0.63
2.667	3.76	5.733	8.15	8.800	1.25	11.87	0.63
2.683	3.76	5.750	8.15	8.817	1.25	11.88	0.63
2.700	3.76	5.767	8.15	8.833	1.25	11.90	0.63
2.717	3.76	5.783	8.15	8.850	1.25	11.92	0.63
2.733	3.76	5.800	8.15	8.867	1.25	11.93	0.63
2.750	3.76	5.817	8.15	8.883	1.25	11.95	0.63
2.767	3.76	5.833	8.15	8.900	1.25	11.97	0.63
2.783	3.76	5.850	8.15	8.917	1.25	11.98	0.63
2.800	3.76	5.867	8.15	8.933	1.25	12.00	0.63
2.817	3.76	5.883	8.15	8.950	1.25	12.02	0.63
2.833	3.76	5.900	8.15	8.967	1.25	12.03	0.63
2.850	3.76	5.917	8.15	8.983	1.25	12.05	0.63
2.867	3.76	5.933	8.15	9.000	1.25	12.07	0.63
2.883	3.76	5.950	8.15	9.017	1.25	12.08	0.63
2.900	3.76	5.967	8.15	9.033	1.25	12.10	0.63
2.917	3.76	5.983	8.15	9.050	1.25	12.12	0.63
2.933	3.76	6.000	8.15	9.067	1.25	12.13	0.63
2.950	3.76	6.017	8.15	9.083	1.25	12.15	0.63
2.967	3.76	6.033	8.15	9.100	1.25	12.17	0.63
2.983	3.76	6.050	8.15	9.117	1.25	12.18	0.63
3.000	3.76	6.067	8.15	9.133	1.25	12.20	0.63
3.017	3.76	6.083	8.15	9.150	1.25	12.22	0.63
3.033	3.76	6.100	8.15	9.167	1.25	12.23	0.63
3.050	3.76	6.117	8.15	9.183	1.25	12.25	0.63
3.067	3.76	6.133	8.15	9.200	1.25		

Max.Eff.Inten.(mm/hr)=	28.84	42.66	
over (min)	8.00	15.00	
Storage Coeff. (min)=	7.74 (ii)	14.75 (ii)	
Unit Hyd. Tpeak (min)=	8.00	15.00	
Unit Hyd. peak (cms)=	0.14	0.08	
			TOTALS
PEAK FLOW (cms)=	0.62	0.24	0.857 (iii)
TIME TO PEAK (hrs)=	5.25	5.28	5.25
RUNOFF VOLUME (mm)=	61.70	43.63	55.74
TOTAL RAINFALL (mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT =	0.98	0.70	0.89

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0012)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5390
	0.0190	0.2190	0.0790	0.6270
	0.0250	0.3570	0.0950	0.6900
	0.0440	0.4680	0.1130	0.7520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0011)	11.520	0.857	5.25	55.74
OUTFLOW: ID= 1 (0012)	11.520	0.059	8.45	31.99

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.87
TIME SHIFT OF PEAK FLOW (min)=192.00
MAXIMUM STORAGE USED (ha.m.)= 0.5386

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V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  L
 V  V    I      SS   U   U  A   A  L
  VV     I    SSSSS  UUUUU  A   A  LLLLL

 OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
O   O    T      T    H   H   Y Y   MM MM  O   O
O   O    T      T    H   H    Y    M   M  O   O
 OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\72318fc0-5961-4021-976a-f00968d069a1\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\72318fc0-5961-4021-976a-f00968d069a1\scenari

DATE: 02-19-2026 TIME: 09:56:03

USER:

COMMENTS: _____

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**********************************************
** SIMULATION : 4 - 25 Year 12 Hour AES (Bloo **
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READ STORM	Filename: C:\Users\hliu\AppData\Local\Temp\15d7e5d8-ec85-4e6b-a747-1f5e44151366\5abf52a3
Ptotal= 73.10 mm	Comments: 25 Year 12 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	12.43	6.50	5.12	9.75	0.73
0.25	0.73	3.50	12.43	6.75	5.12	10.00	0.73

0.50	0.73	3.75	12.43	7.00	5.12	10.25	0.73
0.75	0.73	4.00	12.43	7.25	2.92	10.50	0.73
1.00	0.73	4.25	33.63	7.50	2.92	10.75	0.73
1.25	0.73	4.50	33.63	7.75	2.92	11.00	0.73
1.50	0.73	4.75	33.63	8.00	2.92	11.25	0.73
1.75	0.73	5.00	33.63	8.25	1.46	11.50	0.73
2.00	0.73	5.25	9.50	8.50	1.46	11.75	0.73
2.25	4.39	5.50	9.50	8.75	1.46	12.00	0.73
2.50	4.39	5.75	9.50	9.00	1.46		
2.75	4.39	6.00	9.50	9.25	0.73		
3.00	4.39	6.25	5.12	9.50	0.73		

CALIB	
STANDHYD (0010)	Area (ha)= 18.55
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	4.39	6.150	9.50	9.22	1.46
0.033	0.00	3.100	4.39	6.167	9.50	9.23	1.46
0.050	0.00	3.117	4.39	6.183	9.50	9.25	1.46
0.067	0.00	3.133	4.39	6.200	9.50	9.27	0.73
0.083	0.00	3.150	4.39	6.217	9.50	9.28	0.73
0.100	0.00	3.167	4.39	6.233	9.50	9.30	0.73
0.117	0.00	3.183	4.39	6.250	9.49	9.32	0.73
0.133	0.00	3.200	4.39	6.267	5.12	9.33	0.73
0.150	0.00	3.217	4.39	6.283	5.12	9.35	0.73
0.167	0.00	3.233	4.39	6.300	5.12	9.37	0.73
0.183	0.00	3.250	4.39	6.317	5.12	9.38	0.73
0.200	0.00	3.267	12.43	6.333	5.12	9.40	0.73
0.217	0.00	3.283	12.43	6.350	5.12	9.42	0.73
0.233	0.00	3.300	12.43	6.367	5.12	9.43	0.73
0.250	0.00	3.317	12.43	6.383	5.12	9.45	0.73
0.267	0.73	3.333	12.43	6.400	5.12	9.47	0.73
0.283	0.73	3.350	12.43	6.417	5.12	9.48	0.73
0.300	0.73	3.367	12.43	6.433	5.12	9.50	0.73
0.317	0.73	3.383	12.43	6.450	5.12	9.52	0.73
0.333	0.73	3.400	12.43	6.467	5.12	9.53	0.73
0.350	0.73	3.417	12.43	6.483	5.12	9.55	0.73
0.367	0.73	3.433	12.43	6.500	5.12	9.57	0.73
0.383	0.73	3.450	12.43	6.517	5.12	9.58	0.73
0.400	0.73	3.467	12.43	6.533	5.12	9.60	0.73
0.417	0.73	3.483	12.43	6.550	5.12	9.62	0.73
0.433	0.73	3.500	12.43	6.567	5.12	9.63	0.73
0.450	0.73	3.517	12.43	6.583	5.12	9.65	0.73
0.467	0.73	3.533	12.43	6.600	5.12	9.67	0.73
0.483	0.73	3.550	12.43	6.617	5.12	9.68	0.73
0.500	0.73	3.567	12.43	6.633	5.12	9.70	0.73
0.517	0.73	3.583	12.43	6.650	5.12	9.72	0.73
0.533	0.73	3.600	12.43	6.667	5.12	9.73	0.73
0.550	0.73	3.617	12.43	6.683	5.12	9.75	0.73
0.567	0.73	3.633	12.43	6.700	5.12	9.77	0.73
0.583	0.73	3.650	12.43	6.717	5.12	9.78	0.73
0.600	0.73	3.667	12.43	6.733	5.12	9.80	0.73
0.617	0.73	3.683	12.43	6.750	5.12	9.82	0.73
0.633	0.73	3.700	12.43	6.767	5.12	9.83	0.73
0.650	0.73	3.717	12.43	6.783	5.12	9.85	0.73
0.667	0.73	3.733	12.43	6.800	5.12	9.87	0.73
0.683	0.73	3.750	12.43	6.817	5.12	9.88	0.73
0.700	0.73	3.767	12.43	6.833	5.12	9.90	0.73
0.717	0.73	3.783	12.43	6.850	5.12	9.92	0.73
0.733	0.73	3.800	12.43	6.867	5.12	9.93	0.73
0.750	0.73	3.817	12.43	6.883	5.12	9.95	0.73
0.767	0.73	3.833	12.43	6.900	5.12	9.97	0.73
0.783	0.73	3.850	12.43	6.917	5.12	9.98	0.73
0.800	0.73	3.867	12.43	6.933	5.12	10.00	0.73
0.817	0.73	3.883	12.43	6.950	5.12	10.02	0.73
0.833	0.73	3.900	12.43	6.967	5.12	10.03	0.73
0.850	0.73	3.917	12.43	6.983	5.12	10.05	0.73
0.867	0.73	3.933	12.43	7.000	5.12	10.07	0.73
0.883	0.73	3.950	12.43	7.017	5.12	10.08	0.73
0.900	0.73	3.967	12.43	7.033	5.12	10.10	0.73
0.917	0.73	3.983	12.43	7.050	5.12	10.12	0.73
0.933	0.73	4.000	12.43	7.067	5.12	10.13	0.73
0.950	0.73	4.017	12.43	7.083	5.12	10.15	0.73
0.967	0.73	4.033	12.43	7.100	5.12	10.17	0.73
0.983	0.73	4.050	12.43	7.117	5.12	10.18	0.73
1.000	0.73	4.067	12.43	7.133	5.12	10.20	0.73
1.017	0.73	4.083	12.43	7.150	5.12	10.22	0.73
1.033	0.73	4.100	12.43	7.167	5.12	10.23	0.73
1.050	0.73	4.117	12.43	7.183	5.12	10.25	0.73
1.067	0.73	4.133	12.43	7.200	5.12	10.27	0.73
1.083	0.73	4.150	12.43	7.217	5.12	10.28	0.73
1.100	0.73	4.167	12.43	7.233	5.12	10.30	0.73
1.117	0.73	4.183	12.43	7.250	5.11	10.32	0.73
1.133	0.73	4.200	12.43	7.267	2.92	10.33	0.73
1.150	0.73	4.217	12.43	7.283	2.92	10.35	0.73
1.167	0.73	4.233	12.43	7.300	2.92	10.37	0.73
1.183	0.73	4.250	12.43	7.317	2.92	10.38	0.73
1.200	0.73	4.267	33.63	7.333	2.92	10.40	0.73
1.217	0.73	4.283	33.63	7.350	2.92	10.42	0.73
1.233	0.73	4.300	33.63	7.367	2.92	10.43	0.73
1.250	0.73	4.317	33.63	7.383	2.92	10.45	0.73
1.267	0.73	4.333	33.63	7.400	2.92	10.47	0.73
1.283	0.73	4.350	33.63	7.417	2.92	10.48	0.73
1.300	0.73	4.367	33.63	7.433	2.92	10.50	0.73
1.317	0.73	4.383	33.63	7.450	2.92	10.52	0.73
1.333	0.73	4.400	33.63	7.467	2.92	10.53	0.73
1.350	0.73	4.417	33.63	7.483	2.92	10.55	0.73
1.367	0.73	4.433	33.63	7.500	2.92	10.57	0.73
1.383	0.73	4.450	33.63	7.517	2.92	10.58	0.73
1.400	0.73	4.467	33.63	7.533	2.92	10.60	0.73
1.417	0.73	4.483	33.63	7.550	2.92	10.62	0.73
1.433	0.73	4.500	33.63	7.567	2.92	10.63	0.73
1.450	0.73	4.517	33.63	7.583	2.92	10.65	0.73
1.467	0.73	4.533	33.63	7.600	2.92	10.67	0.73
1.483	0.73	4.550	33.63	7.617	2.92	10.68	0.73
1.500	0.73	4.567	33.63	7.633	2.92	10.70	0.73
1.517	0.73	4.583	33.63	7.650	2.92	10.72	0.73
1.533	0.73	4.600	33.63	7.667	2.92	10.73	0.73
1.550	0.73	4.617	33.63	7.683	2.92	10.75	0.73
1.567	0.73	4.633	33.63	7.700	2.92	10.77	0.73
1.583	0.73	4.650	33.63	7.717	2.92	10.78	0.73
1.600	0.73	4.667	33.63	7.733	2.92	10.80	0.73
1.617	0.73	4.683	33.63	7.750	2.92	10.82	0.73
1.633	0.73	4.700	33.63	7.767	2.92	10.83	0.73
1.650	0.73	4.717	33.63	7.783	2.92	10.85	0.73
1.667	0.73	4.733	33.63	7.800	2.92	10.87	0.73

1.683	0.73	4.750	33.63	7.817	2.92	10.88	0.73
1.700	0.73	4.767	33.63	7.833	2.92	10.90	0.73
1.717	0.73	4.783	33.63	7.850	2.92	10.92	0.73
1.733	0.73	4.800	33.63	7.867	2.92	10.93	0.73
1.750	0.73	4.817	33.63	7.883	2.92	10.95	0.73
1.767	0.73	4.833	33.63	7.900	2.92	10.97	0.73
1.783	0.73	4.850	33.63	7.917	2.92	10.98	0.73
1.800	0.73	4.867	33.63	7.933	2.92	11.00	0.73
1.817	0.73	4.883	33.63	7.950	2.92	11.02	0.73
1.833	0.73	4.900	33.63	7.967	2.92	11.03	0.73
1.850	0.73	4.917	33.63	7.983	2.92	11.05	0.73
1.867	0.73	4.933	33.63	8.000	2.92	11.07	0.73
1.883	0.73	4.950	33.63	8.017	2.92	11.08	0.73
1.900	0.73	4.967	33.63	8.033	2.92	11.10	0.73
1.917	0.73	4.983	33.63	8.050	2.92	11.12	0.73
1.933	0.73	5.000	33.63	8.067	2.92	11.13	0.73
1.950	0.73	5.017	33.63	8.083	2.92	11.15	0.73
1.967	0.73	5.033	33.63	8.100	2.92	11.17	0.73
1.983	0.73	5.050	33.63	8.117	2.92	11.18	0.73
2.000	0.73	5.067	33.63	8.133	2.92	11.20	0.73
2.017	0.73	5.083	33.63	8.150	2.92	11.22	0.73
2.033	0.73	5.100	33.63	8.167	2.92	11.23	0.73
2.050	0.73	5.117	33.63	8.183	2.92	11.25	0.73
2.067	0.73	5.133	33.63	8.200	2.92	11.27	0.73
2.083	0.73	5.150	33.63	8.217	2.92	11.28	0.73
2.100	0.73	5.167	33.63	8.233	2.92	11.30	0.73
2.117	0.73	5.183	33.63	8.250	2.92	11.32	0.73
2.133	0.73	5.200	33.63	8.267	1.46	11.33	0.73
2.150	0.73	5.217	33.63	8.283	1.46	11.35	0.73
2.167	0.73	5.233	33.63	8.300	1.46	11.37	0.73
2.183	0.73	5.250	33.61	8.317	1.46	11.38	0.73
2.200	0.73	5.267	9.50	8.333	1.46	11.40	0.73
2.217	0.73	5.283	9.50	8.350	1.46	11.42	0.73
2.233	0.73	5.300	9.50	8.367	1.46	11.43	0.73
2.250	0.73	5.317	9.50	8.383	1.46	11.45	0.73
2.267	4.39	5.333	9.50	8.400	1.46	11.47	0.73
2.283	4.39	5.350	9.50	8.417	1.46	11.48	0.73
2.300	4.39	5.367	9.50	8.433	1.46	11.50	0.73
2.317	4.39	5.383	9.50	8.450	1.46	11.52	0.73
2.333	4.39	5.400	9.50	8.467	1.46	11.53	0.73
2.350	4.39	5.417	9.50	8.483	1.46	11.55	0.73
2.367	4.39	5.433	9.50	8.500	1.46	11.57	0.73
2.383	4.39	5.450	9.50	8.517	1.46	11.58	0.73
2.400	4.39	5.467	9.50	8.533	1.46	11.60	0.73
2.417	4.39	5.483	9.50	8.550	1.46	11.62	0.73
2.433	4.39	5.500	9.50	8.567	1.46	11.63	0.73
2.450	4.39	5.517	9.50	8.583	1.46	11.65	0.73
2.467	4.39	5.533	9.50	8.600	1.46	11.67	0.73
2.483	4.39	5.550	9.50	8.617	1.46	11.68	0.73
2.500	4.39	5.567	9.50	8.633	1.46	11.70	0.73
2.517	4.39	5.583	9.50	8.650	1.46	11.72	0.73
2.533	4.39	5.600	9.50	8.667	1.46	11.73	0.73
2.550	4.39	5.617	9.50	8.683	1.46	11.75	0.73
2.567	4.39	5.633	9.50	8.700	1.46	11.77	0.73
2.583	4.39	5.650	9.50	8.717	1.46	11.78	0.73
2.600	4.39	5.667	9.50	8.733	1.46	11.80	0.73
2.617	4.39	5.683	9.50	8.750	1.46	11.82	0.73
2.633	4.39	5.700	9.50	8.767	1.46	11.83	0.73
2.650	4.39	5.717	9.50	8.783	1.46	11.85	0.73
2.667	4.39	5.733	9.50	8.800	1.46	11.87	0.73
2.683	4.39	5.750	9.50	8.817	1.46	11.88	0.73
2.700	4.39	5.767	9.50	8.833	1.46	11.90	0.73
2.717	4.39	5.783	9.50	8.850	1.46	11.92	0.73
2.733	4.39	5.800	9.50	8.867	1.46	11.93	0.73
2.750	4.39	5.817	9.50	8.883	1.46	11.95	0.73
2.767	4.39	5.833	9.50	8.900	1.46	11.97	0.73
2.783	4.39	5.850	9.50	8.917	1.46	11.98	0.73
2.800	4.39	5.867	9.50	8.933	1.46	12.00	0.73
2.817	4.39	5.883	9.50	8.950	1.46	12.02	0.73
2.833	4.39	5.900	9.50	8.967	1.46	12.03	0.73
2.850	4.39	5.917	9.50	8.983	1.46	12.05	0.73
2.867	4.39	5.933	9.50	9.000	1.46	12.07	0.73
2.883	4.39	5.950	9.50	9.017	1.46	12.08	0.73
2.900	4.39	5.967	9.50	9.033	1.46	12.10	0.73
2.917	4.39	5.983	9.50	9.050	1.46	12.12	0.73
2.933	4.39	6.000	9.50	9.067	1.46	12.13	0.73
2.950	4.39	6.017	9.50	9.083	1.46	12.15	0.73
2.967	4.39	6.033	9.50	9.100	1.46	12.17	0.73
2.983	4.39	6.050	9.50	9.117	1.46	12.18	0.73
3.000	4.39	6.067	9.50	9.133	1.46	12.20	0.73
3.017	4.39	6.083	9.50	9.150	1.46	12.22	0.73
3.033	4.39	6.100	9.50	9.167	1.46	12.23	0.73
3.050	4.39	6.117	9.50	9.183	1.46	12.25	0.73
3.067	4.39	6.133	9.50	9.200	1.46		

Max.Eff.Inten.(mm/hr)=	33.63	48.02	
over (min)	8.00	17.00	
Storage Coeff. (min)=	8.40 (ii)	16.79 (ii)	
Unit Hyd. Tpeak (min)=	8.00	17.00	
Unit Hyd. peak (cms)=	0.14	0.07	
			TOTALS
PEAK FLOW (cms)=	0.93	0.63	1.563 (iii)
TIME TO PEAK (hrs)=	5.25	5.28	5.25
RUNOFF VOLUME (mm)=	72.09	52.37	63.03
TOTAL RAINFALL (mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT =	0.99	0.72	0.86

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0009)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1090	0.8030
	0.0280	0.3250	0.1440	0.9370
	0.0460	0.5280	0.1740	1.0350
	0.0810	0.6940	0.2060	1.1340

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	18.550	1.563	5.25	63.03
OUTFLOW: ID= 1 (0009)	18.550	0.144	8.30	42.04

PEAK FLOW REDUCTION [Qout/Qin](%)= 9.21
TIME SHIFT OF PEAK FLOW (min)=183.00
MAXIMUM STORAGE USED (ha.m.)= 0.9370

CALIB		
STANDHYD (0011)	Area (ha)= 11.52	
ID= 1 DT= 1.0 min	Total Imp(%)= 81.00	Dir. Conn.(%)= 67.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	9.33	2.19

Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	4.39	6.150	9.50	9.22	1.46
0.033	0.00	3.100	4.39	6.167	9.50	9.23	1.46
0.050	0.00	3.117	4.39	6.183	9.50	9.25	1.46
0.067	0.00	3.133	4.39	6.200	9.50	9.27	0.73
0.083	0.00	3.150	4.39	6.217	9.50	9.28	0.73
0.100	0.00	3.167	4.39	6.233	9.50	9.30	0.73
0.117	0.00	3.183	4.39	6.250	9.49	9.32	0.73
0.133	0.00	3.200	4.39	6.267	5.12	9.33	0.73
0.150	0.00	3.217	4.39	6.283	5.12	9.35	0.73
0.167	0.00	3.233	4.39	6.300	5.12	9.37	0.73
0.183	0.00	3.250	4.39	6.317	5.12	9.38	0.73
0.200	0.00	3.267	12.43	6.333	5.12	9.40	0.73
0.217	0.00	3.283	12.43	6.350	5.12	9.42	0.73
0.233	0.00	3.300	12.43	6.367	5.12	9.43	0.73
0.250	0.00	3.317	12.43	6.383	5.12	9.45	0.73
0.267	0.73	3.333	12.43	6.400	5.12	9.47	0.73
0.283	0.73	3.350	12.43	6.417	5.12	9.48	0.73
0.300	0.73	3.367	12.43	6.433	5.12	9.50	0.73
0.317	0.73	3.383	12.43	6.450	5.12	9.52	0.73
0.333	0.73	3.400	12.43	6.467	5.12	9.53	0.73
0.350	0.73	3.417	12.43	6.483	5.12	9.55	0.73
0.367	0.73	3.433	12.43	6.500	5.12	9.57	0.73
0.383	0.73	3.450	12.43	6.517	5.12	9.58	0.73
0.400	0.73	3.467	12.43	6.533	5.12	9.60	0.73
0.417	0.73	3.483	12.43	6.550	5.12	9.62	0.73
0.433	0.73	3.500	12.43	6.567	5.12	9.63	0.73
0.450	0.73	3.517	12.43	6.583	5.12	9.65	0.73
0.467	0.73	3.533	12.43	6.600	5.12	9.67	0.73
0.483	0.73	3.550	12.43	6.617	5.12	9.68	0.73
0.500	0.73	3.567	12.43	6.633	5.12	9.70	0.73
0.517	0.73	3.583	12.43	6.650	5.12	9.72	0.73
0.533	0.73	3.600	12.43	6.667	5.12	9.73	0.73
0.550	0.73	3.617	12.43	6.683	5.12	9.75	0.73
0.567	0.73	3.633	12.43	6.700	5.12	9.77	0.73
0.583	0.73	3.650	12.43	6.717	5.12	9.78	0.73
0.600	0.73	3.667	12.43	6.733	5.12	9.80	0.73
0.617	0.73	3.683	12.43	6.750	5.12	9.82	0.73
0.633	0.73	3.700	12.43	6.767	5.12	9.83	0.73
0.650	0.73	3.717	12.43	6.783	5.12	9.85	0.73
0.667	0.73	3.733	12.43	6.800	5.12	9.87	0.73
0.683	0.73	3.750	12.43	6.817	5.12	9.88	0.73
0.700	0.73	3.767	12.43	6.833	5.12	9.90	0.73
0.717	0.73	3.783	12.43	6.850	5.12	9.92	0.73
0.733	0.73	3.800	12.43	6.867	5.12	9.93	0.73
0.750	0.73	3.817	12.43	6.883	5.12	9.95	0.73
0.767	0.73	3.833	12.43	6.900	5.12	9.97	0.73
0.783	0.73	3.850	12.43	6.917	5.12	9.98	0.73
0.800	0.73	3.867	12.43	6.933	5.12	10.00	0.73
0.817	0.73	3.883	12.43	6.950	5.12	10.02	0.73
0.833	0.73	3.900	12.43	6.967	5.12	10.03	0.73
0.850	0.73	3.917	12.43	6.983	5.12	10.05	0.73
0.867	0.73	3.933	12.43	7.000	5.12	10.07	0.73
0.883	0.73	3.950	12.43	7.017	5.12	10.08	0.73
0.900	0.73	3.967	12.43	7.033	5.12	10.10	0.73
0.917	0.73	3.983	12.43	7.050	5.12	10.12	0.73
0.933	0.73	4.000	12.43	7.067	5.12	10.13	0.73
0.950	0.73	4.017	12.43	7.083	5.12	10.15	0.73
0.967	0.73	4.033	12.43	7.100	5.12	10.17	0.73
0.983	0.73	4.050	12.43	7.117	5.12	10.18	0.73
1.000	0.73	4.067	12.43	7.133	5.12	10.20	0.73
1.017	0.73	4.083	12.43	7.150	5.12	10.22	0.73
1.033	0.73	4.100	12.43	7.167	5.12	10.23	0.73
1.050	0.73	4.117	12.43	7.183	5.12	10.25	0.73
1.067	0.73	4.133	12.43	7.200	5.12	10.27	0.73
1.083	0.73	4.150	12.43	7.217	5.12	10.28	0.73
1.100	0.73	4.167	12.43	7.233	5.12	10.30	0.73
1.117	0.73	4.183	12.43	7.250	5.11	10.32	0.73
1.133	0.73	4.200	12.43	7.267	2.92	10.33	0.73
1.150	0.73	4.217	12.43	7.283	2.92	10.35	0.73
1.167	0.73	4.233	12.43	7.300	2.92	10.37	0.73
1.183	0.73	4.250	12.43	7.317	2.92	10.38	0.73
1.200	0.73	4.267	33.63	7.333	2.92	10.40	0.73
1.217	0.73	4.283	33.63	7.350	2.92	10.42	0.73
1.233	0.73	4.300	33.63	7.367	2.92	10.43	0.73
1.250	0.73	4.317	33.63	7.383	2.92	10.45	0.73
1.267	0.73	4.333	33.63	7.400	2.92	10.47	0.73
1.283	0.73	4.350	33.63	7.417	2.92	10.48	0.73
1.300	0.73	4.367	33.63	7.433	2.92	10.50	0.73
1.317	0.73	4.383	33.63	7.450	2.92	10.52	0.73
1.333	0.73	4.400	33.63	7.467	2.92	10.53	0.73
1.350	0.73	4.417	33.63	7.483	2.92	10.55	0.73
1.367	0.73	4.433	33.63	7.500	2.92	10.57	0.73
1.383	0.73	4.450	33.63	7.517	2.92	10.58	0.73
1.400	0.73	4.467	33.63	7.533	2.92	10.60	0.73
1.417	0.73	4.483	33.63	7.550	2.92	10.62	0.73
1.433	0.73	4.500	33.63	7.567	2.92	10.63	0.73
1.450	0.73	4.517	33.63	7.583	2.92	10.65	0.73
1.467	0.73	4.533	33.63	7.600	2.92	10.67	0.73
1.483	0.73	4.550	33.63	7.617	2.92	10.68	0.73
1.500	0.73	4.567	33.63	7.633	2.92	10.70	0.73
1.517	0.73	4.583	33.63	7.650	2.92	10.72	0.73
1.533	0.73	4.600	33.63	7.667	2.92	10.73	0.73
1.550	0.73	4.617	33.63	7.683	2.92	10.75	0.73
1.567	0.73	4.633	33.63	7.700	2.92	10.77	0.73
1.583	0.73	4.650	33.63	7.717	2.92	10.78	0.73
1.600	0.73	4.667	33.63	7.733	2.92	10.80	0.73
1.617	0.73	4.683	33.63	7.750	2.92	10.82	0.73
1.633	0.73	4.700	33.63	7.767	2.92	10.83	0.73
1.650	0.73	4.717	33.63	7.783	2.92	10.85	0.73
1.667	0.73	4.733	33.63	7.800	2.92	10.87	0.73
1.683	0.73	4.750	33.63	7.817	2.92	10.88	0.73
1.700	0.73	4.767	33.63	7.833	2.92	10.90	0.73
1.717	0.73	4.783	33.63	7.850	2.92	10.92	0.73
1.733	0.73	4.800	33.63	7.867	2.92	10.93	0.73
1.750	0.73	4.817	33.63	7.883	2.92	10.95	0.73
1.767	0.73	4.833	33.63	7.900	2.92	10.97	0.73
1.783	0.73	4.850	33.63	7.917	2.92	10.98	0.73
1.800	0.73	4.867	33.63	7.933	2.92	11.00	0.73
1.817	0.73	4.883	33.63	7.950	2.92	11.02	0.73
1.833	0.73	4.900	33.63	7.967	2.92	11.03	0.73
1.850	0.73	4.917	33.63	7.983	2.92	11.05	0.73
1.867	0.73	4.933	33.63	8.000	2.92	11.07	0.73
1.883	0.73	4.950	33.63	8.017	2.92	11.08	0.73
1.900	0.73	4.967	33.63	8.033	2.92	11.10	0.73
1.917	0.73	4.983	33.63	8.050	2.92	11.12	0.73
1.933	0.73	5.000	33.63	8.067	2.92	11.13	0.73
1.950	0.73	5.017	33.63	8.083	2.92	11.15	0.73
1.967	0.73	5.033	33.63	8.100	2.92	11.17	0.73
1.983	0.73	5.050	33.63	8.117	2.92	11.18	0.73
2.000	0.73	5.067	33.63	8.133	2.92	11.20	0.73
2.017	0.73	5.083	33.63	8.150	2.92	11.22	0.73

2.033	0.73	5.100	33.63	8.167	2.92	11.23	0.73
2.050	0.73	5.117	33.63	8.183	2.92	11.25	0.73
2.067	0.73	5.133	33.63	8.200	2.92	11.27	0.73
2.083	0.73	5.150	33.63	8.217	2.92	11.28	0.73
2.100	0.73	5.167	33.63	8.233	2.92	11.30	0.73
2.117	0.73	5.183	33.63	8.250	2.92	11.32	0.73
2.133	0.73	5.200	33.63	8.267	1.46	11.33	0.73
2.150	0.73	5.217	33.63	8.283	1.46	11.35	0.73
2.167	0.73	5.233	33.63	8.300	1.46	11.37	0.73
2.183	0.73	5.250	33.61	8.317	1.46	11.38	0.73
2.200	0.73	5.267	9.50	8.333	1.46	11.40	0.73
2.217	0.73	5.283	9.50	8.350	1.46	11.42	0.73
2.233	0.73	5.300	9.50	8.367	1.46	11.43	0.73
2.250	0.73	5.317	9.50	8.383	1.46	11.45	0.73
2.267	4.39	5.333	9.50	8.400	1.46	11.47	0.73
2.283	4.39	5.350	9.50	8.417	1.46	11.48	0.73
2.300	4.39	5.367	9.50	8.433	1.46	11.50	0.73
2.317	4.39	5.383	9.50	8.450	1.46	11.52	0.73
2.333	4.39	5.400	9.50	8.467	1.46	11.53	0.73
2.350	4.39	5.417	9.50	8.483	1.46	11.55	0.73
2.367	4.39	5.433	9.50	8.500	1.46	11.57	0.73
2.383	4.39	5.450	9.50	8.517	1.46	11.58	0.73
2.400	4.39	5.467	9.50	8.533	1.46	11.60	0.73
2.417	4.39	5.483	9.50	8.550	1.46	11.62	0.73
2.433	4.39	5.500	9.50	8.567	1.46	11.63	0.73
2.450	4.39	5.517	9.50	8.583	1.46	11.65	0.73
2.467	4.39	5.533	9.50	8.600	1.46	11.67	0.73
2.483	4.39	5.550	9.50	8.617	1.46	11.68	0.73
2.500	4.39	5.567	9.50	8.633	1.46	11.70	0.73
2.517	4.39	5.583	9.50	8.650	1.46	11.72	0.73
2.533	4.39	5.600	9.50	8.667	1.46	11.73	0.73
2.550	4.39	5.617	9.50	8.683	1.46	11.75	0.73
2.567	4.39	5.633	9.50	8.700	1.46	11.77	0.73
2.583	4.39	5.650	9.50	8.717	1.46	11.78	0.73
2.600	4.39	5.667	9.50	8.733	1.46	11.80	0.73
2.617	4.39	5.683	9.50	8.750	1.46	11.82	0.73
2.633	4.39	5.700	9.50	8.767	1.46	11.83	0.73
2.650	4.39	5.717	9.50	8.783	1.46	11.85	0.73
2.667	4.39	5.733	9.50	8.800	1.46	11.87	0.73
2.683	4.39	5.750	9.50	8.817	1.46	11.88	0.73
2.700	4.39	5.767	9.50	8.833	1.46	11.90	0.73
2.717	4.39	5.783	9.50	8.850	1.46	11.92	0.73
2.733	4.39	5.800	9.50	8.867	1.46	11.93	0.73
2.750	4.39	5.817	9.50	8.883	1.46	11.95	0.73
2.767	4.39	5.833	9.50	8.900	1.46	11.97	0.73
2.783	4.39	5.850	9.50	8.917	1.46	11.98	0.73
2.800	4.39	5.867	9.50	8.933	1.46	12.00	0.73
2.817	4.39	5.883	9.50	8.950	1.46	12.02	0.73
2.833	4.39	5.900	9.50	8.967	1.46	12.03	0.73
2.850	4.39	5.917	9.50	8.983	1.46	12.05	0.73
2.867	4.39	5.933	9.50	9.000	1.46	12.07	0.73
2.883	4.39	5.950	9.50	9.017	1.46	12.08	0.73
2.900	4.39	5.967	9.50	9.033	1.46	12.10	0.73
2.917	4.39	5.983	9.50	9.050	1.46	12.12	0.73
2.933	4.39	6.000	9.50	9.067	1.46	12.13	0.73
2.950	4.39	6.017	9.50	9.083	1.46	12.15	0.73
2.967	4.39	6.033	9.50	9.100	1.46	12.17	0.73
2.983	4.39	6.050	9.50	9.117	1.46	12.18	0.73
3.000	4.39	6.067	9.50	9.133	1.46	12.20	0.73
3.017	4.39	6.083	9.50	9.150	1.46	12.22	0.73
3.033	4.39	6.100	9.50	9.167	1.46	12.23	0.73
3.050	4.39	6.117	9.50	9.183	1.46	12.25	0.73
3.067	4.39	6.133	9.50	9.200	1.46		

Max.Eff.Inten.(mm/hr)=	33.63	51.30
over (min)	7.00	14.00

Storage Coeff. (min)=	7.28 (ii)	13.87 (ii)	
Unit Hyd. Tpeak (min)=	7.00	14.00	
Unit Hyd. peak (cms)=	0.16	0.08	
			TOTALS
PEAK FLOW (cms)=	0.72	0.29	1.014 (iii)
TIME TO PEAK (hrs)=	5.25	5.27	5.25
RUNOFF VOLUME (mm)=	72.09	53.21	65.87
TOTAL RAINFALL (mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT =	0.99	0.73	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0012)		OVERFLOW IS OFF			
IN= 2---> OUT= 1					
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5390
	0.0190	0.2190	0.0790	0.6270
	0.0250	0.3570	0.0950	0.6900
	0.0440	0.4680	0.1130	0.7520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0011)	11.520	1.014	5.25	65.87
OUTFLOW: ID= 1 (0012)	11.520	0.079	8.37	39.84

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.77
TIME SHIFT OF PEAK FLOW (min)=187.00
MAXIMUM STORAGE USED (ha.m.)= 0.6261

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\46f87ebb-9f8a-473d-9211-9000ee927b86\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\46f87ebb-9f8a-473d-9211-9000ee927b86\scenari

DATE: 02-19-2026 TIME: 09:56:03

USER:

COMMENTS: _____

****
** SIMULATION : 5 - 50 Year 12 Hour AES (Bloo **
****

READ STORM	Filename: C:\Users\hliu\AppData\Local\Temp\15d7e5d8-ec85-4e6b-a747-1f5e44151366\2b5f13d6
Ptotal= 80.82 mm	Comments: 50 Year 12 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	13.74	6.50	5.66	9.75	0.81
0.25	0.81	3.50	13.74	6.75	5.66	10.00	0.81
0.50	0.81	3.75	13.74	7.00	5.66	10.25	0.81
0.75	0.81	4.00	13.74	7.25	3.23	10.50	0.81
1.00	0.81	4.25	37.17	7.50	3.23	10.75	0.81
1.25	0.81	4.50	37.17	7.75	3.23	11.00	0.81
1.50	0.81	4.75	37.17	8.00	3.23	11.25	0.81
1.75	0.81	5.00	37.17	8.25	1.62	11.50	0.81
2.00	0.81	5.25	10.50	8.50	1.62	11.75	0.81
2.25	4.85	5.50	10.50	8.75	1.62	12.00	0.81
2.50	4.85	5.75	10.50	9.00	1.62		
2.75	4.85	6.00	10.50	9.25	0.81		
3.00	4.85	6.25	5.66	9.50	0.81		

CALIB	
STANDHYD (0010)	Area (ha)= 18.55
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	4.85	6.150	10.50	9.22	1.62
0.033	0.00	3.100	4.85	6.167	10.50	9.23	1.62
0.050	0.00	3.117	4.85	6.183	10.50	9.25	1.62
0.067	0.00	3.133	4.85	6.200	10.50	9.27	0.81
0.083	0.00	3.150	4.85	6.217	10.50	9.28	0.81
0.100	0.00	3.167	4.85	6.233	10.50	9.30	0.81
0.117	0.00	3.183	4.85	6.250	10.49	9.32	0.81
0.133	0.00	3.200	4.85	6.267	5.66	9.33	0.81
0.150	0.00	3.217	4.85	6.283	5.66	9.35	0.81
0.167	0.00	3.233	4.85	6.300	5.66	9.37	0.81
0.183	0.00	3.250	4.85	6.317	5.66	9.38	0.81
0.200	0.00	3.267	13.74	6.333	5.66	9.40	0.81
0.217	0.00	3.283	13.74	6.350	5.66	9.42	0.81
0.233	0.00	3.300	13.74	6.367	5.66	9.43	0.81
0.250	0.00	3.317	13.74	6.383	5.66	9.45	0.81
0.267	0.81	3.333	13.74	6.400	5.66	9.47	0.81
0.283	0.81	3.350	13.74	6.417	5.66	9.48	0.81
0.300	0.81	3.367	13.74	6.433	5.66	9.50	0.81
0.317	0.81	3.383	13.74	6.450	5.66	9.52	0.81
0.333	0.81	3.400	13.74	6.467	5.66	9.53	0.81
0.350	0.81	3.417	13.74	6.483	5.66	9.55	0.81
0.367	0.81	3.433	13.74	6.500	5.66	9.57	0.81
0.383	0.81	3.450	13.74	6.517	5.66	9.58	0.81
0.400	0.81	3.467	13.74	6.533	5.66	9.60	0.81
0.417	0.81	3.483	13.74	6.550	5.66	9.62	0.81
0.433	0.81	3.500	13.74	6.567	5.66	9.63	0.81
0.450	0.81	3.517	13.74	6.583	5.66	9.65	0.81
0.467	0.81	3.533	13.74	6.600	5.66	9.67	0.81
0.483	0.81	3.550	13.74	6.617	5.66	9.68	0.81
0.500	0.81	3.567	13.74	6.633	5.66	9.70	0.81
0.517	0.81	3.583	13.74	6.650	5.66	9.72	0.81
0.533	0.81	3.600	13.74	6.667	5.66	9.73	0.81
0.550	0.81	3.617	13.74	6.683	5.66	9.75	0.81
0.567	0.81	3.633	13.74	6.700	5.66	9.77	0.81
0.583	0.81	3.650	13.74	6.717	5.66	9.78	0.81
0.600	0.81	3.667	13.74	6.733	5.66	9.80	0.81
0.617	0.81	3.683	13.74	6.750	5.66	9.82	0.81
0.633	0.81	3.700	13.74	6.767	5.66	9.83	0.81
0.650	0.81	3.717	13.74	6.783	5.66	9.85	0.81
0.667	0.81	3.733	13.74	6.800	5.66	9.87	0.81
0.683	0.81	3.750	13.74	6.817	5.66	9.88	0.81
0.700	0.81	3.767	13.74	6.833	5.66	9.90	0.81
0.717	0.81	3.783	13.74	6.850	5.66	9.92	0.81
0.733	0.81	3.800	13.74	6.867	5.66	9.93	0.81
0.750	0.81	3.817	13.74	6.883	5.66	9.95	0.81
0.767	0.81	3.833	13.74	6.900	5.66	9.97	0.81
0.783	0.81	3.850	13.74	6.917	5.66	9.98	0.81
0.800	0.81	3.867	13.74	6.933	5.66	10.00	0.81
0.817	0.81	3.883	13.74	6.950	5.66	10.02	0.81
0.833	0.81	3.900	13.74	6.967	5.66	10.03	0.81
0.850	0.81	3.917	13.74	6.983	5.66	10.05	0.81
0.867	0.81	3.933	13.74	7.000	5.66	10.07	0.81
0.883	0.81	3.950	13.74	7.017	5.66	10.08	0.81
0.900	0.81	3.967	13.74	7.033	5.66	10.10	0.81
0.917	0.81	3.983	13.74	7.050	5.66	10.12	0.81
0.933	0.81	4.000	13.74	7.067	5.66	10.13	0.81
0.950	0.81	4.017	13.74	7.083	5.66	10.15	0.81
0.967	0.81	4.033	13.74	7.100	5.66	10.17	0.81
0.983	0.81	4.050	13.74	7.117	5.66	10.18	0.81
1.000	0.81	4.067	13.74	7.133	5.66	10.20	0.81
1.017	0.81	4.083	13.74	7.150	5.66	10.22	0.81
1.033	0.81	4.100	13.74	7.167	5.66	10.23	0.81
1.050	0.81	4.117	13.74	7.183	5.66	10.25	0.81
1.067	0.81	4.133	13.74	7.200	5.66	10.27	0.81
1.083	0.81	4.150	13.74	7.217	5.66	10.28	0.81
1.100	0.81	4.167	13.74	7.233	5.66	10.30	0.81
1.117	0.81	4.183	13.74	7.250	5.65	10.32	0.81
1.133	0.81	4.200	13.74	7.267	3.23	10.33	0.81
1.150	0.81	4.217	13.74	7.283	3.23	10.35	0.81
1.167	0.81	4.233	13.74	7.300	3.23	10.37	0.81
1.183	0.81	4.250	13.74	7.317	3.23	10.38	0.81
1.200	0.81	4.267	37.17	7.333	3.23	10.40	0.81
1.217	0.81	4.283	37.17	7.350	3.23	10.42	0.81
1.233	0.81	4.300	37.17	7.367	3.23	10.43	0.81

1.250	0.81	4.317	37.17	7.383	3.23	10.45	0.81
1.267	0.81	4.333	37.17	7.400	3.23	10.47	0.81
1.283	0.81	4.350	37.17	7.417	3.23	10.48	0.81
1.300	0.81	4.367	37.17	7.433	3.23	10.50	0.81
1.317	0.81	4.383	37.17	7.450	3.23	10.52	0.81
1.333	0.81	4.400	37.17	7.467	3.23	10.53	0.81
1.350	0.81	4.417	37.17	7.483	3.23	10.55	0.81
1.367	0.81	4.433	37.17	7.500	3.23	10.57	0.81
1.383	0.81	4.450	37.17	7.517	3.23	10.58	0.81
1.400	0.81	4.467	37.17	7.533	3.23	10.60	0.81
1.417	0.81	4.483	37.17	7.550	3.23	10.62	0.81
1.433	0.81	4.500	37.17	7.567	3.23	10.63	0.81
1.450	0.81	4.517	37.17	7.583	3.23	10.65	0.81
1.467	0.81	4.533	37.17	7.600	3.23	10.67	0.81
1.483	0.81	4.550	37.17	7.617	3.23	10.68	0.81
1.500	0.81	4.567	37.17	7.633	3.23	10.70	0.81
1.517	0.81	4.583	37.17	7.650	3.23	10.72	0.81
1.533	0.81	4.600	37.17	7.667	3.23	10.73	0.81
1.550	0.81	4.617	37.17	7.683	3.23	10.75	0.81
1.567	0.81	4.633	37.17	7.700	3.23	10.77	0.81
1.583	0.81	4.650	37.17	7.717	3.23	10.78	0.81
1.600	0.81	4.667	37.17	7.733	3.23	10.80	0.81
1.617	0.81	4.683	37.17	7.750	3.23	10.82	0.81
1.633	0.81	4.700	37.17	7.767	3.23	10.83	0.81
1.650	0.81	4.717	37.17	7.783	3.23	10.85	0.81
1.667	0.81	4.733	37.17	7.800	3.23	10.87	0.81
1.683	0.81	4.750	37.17	7.817	3.23	10.88	0.81
1.700	0.81	4.767	37.17	7.833	3.23	10.90	0.81
1.717	0.81	4.783	37.17	7.850	3.23	10.92	0.81
1.733	0.81	4.800	37.17	7.867	3.23	10.93	0.81
1.750	0.81	4.817	37.17	7.883	3.23	10.95	0.81
1.767	0.81	4.833	37.17	7.900	3.23	10.97	0.81
1.783	0.81	4.850	37.17	7.917	3.23	10.98	0.81
1.800	0.81	4.867	37.17	7.933	3.23	11.00	0.81
1.817	0.81	4.883	37.17	7.950	3.23	11.02	0.81
1.833	0.81	4.900	37.17	7.967	3.23	11.03	0.81
1.850	0.81	4.917	37.17	7.983	3.23	11.05	0.81
1.867	0.81	4.933	37.17	8.000	3.23	11.07	0.81
1.883	0.81	4.950	37.17	8.017	3.23	11.08	0.81
1.900	0.81	4.967	37.17	8.033	3.23	11.10	0.81
1.917	0.81	4.983	37.17	8.050	3.23	11.12	0.81
1.933	0.81	5.000	37.17	8.067	3.23	11.13	0.81
1.950	0.81	5.017	37.17	8.083	3.23	11.15	0.81
1.967	0.81	5.033	37.17	8.100	3.23	11.17	0.81
1.983	0.81	5.050	37.17	8.117	3.23	11.18	0.81
2.000	0.81	5.067	37.17	8.133	3.23	11.20	0.81
2.017	0.81	5.083	37.17	8.150	3.23	11.22	0.81
2.033	0.81	5.100	37.17	8.167	3.23	11.23	0.81
2.050	0.81	5.117	37.17	8.183	3.23	11.25	0.81
2.067	0.81	5.133	37.17	8.200	3.23	11.27	0.81
2.083	0.81	5.150	37.17	8.217	3.23	11.28	0.81
2.100	0.81	5.167	37.17	8.233	3.23	11.30	0.81
2.117	0.81	5.183	37.17	8.250	3.23	11.32	0.81
2.133	0.81	5.200	37.17	8.267	1.62	11.33	0.81
2.150	0.81	5.217	37.17	8.283	1.62	11.35	0.81
2.167	0.81	5.233	37.17	8.300	1.62	11.37	0.81
2.183	0.81	5.250	37.15	8.317	1.62	11.38	0.81
2.200	0.81	5.267	10.50	8.333	1.62	11.40	0.81
2.217	0.81	5.283	10.50	8.350	1.62	11.42	0.81
2.233	0.81	5.300	10.50	8.367	1.62	11.43	0.81
2.250	0.81	5.317	10.50	8.383	1.62	11.45	0.81
2.267	4.85	5.333	10.50	8.400	1.62	11.47	0.81
2.283	4.85	5.350	10.50	8.417	1.62	11.48	0.81
2.300	4.85	5.367	10.50	8.433	1.62	11.50	0.81
2.317	4.85	5.383	10.50	8.450	1.62	11.52	0.81
2.333	4.85	5.400	10.50	8.467	1.62	11.53	0.81
2.350	4.85	5.417	10.50	8.483	1.62	11.55	0.81
2.367	4.85	5.433	10.50	8.500	1.62	11.57	0.81
2.383	4.85	5.450	10.50	8.517	1.62	11.58	0.81
2.400	4.85	5.467	10.50	8.533	1.62	11.60	0.81
2.417	4.85	5.483	10.50	8.550	1.62	11.62	0.81
2.433	4.85	5.500	10.50	8.567	1.62	11.63	0.81
2.450	4.85	5.517	10.50	8.583	1.62	11.65	0.81
2.467	4.85	5.533	10.50	8.600	1.62	11.67	0.81
2.483	4.85	5.550	10.50	8.617	1.62	11.68	0.81
2.500	4.85	5.567	10.50	8.633	1.62	11.70	0.81
2.517	4.85	5.583	10.50	8.650	1.62	11.72	0.81
2.533	4.85	5.600	10.50	8.667	1.62	11.73	0.81
2.550	4.85	5.617	10.50	8.683	1.62	11.75	0.81
2.567	4.85	5.633	10.50	8.700	1.62	11.77	0.81
2.583	4.85	5.650	10.50	8.717	1.62	11.78	0.81
2.600	4.85	5.667	10.50	8.733	1.62	11.80	0.81
2.617	4.85	5.683	10.50	8.750	1.62	11.82	0.81
2.633	4.85	5.700	10.50	8.767	1.62	11.83	0.81
2.650	4.85	5.717	10.50	8.783	1.62	11.85	0.81
2.667	4.85	5.733	10.50	8.800	1.62	11.87	0.81
2.683	4.85	5.750	10.50	8.817	1.62	11.88	0.81
2.700	4.85	5.767	10.50	8.833	1.62	11.90	0.81
2.717	4.85	5.783	10.50	8.850	1.62	11.92	0.81
2.733	4.85	5.800	10.50	8.867	1.62	11.93	0.81
2.750	4.85	5.817	10.50	8.883	1.62	11.95	0.81
2.767	4.85	5.833	10.50	8.900	1.62	11.97	0.81
2.783	4.85	5.850	10.50	8.917	1.62	11.98	0.81
2.800	4.85	5.867	10.50	8.933	1.62	12.00	0.81
2.817	4.85	5.883	10.50	8.950	1.62	12.02	0.81
2.833	4.85	5.900	10.50	8.967	1.62	12.03	0.81
2.850	4.85	5.917	10.50	8.983	1.62	12.05	0.81
2.867	4.85	5.933	10.50	9.000	1.62	12.07	0.81
2.883	4.85	5.950	10.50	9.017	1.62	12.08	0.81
2.900	4.85	5.967	10.50	9.033	1.62	12.10	0.81
2.917	4.85	5.983	10.50	9.050	1.62	12.12	0.81
2.933	4.85	6.000	10.50	9.067	1.62	12.13	0.81
2.950	4.85	6.017	10.50	9.083	1.62	12.15	0.81
2.967	4.85	6.033	10.50	9.100	1.62	12.17	0.81
2.983	4.85	6.050	10.50	9.117	1.62	12.18	0.81
3.000	4.85	6.067	10.50	9.133	1.62	12.20	0.81
3.017	4.85	6.083	10.50	9.150	1.62	12.22	0.81
3.033	4.85	6.100	10.50	9.167	1.62	12.23	0.81
3.050	4.85	6.117	10.50	9.183	1.62	12.25	0.81
3.067	4.85	6.133	10.50	9.200	1.62		

Max.Eff.Inten.(mm/hr)=	37.17	54.06		
over (min)	8.00	17.00		
Storage Coeff. (min)=	8.07 (ii)	16.13 (ii)		
Unit Hyd. Tpeak (min)=	8.00	17.00		
Unit Hyd. peak (cms)=	0.14	0.07		
			TOTALS	
PEAK FLOW (cms)=	1.03	0.72	1.749 (iii)	
TIME TO PEAK (hrs)=	5.25	5.28	5.25	
RUNOFF VOLUME (mm)=	79.81	59.55	70.50	
TOTAL RAINFALL (mm)=	80.82	80.82	80.82	
RUNOFF COEFFICIENT =	0.99	0.74	0.87	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| RESERVOIR(0009)| OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 1.0 min | OUTFLOW STORAGE | OUTFLOW STORAGE
(cms) (ha.m.) | (cms) (ha.m.)
0.0000 0.0000 | 0.1090 0.8030
0.0280 0.3250 | 0.1440 0.9370
0.0460 0.5280 | 0.1740 1.0350
0.0810 0.6940 | 0.2060 1.1340

| AREA | QPEAK | TPEAK | R.V.
(ha) | (cms) | (hrs) | (mm)
INFLOW : ID= 2 (0010) | 18.550 | 1.749 | 5.25 | 70.50
OUTFLOW: ID= 1 (0009) | 18.550 | 0.174 | 7.83 | 48.45

PEAK FLOW REDUCTION [Qout/Qin](%)= 9.95
TIME SHIFT OF PEAK FLOW (min)=155.00
MAXIMUM STORAGE USED (ha.m.)= 1.0350

| CALIB |
| STANDHYD (0011)| Area (ha)= 11.52
|ID= 1 DT= 1.0 min | Total Imp(%)= 81.00 Dir. Conn.(%)= 67.00

| IMPERVIOUS | PERVIOUS (i)
Surface Area (ha)= | 9.33 | 2.19
Dep. Storage (mm)= | 1.00 | 1.50
Average Slope (%)= | 1.00 | 2.00
Length (m)= | 277.13 | 40.00
Mannings n = | 0.013 | 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	4.85	6.150	10.50	9.22	1.62
0.033	0.00	3.100	4.85	6.167	10.50	9.23	1.62
0.050	0.00	3.117	4.85	6.183	10.50	9.25	1.62
0.067	0.00	3.133	4.85	6.200	10.50	9.27	0.81
0.083	0.00	3.150	4.85	6.217	10.50	9.28	0.81
0.100	0.00	3.167	4.85	6.233	10.50	9.30	0.81
0.117	0.00	3.183	4.85	6.250	10.49	9.32	0.81
0.133	0.00	3.200	4.85	6.267	5.66	9.33	0.81
0.150	0.00	3.217	4.85	6.283	5.66	9.35	0.81
0.167	0.00	3.233	4.85	6.300	5.66	9.37	0.81
0.183	0.00	3.250	4.85	6.317	5.66	9.38	0.81
0.200	0.00	3.267	13.74	6.333	5.66	9.40	0.81
0.217	0.00	3.283	13.74	6.350	5.66	9.42	0.81
0.233	0.00	3.300	13.74	6.367	5.66	9.43	0.81
0.250	0.00	3.317	13.74	6.383	5.66	9.45	0.81
0.267	0.81	3.333	13.74	6.400	5.66	9.47	0.81
0.283	0.81	3.350	13.74	6.417	5.66	9.48	0.81
0.300	0.81	3.367	13.74	6.433	5.66	9.50	0.81
0.317	0.81	3.383	13.74	6.450	5.66	9.52	0.81
0.333	0.81	3.400	13.74	6.467	5.66	9.53	0.81
0.350	0.81	3.417	13.74	6.483	5.66	9.55	0.81
0.367	0.81	3.433	13.74	6.500	5.66	9.57	0.81
0.383	0.81	3.450	13.74	6.517	5.66	9.58	0.81
0.400	0.81	3.467	13.74	6.533	5.66	9.60	0.81
0.417	0.81	3.483	13.74	6.550	5.66	9.62	0.81
0.433	0.81	3.500	13.74	6.567	5.66	9.63	0.81
0.450	0.81	3.517	13.74	6.583	5.66	9.65	0.81
0.467	0.81	3.533	13.74	6.600	5.66	9.67	0.81
0.483	0.81	3.550	13.74	6.617	5.66	9.68	0.81
0.500	0.81	3.567	13.74	6.633	5.66	9.70	0.81
0.517	0.81	3.583	13.74	6.650	5.66	9.72	0.81
0.533	0.81	3.600	13.74	6.667	5.66	9.73	0.81
0.550	0.81	3.617	13.74	6.683	5.66	9.75	0.81
0.567	0.81	3.633	13.74	6.700	5.66	9.77	0.81
0.583	0.81	3.650	13.74	6.717	5.66	9.78	0.81
0.600	0.81	3.667	13.74	6.733	5.66	9.80	0.81
0.617	0.81	3.683	13.74	6.750	5.66	9.82	0.81
0.633	0.81	3.700	13.74	6.767	5.66	9.83	0.81
0.650	0.81	3.717	13.74	6.783	5.66	9.85	0.81
0.667	0.81	3.733	13.74	6.800	5.66	9.87	0.81
0.683	0.81	3.750	13.74	6.817	5.66	9.88	0.81
0.700	0.81	3.767	13.74	6.833	5.66	9.90	0.81
0.717	0.81	3.783	13.74	6.850	5.66	9.92	0.81
0.733	0.81	3.800	13.74	6.867	5.66	9.93	0.81
0.750	0.81	3.817	13.74	6.883	5.66	9.95	0.81
0.767	0.81	3.833	13.74	6.900	5.66	9.97	0.81
0.783	0.81	3.850	13.74	6.917	5.66	9.98	0.81
0.800	0.81	3.867	13.74	6.933	5.66	10.00	0.81
0.817	0.81	3.883	13.74	6.950	5.66	10.02	0.81
0.833	0.81	3.900	13.74	6.967	5.66	10.03	0.81
0.850	0.81	3.917	13.74	6.983	5.66	10.05	0.81
0.867	0.81	3.933	13.74	7.000	5.66	10.07	0.81
0.883	0.81	3.950	13.74	7.017	5.66	10.08	0.81
0.900	0.81	3.967	13.74	7.033	5.66	10.10	0.81
0.917	0.81	3.983	13.74	7.050	5.66	10.12	0.81
0.933	0.81	4.000	13.74	7.067	5.66	10.13	0.81
0.950	0.81	4.017	13.74	7.083	5.66	10.15	0.81
0.967	0.81	4.033	13.74	7.100	5.66	10.17	0.81
0.983	0.81	4.050	13.74	7.117	5.66	10.18	0.81
1.000	0.81	4.067	13.74	7.133	5.66	10.20	0.81
1.017	0.81	4.083	13.74	7.150	5.66	10.22	0.81
1.033	0.81	4.100	13.74	7.167	5.66	10.23	0.81
1.050	0.81	4.117	13.74	7.183	5.66	10.25	0.81
1.067	0.81	4.133	13.74	7.200	5.66	10.27	0.81
1.083	0.81	4.150	13.74	7.217	5.66	10.28	0.81
1.100	0.81	4.167	13.74	7.233	5.66	10.30	0.81
1.117	0.81	4.183	13.74	7.250	5.65	10.32	0.81
1.133	0.81	4.200	13.74	7.267	3.23	10.33	0.81
1.150	0.81	4.217	13.74	7.283	3.23	10.35	0.81
1.167	0.81	4.233	13.74	7.300	3.23	10.37	0.81
1.183	0.81	4.250	13.74	7.317	3.23	10.38	0.81
1.200	0.81	4.267	37.17	7.333	3.23	10.40	0.81
1.217	0.81	4.283	37.17	7.350	3.23	10.42	0.81
1.233	0.81	4.300	37.17	7.367	3.23	10.43	0.81
1.250	0.81	4.317	37.17	7.383	3.23	10.45	0.81
1.267	0.81	4.333	37.17	7.400	3.23	10.47	0.81
1.283	0.81	4.350	37.17	7.417	3.23	10.48	0.81
1.300	0.81	4.367	37.17	7.433	3.23	10.50	0.81
1.317	0.81	4.383	37.17	7.450	3.23	10.52	0.81
1.333	0.81	4.400	37.17	7.467	3.23	10.53	0.81
1.350	0.81	4.417	37.17	7.483	3.23	10.55	0.81
1.367	0.81	4.433	37.17	7.500	3.23	10.57	0.81
1.383	0.81	4.450	37.17	7.517	3.23	10.58	0.81
1.400	0.81	4.467	37.17	7.533	3.23	10.60	0.81
1.417	0.81	4.483	37.17	7.550	3.23	10.62	0.81
1.433	0.81	4.500	37.17	7.567	3.23	10.63	0.81
1.450	0.81	4.517	37.17	7.583	3.23	10.65	0.81
1.467	0.81	4.533	37.17	7.600	3.23	10.67	0.81
1.483	0.81	4.550	37.17	7.617	3.23	10.68	0.81
1.500	0.81	4.567	37.17	7.633	3.23	10.70	0.81
1.517	0.81	4.583	37.17	7.650	3.23	10.72	0.81
1.533	0.81	4.600	37.17	7.667	3.23	10.73	0.81
1.550	0.81	4.617	37.17	7.683	3.23	10.75	0.81
1.567	0.81	4.633	37.17	7.700	3.23	10.77	0.81
1.583	0.81	4.650	37.17	7.717	3.23	10.78	0.81

1.600	0.81	4.667	37.17	7.733	3.23	10.80	0.81
1.617	0.81	4.683	37.17	7.750	3.23	10.82	0.81
1.633	0.81	4.700	37.17	7.767	3.23	10.83	0.81
1.650	0.81	4.717	37.17	7.783	3.23	10.85	0.81
1.667	0.81	4.733	37.17	7.800	3.23	10.87	0.81
1.683	0.81	4.750	37.17	7.817	3.23	10.88	0.81
1.700	0.81	4.767	37.17	7.833	3.23	10.90	0.81
1.717	0.81	4.783	37.17	7.850	3.23	10.92	0.81
1.733	0.81	4.800	37.17	7.867	3.23	10.93	0.81
1.750	0.81	4.817	37.17	7.883	3.23	10.95	0.81
1.767	0.81	4.833	37.17	7.900	3.23	10.97	0.81
1.783	0.81	4.850	37.17	7.917	3.23	10.98	0.81
1.800	0.81	4.867	37.17	7.933	3.23	11.00	0.81
1.817	0.81	4.883	37.17	7.950	3.23	11.02	0.81
1.833	0.81	4.900	37.17	7.967	3.23	11.03	0.81
1.850	0.81	4.917	37.17	7.983	3.23	11.05	0.81
1.867	0.81	4.933	37.17	8.000	3.23	11.07	0.81
1.883	0.81	4.950	37.17	8.017	3.23	11.08	0.81
1.900	0.81	4.967	37.17	8.033	3.23	11.10	0.81
1.917	0.81	4.983	37.17	8.050	3.23	11.12	0.81
1.933	0.81	5.000	37.17	8.067	3.23	11.13	0.81
1.950	0.81	5.017	37.17	8.083	3.23	11.15	0.81
1.967	0.81	5.033	37.17	8.100	3.23	11.17	0.81
1.983	0.81	5.050	37.17	8.117	3.23	11.18	0.81
2.000	0.81	5.067	37.17	8.133	3.23	11.20	0.81
2.017	0.81	5.083	37.17	8.150	3.23	11.22	0.81
2.033	0.81	5.100	37.17	8.167	3.23	11.23	0.81
2.050	0.81	5.117	37.17	8.183	3.23	11.25	0.81
2.067	0.81	5.133	37.17	8.200	3.23	11.27	0.81
2.083	0.81	5.150	37.17	8.217	3.23	11.28	0.81
2.100	0.81	5.167	37.17	8.233	3.23	11.30	0.81
2.117	0.81	5.183	37.17	8.250	3.23	11.32	0.81
2.133	0.81	5.200	37.17	8.267	1.62	11.33	0.81
2.150	0.81	5.217	37.17	8.283	1.62	11.35	0.81
2.167	0.81	5.233	37.17	8.300	1.62	11.37	0.81
2.183	0.81	5.250	37.15	8.317	1.62	11.38	0.81
2.200	0.81	5.267	10.50	8.333	1.62	11.40	0.81
2.217	0.81	5.283	10.50	8.350	1.62	11.42	0.81
2.233	0.81	5.300	10.50	8.367	1.62	11.43	0.81
2.250	0.81	5.317	10.50	8.383	1.62	11.45	0.81
2.267	4.85	5.333	10.50	8.400	1.62	11.47	0.81
2.283	4.85	5.350	10.50	8.417	1.62	11.48	0.81
2.300	4.85	5.367	10.50	8.433	1.62	11.50	0.81
2.317	4.85	5.383	10.50	8.450	1.62	11.52	0.81
2.333	4.85	5.400	10.50	8.467	1.62	11.53	0.81
2.350	4.85	5.417	10.50	8.483	1.62	11.55	0.81
2.367	4.85	5.433	10.50	8.500	1.62	11.57	0.81
2.383	4.85	5.450	10.50	8.517	1.62	11.58	0.81
2.400	4.85	5.467	10.50	8.533	1.62	11.60	0.81
2.417	4.85	5.483	10.50	8.550	1.62	11.62	0.81
2.433	4.85	5.500	10.50	8.567	1.62	11.63	0.81
2.450	4.85	5.517	10.50	8.583	1.62	11.65	0.81
2.467	4.85	5.533	10.50	8.600	1.62	11.67	0.81
2.483	4.85	5.550	10.50	8.617	1.62	11.68	0.81
2.500	4.85	5.567	10.50	8.633	1.62	11.70	0.81
2.517	4.85	5.583	10.50	8.650	1.62	11.72	0.81
2.533	4.85	5.600	10.50	8.667	1.62	11.73	0.81
2.550	4.85	5.617	10.50	8.683	1.62	11.75	0.81
2.567	4.85	5.633	10.50	8.700	1.62	11.77	0.81
2.583	4.85	5.650	10.50	8.717	1.62	11.78	0.81
2.600	4.85	5.667	10.50	8.733	1.62	11.80	0.81
2.617	4.85	5.683	10.50	8.750	1.62	11.82	0.81
2.633	4.85	5.700	10.50	8.767	1.62	11.83	0.81
2.650	4.85	5.717	10.50	8.783	1.62	11.85	0.81
2.667	4.85	5.733	10.50	8.800	1.62	11.87	0.81
2.683	4.85	5.750	10.50	8.817	1.62	11.88	0.81
2.700	4.85	5.767	10.50	8.833	1.62	11.90	0.81
2.717	4.85	5.783	10.50	8.850	1.62	11.92	0.81
2.733	4.85	5.800	10.50	8.867	1.62	11.93	0.81
2.750	4.85	5.817	10.50	8.883	1.62	11.95	0.81
2.767	4.85	5.833	10.50	8.900	1.62	11.97	0.81
2.783	4.85	5.850	10.50	8.917	1.62	11.98	0.81
2.800	4.85	5.867	10.50	8.933	1.62	12.00	0.81
2.817	4.85	5.883	10.50	8.950	1.62	12.02	0.81
2.833	4.85	5.900	10.50	8.967	1.62	12.03	0.81
2.850	4.85	5.917	10.50	8.983	1.62	12.05	0.81
2.867	4.85	5.933	10.50	9.000	1.62	12.07	0.81
2.883	4.85	5.950	10.50	9.017	1.62	12.08	0.81
2.900	4.85	5.967	10.50	9.033	1.62	12.10	0.81
2.917	4.85	5.983	10.50	9.050	1.62	12.12	0.81
2.933	4.85	6.000	10.50	9.067	1.62	12.13	0.81
2.950	4.85	6.017	10.50	9.083	1.62	12.15	0.81
2.967	4.85	6.033	10.50	9.100	1.62	12.17	0.81
2.983	4.85	6.050	10.50	9.117	1.62	12.18	0.81
3.000	4.85	6.067	10.50	9.133	1.62	12.20	0.81
3.017	4.85	6.083	10.50	9.150	1.62	12.22	0.81
3.033	4.85	6.100	10.50	9.167	1.62	12.23	0.81
3.050	4.85	6.117	10.50	9.183	1.62	12.25	0.81
3.067	4.85	6.133	10.50	9.200	1.62		

Max.Eff.Inten.(mm/hr)=	37.17	57.69	
over (min)	7.00	14.00	
Storage Coeff. (min)=	7.00 (ii)	13.33 (ii)	
Unit Hyd. Tpeak (min)=	7.00	14.00	
Unit Hyd. peak (cms)=	0.16	0.08	
			TOTALS
PEAK FLOW (cms)=	0.80	0.33	1.129 (iii)
TIME TO PEAK (hrs)=	5.25	5.27	5.25
RUNOFF VOLUME (mm)=	79.81	60.43	73.43
TOTAL RAINFALL (mm)=	80.82	80.82	80.82
RUNOFF COEFFICIENT =	0.99	0.75	0.91

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0012)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0590	0.5390
	0.0190	0.2190	0.0790	0.6270
	0.0250	0.3570	0.0950	0.6900
	0.0440	0.4680	0.1130	0.7520

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0011)	11.520	1.129	5.25	73.43
OUTFLOW: ID= 1 (0012)	11.520	0.095	8.32	46.02

PEAK FLOW REDUCTION [Qout/Qin](%)= 8.41
TIME SHIFT OF PEAK FLOW (min)=184.00
MAXIMUM STORAGE USED (ha.m.)= 0.6897

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\bc9fac7e-2d42-42de-b392-b6e9d9e3d821\scenari
Summary filename: C:\Users\hliu\AppData\Local\Civica\VH5\fbddaa27-fb71-4db6-9c16-43e17470752a\bc9fac7e-2d42-42de-b392-b6e9d9e3d821\scenari

DATE: 02-19-2026 TIME: 09:56:03

USER:

COMMENTS: _____

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  ************************************************
  ** SIMULATION : 6 - 100 Year 12 Hour AES (Blo **
  ************************************************
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READ STORM	Filename: C:\Users\hliu\AppData\Local\Temp\15d7e5d8-ec85-4e6b-a747-1f5e44151366\18311dd4
Ptotal= 88.54 mm	Comments: 100 Year 12 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	15.05	6.50	6.20	9.75	0.89
0.25	0.89	3.50	15.05	6.75	6.20	10.00	0.89
0.50	0.89	3.75	15.05	7.00	6.20	10.25	0.89
0.75	0.89	4.00	15.05	7.25	3.54	10.50	0.89
1.00	0.89	4.25	40.71	7.50	3.54	10.75	0.89
1.25	0.89	4.50	40.71	7.75	3.54	11.00	0.89
1.50	0.89	4.75	40.71	8.00	3.54	11.25	0.89
1.75	0.89	5.00	40.71	8.25	1.77	11.50	0.89
2.00	0.89	5.25	11.51	8.50	1.77	11.75	0.89
2.25	5.31	5.50	11.51	8.75	1.77	12.00	0.89
2.50	5.31	5.75	11.51	9.00	1.77		
2.75	5.31	6.00	11.51	9.25	0.89		
3.00	5.31	6.25	6.20	9.50	0.89		

CALIB STANDHYD (0010) ID= 1 DT= 1.0 min	Area (ha)= 18.55 Total Imp(%)= 72.00 Dir. Conn.(%)= 54.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	13.36	5.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	351.66	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	3.083	5.31	6.150	11.51	9.22	1.77
0.033	0.00	3.100	5.31	6.167	11.51	9.23	1.77
0.050	0.00	3.117	5.31	6.183	11.51	9.25	1.77
0.067	0.00	3.133	5.31	6.200	11.51	9.27	0.89
0.083	0.00	3.150	5.31	6.217	11.51	9.28	0.89
0.100	0.00	3.167	5.31	6.233	11.51	9.30	0.89
0.117	0.00	3.183	5.31	6.250	11.50	9.32	0.89
0.133	0.00	3.200	5.31	6.267	6.20	9.33	0.89
0.150	0.00	3.217	5.31	6.283	6.20	9.35	0.89
0.167	0.00	3.233	5.31	6.300	6.20	9.37	0.89
0.183	0.00	3.250	5.31	6.317	6.20	9.38	0.89
0.200	0.00	3.267	15.05	6.333	6.20	9.40	0.89
0.217	0.00	3.283	15.05	6.350	6.20	9.42	0.89
0.233	0.00	3.300	15.05	6.367	6.20	9.43	0.89
0.250	0.00	3.317	15.05	6.383	6.20	9.45	0.89
0.267	0.89	3.333	15.05	6.400	6.20	9.47	0.89
0.283	0.89	3.350	15.05	6.417	6.20	9.48	0.89
0.300	0.89	3.367	15.05	6.433	6.20	9.50	0.89
0.317	0.89	3.383	15.05	6.450	6.20	9.52	0.89
0.333	0.89	3.400	15.05	6.467	6.20	9.53	0.89
0.350	0.89	3.417	15.05	6.483	6.20	9.55	0.89
0.367	0.89	3.433	15.05	6.500	6.20	9.57	0.89
0.383	0.89	3.450	15.05	6.517	6.20	9.58	0.89
0.400	0.89	3.467	15.05	6.533	6.20	9.60	0.89
0.417	0.89	3.483	15.05	6.550	6.20	9.62	0.89
0.433	0.89	3.500	15.05	6.567	6.20	9.63	0.89
0.450	0.89	3.517	15.05	6.583	6.20	9.65	0.89
0.467	0.89	3.533	15.05	6.600	6.20	9.67	0.89
0.483	0.89	3.550	15.05	6.617	6.20	9.68	0.89
0.500	0.89	3.567	15.05	6.633	6.20	9.70	0.89
0.517	0.89	3.583	15.05	6.650	6.20	9.72	0.89
0.533	0.89	3.600	15.05	6.667	6.20	9.73	0.89
0.550	0.89	3.617	15.05	6.683	6.20	9.75	0.89
0.567	0.89	3.633	15.05	6.700	6.20	9.77	0.89
0.583	0.89	3.650	15.05	6.717	6.20	9.78	0.89
0.600	0.89	3.667	15.05	6.733	6.20	9.80	0.89
0.617	0.89	3.683	15.05	6.750	6.20	9.82	0.89
0.633	0.89	3.700	15.05	6.767	6.20	9.83	0.89
0.650	0.89	3.717	15.05	6.783	6.20	9.85	0.89
0.667	0.89	3.733	15.05	6.800	6.20	9.87	0.89
0.683	0.89	3.750	15.05	6.817	6.20	9.88	0.89
0.700	0.89	3.767	15.05	6.833	6.20	9.90	0.89
0.717	0.89	3.783	15.05	6.850	6.20	9.92	0.89
0.733	0.89	3.800	15.05	6.867	6.20	9.93	0.89
0.750	0.89	3.817	15.05	6.883	6.20	9.95	0.89
0.767	0.89	3.833	15.05	6.900	6.20	9.97	0.89
0.783	0.89	3.850	15.05	6.917	6.20	9.98	0.89
0.800	0.89	3.867	15.05	6.933	6.20	10.00	0.89

0.817	0.89	3.883	15.05	6.950	6.20	10.02	0.89	1.917	0.89	4.983	40.71	8.050	3.54	11.12	0.89
0.833	0.89	3.900	15.05	6.967	6.20	10.03	0.89	1.933	0.89	5.000	40.71	8.067	3.54	11.13	0.89
0.850	0.89	3.917	15.05	6.983	6.20	10.05	0.89	1.950	0.89	5.017	40.71	8.083	3.54	11.15	0.89
0.867	0.89	3.933	15.05	7.000	6.20	10.07	0.89	1.967	0.89	5.033	40.71	8.100	3.54	11.17	0.89
0.883	0.89	3.950	15.05	7.017	6.20	10.08	0.89	1.983	0.89	5.050	40.71	8.117	3.54	11.18	0.89
0.900	0.89	3.967	15.05	7.033	6.20	10.10	0.89	2.000	0.89	5.067	40.71	8.133	3.54	11.20	0.89
0.917	0.89	3.983	15.05	7.050	6.20	10.12	0.89	2.017	0.89	5.083	40.71	8.150	3.54	11.22	0.89
0.933	0.89	4.000	15.05	7.067	6.20	10.13	0.89	2.033	0.89	5.100	40.71	8.167	3.54	11.23	0.89
0.950	0.89	4.017	15.05	7.083	6.20	10.15	0.89	2.050	0.89	5.117	40.71	8.183	3.54	11.25	0.89
0.967	0.89	4.033	15.05	7.100	6.20	10.17	0.89	2.067	0.89	5.133	40.71	8.200	3.54	11.27	0.89
0.983	0.89	4.050	15.05	7.117	6.20	10.18	0.89	2.083	0.89	5.150	40.71	8.217	3.54	11.28	0.89
1.000	0.89	4.067	15.05	7.133	6.20	10.20	0.89	2.100	0.89	5.167	40.71	8.233	3.54	11.30	0.89
1.017	0.89	4.083	15.05	7.150	6.20	10.22	0.89	2.117	0.89	5.183	40.71	8.250	3.54	11.32	0.89
1.033	0.89	4.100	15.05	7.167	6.20	10.23	0.89	2.133	0.89	5.200	40.71	8.267	1.77	11.33	0.89
1.050	0.89	4.117	15.05	7.183	6.20	10.25	0.89	2.150	0.89	5.217	40.71	8.283	1.77	11.35	0.89
1.067	0.89	4.133	15.05	7.200	6.20	10.27	0.89	2.167	0.89	5.233	40.71	8.300	1.77	11.37	0.89
1.083	0.89	4.150	15.05	7.217	6.20	10.28	0.89	2.183	0.89	5.250	40.69	8.317	1.77	11.38	0.89
1.100	0.89	4.167	15.05	7.233	6.20	10.30	0.89	2.200	0.89	5.267	11.51	8.333	1.77	11.40	0.89
1.117	0.89	4.183	15.05	7.250	6.19	10.32	0.89	2.217	0.89	5.283	11.51	8.350	1.77	11.42	0.89
1.133	0.89	4.200	15.05	7.267	3.54	10.33	0.89	2.233	0.89	5.300	11.51	8.367	1.77	11.43	0.89
1.150	0.89	4.217	15.05	7.283	3.54	10.35	0.89	2.250	0.89	5.317	11.51	8.383	1.77	11.45	0.89
1.167	0.89	4.233	15.05	7.300	3.54	10.37	0.89	2.267	5.31	5.333	11.51	8.400	1.77	11.47	0.89
1.183	0.89	4.250	15.05	7.317	3.54	10.38	0.89	2.283	5.31	5.350	11.51	8.417	1.77	11.48	0.89
1.200	0.89	4.267	40.71	7.333	3.54	10.40	0.89	2.300	5.31	5.367	11.51	8.433	1.77	11.50	0.89
1.217	0.89	4.283	40.71	7.350	3.54	10.42	0.89	2.317	5.31	5.383	11.51	8.450	1.77	11.52	0.89
1.233	0.89	4.300	40.71	7.367	3.54	10.43	0.89	2.333	5.31	5.400	11.51	8.467	1.77	11.53	0.89
1.250	0.89	4.317	40.71	7.383	3.54	10.45	0.89	2.350	5.31	5.417	11.51	8.483	1.77	11.55	0.89
1.267	0.89	4.333	40.71	7.400	3.54	10.47	0.89	2.367	5.31	5.433	11.51	8.500	1.77	11.57	0.89
1.283	0.89	4.350	40.71	7.417	3.54	10.48	0.89	2.383	5.31	5.450	11.51	8.517	1.77	11.58	0.89
1.300	0.89	4.367	40.71	7.433	3.54	10.50	0.89	2.400	5.31	5.467	11.51	8.533	1.77	11.60	0.89
1.317	0.89	4.383	40.71	7.450	3.54	10.52	0.89	2.417	5.31	5.483	11.51	8.550	1.77	11.62	0.89
1.333	0.89	4.400	40.71	7.467	3.54	10.53	0.89	2.433	5.31	5.500	11.51	8.567	1.77	11.63	0.89
1.350	0.89	4.417	40.71	7.483	3.54	10.55	0.89	2.450	5.31	5.517	11.51	8.583	1.77	11.65	0.89
1.367	0.89	4.433	40.71	7.500	3.54	10.57	0.89	2.467	5.31	5.533	11.51	8.600	1.77	11.67	0.89
1.383	0.89	4.450	40.71	7.517	3.54	10.58	0.89	2.483	5.31	5.550	11.51	8.617	1.77	11.68	0.89
1.400	0.89	4.467	40.71	7.533	3.54	10.60	0.89	2.500	5.31	5.567	11.51	8.633	1.77	11.70	0.89
1.417	0.89	4.483	40.71	7.550	3.54	10.62	0.89	2.517	5.31	5.583	11.51	8.650	1.77	11.72	0.89
1.433	0.89	4.500	40.71	7.567	3.54	10.63	0.89	2.533	5.31	5.600	11.51	8.667	1.77	11.73	0.89
1.450	0.89	4.517	40.71	7.583	3.54	10.65	0.89	2.550	5.31	5.617	11.51	8.683	1.77	11.75	0.89
1.467	0.89	4.533	40.71	7.600	3.54	10.67	0.89	2.567	5.31	5.633	11.51	8.700	1.77	11.77	0.89
1.483	0.89	4.550	40.71	7.617	3.54	10.68	0.89	2.583	5.31	5.650	11.51	8.717	1.77	11.78	0.89
1.500	0.89	4.567	40.71	7.633	3.54	10.70	0.89	2.600	5.31	5.667	11.51	8.733	1.77	11.80	0.89
1.517	0.89	4.583	40.71	7.650	3.54	10.72	0.89	2.617	5.31	5.683	11.51	8.750	1.77	11.82	0.89
1.533	0.89	4.600	40.71	7.667	3.54	10.73	0.89	2.633	5.31	5.700	11.51	8.767	1.77	11.83	0.89
1.550	0.89	4.617	40.71	7.683	3.54	10.75	0.89	2.650	5.31	5.717	11.51	8.783	1.77	11.85	0.89
1.567	0.89	4.633	40.71	7.700	3.54	10.77	0.89	2.667	5.31	5.733	11.51	8.800	1.77	11.87	0.89
1.583	0.89	4.650	40.71	7.717	3.54	10.78	0.89	2.683	5.31	5.750	11.51	8.817	1.77	11.88	0.89
1.600	0.89	4.667	40.71	7.733	3.54	10.80	0.89	2.700	5.31	5.767	11.51	8.833	1.77	11.90	0.89
1.617	0.89	4.683	40.71	7.750	3.54	10.82	0.89	2.717	5.31	5.783	11.51	8.850	1.77	11.92	0.89
1.633	0.89	4.700	40.71	7.767	3.54	10.83	0.89	2.733	5.31	5.800	11.51	8.867	1.77	11.93	0.89
1.650	0.89	4.717	40.71	7.783	3.54	10.85	0.89	2.750	5.31	5.817	11.51	8.883	1.77	11.95	0.89
1.667	0.89	4.733	40.71	7.800	3.54	10.87	0.89	2.767	5.31	5.833	11.51	8.900	1.77	11.97	0.89
1.683	0.89	4.750	40.71	7.817	3.54	10.88	0.89	2.783	5.31	5.850	11.51	8.917	1.77	11.98	0.89
1.700	0.89	4.767	40.71	7.833	3.54	10.90	0.89	2.800	5.31	5.867	11.51	8.933	1.77	12.00	0.89
1.717	0.89	4.783	40.71	7.850	3.54	10.92	0.89	2.817	5.31	5.883	11.51	8.950	1.77	12.02	0.89
1.733	0.89	4.800	40.71	7.867	3.54	10.93	0.89	2.833	5.31	5.900	11.51	8.967	1.77	12.03	0.89
1.750	0.89	4.817	40.71	7.883	3.54	10.95	0.89	2.850	5.31	5.917	11.51	8.983	1.77	12.05	0.89
1.767	0.89	4.833	40.71	7.900	3.54	10.97	0.89	2.867	5.31	5.933	11.51	9.000	1.77	12.07	0.89
1.783	0.89	4.850	40.71	7.917	3.54	10.98	0.89	2.883	5.31	5.950	11.51	9.017	1.77	12.08	0.89
1.800	0.89	4.867	40.71	7.933	3.54	11.00	0.89	2.900	5.31	5.967	11.51	9.033	1.77	12.10	0.89
1.817	0.89	4.883	40.71	7.950	3.54	11.02	0.89	2.917	5.31	5.983	11.51	9.050	1.77	12.12	0.89
1.833	0.89	4.900	40.71	7.967	3.54	11.03	0.89	2.933	5.31	6.000	11.51	9.067	1.77	12.13	0.89
1.850	0.89	4.917	40.71	7.983	3.54	11.05	0.89	2.950	5.31	6.017	11.51	9.083	1.77	12.15	0.89
1.867	0.89	4.933	40.71	8.000	3.54	11.07	0.89	2.967	5.31	6.033	11.51	9.100	1.77	12.17	0.89
1.883	0.89	4.950	40.71	8.017	3.54	11.08	0.89	2.983	5.31	6.050	11.51	9.117	1.77	12.18	0.89
1.900	0.89	4.967	40.71	8.033	3.54	11.10	0.89	3.000	5.31	6.067	11.51	9.133	1.77	12.20	0.89

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               3.017    5.31 | 6.083   11.51 | 9.150    1.77 | 12.22    0.89
               3.033    5.31 | 6.100   11.51 | 9.167    1.77 | 12.23    0.89
               3.050    5.31 | 6.117   11.51 | 9.183    1.77 | 12.25    0.89
               3.067    5.31 | 6.133   11.51 | 9.200    1.77 |

     Max.Eff.Inten.(mm/hr)=      40.71        60.11
               over (min)        8.00        16.00
     Storage Coeff.  (min)=      7.78 (ii)   15.56 (ii)
     Unit Hyd. Tpeak (min)=      8.00        16.00
     Unit Hyd. peak  (cms)=      0.14         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=      1.13         0.81         1.938 (iii)
     TIME TO PEAK    (hrs)=      5.25         5.28          5.25
     RUNOFF VOLUME    (mm)=     87.53        66.81         78.01
     TOTAL RAINFALL   (mm)=     88.54        88.54         88.54
     RUNOFF COEFFICIENT   =      0.99         0.75          0.88


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0009)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.1090     0.8030
                         0.0280     0.3250   |   0.1440     0.9370
                         0.0460     0.5280   |   0.1740     1.0350
                         0.0810     0.6940   |   0.2060     1.1340

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)    18.550     1.938      5.25      78.01
   OUTFLOW: ID= 1 (  0009)    18.550     0.206      7.65      55.03

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.61
                  TIME SHIFT OF PEAK FLOW          (min)=144.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.1331

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--------------------
| CALIB            |
| STANDHYD (  0011)|   Area    (ha)=  11.52
|ID= 1 DT= 1.0 min |   Total Imp(%)=  81.00   Dir. Conn.(%)=  67.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.33         2.19
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     277.13        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.017    0.00 | 3.083    5.31 | 6.150   11.51 |  9.22    1.77
              0.033    0.00 | 3.100    5.31 | 6.167   11.51 |  9.23    1.77
              0.050    0.00 | 3.117    5.31 | 6.183   11.51 |  9.25    1.77
              0.067    0.00 | 3.133    5.31 | 6.200   11.51 |  9.27    0.89
              0.083    0.00 | 3.150    5.31 | 6.217   11.51 |  9.28    0.89
              0.100    0.00 | 3.167    5.31 | 6.233   11.51 |  9.30    0.89
              0.117    0.00 | 3.183    5.31 | 6.250   11.50 |  9.32    0.89
              0.133    0.00 | 3.200    5.31 | 6.267    6.20 |  9.33    0.89
              0.150    0.00 | 3.217    5.31 | 6.283    6.20 |  9.35    0.89
              0.167    0.00 | 3.233    5.31 | 6.300    6.20 |  9.37    0.89
              0.183    0.00 | 3.250    5.31 | 6.317    6.20 |  9.38    0.89
              0.200    0.00 | 3.267   15.05 | 6.333    6.20 |  9.40    0.89
              0.217    0.00 | 3.283   15.05 | 6.350    6.20 |  9.42    0.89
              0.233    0.00 | 3.300   15.05 | 6.367    6.20 |  9.43    0.89
              0.250    0.00 | 3.317   15.05 | 6.383    6.20 |  9.45    0.89
              0.267    0.89 | 3.333   15.05 | 6.400    6.20 |  9.47    0.89
              0.283    0.89 | 3.350   15.05 | 6.417    6.20 |  9.48    0.89
              0.300    0.89 | 3.367   15.05 | 6.433    6.20 |  9.50    0.89
              0.317    0.89 | 3.383   15.05 | 6.450    6.20 |  9.52    0.89
              0.333    0.89 | 3.400   15.05 | 6.467    6.20 |  9.53    0.89
              0.350    0.89 | 3.417   15.05 | 6.483    6.20 |  9.55    0.89
              0.367    0.89 | 3.433   15.05 | 6.500    6.20 |  9.57    0.89
              0.383    0.89 | 3.450   15.05 | 6.517    6.20 |  9.58    0.89
              0.400    0.89 | 3.467   15.05 | 6.533    6.20 |  9.60    0.89
              0.417    0.89 | 3.483   15.05 | 6.550    6.20 |  9.62    0.89
              0.433    0.89 | 3.500   15.05 | 6.567    6.20 |  9.63    0.89
              0.450    0.89 | 3.517   15.05 | 6.583    6.20 |  9.65    0.89
              0.467    0.89 | 3.533   15.05 | 6.600    6.20 |  9.67    0.89
              0.483    0.89 | 3.550   15.05 | 6.617    6.20 |  9.68    0.89
              0.500    0.89 | 3.567   15.05 | 6.633    6.20 |  9.70    0.89
              0.517    0.89 | 3.583   15.05 | 6.650    6.20 |  9.72    0.89
              0.533    0.89 | 3.600   15.05 | 6.667    6.20 |  9.73    0.89
              0.550    0.89 | 3.617   15.05 | 6.683    6.20 |  9.75    0.89
              0.567    0.89 | 3.633   15.05 | 6.700    6.20 |  9.77    0.89
              0.583    0.89 | 3.650   15.05 | 6.717    6.20 |  9.78    0.89
              0.600    0.89 | 3.667   15.05 | 6.733    6.20 |  9.80    0.89
              0.617    0.89 | 3.683   15.05 | 6.750    6.20 |  9.82    0.89
              0.633    0.89 | 3.700   15.05 | 6.767    6.20 |  9.83    0.89
              0.650    0.89 | 3.717   15.05 | 6.783    6.20 |  9.85    0.89
              0.667    0.89 | 3.733   15.05 | 6.800    6.20 |  9.87    0.89
              0.683    0.89 | 3.750   15.05 | 6.817    6.20 |  9.88    0.89
              0.700    0.89 | 3.767   15.05 | 6.833    6.20 |  9.90    0.89
              0.717    0.89 | 3.783   15.05 | 6.850    6.20 |  9.92    0.89
              0.733    0.89 | 3.800   15.05 | 6.867    6.20 |  9.93    0.89
              0.750    0.89 | 3.817   15.05 | 6.883    6.20 |  9.95    0.89
              0.767    0.89 | 3.833   15.05 | 6.900    6.20 |  9.97    0.89
              0.783    0.89 | 3.850   15.05 | 6.917    6.20 |  9.98    0.89
              0.800    0.89 | 3.867   15.05 | 6.933    6.20 | 10.00    0.89
              0.817    0.89 | 3.883   15.05 | 6.950    6.20 | 10.02    0.89
              0.833    0.89 | 3.900   15.05 | 6.967    6.20 | 10.03    0.89
              0.850    0.89 | 3.917   15.05 | 6.983    6.20 | 10.05    0.89
              0.867    0.89 | 3.933   15.05 | 7.000    6.20 | 10.07    0.89
              0.883    0.89 | 3.950   15.05 | 7.017    6.20 | 10.08    0.89
              0.900    0.89 | 3.967   15.05 | 7.033    6.20 | 10.10    0.89
              0.917    0.89 | 3.983   15.05 | 7.050    6.20 | 10.12    0.89
              0.933    0.89 | 4.000   15.05 | 7.067    6.20 | 10.13    0.89
              0.950    0.89 | 4.017   15.05 | 7.083    6.20 | 10.15    0.89
              0.967    0.89 | 4.033   15.05 | 7.100    6.20 | 10.17    0.89
              0.983    0.89 | 4.050   15.05 | 7.117    6.20 | 10.18    0.89
              1.000    0.89 | 4.067   15.05 | 7.133    6.20 | 10.20    0.89
              1.017    0.89 | 4.083   15.05 | 7.150    6.20 | 10.22    0.89
              1.033    0.89 | 4.100   15.05 | 7.167    6.20 | 10.23    0.89
              1.050    0.89 | 4.117   15.05 | 7.183    6.20 | 10.25    0.89
              1.067    0.89 | 4.133   15.05 | 7.200    6.20 | 10.27    0.89
              1.083    0.89 | 4.150   15.05 | 7.217    6.20 | 10.28    0.89
              1.100    0.89 | 4.167   15.05 | 7.233    6.20 | 10.30    0.89
              1.117    0.89 | 4.183   15.05 | 7.250    6.19 | 10.32    0.89
              1.133    0.89 | 4.200   15.05 | 7.267    3.54 | 10.33    0.89
              1.150    0.89 | 4.217   15.05 | 7.283    3.54 | 10.35    0.89
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1.167	0.89	4.233	15.05	7.300	3.54	10.37	0.89	2.267	5.31	5.333	11.51	8.400	1.77	11.47	0.89
1.183	0.89	4.250	15.05	7.317	3.54	10.38	0.89	2.283	5.31	5.350	11.51	8.417	1.77	11.48	0.89
1.200	0.89	4.267	40.71	7.333	3.54	10.40	0.89	2.300	5.31	5.367	11.51	8.433	1.77	11.50	0.89
1.217	0.89	4.283	40.71	7.350	3.54	10.42	0.89	2.317	5.31	5.383	11.51	8.450	1.77	11.52	0.89
1.233	0.89	4.300	40.71	7.367	3.54	10.43	0.89	2.333	5.31	5.400	11.51	8.467	1.77	11.53	0.89
1.250	0.89	4.317	40.71	7.383	3.54	10.45	0.89	2.350	5.31	5.417	11.51	8.483	1.77	11.55	0.89
1.267	0.89	4.333	40.71	7.400	3.54	10.47	0.89	2.367	5.31	5.433	11.51	8.500	1.77	11.57	0.89
1.283	0.89	4.350	40.71	7.417	3.54	10.48	0.89	2.383	5.31	5.450	11.51	8.517	1.77	11.58	0.89
1.300	0.89	4.367	40.71	7.433	3.54	10.50	0.89	2.400	5.31	5.467	11.51	8.533	1.77	11.60	0.89
1.317	0.89	4.383	40.71	7.450	3.54	10.52	0.89	2.417	5.31	5.483	11.51	8.550	1.77	11.62	0.89
1.333	0.89	4.400	40.71	7.467	3.54	10.53	0.89	2.433	5.31	5.500	11.51	8.567	1.77	11.63	0.89
1.350	0.89	4.417	40.71	7.483	3.54	10.55	0.89	2.450	5.31	5.517	11.51	8.583	1.77	11.65	0.89
1.367	0.89	4.433	40.71	7.500	3.54	10.57	0.89	2.467	5.31	5.533	11.51	8.600	1.77	11.67	0.89
1.383	0.89	4.450	40.71	7.517	3.54	10.58	0.89	2.483	5.31	5.550	11.51	8.617	1.77	11.68	0.89
1.400	0.89	4.467	40.71	7.533	3.54	10.60	0.89	2.500	5.31	5.567	11.51	8.633	1.77	11.70	0.89
1.417	0.89	4.483	40.71	7.550	3.54	10.62	0.89	2.517	5.31	5.583	11.51	8.650	1.77	11.72	0.89
1.433	0.89	4.500	40.71	7.567	3.54	10.63	0.89	2.533	5.31	5.600	11.51	8.667	1.77	11.73	0.89
1.450	0.89	4.517	40.71	7.583	3.54	10.65	0.89	2.550	5.31	5.617	11.51	8.683	1.77	11.75	0.89
1.467	0.89	4.533	40.71	7.600	3.54	10.67	0.89	2.567	5.31	5.633	11.51	8.700	1.77	11.77	0.89
1.483	0.89	4.550	40.71	7.617	3.54	10.68	0.89	2.583	5.31	5.650	11.51	8.717	1.77	11.78	0.89
1.500	0.89	4.567	40.71	7.633	3.54	10.70	0.89	2.600	5.31	5.667	11.51	8.733	1.77	11.80	0.89
1.517	0.89	4.583	40.71	7.650	3.54	10.72	0.89	2.617	5.31	5.683	11.51	8.750	1.77	11.82	0.89
1.533	0.89	4.600	40.71	7.667	3.54	10.73	0.89	2.633	5.31	5.700	11.51	8.767	1.77	11.83	0.89
1.550	0.89	4.617	40.71	7.683	3.54	10.75	0.89	2.650	5.31	5.717	11.51	8.783	1.77	11.85	0.89
1.567	0.89	4.633	40.71	7.700	3.54	10.77	0.89	2.667	5.31	5.733	11.51	8.800	1.77	11.87	0.89
1.583	0.89	4.650	40.71	7.717	3.54	10.78	0.89	2.683	5.31	5.750	11.51	8.817	1.77	11.88	0.89
1.600	0.89	4.667	40.71	7.733	3.54	10.80	0.89	2.700	5.31	5.767	11.51	8.833	1.77	11.90	0.89
1.617	0.89	4.683	40.71	7.750	3.54	10.82	0.89	2.717	5.31	5.783	11.51	8.850	1.77	11.92	0.89
1.633	0.89	4.700	40.71	7.767	3.54	10.83	0.89	2.733	5.31	5.800	11.51	8.867	1.77	11.93	0.89
1.650	0.89	4.717	40.71	7.783	3.54	10.85	0.89	2.750	5.31	5.817	11.51	8.883	1.77	11.95	0.89
1.667	0.89	4.733	40.71	7.800	3.54	10.87	0.89	2.767	5.31	5.833	11.51	8.900	1.77	11.97	0.89
1.683	0.89	4.750	40.71	7.817	3.54	10.88	0.89	2.783	5.31	5.850	11.51	8.917	1.77	11.98	0.89
1.700	0.89	4.767	40.71	7.833	3.54	10.90	0.89	2.800	5.31	5.867	11.51	8.933	1.77	12.00	0.89
1.717	0.89	4.783	40.71	7.850	3.54	10.92	0.89	2.817	5.31	5.883	11.51	8.950	1.77	12.02	0.89
1.733	0.89	4.800	40.71	7.867	3.54	10.93	0.89	2.833	5.31	5.900	11.51	8.967	1.77	12.03	0.89
1.750	0.89	4.817	40.71	7.883	3.54	10.95	0.89	2.850	5.31	5.917	11.51	8.983	1.77	12.05	0.89
1.767	0.89	4.833	40.71	7.900	3.54	10.97	0.89	2.867	5.31	5.933	11.51	9.000	1.77	12.07	0.89
1.783	0.89	4.850	40.71	7.917	3.54	10.98	0.89	2.883	5.31	5.950	11.51	9.017	1.77	12.08	0.89
1.800	0.89	4.867	40.71	7.933	3.54	11.00	0.89	2.900	5.31	5.967	11.51	9.033	1.77	12.10	0.89
1.817	0.89	4.883	40.71	7.950	3.54	11.02	0.89	2.917	5.31	5.983	11.51	9.050	1.77	12.12	0.89
1.833	0.89	4.900	40.71	7.967	3.54	11.03	0.89	2.933	5.31	6.000	11.51	9.067	1.77	12.13	0.89
1.850	0.89	4.917	40.71	7.983	3.54	11.05	0.89	2.950	5.31	6.017	11.51	9.083	1.77	12.15	0.89
1.867	0.89	4.933	40.71	8.000	3.54	11.07	0.89	2.967	5.31	6.033	11.51	9.100	1.77	12.17	0.89
1.883	0.89	4.950	40.71	8.017	3.54	11.08	0.89	2.983	5.31	6.050	11.51	9.117	1.77	12.18	0.89
1.900	0.89	4.967	40.71	8.033	3.54	11.10	0.89	3.000	5.31	6.067	11.51	9.133	1.77	12.20	0.89
1.917	0.89	4.983	40.71	8.050	3.54	11.12	0.89	3.017	5.31	6.083	11.51	9.150	1.77	12.22	0.89
1.933	0.89	5.000	40.71	8.067	3.54	11.13	0.89	3.033	5.31	6.100	11.51	9.167	1.77	12.23	0.89
1.950	0.89	5.017	40.71	8.083	3.54	11.15	0.89	3.050	5.31	6.117	11.51	9.183	1.77	12.25	0.89
1.967	0.89	5.033	40.71	8.100	3.54	11.17	0.89	3.067	5.31	6.133	11.51	9.200	1.77		
1.983	0.89	5.050	40.71	8.117	3.54	11.18	0.89								
2.000	0.89	5.067	40.71	8.133	3.54	11.20	0.89								
2.017	0.89	5.083	40.71	8.150	3.54	11.22	0.89								
2.033	0.89	5.100	40.71	8.167	3.54	11.23	0.89								
2.050	0.89	5.117	40.71	8.183	3.54	11.25	0.89								
2.067	0.89	5.133	40.71	8.200	3.54	11.27	0.89								
2.083	0.89	5.150	40.71	8.217	3.54	11.28	0.89								
2.100	0.89	5.167	40.71	8.233	3.54	11.30	0.89								
2.117	0.89	5.183	40.71	8.250	3.54	11.32	0.89								
2.133	0.89	5.200	40.71	8.267	1.77	11.33	0.89								
2.150	0.89	5.217	40.71	8.283	1.77	11.35	0.89								
2.167	0.89	5.233	40.71	8.300	1.77	11.37	0.89								
2.183	0.89	5.250	40.69	8.317	1.77	11.38	0.89								
2.200	0.89	5.267	11.51	8.333	1.77	11.40	0.89								
2.217	0.89	5.283	11.51	8.350	1.77	11.42	0.89								
2.233	0.89	5.300	11.51	8.367	1.77	11.43	0.89								
2.250	0.89	5.317	11.51	8.383	1.77	11.45	0.89								

Max.Eff.Inten.(mm/hr)=	40.71	64.08	
over (min)	7.00	13.00	
Storage Coeff. (min)=	6.75 (ii)	12.85 (ii)	
Unit Hyd. Tpeak (min)=	7.00	13.00	
Unit Hyd. peak (cms)=	0.17	0.09	
			TOTALS
PEAK FLOW (cms)=	0.87	0.37	1.245 (iii)
TIME TO PEAK (hrs)=	5.25	5.27	5.25
RUNOFF VOLUME (mm)=	87.53	67.72	81.00
TOTAL RAINFALL (mm)=	88.54	88.54	88.54
RUNOFF COEFFICIENT =	0.99	0.76	0.91

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0012)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0590      0.5390
                          0.0190     0.2190   |   0.0790      0.6270
                          0.0250     0.3570   |   0.0950      0.6900
                          0.0440     0.4680   |   0.1130      0.7520

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0011)     11.520      1.245      5.25      81.00
   OUTFLOW: ID= 1 (  0012)     11.520      0.113      7.97      52.46

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.07
                  TIME SHIFT OF PEAK FLOW         (min)=163.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7518

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 FINISH
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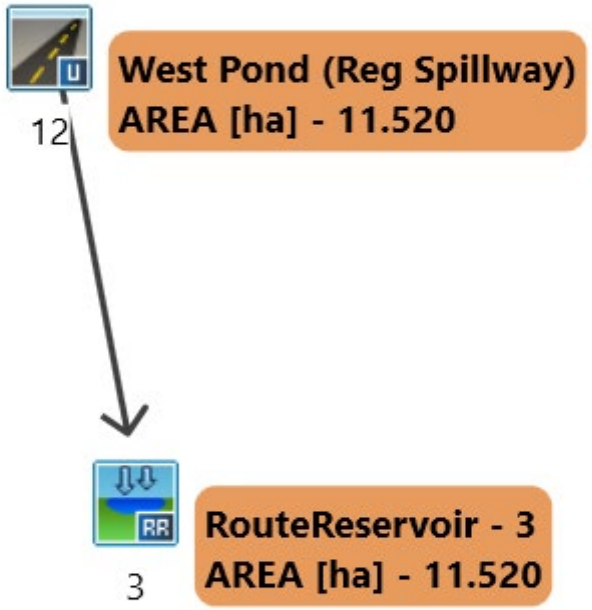

SCHAEFFERS
CONSULTING ENGINEERS

Regional Storm Event - West Pond Attenuation
Mount Hope Residential Subdivision

Job #: 2024-5476	Date: February 2026

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********************************
** SIMULATION:Hazel           **
********************************

--------------------
|    READ STORM    |    Filename: C:\Users\hliu\AppD
|                  |              ata\Local\Temp\
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| Ptotal=212.00 mm |    Comments: Hazel
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	6.00	3.00	13.00	6.00	23.00	9.00	53.00
1.00	4.00	4.00	17.00	7.00	13.00	10.00	38.00
2.00	6.00	5.00	13.00	8.00	13.00	11.00	13.00

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--------------------
| CALIB            |
| STANDHYD (  0012)|   Area     (ha)=  11.52
|ID= 1 DT= 5.0 min |   Total Imp(%)=  81.00   Dir. Conn.(%)=  67.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.33	2.19
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	277.13	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
1.000	6.00	4.000	13.00	7.000	23.00	10.00	53.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	38.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
3.000	6.00	6.000	13.00	9.000	13.00	12.00	13.00

Max.Eff.Inten.(mm/hr)=	53.00	91.65		
over (min)	5.00	15.00		
Storage Coeff. (min)=	6.07 (ii)	13.38 (ii)		
Unit Hyd. Tpeak (min)=	5.00	15.00		
Unit Hyd. peak (cms)=	0.19	0.08		
				TOTALS
PEAK FLOW (cms)=	1.14	0.55		1.685 (iii)
TIME TO PEAK (hrs)=	10.00	10.00		10.00
RUNOFF VOLUME (mm)=	211.00	200.67		207.59
TOTAL RAINFALL (mm)=	212.00	212.00		212.00
RUNOFF COEFFICIENT =	1.00	0.95		0.98

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 93.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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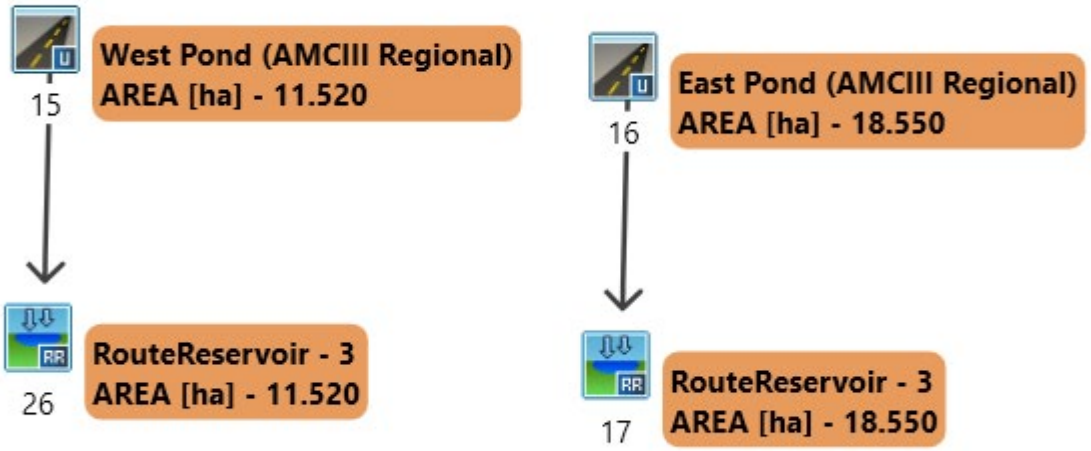
--------------------
| RESERVOIR(  0003)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0790     0.6710
                         0.0190     0.2190    |   0.0950     0.7570
                         0.0250     0.3040    |   0.1130     0.8517
                         0.0440     0.4560    |   1.4500     1.1000
                         0.0590     0.5440    |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0012)     11.520     1.685     10.00     207.59
   OUTFLOW: ID= 1 (  0003)     11.520     1.439     10.17     207.07

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 85.37
                TIME SHIFT OF PEAK FLOW          (min)= 10.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.0986
```



SCHAEFFERS
CONSULTING ENGINEERS

Regional Storm Event
Mount Hope Residential Subdivision

Job #: 2024-5476	Date: February 2026

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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 02-19-2026                          TIME: 10:02:37

USER:



COMMENTS: _____________________________________________________________


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  **********************************************
  ** SIMULATION : Hazel                       **
  **********************************************


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|                  |              07621c9d-5863-45f6-aa8d-93089c554fb6\d2306a3a
| Ptotal=212.00 mm |    Comments: Hazel
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    6.00 |  3.00   13.00 |  6.00   23.00 |  9.00   53.00
                1.00    4.00 |  4.00   17.00 |  7.00   13.00 | 10.00   38.00
                2.00    6.00 |  5.00   13.00 |  8.00   13.00 | 11.00   13.00

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--------------------
| CALIB            |
| STANDHYD (  0015)|   Area    (ha)=  11.52
|ID= 1 DT= 1.0 min |   Total Imp(%)=  81.00   Dir. Conn.(%)=  67.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.33         2.19
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope    (%)=       1.00         2.00
     Length           (m)=     277.13        40.00
     Mannings n         =      0.013        0.250

    NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
0.017    6.00 | 3.017   13.00 | 6.017   23.00 |  9.02   53.00
0.033    6.00 | 3.033   13.00 | 6.033   23.00 |  9.03   53.00
0.050    6.00 | 3.050   13.00 | 6.050   23.00 |  9.05   53.00
0.067    6.00 | 3.067   13.00 | 6.067   23.00 |  9.07   53.00
0.083    6.00 | 3.083   13.00 | 6.083   23.00 |  9.08   53.00
0.100    6.00 | 3.100   13.00 | 6.100   23.00 |  9.10   53.00
0.117    6.00 | 3.117   13.00 | 6.117   23.00 |  9.12   53.00
0.133    6.00 | 3.133   13.00 | 6.133   23.00 |  9.13   53.00
0.150    6.00 | 3.150   13.00 | 6.150   23.00 |  9.15   53.00
0.167    6.00 | 3.167   13.00 | 6.167   23.00 |  9.17   53.00
0.183    6.00 | 3.183   13.00 | 6.183   23.00 |  9.18   53.00
0.200    6.00 | 3.200   13.00 | 6.200   23.00 |  9.20   53.00
0.217    6.00 | 3.217   13.00 | 6.217   23.00 |  9.22   53.00
0.233    6.00 | 3.233   13.00 | 6.233   23.00 |  9.23   53.00
0.250    6.00 | 3.250   13.00 | 6.250   23.00 |  9.25   53.00
0.267    6.00 | 3.267   13.00 | 6.267   23.00 |  9.27   53.00
0.283    6.00 | 3.283   13.00 | 6.283   23.00 |  9.28   53.00
0.300    6.00 | 3.300   13.00 | 6.300   23.00 |  9.30   53.00
0.317    6.00 | 3.317   13.00 | 6.317   23.00 |  9.32   53.00
0.333    6.00 | 3.333   13.00 | 6.333   23.00 |  9.33   53.00
0.350    6.00 | 3.350   13.00 | 6.350   23.00 |  9.35   53.00
0.367    6.00 | 3.367   13.00 | 6.367   23.00 |  9.37   53.00
0.383    6.00 | 3.383   13.00 | 6.383   23.00 |  9.38   53.00
0.400    6.00 | 3.400   13.00 | 6.400   23.00 |  9.40   53.00
0.417    6.00 | 3.417   13.00 | 6.417   23.00 |  9.42   53.00
0.433    6.00 | 3.433   13.00 | 6.433   23.00 |  9.43   53.00
0.450    6.00 | 3.450   13.00 | 6.450   23.00 |  9.45   53.00
0.467    6.00 | 3.467   13.00 | 6.467   23.00 |  9.47   53.00
0.483    6.00 | 3.483   13.00 | 6.483   23.00 |  9.48   53.00
0.500    6.00 | 3.500   13.00 | 6.500   23.00 |  9.50   53.00
0.517    6.00 | 3.517   13.00 | 6.517   23.00 |  9.52   53.00
0.533    6.00 | 3.533   13.00 | 6.533   23.00 |  9.53   53.00
0.550    6.00 | 3.550   13.00 | 6.550   23.00 |  9.55   53.00
0.567    6.00 | 3.567   13.00 | 6.567   23.00 |  9.57   53.00
0.583    6.00 | 3.583   13.00 | 6.583   23.00 |  9.58   53.00
0.600    6.00 | 3.600   13.00 | 6.600   23.00 |  9.60   53.00
0.617    6.00 | 3.617   13.00 | 6.617   23.00 |  9.62   53.00
0.633    6.00 | 3.633   13.00 | 6.633   23.00 |  9.63   53.00
0.650    6.00 | 3.650   13.00 | 6.650   23.00 |  9.65   53.00
0.667    6.00 | 3.667   13.00 | 6.667   23.00 |  9.67   53.00
0.683    6.00 | 3.683   13.00 | 6.683   23.00 |  9.68   53.00
0.700    6.00 | 3.700   13.00 | 6.700   23.00 |  9.70   53.00
0.717    6.00 | 3.717   13.00 | 6.717   23.00 |  9.72   53.00
0.733    6.00 | 3.733   13.00 | 6.733   23.00 |  9.73   53.00
0.750    6.00 | 3.750   13.00 | 6.750   23.00 |  9.75   53.00
0.767    6.00 | 3.767   13.00 | 6.767   23.00 |  9.77   53.00
0.783    6.00 | 3.783   13.00 | 6.783   23.00 |  9.78   53.00
0.800    6.00 | 3.800   13.00 | 6.800   23.00 |  9.80   53.00
0.817    6.00 | 3.817   13.00 | 6.817   23.00 |  9.82   53.00
0.833    6.00 | 3.833   13.00 | 6.833   23.00 |  9.83   53.00
0.850    6.00 | 3.850   13.00 | 6.850   23.00 |  9.85   53.00
0.867    6.00 | 3.867   13.00 | 6.867   23.00 |  9.87   53.00
0.883    6.00 | 3.883   13.00 | 6.883   23.00 |  9.88   53.00
0.900    6.00 | 3.900   13.00 | 6.900   23.00 |  9.90   53.00
0.917    6.00 | 3.917   13.00 | 6.917   23.00 |  9.92   53.00
0.933    6.00 | 3.933   13.00 | 6.933   23.00 |  9.93   53.00
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0.950	6.00	3.950	13.00	6.950	23.00	9.95	53.00		2.050	6.00	5.050	13.00	8.050	13.00	11.05	13.00
0.967	6.00	3.967	13.00	6.967	23.00	9.97	53.00		2.067	6.00	5.067	13.00	8.067	13.00	11.07	13.00
0.983	6.00	3.983	13.00	6.983	23.00	9.98	53.00		2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
1.000	6.00	4.000	13.00	7.000	22.98	10.00	52.98		2.100	6.00	5.100	13.00	8.100	13.00	11.10	13.00
1.017	4.00	4.017	17.00	7.017	13.00	10.02	38.00		2.117	6.00	5.117	13.00	8.117	13.00	11.12	13.00
1.033	4.00	4.033	17.00	7.033	13.00	10.03	38.00		2.133	6.00	5.133	13.00	8.133	13.00	11.13	13.00
1.050	4.00	4.050	17.00	7.050	13.00	10.05	38.00		2.150	6.00	5.150	13.00	8.150	13.00	11.15	13.00
1.067	4.00	4.067	17.00	7.067	13.00	10.07	38.00		2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00		2.183	6.00	5.183	13.00	8.183	13.00	11.18	13.00
1.100	4.00	4.100	17.00	7.100	13.00	10.10	38.00		2.200	6.00	5.200	13.00	8.200	13.00	11.20	13.00
1.117	4.00	4.117	17.00	7.117	13.00	10.12	38.00		2.217	6.00	5.217	13.00	8.217	13.00	11.22	13.00
1.133	4.00	4.133	17.00	7.133	13.00	10.13	38.00		2.233	6.00	5.233	13.00	8.233	13.00	11.23	13.00
1.150	4.00	4.150	17.00	7.150	13.00	10.15	38.00		2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00		2.267	6.00	5.267	13.00	8.267	13.00	11.27	13.00
1.183	4.00	4.183	17.00	7.183	13.00	10.18	38.00		2.283	6.00	5.283	13.00	8.283	13.00	11.28	13.00
1.200	4.00	4.200	17.00	7.200	13.00	10.20	38.00		2.300	6.00	5.300	13.00	8.300	13.00	11.30	13.00
1.217	4.00	4.217	17.00	7.217	13.00	10.22	38.00		2.317	6.00	5.317	13.00	8.317	13.00	11.32	13.00
1.233	4.00	4.233	17.00	7.233	13.00	10.23	38.00		2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00		2.350	6.00	5.350	13.00	8.350	13.00	11.35	13.00
1.267	4.00	4.267	17.00	7.267	13.00	10.27	38.00		2.367	6.00	5.367	13.00	8.367	13.00	11.37	13.00
1.283	4.00	4.283	17.00	7.283	13.00	10.28	38.00		2.383	6.00	5.383	13.00	8.383	13.00	11.38	13.00
1.300	4.00	4.300	17.00	7.300	13.00	10.30	38.00		2.400	6.00	5.400	13.00	8.400	13.00	11.40	13.00
1.317	4.00	4.317	17.00	7.317	13.00	10.32	38.00		2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00		2.433	6.00	5.433	13.00	8.433	13.00	11.43	13.00
1.350	4.00	4.350	17.00	7.350	13.00	10.35	38.00		2.450	6.00	5.450	13.00	8.450	13.00	11.45	13.00
1.367	4.00	4.367	17.00	7.367	13.00	10.37	38.00		2.467	6.00	5.467	13.00	8.467	13.00	11.47	13.00
1.383	4.00	4.383	17.00	7.383	13.00	10.38	38.00		2.483	6.00	5.483	13.00	8.483	13.00	11.48	13.00
1.400	4.00	4.400	17.00	7.400	13.00	10.40	38.00		2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00		2.517	6.00	5.517	13.00	8.517	13.00	11.52	13.00
1.433	4.00	4.433	17.00	7.433	13.00	10.43	38.00		2.533	6.00	5.533	13.00	8.533	13.00	11.53	13.00
1.450	4.00	4.450	17.00	7.450	13.00	10.45	38.00		2.550	6.00	5.550	13.00	8.550	13.00	11.55	13.00
1.467	4.00	4.467	17.00	7.467	13.00	10.47	38.00		2.567	6.00	5.567	13.00	8.567	13.00	11.57	13.00
1.483	4.00	4.483	17.00	7.483	13.00	10.48	38.00		2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00		2.600	6.00	5.600	13.00	8.600	13.00	11.60	13.00
1.517	4.00	4.517	17.00	7.517	13.00	10.52	38.00		2.617	6.00	5.617	13.00	8.617	13.00	11.62	13.00
1.533	4.00	4.533	17.00	7.533	13.00	10.53	38.00		2.633	6.00	5.633	13.00	8.633	13.00	11.63	13.00
1.550	4.00	4.550	17.00	7.550	13.00	10.55	38.00		2.650	6.00	5.650	13.00	8.650	13.00	11.65	13.00
1.567	4.00	4.567	17.00	7.567	13.00	10.57	38.00		2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00		2.683	6.00	5.683	13.00	8.683	13.00	11.68	13.00
1.600	4.00	4.600	17.00	7.600	13.00	10.60	38.00		2.700	6.00	5.700	13.00	8.700	13.00	11.70	13.00
1.617	4.00	4.617	17.00	7.617	13.00	10.62	38.00		2.717	6.00	5.717	13.00	8.717	13.00	11.72	13.00
1.633	4.00	4.633	17.00	7.633	13.00	10.63	38.00		2.733	6.00	5.733	13.00	8.733	13.00	11.73	13.00
1.650	4.00	4.650	17.00	7.650	13.00	10.65	38.00		2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00		2.767	6.00	5.767	13.00	8.767	13.00	11.77	13.00
1.683	4.00	4.683	17.00	7.683	13.00	10.68	38.00		2.783	6.00	5.783	13.00	8.783	13.00	11.78	13.00
1.700	4.00	4.700	17.00	7.700	13.00	10.70	38.00		2.800	6.00	5.800	13.00	8.800	13.00	11.80	13.00
1.717	4.00	4.717	17.00	7.717	13.00	10.72	38.00		2.817	6.00	5.817	13.00	8.817	13.00	11.82	13.00
1.733	4.00	4.733	17.00	7.733	13.00	10.73	38.00		2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00		2.850	6.00	5.850	13.00	8.850	13.00	11.85	13.00
1.767	4.00	4.767	17.00	7.767	13.00	10.77	38.00		2.867	6.00	5.867	13.00	8.867	13.00	11.87	13.00
1.783	4.00	4.783	17.00	7.783	13.00	10.78	38.00		2.883	6.00	5.883	13.00	8.883	13.00	11.88	13.00
1.800	4.00	4.800	17.00	7.800	13.00	10.80	38.00		2.900	6.00	5.900	13.00	8.900	13.00	11.90	13.00
1.817	4.00	4.817	17.00	7.817	13.00	10.82	38.00		2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00		2.933	6.00	5.933	13.00	8.933	13.00	11.93	13.00
1.850	4.00	4.850	17.00	7.850	13.00	10.85	38.00		2.950	6.00	5.950	13.00	8.950	13.00	11.95	13.00
1.867	4.00	4.867	17.00	7.867	13.00	10.87	38.00		2.967	6.00	5.967	13.00	8.967	13.00	11.97	13.00
1.883	4.00	4.883	17.00	7.883	13.00	10.88	38.00		2.983	6.00	5.983	13.00	8.983	13.00	11.98	13.00
1.900	4.00	4.900	17.00	7.900	13.00	10.90	38.00		3.000	6.00	6.000	13.01	9.000	13.08	12.00	13.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00									
1.933	4.00	4.933	17.00	7.933	13.00	10.93	38.00									
1.950	4.00	4.950	17.00	7.950	13.00	10.95	38.00									
1.967	4.00	4.967	17.00	7.967	13.00	10.97	38.00									
1.983	4.00	4.983	17.00	7.983	13.00	10.98	38.00									
2.000	4.00	5.000	17.00	8.000	13.00	11.00	37.99									
2.017	6.00	5.017	13.00	8.017	13.00	11.02	13.00									
2.033	6.00	5.033	13.00	8.033	13.00	11.03	13.00									

Max.Eff.Inten.(mm/hr)=	53.00	91.65	
over (min)	6.00	12.00	
Storage Coeff. (min)=	6.07 (ii)	11.57 (ii)	
Unit Hyd. Tpeak (min)=	6.00	12.00	
Unit Hyd. peak (cms)=	0.19	0.10	
			TOTALS
PEAK FLOW (cms)=	1.14	0.55	1.689 (iii)

TIME TO PEAK (hrs)=	10.00	10.00	10.00
RUNOFF VOLUME (mm)=	210.99	200.66	207.59
TOTAL RAINFALL (mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT =	1.00	0.95	0.98

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 93.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0026)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0790	0.6710
	0.0190	0.2190	0.0950	0.7570
	0.0250	0.3040	0.1130	0.8520
	0.0440	0.4560	1.1520	1.3150
	0.0590	0.5440	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0015)	11.520	1.689	10.00	207.59
OUTFLOW: ID= 1 (0026)	11.520	1.150	11.05	172.52

PEAK FLOW REDUCTION [Qout/Qin](%)= 68.09
TIME SHIFT OF PEAK FLOW (min)= 63.00
MAXIMUM STORAGE USED (ha.m.)= 1.3141

CALIB				
STANDHYD (0016)	Area (ha)= 18.55			
ID= 1 DT= 1.0 min	Total Imp(%)= 72.00	Dir. Conn.(%)= 54.00		
	IMPERVIOUS	PERVIOUS (i)		
Surface Area (ha)=	13.36	5.19		
Dep. Storage (mm)=	1.00	1.50		
Average Slope (%)=	1.00	2.00		
Length (m)=	351.66	40.00		
Mannings n =	0.013	0.250		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	6.00	3.017	13.00	6.017	23.00	9.02	53.00
0.033	6.00	3.033	13.00	6.033	23.00	9.03	53.00
0.050	6.00	3.050	13.00	6.050	23.00	9.05	53.00
0.067	6.00	3.067	13.00	6.067	23.00	9.07	53.00
0.083	6.00	3.083	13.00	6.083	23.00	9.08	53.00
0.100	6.00	3.100	13.00	6.100	23.00	9.10	53.00
0.117	6.00	3.117	13.00	6.117	23.00	9.12	53.00
0.133	6.00	3.133	13.00	6.133	23.00	9.13	53.00
0.150	6.00	3.150	13.00	6.150	23.00	9.15	53.00
0.167	6.00	3.167	13.00	6.167	23.00	9.17	53.00
0.183	6.00	3.183	13.00	6.183	23.00	9.18	53.00
0.200	6.00	3.200	13.00	6.200	23.00	9.20	53.00
0.217	6.00	3.217	13.00	6.217	23.00	9.22	53.00
0.233	6.00	3.233	13.00	6.233	23.00	9.23	53.00
0.250	6.00	3.250	13.00	6.250	23.00	9.25	53.00
0.267	6.00	3.267	13.00	6.267	23.00	9.27	53.00
0.283	6.00	3.283	13.00	6.283	23.00	9.28	53.00
0.300	6.00	3.300	13.00	6.300	23.00	9.30	53.00
0.317	6.00	3.317	13.00	6.317	23.00	9.32	53.00
0.333	6.00	3.333	13.00	6.333	23.00	9.33	53.00
0.350	6.00	3.350	13.00	6.350	23.00	9.35	53.00
0.367	6.00	3.367	13.00	6.367	23.00	9.37	53.00
0.383	6.00	3.383	13.00	6.383	23.00	9.38	53.00
0.400	6.00	3.400	13.00	6.400	23.00	9.40	53.00
0.417	6.00	3.417	13.00	6.417	23.00	9.42	53.00
0.433	6.00	3.433	13.00	6.433	23.00	9.43	53.00
0.450	6.00	3.450	13.00	6.450	23.00	9.45	53.00
0.467	6.00	3.467	13.00	6.467	23.00	9.47	53.00
0.483	6.00	3.483	13.00	6.483	23.00	9.48	53.00
0.500	6.00	3.500	13.00	6.500	23.00	9.50	53.00
0.517	6.00	3.517	13.00	6.517	23.00	9.52	53.00
0.533	6.00	3.533	13.00	6.533	23.00	9.53	53.00
0.550	6.00	3.550	13.00	6.550	23.00	9.55	53.00
0.567	6.00	3.567	13.00	6.567	23.00	9.57	53.00
0.583	6.00	3.583	13.00	6.583	23.00	9.58	53.00
0.600	6.00	3.600	13.00	6.600	23.00	9.60	53.00
0.617	6.00	3.617	13.00	6.617	23.00	9.62	53.00
0.633	6.00	3.633	13.00	6.633	23.00	9.63	53.00
0.650	6.00	3.650	13.00	6.650	23.00	9.65	53.00
0.667	6.00	3.667	13.00	6.667	23.00	9.67	53.00
0.683	6.00	3.683	13.00	6.683	23.00	9.68	53.00
0.700	6.00	3.700	13.00	6.700	23.00	9.70	53.00
0.717	6.00	3.717	13.00	6.717	23.00	9.72	53.00
0.733	6.00	3.733	13.00	6.733	23.00	9.73	53.00
0.750	6.00	3.750	13.00	6.750	23.00	9.75	53.00
0.767	6.00	3.767	13.00	6.767	23.00	9.77	53.00
0.783	6.00	3.783	13.00	6.783	23.00	9.78	53.00
0.800	6.00	3.800	13.00	6.800	23.00	9.80	53.00
0.817	6.00	3.817	13.00	6.817	23.00	9.82	53.00
0.833	6.00	3.833	13.00	6.833	23.00	9.83	53.00
0.850	6.00	3.850	13.00	6.850	23.00	9.85	53.00
0.867	6.00	3.867	13.00	6.867	23.00	9.87	53.00
0.883	6.00	3.883	13.00	6.883	23.00	9.88	53.00
0.900	6.00	3.900	13.00	6.900	23.00	9.90	53.00
0.917	6.00	3.917	13.00	6.917	23.00	9.92	53.00
0.933	6.00	3.933	13.00	6.933	23.00	9.93	53.00
0.950	6.00	3.950	13.00	6.950	23.00	9.95	53.00
0.967	6.00	3.967	13.00	6.967	23.00	9.97	53.00
0.983	6.00	3.983	13.00	6.983	23.00	9.98	53.00
1.000	6.00	4.000	13.00	7.000	22.98	10.00	52.98
1.017	4.00	4.017	17.00	7.017	13.00	10.02	38.00
1.033	4.00	4.033	17.00	7.033	13.00	10.03	38.00
1.050	4.00	4.050	17.00	7.050	13.00	10.05	38.00
1.067	4.00	4.067	17.00	7.067	13.00	10.07	38.00
1.083	4.00	4.083	17.00	7.083	13.00	10.08	38.00
1.100	4.00	4.100	17.00	7.100	13.00	10.10	38.00
1.117	4.00	4.117	17.00	7.117	13.00	10.12	38.00
1.133	4.00	4.133	17.00	7.133	13.00	10.13	38.00
1.150	4.00	4.150	17.00	7.150	13.00	10.15	38.00
1.167	4.00	4.167	17.00	7.167	13.00	10.17	38.00
1.183	4.00	4.183	17.00	7.183	13.00	10.18	38.00
1.200	4.00	4.200	17.00	7.200	13.00	10.20	38.00
1.217	4.00	4.217	17.00	7.217	13.00	10.22	38.00
1.233	4.00	4.233	17.00	7.233	13.00	10.23	38.00
1.250	4.00	4.250	17.00	7.250	13.00	10.25	38.00
1.267	4.00	4.267	17.00	7.267	13.00	10.27	38.00
1.283	4.00	4.283	17.00	7.283	13.00	10.28	38.00
1.300	4.00	4.300	17.00	7.300	13.00	10.30	38.00
1.317	4.00	4.317	17.00	7.317	13.00	10.32	38.00
1.333	4.00	4.333	17.00	7.333	13.00	10.33	38.00

1.350	4.00	4.350	17.00	7.350	13.00	10.35	38.00
1.367	4.00	4.367	17.00	7.367	13.00	10.37	38.00
1.383	4.00	4.383	17.00	7.383	13.00	10.38	38.00
1.400	4.00	4.400	17.00	7.400	13.00	10.40	38.00
1.417	4.00	4.417	17.00	7.417	13.00	10.42	38.00
1.433	4.00	4.433	17.00	7.433	13.00	10.43	38.00
1.450	4.00	4.450	17.00	7.450	13.00	10.45	38.00
1.467	4.00	4.467	17.00	7.467	13.00	10.47	38.00
1.483	4.00	4.483	17.00	7.483	13.00	10.48	38.00
1.500	4.00	4.500	17.00	7.500	13.00	10.50	38.00
1.517	4.00	4.517	17.00	7.517	13.00	10.52	38.00
1.533	4.00	4.533	17.00	7.533	13.00	10.53	38.00
1.550	4.00	4.550	17.00	7.550	13.00	10.55	38.00
1.567	4.00	4.567	17.00	7.567	13.00	10.57	38.00
1.583	4.00	4.583	17.00	7.583	13.00	10.58	38.00
1.600	4.00	4.600	17.00	7.600	13.00	10.60	38.00
1.617	4.00	4.617	17.00	7.617	13.00	10.62	38.00
1.633	4.00	4.633	17.00	7.633	13.00	10.63	38.00
1.650	4.00	4.650	17.00	7.650	13.00	10.65	38.00
1.667	4.00	4.667	17.00	7.667	13.00	10.67	38.00
1.683	4.00	4.683	17.00	7.683	13.00	10.68	38.00
1.700	4.00	4.700	17.00	7.700	13.00	10.70	38.00
1.717	4.00	4.717	17.00	7.717	13.00	10.72	38.00
1.733	4.00	4.733	17.00	7.733	13.00	10.73	38.00
1.750	4.00	4.750	17.00	7.750	13.00	10.75	38.00
1.767	4.00	4.767	17.00	7.767	13.00	10.77	38.00
1.783	4.00	4.783	17.00	7.783	13.00	10.78	38.00
1.800	4.00	4.800	17.00	7.800	13.00	10.80	38.00
1.817	4.00	4.817	17.00	7.817	13.00	10.82	38.00
1.833	4.00	4.833	17.00	7.833	13.00	10.83	38.00
1.850	4.00	4.850	17.00	7.850	13.00	10.85	38.00
1.867	4.00	4.867	17.00	7.867	13.00	10.87	38.00
1.883	4.00	4.883	17.00	7.883	13.00	10.88	38.00
1.900	4.00	4.900	17.00	7.900	13.00	10.90	38.00
1.917	4.00	4.917	17.00	7.917	13.00	10.92	38.00
1.933	4.00	4.933	17.00	7.933	13.00	10.93	38.00
1.950	4.00	4.950	17.00	7.950	13.00	10.95	38.00
1.967	4.00	4.967	17.00	7.967	13.00	10.97	38.00
1.983	4.00	4.983	17.00	7.983	13.00	10.98	38.00
2.000	4.00	5.000	17.00	8.000	13.00	11.00	37.99
2.017	6.00	5.017	13.00	8.017	13.00	11.02	13.00
2.033	6.00	5.033	13.00	8.033	13.00	11.03	13.00
2.050	6.00	5.050	13.00	8.050	13.00	11.05	13.00
2.067	6.00	5.067	13.00	8.067	13.00	11.07	13.00
2.083	6.00	5.083	13.00	8.083	13.00	11.08	13.00
2.100	6.00	5.100	13.00	8.100	13.00	11.10	13.00
2.117	6.00	5.117	13.00	8.117	13.00	11.12	13.00
2.133	6.00	5.133	13.00	8.133	13.00	11.13	13.00
2.150	6.00	5.150	13.00	8.150	13.00	11.15	13.00
2.167	6.00	5.167	13.00	8.167	13.00	11.17	13.00
2.183	6.00	5.183	13.00	8.183	13.00	11.18	13.00
2.200	6.00	5.200	13.00	8.200	13.00	11.20	13.00
2.217	6.00	5.217	13.00	8.217	13.00	11.22	13.00
2.233	6.00	5.233	13.00	8.233	13.00	11.23	13.00
2.250	6.00	5.250	13.00	8.250	13.00	11.25	13.00
2.267	6.00	5.267	13.00	8.267	13.00	11.27	13.00
2.283	6.00	5.283	13.00	8.283	13.00	11.28	13.00
2.300	6.00	5.300	13.00	8.300	13.00	11.30	13.00
2.317	6.00	5.317	13.00	8.317	13.00	11.32	13.00
2.333	6.00	5.333	13.00	8.333	13.00	11.33	13.00
2.350	6.00	5.350	13.00	8.350	13.00	11.35	13.00
2.367	6.00	5.367	13.00	8.367	13.00	11.37	13.00
2.383	6.00	5.383	13.00	8.383	13.00	11.38	13.00
2.400	6.00	5.400	13.00	8.400	13.00	11.40	13.00
2.417	6.00	5.417	13.00	8.417	13.00	11.42	13.00
2.433	6.00	5.433	13.00	8.433	13.00	11.43	13.00
2.450	6.00	5.450	13.00	8.450	13.00	11.45	13.00
2.467	6.00	5.467	13.00	8.467	13.00	11.47	13.00
2.483	6.00	5.483	13.00	8.483	13.00	11.48	13.00
2.500	6.00	5.500	13.00	8.500	13.00	11.50	13.00
2.517	6.00	5.517	13.00	8.517	13.00	11.52	13.00
2.533	6.00	5.533	13.00	8.533	13.00	11.53	13.00
2.550	6.00	5.550	13.00	8.550	13.00	11.55	13.00
2.567	6.00	5.567	13.00	8.567	13.00	11.57	13.00
2.583	6.00	5.583	13.00	8.583	13.00	11.58	13.00
2.600	6.00	5.600	13.00	8.600	13.00	11.60	13.00
2.617	6.00	5.617	13.00	8.617	13.00	11.62	13.00
2.633	6.00	5.633	13.00	8.633	13.00	11.63	13.00
2.650	6.00	5.650	13.00	8.650	13.00	11.65	13.00
2.667	6.00	5.667	13.00	8.667	13.00	11.67	13.00
2.683	6.00	5.683	13.00	8.683	13.00	11.68	13.00
2.700	6.00	5.700	13.00	8.700	13.00	11.70	13.00
2.717	6.00	5.717	13.00	8.717	13.00	11.72	13.00
2.733	6.00	5.733	13.00	8.733	13.00	11.73	13.00
2.750	6.00	5.750	13.00	8.750	13.00	11.75	13.00
2.767	6.00	5.767	13.00	8.767	13.00	11.77	13.00
2.783	6.00	5.783	13.00	8.783	13.00	11.78	13.00
2.800	6.00	5.800	13.00	8.800	13.00	11.80	13.00
2.817	6.00	5.817	13.00	8.817	13.00	11.82	13.00
2.833	6.00	5.833	13.00	8.833	13.00	11.83	13.00
2.850	6.00	5.850	13.00	8.850	13.00	11.85	13.00
2.867	6.00	5.867	13.00	8.867	13.00	11.87	13.00
2.883	6.00	5.883	13.00	8.883	13.00	11.88	13.00
2.900	6.00	5.900	13.00	8.900	13.00	11.90	13.00
2.917	6.00	5.917	13.00	8.917	13.00	11.92	13.00
2.933	6.00	5.933	13.00	8.933	13.00	11.93	13.00
2.950	6.00	5.950	13.00	8.950	13.00	11.95	13.00
2.967	6.00	5.967	13.00	8.967	13.00	11.97	13.00
2.983	6.00	5.983	13.00	8.983	13.00	11.98	13.00
3.000	6.00	6.000	13.01	9.000	13.08	12.00	13.00

Max.Eff.Inten.(mm/hr)=	53.00	86.65	
over (min)	7.00	14.00	
Storage Coeff. (min)=	7.00 (ii)	14.00 (ii)	
Unit Hyd. Tpeak (min)=	7.00	14.00	
Unit Hyd. peak (cms)=	0.16	0.08	
			TOTALS
PEAK FLOW (cms)=	1.47	1.23	2.701 (iii)
TIME TO PEAK (hrs)=	10.00	10.02	10.00
RUNOFF VOLUME (mm)=	210.99	200.04	205.97
TOTAL RAINFALL (mm)=	212.00	212.00	212.00
RUNOFF COEFFICIENT =	1.00	0.94	0.97

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 93.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0017)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.1440	1.0160
	0.0280	0.3250	0.1740	1.1510
	0.0460	0.4470	0.2060	1.3010
	0.0810	0.6790	0.9200	2.7190
	0.1090	0.8140	0.0000	0.0000

```
                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0016)     18.550      2.701     10.00     205.97
   OUTFLOW: ID= 1 (  0017)     18.550      0.920     11.38     169.33

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.05
                  TIME SHIFT OF PEAK FLOW         (min)= 83.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.7184

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 FINISH
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Pond Permanent Pool and Erosion Control

Mount Hope West
WATER QUALITY REQUIREMENT CALCULATIONS
West Pond

Table: Water Quality Storage Requirements Based on Receiving Waters

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level					
		0%	35%	55%	70%	85%	100%
Level 1	Wet Pond	53	140	190	225	250	275

* For wet ponds, all of the storage, except for 40 m^3/ha represents the permanent pool volume.
The 40 m^3/ha represents extended detention storage.

West Pond

Input:

Estimated Imperviousness =	81%	
Area =	11.52	ha
Level of Protection:	1	
SWMP Type :	Wet Pond	

Calculation:

Total Storage Volume Required =	243	m^3/ha →	2,803	m^3
Permanent Pool Volume =	203	m^3/ha →	2,342	m^3
Active Storage Volume =	40	m^3/ha →	461	m^3

Erosion Control:

Input			
	Area =	11.52	ha
	R.V =	25	mm
	Runoff Coefficient =	0.76	
	Draw Down Time =	48	hrs

Calculations:

Storage =	2,189	m^3
Average Outflow =	0.013	m^3/s
Peak Outflow =	0.019	m^3/s

Note: Estimated at 1.5 times Average Outflow

Provide 2189 m3 for erosion control.

Mount Hope West
WATER QUALITY REQUIREMENT CALCULATIONS
East Pond

Table: Water Quality Storage Requirements Based on Receiving Waters

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level					
		0%	35%	55%	70%	85%	100%
Level 1	Wet Pond	53	140	190	225	250	275

* For wet ponds, all of the storage, except for 40 m^3/ha represents the permanent pool volume.
The 40 m^3/ha represents extended detention storage.

East Pond

Input:

Estimated Imperviousness =	72%	
Area =	18.55	ha
Level of Protection:	1	
SWMP Type :	Wet Pond	

Calculation:

Total Storage Volume Required =	228	m^3/ha →	4,236	m^3
Permanent Pool Volume =	188	m^3/ha →	3,494	m^3
Active Storage Volume =	40	m^3/ha →	742	m^3

Erosion Control:

Input			
	Area =	18.55	ha
	R.V =	25	mm
	Runoff Coefficient =	0.70	
	Draw Down Time =	48	hrs

Calculations:

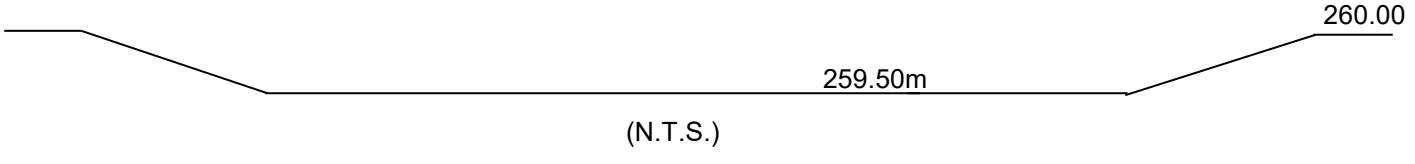
Storage =	3,246	m^3
Average Outflow =	0.019	m^3/s
Peak Outflow =	0.028	m^3/s

Note: Estimated at 1.5 times Average Outflow

Provide 3246 m3 for erosion control.

Pond Emergency Spillway

EMERGENCY SPILLWAY
West Pond



(N.T.S.)

Weir Parameters

Weir Length (L)	*(Parallel to flow)*	10.0 m
Crest bottom Length (B)	*(Perp. to flow)*	19.0 m
Crest Elevation		258.70 m
Side Slope		10 :1 (h:v)

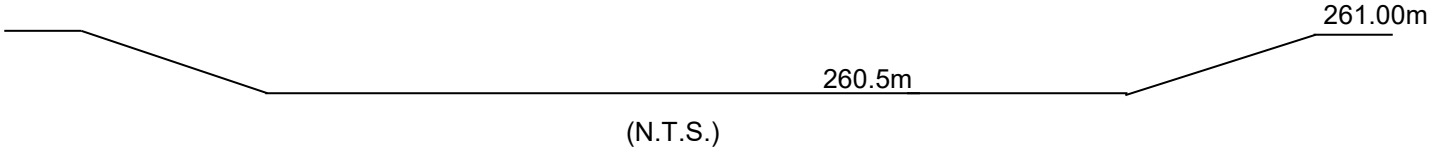
Weir Calculations ($Q = Cd * b * H^{3/2}$)

Water Elevation	Water Level (H)	H/L	Cd	Q
258.75	0.05	0.005	0.63	0.14
258.80	0.10	0.010	1.12	0.71
258.85	0.15	0.015	1.28	1.53
258.90	0.20	0.020	1.36	2.56
259.00	**0.30**	**0.030**	**1.45**	**5.23**

Maximum Flow at Elevation 260.00m is 5.23 m^3/s

100-Year Storm Peak Inflow is 5.15 m^3/s (4Hr Chicago)

EMERGENCY SPILLWAY
East Pond



(N.T.S.)

Weir Parameters

Weir Length (L)	*(Parallel to flow)*	10.0 m
Crest bottom Length (B)	*(Perp. to flow)*	15.0 m
Crest Elevation		259.60 m
Side Slope		10 :1 (h:v)

Weir Calculations ($Q = Cd * b * H^{3/2}$)

Water Elevation	Water Level (H)	H/L	Cd	Q
259.65	0.05	0.005	0.63	0.11
259.70	0.10	0.010	1.12	0.57
259.75	0.15	0.015	1.28	1.23
259.90	0.30	0.030	1.45	4.28
260.00	**0.40**	**0.040**	**1.49**	**7.16**

Maximum Flow at Elevation 261.00m is 7.16 m^3/s

100-Year Storm Peak Inflow is 7.09 m^3/s (4Hr Chicago)

Pond Forebay

PROJECT NO: Mount Hope West
DESCRIPTION: West Pond
DATE: 19-Sep-24 PREPARED BY: Howie Liu

SCHAEFFERS
CONSULTING ENGINEERS

WEST POND FOREBAY

FOREBAY SETTLING LENGTH

ref: SWM Planning & Design Manual (MOE, March 2003)

$Dist = (rQ_p / V_s)^{1/2}$, where

Dist = forebay length (m)
r = Length to width ratio of forebay (>2:1)
Q_p = peak flowrate from the pond during design quality storm (m^3/s)
V_s = settling velocity in the forebay (m/s)

r =	2.0		(2:1)
Q_p =	0.019	m^3/s	(required erosion outflow rate)
V_s =	0.0003	m/s	(based on 150μm particles)

Dist = 11 metres

DISPERSION LENGTH

ref: SWM Planning & Design Manual (MOE, March 2003)

$D = 8Q / dV_f$, where

D = length of dispersion (m)
Q = 10 year inlet flowrate (m^3/s)
d = depth of permanent pool in forebay (m)
V_f = desired velocity in the forebay (m/s)

Q =	1.500	m^3/s	(from hydrologic model)
d =	1.50	m	
V_f =	0.5	m/s	(MOEE empirical value)

D = 16 m

Forebay Length Required: 16 metres
Forebay Length Provided: 50 metres

PROJECT NO: Mount Hope West
DESCRIPTION: East Pond
DATE: 27-Feb-26 PREPARED BY: Howie Liu

SCHAEFFERS
CONSULTING ENGINEERS

EAST POND FOREBAY

FOREBAY SETTLING LENGTH

ref: SWM Planning & Design Manual (MOE, March 2003)

$Dist = (rQ_p / V_s)^{1/2}$, where

Dist = forebay length (m)
r = Length to width ratio of forebay (>2:1)
Q_p = peak flowrate from the pond during design quality storm (m^3/s)
V_s = settling velocity in the forebay (m/s)

r =	2.0		(2:1)
Q_p =	0.028	m^3/s	(required erosion outflow rate)
V_s =	0.0003	m/s	(based on 150μm particles)

Dist = 14 metres

DISPERSION LENGTH

ref: SWM Planning & Design Manual (MOE, March 2003)

$D = 8Q / dV_f$, where

D = length of dispersion (m)
Q = 10 year inlet flowrate (m^3/s)
d = depth of permanent pool in forebay (m)
V_f = desired velocity in the forebay (m/s)

Q =	2.100	m^3/s	(from hydrologic model)
d =	1.00	m	
V_f =	0.5	m/s	(MOEE empirical value)

D = 34 m

Forebay Length Required: 34 metres
Forebay Length Provided: 70 metres

Pond Filter Bed

WEST POND FILTER BED SIZING

Project: 5476

Schaeffers Consulting Engineers

Filter Surface Area Calculation Based on Equation 4.12 of MOE Manual		
A = (1000 x V x d) / (k x (h + d) x t)		
Volume of Water to be Filtered (V), (Extended Detention Volume) =	**2519**	(m^3)
Depth of Filter (d) =	**0.80**	(m)
Permeability Coefficient (k) =	**45**	mm/hr
Head of Water (h) =	0.30	(m)
Maximum Flow into Filter Media (Erosion Flow) =	0.02	(m^3/s)
Minimum Drawdown Time (t) =	**48**	(hour)
Filtration Bed Area (A) =	**848**	(m^2)
Filtration Bed Area Provided (A) =	**960**	(m^2)
Actual Head of Water (h) =	**0.30**	(m)
Expected Drawdown Time based on provided filtration bed area (t) =	**42**	(hours)

Site 27mm Requirement		
Area	11.52	ha
IMP	81	%
VCTL	27	mm
Volume	**2519**	m^3

EAST POND FILTER BED SIZING

Project: 5476

Schaeffers Consulting Engineers

Filter Surface Area Calculation Based on Equation 4.12 of MOE Manual		
A = (1000 x V x d) / (k x (h + d) x t)		
Volume of Water to be Filtered (V), (Extended Detention Volume) =	**3606**	(m^3)
Depth of Filter (d) =	**0.80**	(m)
Permeability Coefficient (k) =	**45**	mm/hr
Head of Water (h) =	0.30	(m)
Maximum Flow into Filter Media (Erosion Flow) =	0.028	(m^3/s)
Minimum Drawdown Time (t) =	**48**	(hour)
Filtration Bed Area (A) =	**1214**	(m^2)
Filtration Bed Area Provided (A) =	**1480**	(m^2)
Actual Head of Water (h) =	**0.30**	(m)
Expected Drawdown Time based on provided filtration bed area (t) =	**39**	(hours)

Site 27mm Requirement		
Area	18.55	ha
IMP	72	%
VCTL	27	mm
Volume	**3606**	m^3

Pond Sediment Drying Area

Project: Mount Hope West
Project No.: 2024-5476

SCHAEFFERS
CONSULTING ENGINEERS

West Pond Sediment Drying Area Calculation

Annual Sediment Loading - West Pond		
Catchment Imperviousness (%)	*Annual Loading (m^3/ha)*	*Area (ha)*
81	3.5	11.52

Total Sediment Volume for 10 year period (m^3)	406.90

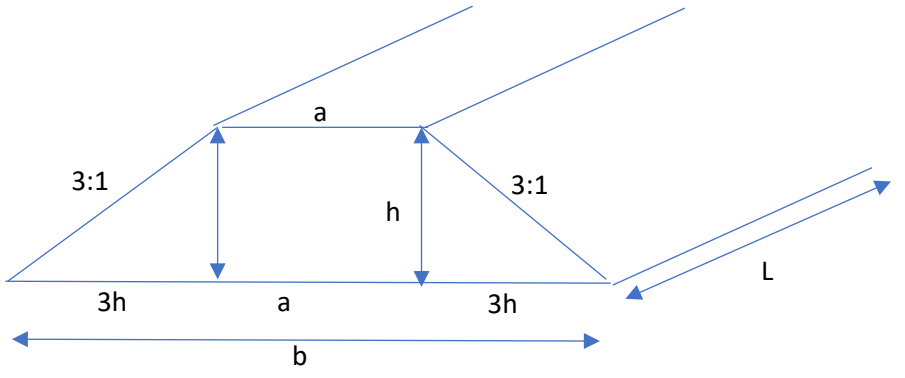
Table 6.3: Annual Sediment Loadings

Catchment Imperviousness	Annual Loading (kg/ha)	Wet Density (kg/m³)	Annual Loading (m³/ha)
35%	770	1,230	0.6
55%	2,300	1,230	1.9
70%	3,495	1,230	2.8
85%	4,680	1,230	3.8

SWM Planning & Design Manual *- 6-13 -* *Operation, Maintenance and Monitoring*

Sediment Drying Area Req'd

Area Req'd (m^2)	525.00



Volume, V = (1/2)*(a+b)/2*h*L

Top width, a (m)	9.0
Bottom width, b (m)	15.0
Height, h (m)	1 <--- Minimum depth
Length, L (m)	35

Volume Provided 420.00

Project: Mount Hope West
Project No.: 2024-5476

SCHAEFFERS
CONSULTING ENGINEERS

East Pond Sediment Drying Area Calculation

Annual Sediment Loading - East Pond		
Catchment Imperviousness (%)	*Annual Loading (m^3/ha)*	*Area (ha)*
72	2.96	18.55

Total Sediment Volume for 10 year period (m^3)	548.94

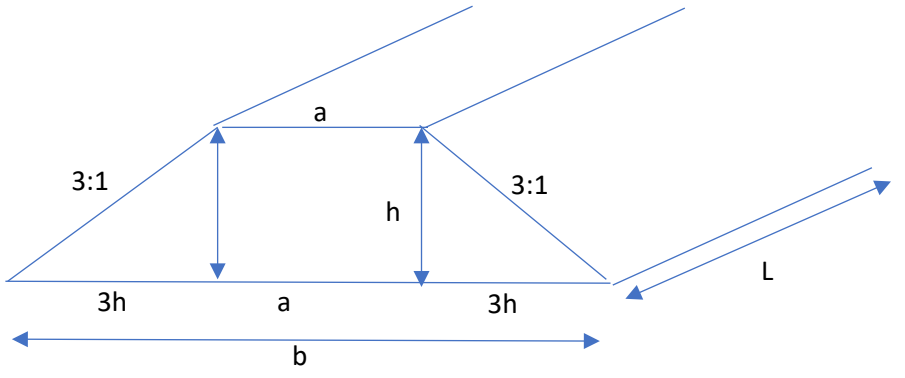
Table 6.3: Annual Sediment Loadings

Catchment Imperviousness	Annual Loading (kg/ha)	Wet Density (kg/m³)	Annual Loading (m³/ha)
35%	770	1,230	0.6
55%	2,300	1,230	1.9
70%	3,495	1,230	2.8
85%	4,680	1,230	3.8

SWM Planning & Design Manual *- 6-13 -* *Operation, Maintenance and Monitoring*

Sediment Drying Area Req'd

Area Req'd (m^2)	1000.00



Volume, V = (1/2)*(a+b)/2*h*L

Top width, a (m)	14.0	
Bottom width, b (m)	20.0	
Height, h (m)	1	<--- Minimum depth
Length, L (m)	50	

Volume Provided 850.00

Subdivision Water Balance

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Site	
	Landscape	Total
Area (m^2)	319800	319800
Pervious Area (m^2)	319800	319800
Impervious Area (m^2)	0	0
Infiltration Factors		
Topography Infiltration Factor (Rolling Land)	0.20	
Soil Infiltration Factor (Silty Clay)	0.15	
Land Cover Infiltration Factor (Cultivated Land)	0.10	
MOE Infiltration Factor	0.45	
Inputs (per unit area)		
Precipitation (mm/year)*	860	860
Total Inputs (mm/year)	**860**	**860**
Outputs (per unit area)		
Precipitation Surplus (mm/year)	289	289
Net Surplus (mm/year)	289	289
Downspout Disconnection Retention	0	0
Evapotranpiration (mm/year)*	571	571
Roof Evapotranspiration (mm/year)	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**
Infiltration (mm/year)	130	130
Rooftop Infiltration (mm/year)	0	0
Total Infiltration (mm/year)	**130**	**130**
Runoff Pervious Area (mm/year)	159	159
Runoff Impervious Area (mm/year)	0	0
Total Runoff (mm/year)	**159**	**159**
Total Outputs (mm/year)	**860**	**860**
Difference (Inputs - Outputs)	0	0
Input Volumes		
Precipitation (m^3/year)	275028	275028
Total Inputs (m^3/year)	**275028**	**275028**
Outputs (Volumes)		
Precipitation Surplus (m^3/year)	92422	92422
Net Surplus (m^3/year)	92422	92422
Downspout Disconnection Retention* (m^3/year)	0	0
Evapotranpiration (m^3/year)	182606	182606
Roof Evapotranspiration (m^3/year)	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0
Total Evapotranspiration (m^3/year)	**182606**	**182606**
Infiltration (m^3/year)	41590	41590
Rooftop Infiltration (m^3/year)	0	0
Total Infiltration (m^3/year)	**41590**	**41590**
Runoff Pervious Area (m^3/year)	50832	50832
Runoff Impervious Area (m^3/year)	0	0
Total Runoff (m^3/year)	**50832**	**50832**
Total Outputs (m^3/year)	**275028**	**275028**
Difference (Inputs - Outputs)	0	0

TABLE 2: WATER BUDGET - POST-DEVELOPMENT WITHOUT MITIGATION
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Site											
	Pervious Grassed Area (Homes)	Roofs (Homes)	Impervious Area (Driveway, Porch of Homes)	ROW	Servicing Block/Future Development	Future Residential (64% Impervious)	Future Residential (36% Pervious)	SWM Pond Blocks (57% Pervious)	SWM Pond Blocks (43% Impervious)	Commercial Block	Parks/NHS/Open Space	Total
Area (m^2)	54978	66573	11149	82800	2100	4224	2376	23997	18103	26500	27000	319800
Pervious Area (m^2)	54978	0	0	0	0	0	2376	23997	0	0	27000	108351
Impervious Area (m^2)	0	66573	11149	82800	2100	4224	0	0	18103	26500	0	211449
Infiltration Factors												
Topography Infiltration Factor	0.2	N/A	N/A	N/A	N/A	N/A	0.2	0.2	N/A	N/A	0.2	
Soil Infiltration Factor	0.15	N/A	N/A	N/A	N/A	N/A	0.15	0.15	N/A	N/A	0.15	
Land Cover Infiltration Factor	0.1	N/A	N/A	N/A	N/A	N/A	0.1	0.1	N/A	N/A	0.1	
MOE Infiltration Factor	0.45	N/A	N/A	N/A	N/A	N/A	0.45	0.45	N/A	N/A	0.45	
Inputs (per unit area)												
Precipitation (mm/year)	860	860	860	860	860	860	860	860	860	860	860	860
Total Inputs (m^3/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Outputs (per unit area)												
Precipitation Surplus (mm/year)[1]	289	774	774	774	774	774	289	289	774	774	289	610
Net Surplus (mm/year)	289	774	774	774	774	774	289	289	774	774	289	610
Downspout Disconnection Retention[2]	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (mm/year)	571	86	86	86	86	86	571	571	86	86	571	250
Roof Evapotranspiration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**571**	**86**	**86**	**86**	**86**	**86**	**571**	**571**	**86**	**86**	**571**	**250**
Infiltration (mm/year)	130	0	0	0	0	0	130	130	0	0	130	44
Rooftop Infiltration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	**130**	**0**	**0**	**0**	**0**	**0**	**130**	**130**	**0**	**0**	**130**	**44**
Runoff Pervious Area (mm/year)	159	0	0	0	0	0	159	159	0	0	159	54
Runoff Impervious Area (mm/year)	0	774	774	774	774	774	0	0	774	774	0	512
Total Runoff (mm/year)	**159**	**774**	**774**	**774**	**774**	**774**	**159**	**159**	**774**	**774**	**159**	**566**
Total Outputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0
Input Volumes												
Precipitation (m^3/year)	47281	57252	9588	71208	1806	3633	2043	20637	15569	22790	23220	275028
Total Inputs (m^3/year)	**47281**	**57252**	**9588**	**71208**	**1806**	**3633**	**2043**	**20637**	**15569**	**22790**	**23220**	**275028**
Outputs (Volumes)												
Precipitation Surplus (m^3/year)	15889	51527	8630	64087	1625	3269	687	6935	14012	20511	7803	194975
Net Surplus (m^3/year)	15889	51527	8630	64087	1625	3269	687	6935	14012	20511	7803	194975
Downspout Disconnection Retention[2] (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranspiration (m^3/year)	31392	5725	959	7121	181	363	1357	13702	1557	2279	15417	80053
Roof Evapotranspiration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**31392**	**5725**	**959**	**7121**	**181**	**363**	**1357**	**13702**	**1557**	**2279**	**15417**	**80053**
Infiltration (m^3/year)	7150	0	0	0	0	0	309	3121	0	0	3511	14091
Rooftop Infiltration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	**7150**	**0**	**0**	**0**	**0**	**0**	**309**	**3121**	**0**	**0**	**3511**	**14091**
Runoff Pervious Area (m^3/year)	8739	0	0	0	0	0	378	3814	0	0	4292	17222
Runoff Impervious Area (m^3/year)	0	51527	8630	64087	1625	3269	0	0	14012	20511	0	163661
Total Runoff (m^3/year)	**8739**	**51527**	**8630**	**64087**	**1625**	**3269**	**378**	**3814**	**14012**	**20511**	**4292**	**180884**
Total Outputs (m^3/year)	**47281**	**57252**	**9588**	**71208**	**1806**	**3633**	**2043**	**20637**	**15569**	**22790**	**23220**	**275028**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0

1 - Assumes 10% Evaporation from Impervious Surfaces

TABLE 2: WATER BUDGET - POST-DEVELOPMENT WITHOUT MITIGATION
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Site											
	Pervious Grassed Area (Homes)	Roofs (Homes)	Impervious Area (Driveway, Porch of Homes)	ROW	Servicing Block/Future Development	Future Residential (64% Impervious)	Future Residential (36% Pervious)	SWM Pond Blocks (57% Pervious)	SWM Pond Blocks (43% Impervious)	Commercial Block	Parks/NHS/Open Space	Total
Area (m^2)	54978	66573	11149	82800	2100	4224	2376	23997	18103	26500	27000	319800
Pervious Area (m^2)	54978	0	0	0	0	0	2376	23997	0	0	27000	108351
Impervious Area (m^2)	0	66573	11149	82800	2100	4224	0	0	18103	26500	0	211449
Infiltration Factors												
Topography Infiltration Factor	0.2	N/A	N/A	N/A	N/A	N/A	0.2	0.2	N/A	N/A	0.2	
Soil Infiltration Factor	0.15	N/A	N/A	N/A	N/A	N/A	0.15	0.15	N/A	N/A	0.15	
Land Cover Infiltration Factor	0.1	N/A	N/A	N/A	N/A	N/A	0.1	0.1	N/A	N/A	0.1	
MOE Infiltration Factor	0.45	N/A	N/A	N/A	N/A	N/A	0.45	0.45	N/A	N/A	0.45	
Inputs (per unit area)												
Precipitation (mm/year)	860	860	860	860	860	860	860	860	860	860	860	860
Total Inputs (m^3/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Outputs (per unit area)												
Precipitation Surplus (mm/year)[1]	289	774	774	774	774	774	289	289	774	774	289	610
Net Surplus (mm/year)	289	774	774	774	774	774	289	289	774	774	289	610
Downspout Disconnection Retention[2]	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (mm/year)	571	86	86	86	86	86	571	571	86	86	571	250
Roof Evapotranspiration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**571**	**86**	**86**	**86**	**86**	**86**	**571**	**571**	**86**	**86**	**571**	**250**
Infiltration (mm/year)	130	0	0	0	0	0	130	130	0	0	130	44
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	182	0	15
Infiltration Trenches	77	279	0	0	0	0	0	0	0	0	0	71
Rooftop Infiltration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	**207**	**279**	**0**	**0**	**0**	**0**	**130**	**130**	**0**	**182**	**130**	**130**
Runoff Pervious Area (mm/year)	82	0	0	0	0	0	159	159	0	0	159	41
Runoff Impervious Area (mm/year)	0	495	774	774	774	774	0	0	774	592	0	439
Total Runoff (mm/year)	**82**	**495**	**774**	**774**	**774**	**774**	**159**	**159**	**774**	**592**	**159**	**479**
Total Outputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0
Input Volumes												
Precipitation (m^3/year)	47281	57252	9588	71208	1806	3633	2043	20637	15569	22790	23220	275028
Total Inputs (m^3/year)	**47281**	**57252**	**9588**	**71208**	**1806**	**3633**	**2043**	**20637**	**15569**	**22790**	**23220**	**275028**
Outputs (Volumes)												
Precipitation Surplus (m^3/year)	15889	51527	8630	64087	1625	3269	687	6935	14012	20511	7803	194975
Net Surplus (m^3/year)	15889	51527	8630	64087	1625	3269	687	6935	14012	20511	7803	194975
Downspout Disconnection Retention[2] (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranspiration (m^3/year)	31392	5725	959	7121	181	363	1357	13702	1557	2279	15417	80053
Roof Evapotranspiration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**31392**	**5725**	**959**	**7121**	**181**	**363**	**1357**	**13702**	**1557**	**2279**	**15417**	**80053**
Infiltration (m^3/year)	7150	0	0	0	0	0	309	3121	0	0	3511	14091
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	4820	0	4820
Infiltration Trenches	4237	18541	0	0	0	0	0	0	0	0	0	22778
Rooftop Infiltration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	**11387**	**18541**	**0**	**0**	**0**	**0**	**309**	**3121**	**0**	**4820**	**3511**	**41689**
Runoff Pervious Area (m^3/year)	4502	0	0	0	0	0	378	3814	0	0	4292	12986
Runoff Impervious Area (m^3/year)	0	32986	8630	64087	1625	3269	0	0	14012	15691	0	140300
Total Runoff (m^3/year)	**4502**	**32986**	**8630**	**64087**	**1625**	**3269**	**378**	**3814**	**14012**	**15691**	**4292**	**153286**
Total Outputs (m^3/year)	**47281**	**57252**	**9588**	**71208**	**1806**	**3633**	**2043**	**20637**	**15569**	**22790**	**23220**	**275028**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0

1 - Assumes 10% Evaporation from Impervious Surfaces

Water Balance Mitigation Calculations

Pre Development Infiltration =	**41,590**	**m^3/y**
Post Development Infiltration without Mitigation =	**14,091**	**m^3/y**
Post to Pre Deficit =	**27,499**	**m^3/y**
Mitigation Measures		
Site Plan Infiltration =	**4,820**	**m^3/y**
Infiltration Trench =	**22,720**	**m^3/y**
Mitigation Volume Provided =	**27,540**	**m^3/y**

In order to meet the annual pre-development infiltration deficit, the runoff from the site directed to the infiltration trenches shall be equal to the annual deficit volume. Therefore,

Roof Area to Trenches =

3.33 ha x Annual Precipitation Depth = 18,500 m^3/year
Required Annual Precpitation Depth to meet deficit = 556 mm/yr
Based on this analysis, it is concluded that precipitation events of depth less than or equal to *17.4 mm* 579.8 m^3/event
will produce an annual amount of precipitation equal to 557 mm/yr

Grass Area to Trenches =

2.75 ha x Annual Precipitation Depth = 4,220 m^3/year
Required Annual Precpitation Depth to meet deficit = 154 mm/yr
Based on this analysis, it is concluded that precipitation events of depth less than or equal to *4.2 mm* 116.0 m^3/event
will produce an annual amount of precipitation equal to 154 mm/yr

Commercial Block - On-site Retention =

2.65 ha x Annual Precipitation Depth = 4,820 m^3/year
Required Annual Precpitation Depth to meet deficit = 182 mm/yr
Based on this analysis, it is concluded that precipitation events of depth less than or equal to *5.0 mm* 132.5 m^3/event
will produce an annual amount of precipitation equal to 182 mm/yr

The analysis was performed on daily precipitation data collected from Pearson rain gauge from 1990 to 2012 by Environment Canada. The data was then arranged into four categories for each year: Total Annual Depth of Precipitation from events less than or equal to 5mm, 10mm, 15mm and 20mm. This yearly data was then used to determine an average annual precipitation depth.

Infiltration Trench Sizing

Job: 5048
Feb-26

Required Infiltration System Footprint Area

Infiltration Volume	695.9	m^3	
drawdown time	72	hours	
infiltration rate	15	mm/h	
Safety Factor	2.5		
Design Infiltration Rate	6.0	mm/h	
Maximum Depth	1080	mm	
Required Footprint Area	1611	m^2	MOE Eqn 4.3

Proposed Infiltration Details - Trenches

Length=	1489	m	
Width=	1.5	m	**(1489m x 1.5m x 1 m)**
Minimum Required Storage Depth =	1.00	m	
Drawdown time=	66.7	hours	
Total Volume retained =	893.4	m^3	

* Soils with Satutrated Hydraulic Conductivity = $1(10^{-7})$ cm/s correlates to an infiltration rate of 15mm/h
Low Impact Development Design Manual (TRCA and CVC, 2010)

Feature Based Water Balance

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 2	
	Existing Grassed Drainage Area	Total
Area (m^2)	81754	81754
Pervious Area (m^2)	81754	81754
Impervious Area (m^2)	0	0
Infiltration Factors		
Topography Infiltration Factor (Rolling Land)	0.20	
Soil Infiltration Factor (Silty Clay)	0.15	
Land Cover Infiltration Factor (Cultivated Land)	0.10	
MOE Infiltration Factor	0.45	
Inputs (per unit area)		
Precipitation (mm/year)*	860	860
Total Inputs (mm/year)	**860**	**860**
Outputs (per unit area)		
Precipitation Surplus (mm/year)	289	289
Net Surplus (mm/year)	289	289
Downspout Disconnection Retention	0	0
Evapotranpiration (mm/year)*	571	571
Roof Evapotranspiration (mm/year)	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**
Infiltration (mm/year)	130	130
Rooftop Infiltration (mm/year)	0	0
Total Infiltration (mm/year)	**130**	**130**
Runoff Pervious Area (mm/year)	159	159
Runoff Impervious Area (mm/year)	0	0
Total Runoff (mm/year)	**159**	**159**
Total Outputs (mm/year)	**860**	**860**
Difference (Inputs - Outputs)	0	0
Input Volumes		
Precipitation (m^3/year)	70308	70308
Total Inputs (m^3/year)	**70308**	**70308**
Outputs (Volumes)		
Precipitation Surplus (m^3/year)	23627	23627
Net Surplus (m^3/year)	23627	23627
Downspout Disconnection Retention* (m^3/year)	0	0
Evapotranpiration (m^3/year)	46682	46682
Roof Evapotranspiration (m^3/year)	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0
Total Evapotranspiration (m^3/year)	**46682**	**46682**
Infiltration (m^3/year)	10632	10632
Rooftop Infiltration (m^3/year)	0	0
Total Infiltration (m^3/year)	**10632**	**10632**
Runoff Pervious Area (m^3/year)	12995	12995
Runoff Impervious Area (m^3/year)	0	0
Total Runoff (m^3/year)	**12995**	**12995**
Total Outputs (m^3/year)	**70308**	**70308**
Difference (Inputs - Outputs)	0	0

TABLE 2: WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 2												
	Existing Grassed Drainage Area	Development Area Parks/Open Space	Development Area Lot Pervious Area(With LIDs)	Development Area Lot Pervious Area(Without LIDs)	Development Area Roofs (Drain to LIDs)	Development Area Roofs (Not Drain to LIDs)	Development Area Other Lot Impervious Area(Driveway, Porch)	Development Area ROW	Development Area SWM Pond Blocks (57% Pervious)	Development Area SWM Pond Blocks (43% Impervious)	Development Area Commercial Block	Development Area Mid/High Rise Block	Total
Area (m^2)	70000	0	3800	0	4700	0	0	0	0	0	0	0	78500
Pervious Area (m^2)	70000	0	3800	0	0	0	0	0	0	0	0	0	73800
Impervious Area (m^2)	0	0	0	0	4700	0	0	0	0	0	0	0	4700
Topography Infiltration Factor	0.2	0.2	0.2	0.2	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	
Soil Infiltration Factor	0.15	0.15	0.15	0.15	N/A	N/A	N/A	N/A	0.15	N/A	N/A	N/A	
Land Cover Infiltration Factor	0.1	0.1	0.1	0.1	N/A	N/A	N/A	N/A	0.1	N/A	N/A	N/A	
MOE Infiltration Factor	0.45	0.45	0.45	0.45	N/A	N/A	N/A	N/A	0.45	N/A	N/A	N/A	
Precipitation (mm/year)	860	860	860	860	860	860	860	860	860	860	860	860	860
Total Inputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	860
Precipitation Surplus (mm/year)[1]	289	289	289	289	774	774	774	774	289	774	774	774	318
Net Surplus (mm/year)	289	289	289	289	774	774	774	774	289	774	774	774	318
Downspout Disconnection Retention[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (mm/year)	571	571	571	571	86	86	86	86	571	86	86	86	542
Roof Evapotranspiration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**	**571**	**571**	**86**	**86**	**86**	**86**	**571**	**86**	**86**	**86**	**542**
Infiltration (mm/year)	130	130	130	130	0	0	0	0	130	0	0	0	122
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	0	0	0	0
Infiltration Trenches	0	0	77	0	279	0	0	0	0	0	0	0	20
Rooftop Infiltration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	**130**	**130**	**207**	**130**	**279**	**0**	**0**	**0**	**130**	**0**	**0**	**0**	**143**
Runoff Pervious Area (mm/year)	159	159	82	159	0	0	0	0	159	0	0	0	146
Runoff Impervious Area (mm/year)	0	0	0	0	495	774	774	774	0	774	774	774	30
Total Runoff (mm/year)	**159**	**159**	**82**	**159**	**495**	**774**	**774**	**774**	**159**	**774**	**774**	**774**	**175**
Total Outputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Precipitation (m^3/year)	60200	0	3268	0	4042	0	0	0	0	0	0	0	67510
Total Inputs (m^3/year)	**60200**	**0**	**3268**	**0**	**4042**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**67510**
Precipitation Surplus (m^3/year)	20230	0	1098	0	3638	0	0	0	0	0	0	0	24966
Net Surplus (m^3/year)	20230	0	1098	0	3638	0	0	0	0	0	0	0	24966
Downspout Disconnection Retention* (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (m^3/year)	39970	0	2170	0	404	0	0	0	0	0	0	0	42544
Roof Evapotranspiration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**39970**	**0**	**2170**	**0**	**404**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**42544**
Infiltration (m^3/year)	9104	0	494	0	0	0	0	0	0	0	0	0	9598
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	0	0	0	0
Infiltration Trenches	0	0	293	0	1311	0	0	0	0	0	0	0	1604
Rooftop Infiltration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	**9104**	**0**	**787**	0	**1311**	0	**0**	**0**	**0**	**0**	**0**	**0**	**11202**
Runoff Pervious Area (m^3/year)	11127	0	311	0	0	0	0	0	0	0	0	0	11438
Runoff Impervious Area (m^3/year)	0	0	0	0	2327	0	0	0	0	0	0	0	2327
Total Runoff (m^3/year)	**11127**	**0**	**311**	0	**2327**	0	**0**	**0**	**0**	**0**	**0**	**0**	**13764**
Total Outputs (m^3/year)	**60200**	**0**	**3268**	**0**	**4042**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**67510**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0

1 - Assumes 10% Evaporation from Impervious Surfaces

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 5	
	Existing Grassed Drainage Area	Total
Area (m^2)	46406	46406
Pervious Area (m^2)	46406	46406
Impervious Area (m^2)	0	0
Infiltration Factors		
Topography Infiltration Factor (Rolling Land)	0.20	
Soil Infiltration Factor (Silty Clay)	0.15	
Land Cover Infiltration Factor (Cultivated Land)	0.10	
MOE Infiltration Factor	0.45	
Inputs (per unit area)		
Precipitation (mm/year)*	860	860
Total Inputs (mm/year)	**860**	**860**
Outputs (per unit area)		
Precipitation Surplus (mm/year)	289	289
Net Surplus (mm/year)	289	289
Downspout Disconnection Retention	0	0
Evapotranpiration (mm/year)*	571	571
Roof Evapotranspiration (mm/year)	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**
Infiltration (mm/year)	130	130
Rooftop Infiltration (mm/year)	0	0
Total Infiltration (mm/year)	**130**	**130**
Runoff Pervious Area (mm/year)	159	159
Runoff Impervious Area (mm/year)	0	0
Total Runoff (mm/year)	**159**	**159**
Total Outputs (mm/year)	**860**	860
Difference (Inputs - Outputs)	0	0
Input Volumes		
Precipitation (m^3/year)	39909	39909
Total Inputs (m^3/year)	**39909**	**39909**
Outputs (Volumes)		
Precipitation Surplus (m^3/year)	13411	13411
Net Surplus (m^3/year)	13411	13411
Downspout Disconnection Retention* (m^3/year)	0	0
Evapotranpiration (m^3/year)	26498	26498
Roof Evapotranspiration (m^3/year)	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0
Total Evapotranspiration (m^3/year)	**26498**	**26498**
Infiltration (m^3/year)	6035	6035
Rooftop Infiltration (m^3/year)	0	0
Total Infiltration (m^3/year)	**6035**	**6035**
Runoff Pervious Area (m^3/year)	7376	7376
Runoff Impervious Area (m^3/year)	0	0
Total Runoff (m^3/year)	**7376**	**7376**
Total Outputs (m^3/year)	**39909**	**39909**
Difference (Inputs - Outputs)	0	0

TABLE 2: WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 5												
	Existing Grassed Drainage Area	Development Area Parks/Open Space	Development Area Lot Pervious Area(With LIDs)	Development Area Lot Pervious Area(Without LIDs)	Development Area Roofs (Drain to LIDs)	Development Area Roofs (Not Drain to LIDs)	Development Area Other Lot Impervious Area(Driveway, Porch)	Development Area ROW	Development Area SWM Pond Blocks (57% Pervious)	Development Area SWM Pond Blocks (43% Impervious)	Development Area Commercial Block	Development Area Mid/High Rise Block	Total
Area (m^2)	43500	0	0	0	0	0	0	0	0	0	0	0	43500
Pervious Area (m^2)	43500	0	0	0	0	0	0	0	0	0	0	0	43500
Impervious Area (m^2)	0	0	0	0	0	0	0	0	0	0	0	0	0
Topography Infiltration Factor	0.2	0.2	0.2	0.2	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	
Soil Infiltration Factor	0.15	0.15	0.15	0.15	N/A	N/A	N/A	N/A	0.15	N/A	N/A	N/A	
Land Cover Infiltration Factor	0.1	0.1	0.1	0.1	N/A	N/A	N/A	N/A	0.1	N/A	N/A	N/A	
MOE Infiltration Factor	0.45	0.45	0.45	0.45	N/A	N/A	N/A	N/A	0.45	N/A	N/A	N/A	
Precipitation (mm/year)	860	860	860	860	860	860	860	860	860	860	860	860	860
Total Inputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	860
Precipitation Surplus (mm/year)[1]	289	289	289	289	774	774	774	774	289	774	774	774	289
Net Surplus (mm/year)	289	289	289	289	774	774	774	774	289	774	774	774	289
Downspout Disconnection Retention[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (mm/year)	571	571	571	571	86	86	86	86	571	86	86	86	571
Roof Evapotranspiration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**	**571**	**571**	**86**	**86**	**86**	**86**	**571**	**86**	**86**	**86**	**571**
Infiltration (mm/year)	130	130	130	130	0	0	0	0	130	0	0	0	130
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	0	182	182	0
Infiltration Trenches	0	0	77	0	279	0	0	0	0	0	0	0	0
Rooftop Infiltration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	**130**	**130**	**207**	**130**	**279**	**0**	**0**	**0**	**130**	**0**	**182**	**182**	**130**
Runoff Pervious Area (mm/year)	159	159	82	159	0	0	0	0	159	0	0	0	159
Runoff Impervious Area (mm/year)	0	0	0	0	495	774	774	774	0	774	592	592	0
Total Runoff (mm/year)	**159**	**159**	**82**	**159**	**495**	**774**	**774**	**774**	**159**	**774**	**592**	**592**	**159**
Total Outputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Precipitation (m^3/year)	37410	0	0	0	0	0	0	0	0	0	0	0	37410
Total Inputs (m^3/year)	**37410**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**37410**
Precipitation Surplus (m^3/year)	12572	0	0	0	0	0	0	0	0	0	0	0	12572
Net Surplus (m^3/year)	12572	0	0	0	0	0	0	0	0	0	0	0	12572
Downspout Disconnection Retention* (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (m^3/year)	24839	0	0	0	0	0	0	0	0	0	0	0	24839
Roof Evapotranspiration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**24839**	**0**	**0**	0	**0**	0	**0**	**0**	**0**	**0**	**0**	**0**	**24839**
Infiltration (m^3/year)	5657	0	0	0	0	0	0	0	0	0	0	0	5657
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	0	0	0	0
Infiltration Trenches	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Infiltration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	**5657**	**0**	**0**	0	**0**	0	**0**	**0**	**0**	**0**	**0**	**0**	**5657**
Runoff Pervious Area (m^3/year)	6914	0	0	0	0	0	0	0	0	0	0	0	6914
Runoff Impervious Area (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Runoff (m^3/year)	**6914**	**0**	**0**	0	**0**	0	**0**	**0**	**0**	**0**	**0**	**0**	**6914**
Total Outputs (m^3/year)	**37410**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**37410**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0

1 - Assumes 10% Evaporation from Impervious Surfaces

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 7	
	Existing Grassed Drainage Area	Total
Area (m^2)	219487	219487
Pervious Area (m^2)	219487	219487
Impervious Area (m^2)	0	0
Infiltration Factors		
Topography Infiltration Factor (Rolling Land)	0.20	
Soil Infiltration Factor (Silty Clay)	0.15	
Land Cover Infiltration Factor (Cultivated Land)	0.10	
MOE Infiltration Factor	0.45	
Inputs (per unit area)		
Precipitation (mm/year)*	860	860
Total Inputs (mm/year)	**860**	**860**
Outputs (per unit area)		
Precipitation Surplus (mm/year)	289	289
Net Surplus (mm/year)	289	289
Downspout Disconnection Retention	0	0
Evapotranpiration (mm/year)*	571	571
Roof Evapotranspiration (mm/year)	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**
Infiltration (mm/year)	130	130
Rooftop Infiltration (mm/year)	0	0
Total Infiltration (mm/year)	**130**	**130**
Runoff Pervious Area (mm/year)	159	159
Runoff Impervious Area (mm/year)	0	0
Total Runoff (mm/year)	**159**	**159**
Total Outputs (mm/year)	**860**	**860**
Difference (Inputs - Outputs)	0	0
Input Volumes		
Precipitation (m^3/year)	188759	188759
Total Inputs (m^3/year)	**188759**	**188759**
Outputs (Volumes)		
Precipitation Surplus (m^3/year)	63432	63432
Net Surplus (m^3/year)	63432	63432
Downspout Disconnection Retention* (m^3/year)	0	0
Evapotranpiration (m^3/year)	125327	125327
Roof Evapotranspiration (m^3/year)	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0
Total Evapotranspiration (m^3/year)	**125327**	**125327**
Infiltration (m^3/year)	28544	28544
Rooftop Infiltration (m^3/year)	0	0
Total Infiltration (m^3/year)	**28544**	**28544**
Runoff Pervious Area (m^3/year)	34887	34887
Runoff Impervious Area (m^3/year)	0	0
Total Runoff (m^3/year)	**34887**	**34887**
Total Outputs (m^3/year)	**188759**	**188759**
Difference (Inputs - Outputs)	0	0

TABLE 2: WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 7												
	Existing Grassed Drainage Area	Development Area Parks/Open Space	Development Area Lot Pervious Area(With LIDs)	Development Area Lot Pervious Area(Without LIDs)	Development Area Roofs (Drain to LIDs)	Development Area Roofs (Not Drain to LIDs)	Development Area Other Lot Impervious Area(Driveway, Porch)	Development Area ROW	Development Area SWM Pond Blocks (57% Pervious)	Development Area SWM Pond Blocks (43% Impervious)	Development Area Commercial Block	Development Area Mid/High Rise Block	Total
Area (m^2)	191500	0	2300	0	5000	0	0	0	0	0	0	0	198800
Pervious Area (m^2)	191500	0	2300	0	0	0	0	0	0	0	0	0	193800
Impervious Area (m^2)	0	0	0	0	5000	0	0	0	0	0	0	0	5000
Topography Infiltration Factor	0.2	0.2	0.2	0.2	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	
Soil Infiltration Factor	0.15	0.15	0.15	0.15	N/A	N/A	N/A	N/A	0.15	N/A	N/A	N/A	
Land Cover Infiltration Factor	0.1	0.1	0.1	0.1	N/A	N/A	N/A	N/A	0.1	N/A	N/A	N/A	
MOE Infiltration Factor	0.45	0.45	0.45	0.45	N/A	N/A	N/A	N/A	0.45	N/A	N/A	N/A	
Precipitation (mm/year)	860	860	860	860	860	860	860	860	860	860	860	860	860
Total Inputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Precipitation Surplus (mm/year)[1]	289	289	289	289	774	774	774	774	289	774	774	774	301
Net Surplus (mm/year)	289	289	289	289	774	774	774	774	289	774	774	774	301
Downspout Disconnection Retention[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (mm/year)	571	571	571	571	86	86	86	86	571	86	86	86	559
Roof Evapotranspiration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**	**571**	**571**	**86**	**86**	**86**	**86**	**571**	**86**	**86**	**86**	**559**
Infiltration (mm/year)	130	130	130	130	0	0	0	0	130	0	0	0	127
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	0	182	182	0
Infiltration Trenches	0	0	77	0	279	0	0	0	0	0	0	0	8
Rooftop Infiltration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	**130**	**130**	**207**	**130**	**279**	**0**	**0**	**0**	**130**	**0**	**182**	**182**	**135**
Runoff Pervious Area (mm/year)	159	159	82	159	0	0	0	0	159	0	0	0	154
Runoff Impervious Area (mm/year)	0	0	0	0	495	774	774	774	0	774	592	592	12
Total Runoff (mm/year)	**159**	**159**	**82**	**159**	**495**	**774**	**774**	**774**	**159**	**774**	**592**	**592**	**167**
Total Outputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Precipitation (m^3/year)	164690	0	1978	0	4300	0	0	0	0	0	0	0	170968
Total Inputs (m^3/year)	**164690**	**0**	**1978**	**0**	**4300**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**170968**
Precipitation Surplus (m^3/year)	55344	0	665	0	3870	0	0	0	0	0	0	0	59878
Net Surplus (m^3/year)	55344	0	665	0	3870	0	0	0	0	0	0	0	59878
Downspout Disconnection Retention* (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (m^3/year)	109347	0	1313	0	430	0	0	0	0	0	0	0	111090
Roof Evapotranspiration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**109347**	**0**	**1313**	**0**	**430**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**111090**
Infiltration (m^3/year)	24905	0	299	0	0	0	0	0	0	0	0	0	25204
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	0	0	0	0
Infiltration Trenches	0	0	177	0	1395	0	0	0	0	0	0	0	1572
Rooftop Infiltration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	**24905**	**0**	**476**	0	**1395**	0	**0**	**0**	**0**	**0**	**0**	**0**	**26776**
Runoff Pervious Area (m^3/year)	30439	0	188	0	0	0	0	0	0	0	0	0	30627
Runoff Impervious Area (m^3/year)	0	0	0	0	2475	0	0	0	0	0	0	0	2475
Total Runoff (m^3/year)	**30439**	**0**	**188**	0	**2475**	0	**0**	**0**	**0**	**0**	**0**	**0**	**33102**
Total Outputs (m^3/year)	**164690**	**0**	**1978**	**0**	**4300**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**170968**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0

1 - Assumes 10% Evaporation from Impervious Surfaces

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 11	
	Existing Grassed Drainage Area	Total
Area (m^2)	282727	282727
Pervious Area (m^2)	282727	282727
Impervious Area (m^2)	0	0
Infiltration Factors		
Topography Infiltration Factor (Rolling Land)	0.20	
Soil Infiltration Factor (Silty Clay)	0.15	
Land Cover Infiltration Factor (Cultivated Land)	0.10	
MOE Infiltration Factor	0.45	
Inputs (per unit area)		
Precipitation (mm/year)*	860	860
Total Inputs (mm/year)	**860**	**860**
Outputs (per unit area)		
Precipitation Surplus (mm/year)	289	289
Net Surplus (mm/year)	289	289
Downspout Disconnection Retention	0	0
Evapotranpiration (mm/year)*	571	571
Roof Evapotranspiration (mm/year)	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**
Infiltration (mm/year)	130	130
Rooftop Infiltration (mm/year)	0	0
Total Infiltration (mm/year)	**130**	**130**
Runoff Pervious Area (mm/year)	159	159
Runoff Impervious Area (mm/year)	0	0
Total Runoff (mm/year)	**159**	**159**
Total Outputs (mm/year)	**860**	**860**
Difference (Inputs - Outputs)	0	0
Input Volumes		
Precipitation (m^3/year)	243145	243145
Total Inputs (m^3/year)	**243145**	**243145**
Outputs (Volumes)		
Precipitation Surplus (m^3/year)	81708	81708
Net Surplus (m^3/year)	81708	81708
Downspout Disconnection Retention* (m^3/year)	0	0
Evapotranpiration (m^3/year)	161437	161437
Roof Evapotranspiration (m^3/year)	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0
Total Evapotranspiration (m^3/year)	**161437**	**161437**
Infiltration (m^3/year)	36769	36769
Rooftop Infiltration (m^3/year)	0	0
Total Infiltration (m^3/year)	**36769**	**36769**
Runoff Pervious Area (m^3/year)	44939	44939
Runoff Impervious Area (m^3/year)	0	0
Total Runoff (m^3/year)	**44939**	**44939**
Total Outputs (m^3/year)	**243145**	**243145**
Difference (Inputs - Outputs)	0	0

TABLE 2: WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 11												
	Existing Grassed Drainage Area	Development Area Parks/Open Space	Development Area Lot Pervious Area(With LIDs)	Development Area Lot Pervious Area(Without LIDs)	Development Area Roofs (Drain to LIDs)	Development Area Roofs (Not Drain to LIDs)	Development Area Other Lot Impervious Area(Driveway, Porch)	Development Area ROW	Development Area SWM Pond Blocks (57% Pervious)	Development Area SWM Pond Blocks (43% Impervious)	Development Area Commercial Block	Development Area Mid/High Rise Block	Total
Area (m^2)	248000	1300	2300	0	5000	0	0	0	0	0	0	0	256600
Pervious Area (m^2)	248000	1300	2300	0	0	0	0	0	0	0	0	0	251600
Impervious Area (m^2)	0	0	0	0	5000	0	0	0	0	0	0	0	5000
Topography Infiltration Factor	0.2	0.2	0.2	0.2	N/A	N/A	N/A	N/A	0.2	N/A	N/A	N/A	
Soil Infiltration Factor	0.15	0.15	0.15	0.15	N/A	N/A	N/A	N/A	0.15	N/A	N/A	N/A	
Land Cover Infiltration Factor	0.1	0.1	0.1	0.1	N/A	N/A	N/A	N/A	0.1	N/A	N/A	N/A	
MOE Infiltration Factor	0.45	0.45	0.45	0.45	N/A	N/A	N/A	N/A	0.45	N/A	N/A	N/A	
Precipitation (mm/year)	860	860	860	860	860	860	860	860	860	860	860	860	860
Total Inputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	860
Precipitation Surplus (mm/year)[1]	289	289	289	289	774	774	774	774	289	774	774	774	298
Net Surplus (mm/year)	289	289	289	289	774	774	774	774	289	774	774	774	298
Downspout Disconnection Retention[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (mm/year)	571	571	571	571	86	86	86	86	571	86	86	86	562
Roof Evapotranspiration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**	**571**	**571**	**86**	**86**	**86**	**86**	**571**	**86**	**86**	**86**	**562**
Infiltration (mm/year)	130	130	130	130	0	0	0	0	130	0	0	0	128
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	0	182	182	0
Infiltration Trenches	0	0	77	0	279	0	0	0	0	0	0	0	6
Rooftop Infiltration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	**130**	**130**	**207**	**130**	**279**	**0**	**0**	**0**	**130**	**0**	**182**	**182**	**134**
Runoff Pervious Area (mm/year)	159	159	82	159	0	0	0	0	159	0	0	0	155
Runoff Impervious Area (mm/year)	0	0	0	0	495	774	774	774	0	774	592	592	10
Total Runoff (mm/year)	**159**	**159**	**82**	**159**	**495**	**774**	**774**	**774**	**159**	**774**	**592**	**592**	**165**
Total Outputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0
Precipitation (m^3/year)	213280	1118	1978	0	4300	0	0	0	0	0	0	0	220676
Total Inputs (m^3/year)	**213280**	**1118**	**1978**	**0**	**4300**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**220676**
Precipitation Surplus (m^3/year)	71672	376	665	0	3870	0	0	0	0	0	0	0	76582
Net Surplus (m^3/year)	71672	376	665	0	3870	0	0	0	0	0	0	0	76582
Downspout Disconnection Retention* (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (m^3/year)	141608	742	1313	0	430	0	0	0	0	0	0	0	144094
Roof Evapotranspiration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**141608**	**742**	**1313**	**0**	**430**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**144094**
Infiltration (m^3/year)	32252	169	299	0	0	0	0	0	0	0	0	0	32721
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	0	0	0	0	0
Infiltration Trenches	0	0	177	0	1395	0	0	0	0	0	0	0	1572
Rooftop Infiltration (m^3/year)	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	**32252**	**169**	**476**	0	**1395**	0	**0**	**0**	**0**	**0**	**0**	**0**	**34293**
Runoff Pervious Area (m^3/year)	39420	207	188	0	0	0	0	0	0	0	0	0	39815
Runoff Impervious Area (m^3/year)	0	0	0	0	2475	0	0	0	0	0	0	0	2475
Total Runoff (m^3/year)	**39420**	**207**	**188**	0	**2475**	0	**0**	**0**	**0**	**0**	**0**	**0**	**42290**
Total Outputs (m^3/year)	**213280**	**1118**	**1978**	**0**	**4300**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**220676**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0	0	0	0

1 - Assumes 10% Evaporation from Impervious Surfaces

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 13	
	Existing Grassed Drainage Area	Total
Area (m^2)	1707921	1707921
Pervious Area (m^2)	1707921	1707921
Impervious Area (m^2)	0	0
Infiltration Factors		
Topography Infiltration Factor (Rolling Land)	0.20	
Soil Infiltration Factor (Silty Clay)	0.15	
Land Cover Infiltration Factor (Cultivated Land)	0.10	
MOE Infiltration Factor	0.45	
Inputs (per unit area)		
Precipitation (mm/year)*	860	860
Total Inputs (mm/year)	**860**	**860**
Outputs (per unit area)		
Precipitation Surplus (mm/year)	289	289
Net Surplus (mm/year)	289	289
Downspout Disconnection Retention	0	0
Evapotranpiration (mm/year)*	571	571
Roof Evapotranspiration (mm/year)	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**
Infiltration (mm/year)	130	130
Rooftop Infiltration (mm/year)	0	0
Total Infiltration (mm/year)	**130**	**130**
Runoff Pervious Area (mm/year)	159	159
Runoff Impervious Area (mm/year)	0	0
Total Runoff (mm/year)	**159**	159
Total Outputs (mm/year)	**860**	860
Difference (Inputs - Outputs)	0	0
Input Volumes		
Precipitation (m^3/year)	1468812	1468812
Total Inputs (m^3/year)	**1468812**	**1468812**
Outputs (Volumes)		
Precipitation Surplus (m^3/year)	493589	493589
Net Surplus (m^3/year)	493589	493589
Downspout Disconnection Retention* (m^3/year)	0	0
Evapotranpiration (m^3/year)	975223	975223
Roof Evapotranspiration (m^3/year)	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0
Total Evapotranspiration (m^3/year)	**975223**	**975223**
Infiltration (m^3/year)	222115	222115
Rooftop Infiltration (m^3/year)	0	0
Total Infiltration (m^3/year)	**222115**	**222115**
Runoff Pervious Area (m^3/year)	271474	271474
Runoff Impervious Area (m^3/year)	0	0
Total Runoff (m^3/year)	**271474**	**271474**
Total Outputs (m^3/year)	**1468812**	**1468812**
Difference (Inputs - Outputs)	0	0

TABLE 2: WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Wetland 13									
	Existing Grassed Drainage Area	Development Area Lot Pervious Area(With LIDs)	Development Area Roofs (Drain to LIDs)	Development Area Other Lot Impervious Area(Driveway, Porch)	Servicing Block/Future Dev	Development Area ROW	Development Area SWM Pond Blocks (57% Pervious)	Development Area SWM Pond Blocks (43% Impervious)	Development Area Commercial Block	Total
Area (m^2)	1610300	23497	26247	4555	300	26900	8265	6235	26500	1732800
Pervious Area (m^2)	1610300	23497	0	0	0	0	8265	0	0	1642062
Impervious Area (m^2)	0	0	26247	4555	300	26900	0	6235	26500	90738
Topography Infiltration Factor	0.2	0.2	N/A	N/A	N/A	N/A	0.2	N/A	N/A	
Soil Infiltration Factor	0.15	0.15	N/A	N/A	N/A	N/A	0.15	N/A	N/A	
Land Cover Infiltration Factor	0.1	0.1	N/A	N/A	N/A	N/A	0.1	N/A	N/A	
MOE Infiltration Factor	0.45	0.45	N/A	N/A	N/A	N/A	0.45	N/A	N/A	
Precipitation (mm/year)	860	860	860	860	860	860	860	860	860	860
Total Inputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	860
Precipitation Surplus (mm/year)[1]	289	289	774	774	774	774	289	774	774	314
Net Surplus (mm/year)	289	289	774	774	774	774	289	774	774	314
Downspout Disconnection Retention[2]	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (mm/year)	571	571	86	86	86	86	571	86	86	546
Roof Evapotranspiration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**571**	**571**	**86**	**86**	**86**	**86**	**571**	**86**	**86**	**546**
Infiltration (mm/year)	130	130	0	0	0	0	130	0	0	123
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	182	3
Infiltration Trenches	0	77	279	0	0	0	0	0	0	5
Rooftop Infiltration (mm/year)[2]	0	0	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	**130**	**207**	**279**	**0**	**0**	**0**	**130**	**0**	**182**	**131**
Runoff Pervious Area (mm/year)	159	82	0	0	0	0	159	0	0	150
Runoff Impervious Area (mm/year)	0	0	495	774	774	774	0	774	592	34
Total Runoff (mm/year)	**159**	**82**	**495**	**774**	**774**	**774**	**159**	**774**	**592**	**183**
Total Outputs (mm/year)	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**	**860**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0
Precipitation (m^3/year)	1384858	20208	22573	3918	258	23134	7108	5362	22790	1490208
Total Inputs (m^3/year)	**1384858**	**20208**	**22573**	**3918**	**258**	**23134**	**7108**	**5362**	**22790**	**1490208**
Precipitation Surplus (m^3/year)	465377	6791	20315	3526	232	20821	2389	4826	20511	544787
Net Surplus (m^3/year)	465377	6791	20315	3526	232	20821	2389	4826	20511	544787
Downspout Disconnection Retention* (m^3/year)	0	0	0	0	0	0	0	0	0	0
Evapotranpiration (m^3/year)	919481	13417	2257	392	26	2313	4719	536	2279	945421
Roof Evapotranspiration (m^3/year)	0	0	0	0	0	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**919481**	**13417**	**2257**	**392**	**26**	**2313**	**4719**	**536**	**2279**	**945421**
Infiltration (m^3/year)	209420	3056	0	0	0	0	1075	0	0	213550
Site Plan Infiltration Target	0	0	0	0	0	0	0	0	4823	4823
Infiltration Trenches	0	1809	7323	0	0	0	0	0	0	9132
Rooftop Infiltration (m^3/year)	0	0	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	**209420**	**4865**	**7323**	**0**	**0**	**0**	**1075**	**0**	**4823**	**227506**
Runoff Pervious Area (m^3/year)	255957	1926	0	0	0	0	1314	0	0	259197
Runoff Impervious Area (m^3/year)	0	0	12992	3526	232	20821	0	4826	15688	58085
Total Runoff (m^3/year)	**255957**	**1926**	**12992**	**3526**	**232**	**20821**	**1314**	**4826**	**15688**	**317281**
Total Outputs (m^3/year)	**1384858**	**20208**	**22573**	**3918**	**258**	**23134**	**7108**	**5362**	**22790**	**1490208**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0	0	0

1 - Assumes 10% Evaporation from Impervious Surfaces

Wetland Feature	Pre-development			Post-development			Comparison (%)
	Total Contributing Area (ha)	Runoff Coeficient C	A x C	Total Contributing Area (ha)	Runoff Coeficient C	A x C	
WT2	8.18	0.25	**2.05**	7.85	0.30	**2.34**	**14%**
WT5	4.64	0.25	**1.16**	4.35	0.25	**1.09**	**-6%**
WT7	21.95	0.25	**5.49**	19.88	0.27	**5.28**	**-4%**
WT11	28.27	0.25	**7.07**	25.66	0.26	**6.73**	**-5%**
WT13	170.79	0.25	**42.70**	173.28	0.29	**49.57**	**16%**

FBWB Runoff Analysis

Feature	Pre-Development Runoff (m^3/year)	Post-Development Runoff (m^3/year)	Runoff Post Development with Mitigation / Pre Development (%)
Wetland 2	12995	13764	106%
Wetland 5	7376	6914	94%
Wetland 7	34887	33102	95%
Wetland 11	44939	42290	94%
Wetland 13	271474	317281	117%

Appendix E Operations and Maintenance Manual

SWM OPERATION AND MAINTENANCE REPORT

MOUNT HOPE WEST
RESIDENTIAL SUBDIVISION
UNITED HOLDINGS INC.

TOWN OF CALEDON

Project: 2024-5476 **February 2026**

Revision	Description	Prepared		Checked	
		By	Date	By	Date
0.0	O&M Report	J. Ghobrial	February 2026	S. Katukurunde	February 2026

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Appendix B: Sample Inspection Checklist and O&M Manual
Appendix C: Operations & Maintenance Cost
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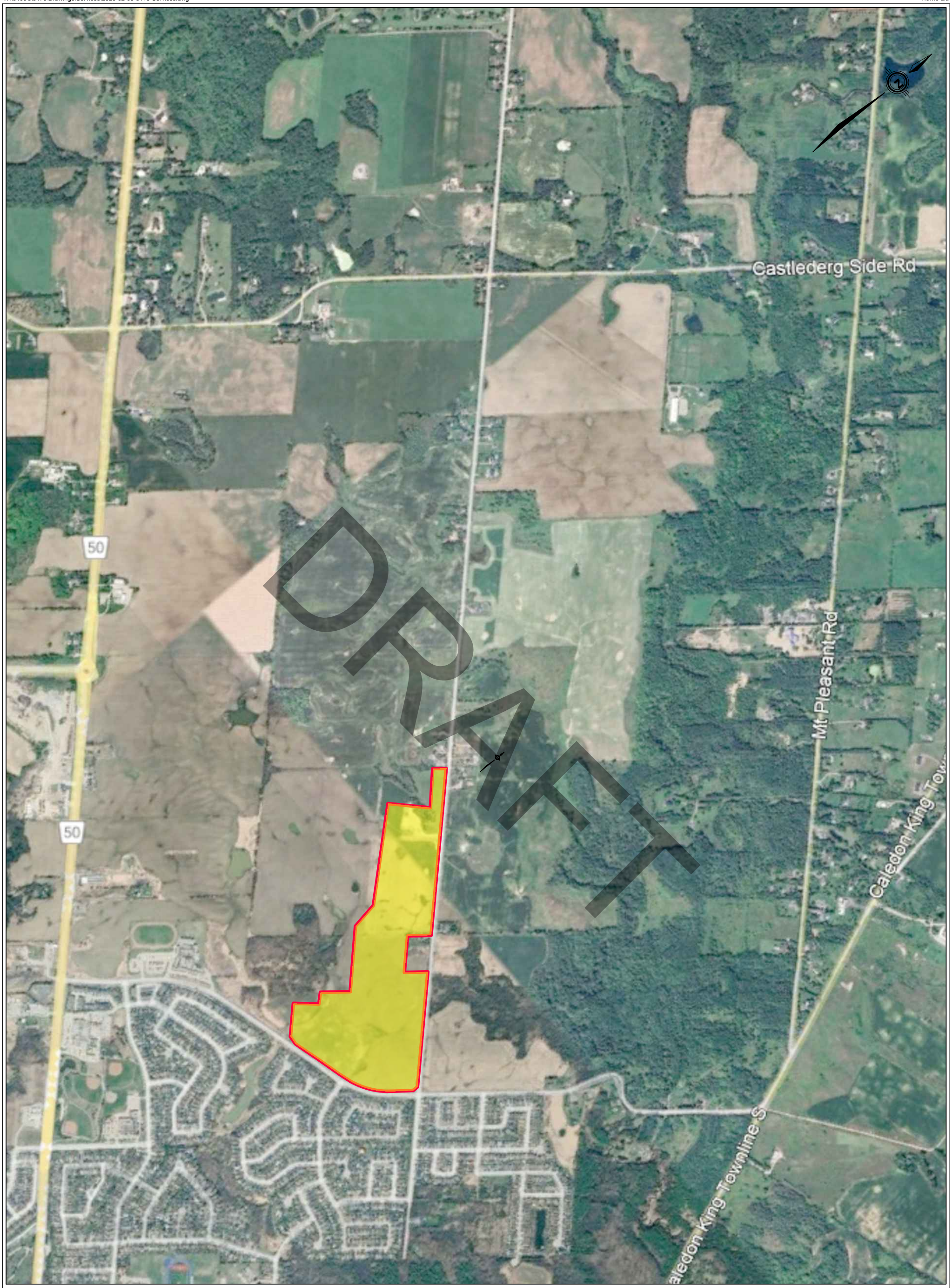
1.0 INTRODUCTION

The purpose of this report is to present a suggested operations and maintenance guideline concerning the Stormwater Management (SWM) measures within the proposed residential development located west of Mount Hope Road, North of Columbia Way as a northerly extension of the existing Bolton community. The subject site is registered as part of Lot 5, Concession 4, W.H.S., Town of Caledon within the Regional Municipality of Peel. The area of the subject lands is approximately **31.98 ha**. A location plan is provided in **Figure 1**. Please note that the preparation of this report considers design information from the Functional Servicing and Stormwater Management Report (FSSR) and should be updated as the detailed design process commences.

The primary SWM measures proposed on-site are backyard infiltration trenches, Clean Water Collector (CWC), and two (2) stormwater management (SWM) ponds, which are intended to provide quantity control, water quality treatment, erosion control, and CLI-ECA compliance in post-development conditions. Based on site grading, an area of approximately **11.52 ha** is proposed to drain to the west SWM pond whereas an area of approximately **18.55 ha** is proposed to drain to the east SWM pond. The storm servicing plan is illustrated in **Figure 2**.

The proposed wet ponds adheres to the Town of Caledon and TRCA Stormwater Design Guidelines, featuring a sediment forebay, wet cell, and filter bed. Erosion control will be achieved by detaining the 25 mm storm event for 48 hours. Quantity control is to be provided for the 2-to-100-year design storms to the appropriate Watershed Flood Control Criteria required by the Toronto and Region Conservation Authority (TRCA). Quality control is provided to achieve an "Enhanced" level by removing 80% of total suspended solids within the permanent pool of the SWM pond. To satisfy the CLI-ECA requirement for 27 mm of runoff volume control, a filter bed is proposed within the SWM pond. The filter bed will provide treatment for the 27 mm storm. Please refer to the FSSR prepared by Schaeffers Consulting Engineers, dated February 2026, for more details.

Engineering drawings for the SWM pond are provided in **Appendix A**. It should be noted that as-built drawings should be referenced for maintenance purposes.



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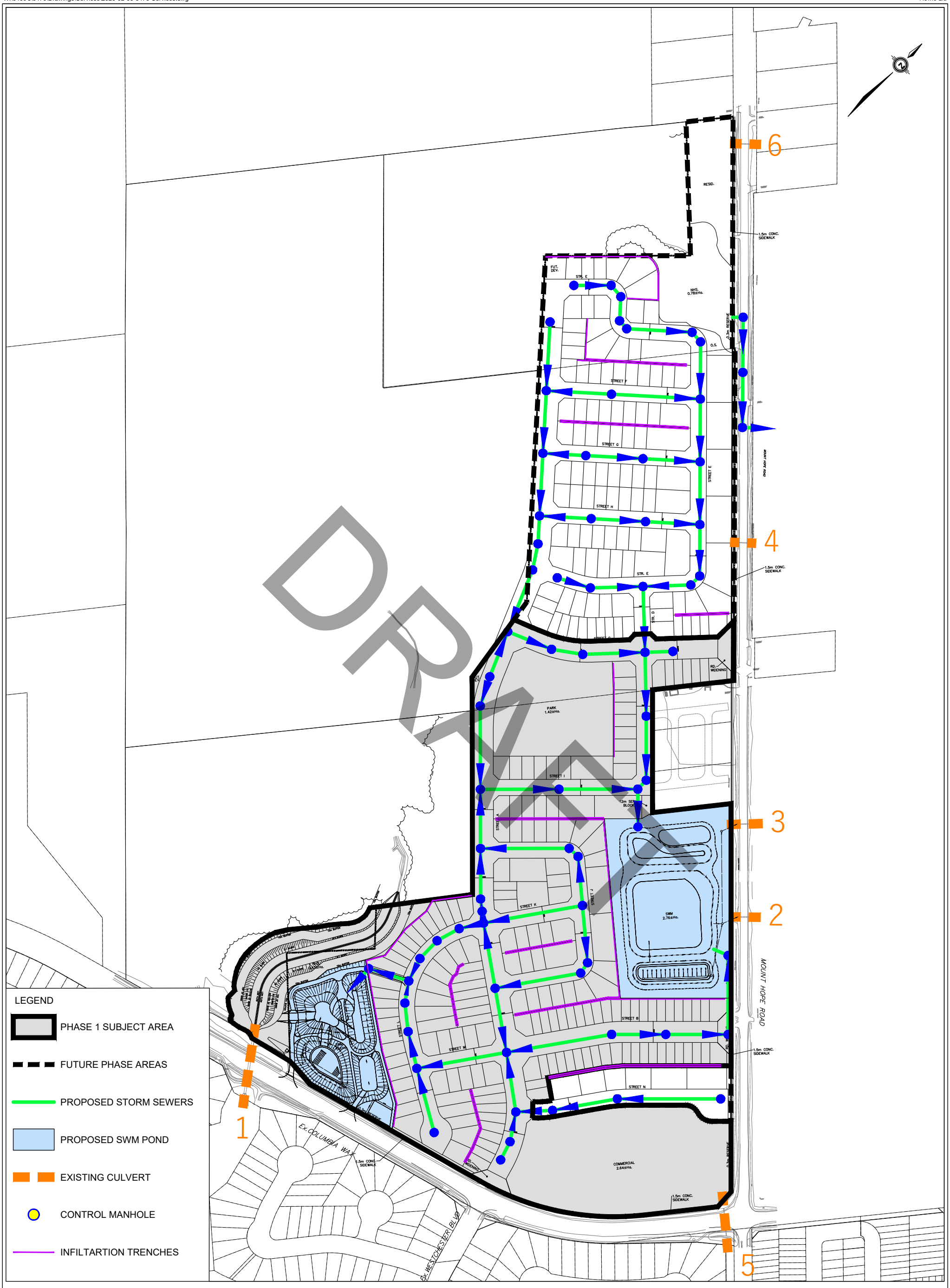
LEGEND

SUBJECT AREA

FIGURE
LOCATION PLAN

2024-5476	FEBRUARY 2026	SCALE: N.T.S.



DRAFT

LEGEND

- PHASE 1 SUBJECT AREA
- FUTURE PHASE AREAS
- PROPOSED STORM SEWERS
- PROPOSED SWM POND
- EXISTING CULVERT
- CONTROL MANHOLE
- INFILTARTION TRENCHES

RESIDENTIAL SUBDIVISION
UNITED HOLDINGS INC. C/O SOLMAR DEVELOPMENT CORP.

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6 Ronrose Drive, Concord, Ontario L4K 4R3
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LEGEND
(AS SHOWN ABOVE)

FIGURE 2
PROPOSED
STORM SERVICING

2024-5476	FEBRUARY 2026	SCALE: N.T.S.

2.0 SILTATION CONTROL

2.1 During Construction

During the construction phase, all siltation control activities will be the responsibility of the developer and their contractors. Erosion and sediment control measures during construction shall be implemented following the approved siltation control drawings. To prevent sediment from discharging directly to the watercourse downstream, erosion and sediment control measures will be implemented in strategic locations. Street catch basins will also be fitted with siltation control traps. The proposed siltation control plan will be designed to the satisfaction of the Town of Caledon and the Toronto and Region Conservation Authority (TRCA).

2.2 Continued Facility Operation by the Town of Caledon upon Assumption

Following the assumption by the Town of Caledon, all inspection and maintenance procedures, as described in the following sections of this report, are to be adhered to. Such inspection and maintenance works will be the responsibility of the Town of Caledon. Appropriate inspection/monitoring checklists have been provided in **Appendix B**. The respective sections in the report discuss the recommended inspection procedures. Results of regular inspection will govern the maintenance frequency of the SWM components proposed for the site.

3.0 FACILITY INSPECTION FREQUENCY AND METHOD

A regular inspection program is required to monitor the west and east SWM facilities while in operation. The SWM facilities should be inspected after every major storm event (25 mm storm or higher) for the first two years of operation. This should translate into an average of four inspections per year for two years. These inspections should be made with a copy of the "as-built" pond drawings and a copy of the Pond Inspection and Monitoring Checklist. The checklist can be found in **Appendix B**.

Following the first 2 years of operation, annual maintenance inspections and procedures should be undertaken. In addition, an annual report for the facilities should be prepared in conjunction with the inspections. The Stormwater Management Practices, Planning and Design Manual by the Ministry of Environment and Energy, March 2003 (SWMP manual) recommends the following items to be included in the report:

- Observations resulting from the inspection of the west and east SWM ponds over the course of the year, including comments on:
    - The hydraulic operation of each facility (detention time, evidence, or occurrence of overflows).
    - Any evidence of erosion.
    - Condition of vegetation in and around each facility.
    - Occurrence of obstructions at the inlet and outlet.
    - Any evidence of spills and oil/grease contamination.
    - Frequency of trash build-up.
    - Measured sediment depths in each SWM pond.
- Monitoring results, if flow or quality monitoring was undertaken during the year.
- Maintenance and operational control were undertaken for each SWM pond during the year.

- Recommendations for each SWM pond inspection and maintenance program for the coming year.

Inspections of SWM facilities should generally occur such that at least 2-3 days have passed since the previous rainfall event to allow for sufficient drainage of water within the detention portion. Specific tasks during inspection should include, but are not limited to, the following activities:

- Inspection of the system at each entry/manhole location.
- Measurement & documentation of the silt level within the SWM facilities, each manhole, and associated pipe openings, with emphasis on the outlets.
- Removal of large trash or debris from pipe inlets/outlets to the SWM facilities.
- Notification of appropriate maintenance personnel if blockages cannot be removed without entry. Entry personnel shall have proper ventilation and training following the Ontario Health and Safety Act (OHSA).
- Sediment levels should be graphed to estimate and re-evaluate the current maintenance interval.

The west SWM pond should be maintained approximately every 13 years and the filterbed maintained every 9 years. The east SWM pond should be maintained approximately every 16 years and the filterbed maintained every 10 years. A sample inspection and maintenance log, which can be brought to each scheduled visit, has been provided in **Appendix B**.

4.0 INSPECTION & MAINTENANCE PROCEDURES

In the early years of the development, the accumulation of large organic material should be minimal, but objects such as tree branches will increase in presence as the development matures. Given the type of development, the generation of oils and other contaminants is not expected. As part of the regular inspection and maintenance operations described in Section 3, any deficiencies in each facility should be rectified. Debris and litter in each pond or on the water surface should be removed. Typically, this work can be carried out manually with hand-held tools, and the resulting debris can be disposed of at the nearest landfill site.

Maintenance access roads have been provided for safe access to each SWM facility. The west SWM pond can be accessed from Columbia Way and the east Swm Pond can be accesed from Mount Hope Road. The access roads will allow for trucks and other equipment to access the SWM facility for inspection, maintenance, and cleaning. Equipment access in the facility itself should be kept to a minimum to avoid disturbing the vegetation and substrate.

4.1 SWM Pond

4.1.1 Outlet Control Structures

The outlet control structures should be inspected on an annual basis to ensure that the outlet is free of clogging. The outlets should also be checked during a large rainfall event to make sure that it is performing to the specifications given in the detailed Stormwater Management Report. It is important to clear away any obstructions from the outlet. A sewer flusher or street cleaner with a hose attachment may be used to flush out any of the pipes associated with the outlet structures. Outlet control valves at the flow control structure should be checked during inspection to ensure they are intact without corrosion.

4.1.2 Grass Cutting

Grass cutting is generally not recommended adjacent to stormwater management facilities to maintain a natural environment and increase water quality benefits.

Should the Town wish to cut the grass around the facility, the following criteria should be adhered to:

- The frequency of cutting must be minimized.
- The grass immediately adjacent to the permanent pool must not be cut, since it maintains shading and nutrient uptake.
- Grass clippings must not be blown into the pond to minimize organic loading.

4.1.3 Weed Control

The need for weed control is not anticipated or recommended practice for this pond. Should the Town wish to control weeds around the pond, the following criteria must be adhered to:

- The use of herbicides and pesticides is prohibited.
- The use of fertilizer, which contributes to nutrient loading and weed growth, should be limited.

4.1.4 Plantings

Any replacement plantings required due to disturbance or die-out (upland, shoreline/flood fringe, aquatic) should follow the approved landscape plans, or as otherwise deemed appropriate by the Town.

4.1.5 Side Slope Revetment

Another minor but more involved maintenance item is regarding side slope and revetment maintenance. Even though side slopes are designed to be stable (i.e., a maximum of 5:1 side slopes), some sloughing or erosion may occur. This type of maintenance would require a small crew with a rubber-tire backhoe or skid steer loader and a small dump truck. The same work may apply to any maintenance required on rip rap or any other revetment.

4.1.6 Regular Maintenance Cost and Equipment

The cost associated with regular maintenance work for a single SWM facility can range from $150-$200 for one man-day of labour for inspection and light litter pick-up to $4,668.20 for one day with a rubber tire backhoe, small dump truck, wheelbarrow, and labourer. The estimated maintenance costs are provided in **Appendix C**.

4.1.7 Filtration Bed Cell

To satisfy the CLI-ECA requirement for 27 mm of runoff volume control, a filter bed is proposed within the west and east SWM pond, specifically designed to treat the 27 mm storm event. The filter bed area is to have regular maintenance to ensure that each filtration facility functions as per the FSSR for the subject site. Given that filtration is to occur once sediment settles within the forebay of each pond, maintenance of the filter bed facility is expected to be low.

Regular maintenance will consist of removing debris, trash, and sediment from the top surface of the infiltration bed as follows:

1. Each filtration bed is to be inspected after each major storm event (ie: 25mm storm or greater).

2. Debris and trash are to be removed after each storm event.

3. The depth of sediment is to be inspected regularly.

4. To maintain the required filtration, sediment is to be removed when the depth of sediment on the top surface of each filtration bed reaches 25 mm.

5. The sediment can be removed with light-duty equipment, depending on the volume of sediment to be removed.

6. The required equipment will consist of a rubber tire backhoe or skid steer loader and a small dump truck.

7. Subdrains beneath each filtration bed are to be inspected after each major storm event to

ensure they are freely conveying flow.

4.1.8 Forebay & Wet Cell

Each forebay and wet cell will need to be inspected periodically to monitor sediment levels. The majority of incoming sediment is expected to settle in each forebay. Each forebay should be visually inspected to ensure sediment levels do not exceed 50% of the permanent pool volume or a depth of 1.37 meter from the bottom. Once the maintenance point is reached, the sediment should be removed. More details on sediment removal are provided in the following sections. Each forebay, wet cell, and filter bed can be accessed from the dediscated access road, which circles the pond.

4.2 Clean Water Collector (CWC) System

Following the Ministry of Environment's Stormwater Management Planning and Design Manual (SWMPD Manual), the CWC systems should be inspected after every significant storm event (i.e., precipitation of 25mm or greater) during the first two years of operation to ensure proper functioning.

Since the ownership of the roof leader system will eventually be transferred to the lot's homeowner, there is a very limited time window to perform monitoring to ensure the performance of the roof gutter, downspout, and roof leader filters, which are connected to the CWC systems. Therefore, the inspection of the roof leader system will commence upon construction and is continued by the developer or builder until the lot's ownership is transferred to the new homeowners.

Before transferring the lot's ownership, the developer or builder should take responsibility for inspecting the roof leader system from every house connected to the CWC systems. The developer or builder should monitor the accumulation of debris in the gutters and ensure the downspout and lead filter are intact and functioning as intended. When inspection indicates blockage or damage, maintenance should be conducted. The maintenance activities include:

- Clear the leaves and debris from the roof gutter and the roof lead filter installed on the

downspout. If a problem with the filter is found, replace it with a new one;

- Prune branches regularly to reduce the accumulation of fallen leaves on the roof.

The operation of the CWC pipes will be undertaken by the City as part of the storm sewer operation program.

As mentioned, the pipes of the CWC systems are proposed to be standard storm sewer pipes. Therefore, there is no further maintenance requirement for the CWC pipes compared with the standard storm sewer pipes. Considering thatonly clean sources are connected to these sewer, the maintenance requirements are expected to be lower compared to standard storm sewers. It is recommended that the CWC systems be inspected as part of the regular storm sewer pipe system inspection program.

4.3 Backyard Infiltration Trench

The lot-level infiltration facilities are proposed to conform to the City's standards. As mentioned, since the ownership of the backyard infiltration trench will be finally transferred to the new homeowners, there is a very limited time window to perform the necessary level of monitoring to ensure the performance of the infiltration facilities before the transfer of the lot's ownership. Therefore, the inspection of the backyard infiltration trenches will commence upon construction of the infiltration facilities and will be continued by the developer or builder until the transfer of the lot's ownership to the new homeowners. Compliance monitoring is recommended to ensure that the infiltration facilities are functioning as designed and meeting the minimum acceptable requirements.

Before transferring the lot's ownership, the developer or builder should take responsibility for inspecting the infiltration facilities after a significant rainfall event (i.e., 25mm of precipitation or greater). The following type of monitoring is recommended:

- Visually inspect the roof leader system, which drains roof runoff to the infiltration trench. Ensure the roof gutters, downspouts, and leader filter are not damaged or clogged by leaves and other debris. The screen in the lead filter is used to prevent leaves, debris, and sediment from entering the infiltration trench. Check if the screen is functioning;

- Visually check the infiltration trench dimensions for collapse or destruction;
- Visually check if there is water ponding above the trench. The consistently ponding water indicates potential clogging and sediment, and maintenance is needed;

Before the transfer of the lot's ownership, the developer or builder should take responsibility for the maintenance when inspection indicates blocking or damage. The maintenance activities include:

- Remove the obstructions at the roof gutter, the leader filter, and connections to the infiltration trenches. If the leader filter doesn't work, repair or replace the filter;
- Repair the soil conditions at the surface of the trenches;
- Any structural damage should be repaired immediately;
- When there are signs of excessive sedimentation and clogging (e.g., ponding water above the infiltration trench), the blockage and accumulated sediment should be removed from the infiltration trench by high-pressure jet flushing or vacuum truck;
- If complete failure is observed, perform total rehabilitation of the facilities by excavating the trench walls to expose clean soil and replace the gravel, geotextile filter fabric, and topsoil.

5.0 SEDIMENT ACCUMULATION AND REMOVAL

Calculation of anticipated sediment volume is not yet an exact science, and at best, the calculations will give an indication of the scale of potential sediment volume that the ponds may receive.

The MOE's SWMP Manual suggests that an average residential development with 55% imperviousness can expect to accumulate approximately 1.9 m^3/ha of sediment per year. The drainage area to the west pond has an imperviousness of 81%. Linear interpolation is therefore performed, resulting in approximately 3.53 m^3/ha of sediment accumulation per year. The drainage area to the east pond has an imperviousness of 72 %. Linear interpolation is therefore performed, resulting in approximately 2.93 m^3/ha of sediment accumulation per year.

To ensure the long-term effectiveness of each stormwater management facility, sediment that is accumulated within either pond should be periodically removed. This subject is described in detail in Section 5.5 of the SWMP Manual and is summarized as follows:

> *Sediment accumulation within the permanent pool of the facility causes a reduction in available storage volume, and will therefore decrease the effective suspended solids removal rate, and may cause other operational problems. The impact of the sediment accumulation must be determined from an assessment of tolerable reductions in performance as compared to the costs and resources required to remove it.*

The SWMP manual specifies that accumulated sediment cleanout procedures should be undertaken when the Total Suspended Solids (TSS) removal efficiency of the SWM facility reaches a value of 5% lower than the required removal efficiency.

5.1 Complete SWM Facility Sediment Removal Frequency

The required TSS removal efficiency for the SWM facilities are based on Level 1 (80%TSS) treatment. It should be noted that the decision to undertake a complete SWM facility cleanout should be based on the yearly inspection results for the forebay, wet cell, and filter bed. If the majority of accumulated sediments are contained within the forebay, a cleanout of the entire SWM

facility may not be required.

5.1.1 West Pond

For the 11.52 ha drainage area with an average weighted imperviousness of 82%, a permanent pool volume of approximately 203 m^3/ha or **2,342 m^3** is required.

As specified, a cleanout of the facility should be undertaken when the removal efficiency is reduced by 5%. The total permanent pool storage reduction when the efficiency is reduced to 75% is approximately **1,774 m^3**. Given a sediment load of **41 m^3 per year,** a complete SWM facility cleanout is estimated to be required after approximately **13 years**. Detailed calculations are provided in **Appendix C** for reference.

5.1.2 East Pond

For the 18.55 ha drainage area (drainage area to the east SWM pond), with an average weighted imperviousness of 72%, a permanent pool volume of approximately **188 m^3/ha** or **3,494 m^3** is required. The pond design provides a permanent pool of **2,000 m^3**.

As specified, a cleanout of the facility should be undertaken when the removal efficiency is reduced by 5%. The total permanent pool storage reduction when the efficiency is reduced to 75% is approximately **2,606 m^3**. Given a sediment load of **55 m^3 per year,** a complete SWM facility cleanout is estimated to be required after approximately **16 years**. Detailed calculations are provided in **Appendix C** for reference.

5.2 Forebay Sediment Removal Frequency

Each forebay is designed to trap the majority of the large sediment and debris and typically requires clean-out on a more frequent basis than each entire SWM facility. To maintain the proper hydraulic operation of each SWM facility, cleanout should be completed when accumulated sediments occupy approximately half the volume of the permanent pool within the forebays or a depth of approximately 1.37 m from the bottom of the permanent pool of the pond.

approximately 1.37 m from the bottom of the permanent pool of the pond.

5.3 Dewatering the Pond for Sediment Removal

Dewatering for the SWM facilities for maintenance purposes should occur on a dry day when the pond contains only the permanent pool volume of water (i.e., max. elevation of 257.30 m for the west SWM pond and 257.50 m for the east SWM pond). Dewatering the SWM facilities can be easily accomplished by pumping the stormwater to the outlet of the pond after installing the required siltation control measures. Please note that the valves that isolate the filter bed area need to be closed before the pond dewatering process starts. Refer to Drawings SWM-1-1 to SWM-2-1 in **Appendix A f**or the Pond Drawings.

5.4 Dredging for Sediment Removal

Dredging for each SWM facility for maintenance purposes should occur on a dry day when the pond contains only the permanent pool volume of water (i.e., max. elevation of 257.30 m for the west SWM pond and 257.50 m for the east SWM pond). For mechanical dredging, it is required to remove the water and lower the forebay and wet cell water levels below the permanent pool elevation to excavate the sediment. For hydraulic dredging, it is unnecessary to drain the forebay and wet cell below the permanent pool elevation. This practice maintains the water pressure on the pond's bottom in equilibrium, which prevents the uplifting of the sediment layers during the cleaning operation.

5.5 Equipment

A rubber-tire backhoe or a track machine with wide tracks for mud would be required due to the wet, soft soil conditions that may be encountered within each SWM facility. The water in the permanent pool should be pumped using a pump designed to handle water and debris (e.g., a 2” Trash Pump). A clamshell is required for sediment removal using the dredging technique.

Other equipment, including dragline, track backhoe, and to a limited extent, a grade-all with a telescopic boom, may also be considered, depending on site conditions. Dump trucks and a rubber-tire backhoe would be required to haul the sediment to an acceptable off-site disposal location.

5.6 Filtration Bed Maintenance

The filtration bed within the SWM facilities is intended to provide runoff volume control to satisfy the 27 mm water balance requirement under the CLI-ECA. As outlined in the FSSR (February 2026), the filtration bed is not intended to serve as a water quality treatment feature. Water quality control is achieved through the permanent pool, which has been designed to provide Enhanced Level (80% TSS removal) treatment. Since runoff entering each filtration bed has already undergone treatment within the permanent pool and forebay, minimal sediment accumulation within each filtration bed is anticipated.

The primary maintenance consideration for the filtration bed relates to the potential clogging of the stone top layer placed over the geotextile and sand media. Over time, fine sediment may accumulate within this top stone layer, reducing infiltration capacity. For the west SWM pond filterbed the stone layer has a sediment storage capacity of approximately **31 m³** (based on a surface area of 960 m², a stone layer of 80 mm and porosity of 40%). For the east SWM pond filterbed the stone layer has a sediment storage capacity of approximately **47 m³** (based on a surface area of 1480 m², a stone layer of 80 mm and porosity of 40%).

The filterbed is to be made up entirely of a sand layer. Sand media is not expected to require frequent maintenance. However, actual performance of the filtration bed should be observed and monitored to determine an appropriate maintenance period based on field data.

6.0 MAINTENANCE COST

In addition to the above-noted maintenance procedures, the following table summarizes the SWM components, their function, and any recommended maintenance procedures required for each item.

6.1 Outlet Control Structure

Cost calculations related to the inspection of the orifice control structures were not done. It is assumed that the inspection will be done concurrently with the SWM ponds. As such, for this analysis, it is assumed that the control structure inspection costs are covered as part of the costing done for the SWM ponds. Given that the inspection of the orifice control structure is primarily visual and relatively brief, this is a fair assumption.

6.2 SWM Pond Cost

6.2.1 West Pond

The maintenance frequency for the SWM pond is approximately every 13 years, and the maintenance frequency for the filtration bed is every 9 years. This includes, but is not limited to, cleaning and regular maintenance. The annual cost (including 10% contingency cost and HST) is approximately **$19,227.52**. Please refer to the detailed breakdown in **Appendix C**.

6.2.2 East Pond

The maintenance frequency for the SWM pond is approximately every 16 years, and the maintenance frequency for the filtration bed is every 10 years. This includes, but is not limited to, cleaning and regular maintenance. The annual cost (including 10% contingency cost and HST) is approximately **$22,079.29**. Please refer to the detailed breakdown in **Appendix C**.

6.3 Summary of Costs

The table below summarizes the annual cost estimate based on the sediment loading, inspection, and maintenance activities and frequencies discussed previously. Please note that these costs are only an estimate, and the true cost may vary based on real-world conditions encountered.

Furthermore, this does not account for inflation over time.

Table 6-1: Summary of Annual Costs

SWM Component	Annual Cost with 10% Contingency and 13% HST
West SWM Pond	**$19,227.52**
East SWM Pond	**$22,079.29**
Total	**$41,306.82**

7.0 WATER QUALITY - EMERGENCY RESPONSE

This section details the probable stormwater system response to a hypothetical water quality emergency. An example of such an event would be 4 litres of motor oil entering either stormwater management system through a street catch basin. Since the drainage area for which either facility provides treatment is a residential development, it is very unlikely that a spill of more environmentally dangerous contaminants would occur.

If this event occurs, the following reactions will take place:

1. If there was no precipitation causing flow in the storm sewer system at the time of the spill, then the oil would remain within the sewer system, close to the location of the original spill.

2. If precipitation occurred at the same time as or after the spill, the flow would transport the oil through the sewer system to the outfall.

3. Upon the eventual arrival of the oil at the SWM outlet, the spill will be contained within the scour pool under most conditions. The 4 litres of oil would spread into a very thin film, overtop of the surface area of the scour pool.

4. If a spill occurs, it will likely be treated in one or more of the following ways (please refer to *Constructed Wetlands for Stormwater Management: A Review published by the Ontario Ministry of Environment and Energy in April 1992*):

    - Volatilization - many pollutants may be dispersed by evaporation. They include oils, mercury, and some chlorinated hydrocarbons.

    - Sedimentation - this is a principal mechanism for the removal of particulate pollutants. The deposition is affected by flow rates, paths, and storm size. Sedimentation is also important in removing suspended solids, particulate nitrogen, oils, chlorinated hydrocarbons, and most heavy metals.

    - Metabolization - the oil may be metabolized by microbes and plants; the rates of

disappearance depend on the organic compounds concerned, the nature of the marsh, and the previous exposure of the microbes to the specific contaminant.

Failure of any SWM features will not impact the subdivision storm drainage and conveyance system, as the bypass system is designed with the capacity to convey the 100-year flows for each pond. However, it will impact the quality control functions of each SWM system on site and should be addressed immediately to minimize impacts on the receiving watercourse.

The table below is a maintenance personnel list, which should be filled out and referenced when a system failure or environmentally hazardous spill occurs, and an emergency response is required. Please see the Spill Management Plan Provided in **Appendix D**.

Table 7-1: Maintenance Personnel Table

Person	Regular Business Hours	After hours / Weekends
Ms.		
Mr.		
Ms.		

8.0 SAFETY CONSIDERATIONS

8.1 General Safety Considerations

To ensure the safety of the public under regular system use, standard safety procedures should be used during regular sewer maintenance and manhole access. When conducting maintenance, proper signage and road occupancy procedures should be followed to limit risk to the public.

8.2 Confined Space Entry

During maintenance activities that require the physical entry of personnel (if necessary) within the underground storage/sump system, all personnel should have valid confined space entry training within the province of Ontario. Procedures carried out during entry shall be consistent with the Ontario Occupational Health and Safety Act (OSHA) and Regulations.

8.3 Vegetation

The landscape plan utilizes strategic location and species to discourage direct access to the SWM facilities and serve a specific function to achieve SWM targets. Any re-vegetation should be completed following these plans.

8.4 Signage

Safety signage should be installed to notify the public of the potential safety concerns associated with the SWM facility proposed on-site.

9.0 CLOSING REMARKS

This report, prepared at the request of the Town of Caledon, acts as an operations and maintenance guideline concerning the west and east SWM facility within the proposed Mount Hope West Residential Subdivision. It provides suggested scheduling of inspection and maintenance activities for each SWM facility, in addition to cost estimates, operational theory, and an inspection/monitoring checklist.

Sincerely,

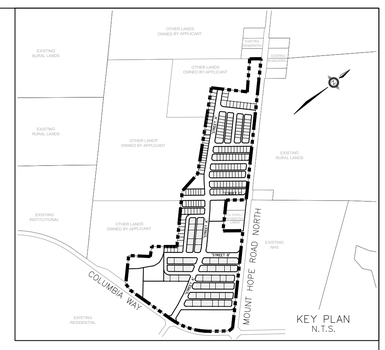
SCHAEFFERS CONSULTING ENGINEERS

Joshua Ghobrial
Water Resources Analyst

Sadh Katukurunde, P.Eng.
Junior Associate

APPENDIX A

Engineering Drawings



KEY PLAN
N.T.S.

LEGEND

- DENOTES PROPOSED STORM MANHOLE
- DENOTES PROPOSED SANITARY MANHOLE
- DENOTES PROPOSED STORM SEWER
- DENOTES PROPOSED SANITARY SEWER
- DENOTES PROPOSED WATERMAIN
- DENOTES PROPOSED INFILTRATION TRENCH
- 246 DENOTES EXISTING CONTOUR AND ELEVATION
- DENOTES PROPERTY LIMIT
- DENOTES OVERLAND FLOW ROUTE
- × 264.59 DENOTES EXISTING ELEVATION
- × 278.60 DENOTES PROPOSED ELEVATION
- N 270.80 W 270.30 DENOTES SANITARY SEWER OBVERT
- N 270.80 W 270.30 E 270.70 DENOTES STORM SEWER OBVERT
- E 281.25 DENOTES CLEAN WATER COLLECTOR OBVERT
- 0.21HA DENOTES DRAINAGE AREA TO WETLAND (INCLUDES ROOF AREA AND BACKYARD)
- DENOTES 3:1 SLOPE

NOTE:
SANITARY INFORMATION GOING NORTH ON MOUNT HOPE ROAD TO BE CONFIRMED.

NO.	DATE	ISSUED FOR
1.	17/05/26	FIRST SUBMISSION TO THE TOWN OF CALEDON / REGION OF PEEL / TRCA

BENCH MARK:
ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF CALEDON BENCH MARK No. 23, HAVING AN ELEVATION OF 308.817 METRES.

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
FEB 27, 2026
PROVINCE OF ONTARIO

RESIDENTIAL SUBDIVISION
UNITED HOLDINGS INC. C/O SOLMAR DEVELOPMENT CORP.

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Region of Peel
Working for you.

TOWN OF CALEDON

SCALE: 1:1250			PROJECT No. 2023-5476
DESIGNED BY: A.C.	DRAWN BY: V.B.		DRAWING No. GR-SS-1
CHECKED BY: N.L.	DATE: DEC. 2025		

F:\5476\5476-DRAWINGS\5476-GRSS-1.dwg, 2026-02-25 11:55:03 AM, gsaini

LEGEND

- 5.0m WIDE MAINTENANCE ACCESS ROAD 300mm DEPTH OF 50mm CRUSHER-RUN LIMESTONE
- RIP-RAP STONE WASHED IN WITH TOPSOIL AND SEEDED, PLACED ON TOP OF 270R TERRAFIX FILTER CLOTH OR APPROVED EQUAL.
- RIP-RAP STONE (150mm MIN.) ON TOP OF 270R TERRAFIX FILTER CLOTH OR APPROVED EQUAL
- FILTER BED AREA
- SEDIMENT DRYING AREA
- FILTER BED AREA
- EL.252.92 — DENOTES PROPOSED GRADE
- + 260.50 — DENOTES PROPOSED ROAD GRADE
- 259.0 — DENOTES EXISTING GROUND CONTOUR LINE
- DENOTES PROP. SWM POND BOTTOM
- DENOTES NORMAL WATER LEVEL (PERMANENT POOL)
- DENOTES 100 YR. W.L. CONTOUR LINE

WEST POND

DESCRIPTION	REQUIRED STORAGE (m^3)	PROVIDED STORAGE (m^3)
PERMANENT POOL EL.255.50–EL.257.30	2,400m^3	4,400m^3
100 YR. WATER LEVEL EL.257.30–EL.258.70	9,600m^3	10,000m^3
EROSION CONTROL EL.257.30–EL.259.00	2,300m^3	2,386m^3
FILTER BED AREA	850m^2	1000m^2
SEDIMENT DRYING AREA	600m^2	650m^2

NO.	DATE	ISSUED FOR
1.	17/05/26	FIRST SUBMISSION TO THE TOWN OF CALEDON / REGION OF PEEL / TRCA

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TOWN OF CALEDON

WEST SWM POND

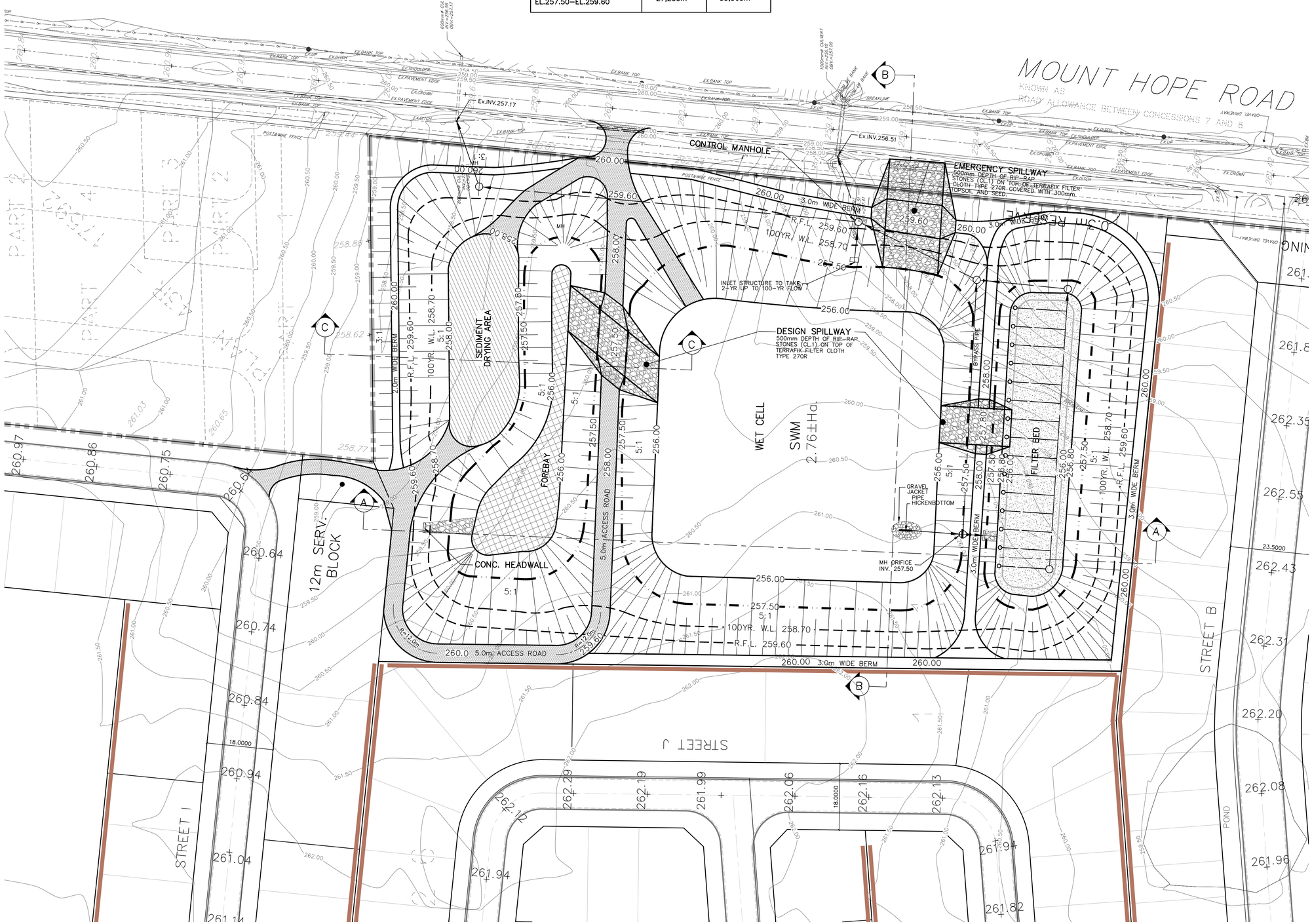
SCALE: 1:500			PROJECT No. 2024-5476
DESIGNED BY: A.C.	DRAWN BY: V.B.		
CHECKED BY: N.L.	DATE: FEB 2025		DRAWING No. SWM-1-1

F:\5476\5476-SWM\5476-POND 1.dwg, 2026-02-25 11:52:52 AM, gsalni

EAST POND

DESCRIPTION	REQUIRED STORAGE (m^3)	PROVIDED STORAGE (m^3)
PERMANENT POOL EL.256.00–EL.257.50	3,500m^3	17,700m^3
100 YR. WATER LEVEL EL.257.50–EL.258.70	13,100m^3	17,865m^3
REGIONAL FLOODLINE EL.257.50–EL.259.60	27,200m^3	35,565m^3

DESCRIPTION	REQUIRED STORAGE (m^3)	PROVIDED STORAGE (m^3)
EROSION CONTROL EL.257.50–EL.257.80	3,300m^3	3,390m^3
FILTER BED AREA	1,215m^2	1,500m^2
SEDIMENT DRYING AREA	1000m^2	1,000m^2


MOUNT HOPE ROAD
KNOWN AS
ROAD ALLOWANCE BETWEEN CONCESSIONS 7 AND 8
600mmø CULVERT INV.=255.10 OUT=255.17
1000mmø CULVERT INV.=255.10 OUT=255.00
Ex.INV.257.17
Ex.INV.256.51
CONTROL MANHOLE
EMERGENCY SPILLWAY
500mm DEPTH OF RIP-RAP STONES (CL.1) ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R COVERED WITH 300mm. TOPSOIL AND SEED.
3.0m WIDE BERM
R.F.L. 259.60
100YR. W.L. 258.70
257.50
INLET STRUCTURE TO TAKE 2+YR UP TO 100-YR FLOW
DESIGN SPILLWAY
500mm DEPTH OF RIP-RAP STONES (CL.1) ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R
SEDIMENT DRYING AREA
2.0m WIDE BERM
3:1
5:1
258.00
257.80
257.50
256.00
FOREBAY
WET CELL
SWM 2.76±Ha.
5.0m ACCESS ROAD
CONC. HEADWALL
12m SERV. BLOCK
BYPASS PIPE
FILTER BED
GRAVEL JACKET PIPE HICKENBOTTOM
MH ORIFICE INV. 257.50
STREET I
STREET J
STREET B
POND
18.0000
260.0 5.0m ACCESS ROAD
260.00 3.0m WIDE BERM
PART 1
PART 2
PART 3
PART 4
PART 5
PART 6
PART 7
PART 8
PART 9
PART 10
PART 11
PART 12
PART 13
PART 14
PART 15
PART 16
PART 17
PART 18
PART 19
PART 20
PART

APPENDIX B

Sample Inspection Checklist and O&M Manual

SWM Facility Inspection/Monitoring Checklist

Inspection Date:_____

Inspector:_____

Recent Weather:_____ **Current Weather:**_____

	Item	Maintenance Required (Y/N)	Comments
1	Outlet Blockage		
2	Inlet Blockage		
3	Hydrocarbon (oil) Build-up		
4	Sediment Depth (has minimum depth of 0.10 m been achieved at low point in main cell?)		
5	Trash Build-up		
6	Inlet Structure		
7	Outlet Structure		
8	Maintenance Access		

APPENDIX C

Operation and Maintenance Cost

Mount Hopoe West Residential Subdivision
Town of Caledon
Project # 5476

SWM Facility Cleanout Frequency Calculation		
West SWM Pond		
Input:		
Drainage Area =	11.52	ha
Imperviousness =	81	%
Level 1 Storage Required =	203	m^3/ha (80% TSS)
Level 2 Storage Required =	105	m^3/ha (70% TSS)
Provided Permanent Pool Storage =	2,342	m^3
Annual Sediment Loadings* =	3.53	m^3/ha
Output:		
5% Storage Reduction =	154.0	m^3/ha (75% TSS)
5% Storage Reduction =	1774.1	m^3 (75% TSS)
Permanent Pool Storage Reduction =	567.9	m^3 (Sediments)
Annual Sediment Loadings =	41.00	m^3
Total Permanent Pool Storage Reduction =	568	m^3 (Sediments)
Total Annual Sediment Loadings =	41	m^3
Maintenance Frequency =	13.85	Years

* Based on Table 6.3 in MOE SWMP Design Manual, March 2003

Mount Hopoe West Residential Subdivision
Town of Caledon
Project # 5476

SCHAEFFERS
CONSULTING ENGINEERS

WATER QUALITY REQUIREMENT CALCULATIONS
West SWM Pond

Table 3.2: Water Quality Storage Requirements Based on Receiving Waters

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
2	Wet Pond	90	110	130	150

* For wet ponds, all of the storage, except for 40 m^3/ha represents the permanent pool volume. The 40 m^3/ha represents extended detention storage.

Input:

Estimated Imperviousness =	81%	
Area =	11.52	ha
Level of Protection:	2	
SWMP Type :	Wet Pond	

Calculation:

Total Storage Volume Required =	145	m^3/ha →	1,667	m^3
Permanent Pool Volume =	105	m^3/ha →	1,206	m^3
Active Storage Volume =	40	m^3/ha →	461	m^3

Mount Hopoe West Residential Subdivision
Town of Caledon
Project # 5476

SCHAEFFERS
CONSULTING ENGINEERS

WATER QUALITY REQUIREMENT CALCULATIONS
West SWM Pond

Table 3.2: Water Quality Storage Requirements Based on Receiving Waters

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
2	Wet Pond	140	190	225	250

* For wet ponds, all of the storage, except for 40 m^3/ha represents the permanent pool volume. The 40 m^3/ha represents extended detention storage.

Input:

Estimated Imperviousness =	81%	
Area =	11.52	ha
Level of Protection:	1	
SWMP Type :	Wet Pond	

Calculation:

Total Storage Volume Required =	243	m^3/ha →	2,803	m^3
Permanent Pool Volume =	203	m^3/ha →	2,342	m^3
Active Storage Volume =	40	m^3/ha →	461	m^3

Mount Hopoe West Residential Subdivision
Town of Caledon
Project # 5476

SWM Facility Cleanout Frequency Calculation	
East SWM Pond	
Input:	
Drainage Area =	18.55 ha
Imperviousness =	72 %
Level 1 Storage Required =	188 m^3/ha (80% TSS)
Level 2 Storage Required =	93 m^3/ha (70% TSS)
Provided Permanent Pool Storage =	3,494 m^3
Annual Sediment Loadings* =	2.93 m^3/ha
Output:	
5% Storage Reduction =	140.5 m^3/ha (75% TSS)
5% Storage Reduction =	2606.3 m^3 (75% TSS)
Permanent Pool Storage Reduction =	887.7 m^3 (Sediments)
Annual Sediment Loadings =	55.00 m^3
Total Permanent Pool Storage Reduction =	888 m^3 (Sediments)
Total Annual Sediment Loadings =	55 m^3
Maintenance Frequency =	16.14 Years

* Based on Table 6.3 in MOE SWMP Design Manual, March 2003

Mount Hopoe West Residential Subdivision
Town of Caledon
Project # 5476

SCHAEFFERS
CONSULTING ENGINEERS

WATER QUALITY REQUIREMENT CALCULATIONS
East SWM Pond

Table 3.2: Water Quality Storage Requirements Based on Receiving Waters

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
2	Wet Pond	90	110	130	150

* For wet ponds, all of the storage, except for 40 m^3/ha represents the permanent pool volume. The 40 m^3/ha represents extended detention storage.

Input:

Estimated Imperviousness =	72%	
Area =	18.55	ha
Level of Protection:	2	
SWMP Type :	Wet Pond	

Calculation:

Total Storage Volume Required =	133	m^3/ha →	2,461	m^3
Permanent Pool Volume =	93	m^3/ha →	1,719	m^3
Active Storage Volume =	40	m^3/ha →	742	m^3

Mount Hopoe West Residential Subdivision
Town of Caledon
Project # 5476

SCHAEFFERS
CONSULTING ENGINEERS

WATER QUALITY REQUIREMENT CALCULATIONS
East SWM Pond

Table 3.2: Water Quality Storage Requirements Based on Receiving Waters

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
2	Wet Pond	140	190	225	250

* For wet ponds, all of the storage, except for 40 m^3/ha represents the permanent pool volume. The 40 m^3/ha represents extended detention storage.

Input:

Estimated Imperviousness =	72%	
Area =	18.55	ha
Level of Protection:	1	
SWMP Type :	Wet Pond	

Calculation:

Total Storage Volume Required =	228	m^3/ha →	4,236	m^3
Permanent Pool Volume =	188	m^3/ha →	3,494	m^3
Active Storage Volume =	40	m^3/ha →	742	m^3

Operations & Maintenance Costs

Filter bed Expected Maintainance

System	Drainage Area (ha)	Imp. %	Treatment Train measure	Unit Sediment Loading Rate (m3 / ha/yr.)*	Annual Sediment Loading Rate (m3/yr)	Sediment Capacity of Filter bed (25mm accumulation on surface area) (m^3)	TSS Removal (%)	Sediment Loading Reduction (m3/yr.)	Adjusted Sediment Loading Rate to Filterbed	Number of Years Before Maint.
	A	B		C	D = A x C	E	F	G = D x F	h = D - G	L = E/H
West Pond - Filterbed	11.52	81%	Filterbed	3.53	8.13	30.72	60%	4.88	**3.25**	9.4
East Pond - Filterbed	18.55	72%	Filterbed	2.93	10.87	47.36	60%	6.52	**4.35**	10.9

Notes:

* Loading Rates are based on MOE SWM Manual Table 6.3 Anual Sediment Loadings

West SWM Pond Operations and Maintenance Costs Calculations

Annual Maintenance Costs					
Type of Maintenance	**Maintenance Interval (yrs)**	**Unit**	**Quantity**	**Unit Cost ($/unit)**	**Total Cost ($)**
Debris and Litter Removal	1	Lump sum	1	4,668.20	4,668.20
Grass Cutting and Weed Control	2	ha	0.26	2,750.00	363.31
Inspection (Inlet/Outlet etc.)	1	Lump sum	1	100.00	100.00
Vegetation Maintenance (Aquatic Shoreline Fringe)	5	ha	0.26	3,500.00	184.76
Equipment Cost for Vegetation Maintenance (see attached. Calc.)	5	Calculated	1	3,209.56	641.91
Vegetation Maintenance (Upland/Flood Fringe)	5	ha	0.54	1,000.00	107.28
Equipment Cost for Vegetation Maintenance (see attached. Calc.)	5	Calculated	1	3,209.56	641.91
Outlet Structure and Maintenance Sewers Cleanout	2	Lump sum	1	2,000.00	1,000.00
Slopes Revetment (once every two years-Labor + Equipment cost)	2	Calculated	0.66	1,458.64	480.48
					8,187.85
SWM Pond Cleaning Cost					
Mobilization	13	Lump sum	1	7,264.00	7,264.00
Installing Erosion and Sediment Control Measures	13	Lump sum	1	2,400.00	2,400.00
Lowering water level to allow for survey	13	Lump sum	1	9,800.00	9,800.00
Pre-cleaning survey cost	13	Lump sum	1	2,100.00	2,100.00
Removal and disposal of silt	13	m^3	568.00	97.00	55,096.00
Reinstate the stone filter of existing Hickenbottom and flush	13	Lump sum	1	2,000.00	2,000.00
Mud and dust control measures	13	Lump sum	1	2,100.00	2,100.00
Traffic control	13	Lump sum	1	1,200.00	1,200.00
Post-cleaning survey and pond capacity calculation	13	Lump sum	1	2,600.00	2,600.00
Restoration of all disturbed and damaged areas	13	ha	0.16	8,700.00	1,397.19
Supply and install new Stone in Outfall	13	Lump sum	1	1,500.00	1,500.00
Total Pond Cleaning Cost		year	13	**6,727.48**	**87,457.19**
Plus 13% HST		Lump sum	1	11,369.43	**98,826.62**
Filterbed Cleaning Cost					
Removal and disposal of silt/stones	9	m^3	30.72	97.00	2,979.84
Reinstate the stone filter	9	Lump sum	1	2,000.00	2,000.00
Filterbed Cleaning Cost		year	9	**553.32**	**4,979.84**
Plus 13% HST		Lump sum	1	647.38	**5,627.22**
SWM Pond Total Annual Costs					
Total Annual Cost	1	year	1	15,468.64	15,468.64
Plus 10% contingency cost	1	year	1	1,546.86	17,015.51
Plus 13% HST	1	year	1	2,212.02	**19,227.52**

Notes:

1. *No grass cutting or minimal frequency of grass cutting (once or twice per year) as per MOE Manual (March 2003)*
2. *Please refer to the attached calculation for the labor and equipment cost for debris and litter removal.*

41,306.82

East SWM Pond Operations and Maintenance Costs Calculations

Annual Maintenance Costs					
Type of Maintenance	**Maintenance Interval (yrs)**	**Unit**	**Quantity**	**Unit Cost ($/unit)**	**Total Cost ($)**
Debris and Litter Removal	1	Lump sum	1	4,668.20	4,668.20
Grass Cutting and Weed Control	2	ha	0.69	2,750.00	944.55
Inspection (Inlet/Outlet etc.)	1	Lump sum	1	100.00	100.00
Vegetation Maintenance (Aquatic Shoreline Fringe)	5	ha	0.80	3,500.00	562.14
Equipment Cost for Vegetation Maintenance (see attached. Calc.)	5	Calculated	1	3,209.56	641.91
Vegetation Maintenance (Upland/Flood Fringe)	5	ha	0.71	1,000.00	141.77
Equipment Cost for Vegetation Maintenance (see attached. Calc.)	5	Calculated	1	3,209.56	641.91
Outlet Structure and Maintenance Sewers Cleanout	2	Lump sum	1	2,000.00	1,000.00
Slopes Revetment (once every two years-Labor + Equipment cost)	2	Calculated	1.35	1,458.64	984.74
					9,685.23
SWM Pond Cleaning Cost					
Mobilization	16	Lump sum	1	7,264.00	7,264.00
Installing Erosion and Sediment Control Measures	16	Lump sum	1	2,400.00	2,400.00
Lowering water level to allow for survey	16	Lump sum	1	9,800.00	9,800.00
Pre-cleaning survey cost	16	Lump sum	1	2,100.00	2,100.00
Removal and disposal of silt	16	m^3	888.00	97.00	86,136.00
Reinstate the stone filter of existing Hickenbottom and flush	16	Lump sum	1	2,000.00	2,000.00
Mud and dust control measures	16	Lump sum	1	2,100.00	2,100.00
Traffic control	16	Lump sum	1	1,200.00	1,200.00
Post-cleaning survey and pond capacity calculation	16	Lump sum	1	2,600.00	2,600.00
Restoration of all disturbed and damaged areas	16	ha	0.18	8,700.00	1,592.58
Supply and install new Stone in Outfall	16	Lump sum	1	1,500.00	1,500.00
Total Pond Cleaning Cost		year	16	**7,418.29**	**118,692.58**
Plus 13% HST		Lump sum	1	15,430.04	**134,122.62**
Filterbed Cleaning Cost					
Removal and disposal of silt/stones	10	m^3	47.36	97.00	4,593.92
Reinstate the stone filter	10	Lump sum	1	2,000.00	2,000.00
Filterbed Cleaning Cost		year	10	**659.39**	**6,593.92**
Plus 13% HST		Lump sum	1	857.21	**7,451.13**
SWM Pond Total Annual Costs					
Total Annual Cost	1	year	1	17,762.91	17,762.91
Plus 10% contingency cost	1	year	1	1,776.29	19,539.20
Plus 13% HST	1	year	1	2,540.10	**22,079.29**

Notes:

1. *No grass cutting or minimal frequency of grass cutting (once or twice per year) as per MOE Manual (March 2003)*
2. *Please refer to the attached calculation for the labor and equipment cost for debris and litter removal.*

Cost Breakdown for Debris and Litter Removal from SWM Pond Block

Equipment			Cost/day ($)		
Type of Equipment	No		Rental*	Operator	Total Cost/day
Backhoe Loader	1		649.00	618.08	1267.08
Dump Truck	1		637.84	570.00	1207.84
Wheelbarrow	1		176.00	558.64	734.64
Total Equipment Cost/day ($)					3210
Labor Cost ($)					
	No		Cost/cap/day ($)	Total Cost/day	
	1	Wheelbarrow	735		
Labor	1	Foreman	724		
Total				1458.64	
Total Equipment and Labor Cost/day					**4668.20**

Table 1: Equipment Cost Estimation for Vegetation Maintenance

Equipment	No.	Rental Cost ($)		Operator Cost ($)		Total Cost ($)	
		Per hour	per day	Per hour	per day	Per hour	per day
Backhoe Loader	1	81.13	649.00	77.26	618.08	158.39	1267
Dump Truck	1	79.73	637.84	71.25	570.00	150.98	1208
Wheelbarrow	1	22.00	176.00	69.83	558.64	91.83	735
Total cost per day (8 hours per day)							3210

Table 2: Slope Revetment Equipment and Labour Cost Estimation

Equipment	No.	Rental Cost ($)		Operator Cost ($)		Total Cost ($)	
		Per hour	per day	Per hour	per day	Per hour	per day
Wheelbarrow	1	22.00	176.00	69.83	558.64	91.83	735
Foreman	1	0.00	0.00	90.50	724.00	90.50	724
Total cost per day (8 hours per day)							1459

APPENDIX D

Spill Management

1.4 Spill Reporting

Spill reporting is one of the most important elements of the spill management plan. For most accidental spills, the laws of Ontario require that specific rules and procedures be followed. The person who has control of a substance that spills and is likely to harm the environment must follow the procedures set out in the Environmental Protection Act as follows:

- Must report the spill to the Ministry of the Environment, Conservation and Parks (MECP) Spills Action Centre. This office is open 24 hours a day, seven days a week. Call the Spills Action Centre at (416) 325 – 3000 or toll-free at 1-800-268-6060;
- Must report the spill to your municipality;
- Must contact the owner or person in control of the spilled contaminants if they are not already aware of the spill.

1.5 Spill Response and Clean-up

After a leak or spill, the owner or person in control of the contaminant will usually be required to clean it up. In the event of a major spill, the Ministry may choose to handle the clean-up themselves. If necessary, the Ministry can sometimes enter a contaminated property even without the permission of the owner. After the clean-up, the Ministry will usually try to recover the cost of the clean-up from the owner or the person in control of the contaminant.

February, 2026

Our File: 2024 - 5476

SCHAEFFERS
CONSULTING ENGINEERS

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SPILL MANAGEMENT PLAN

Mount Hope West Residential Subdivision
Town of Caledon, Ontario

---

1 Introduction

This construction Spill Management Plan is prepared to mitigate the risk of a spill incident.

In Ontario, a spill is a discharge of a pollutant into the natural environment that can be from or out of a structure, vehicle, or another container.

The spills may not be a routine occurrence, but their impacts when they do occur can be substantial. Responding to these incidents quickly and effectively can greatly reduce the extent to which the natural environment is adversely impacted, and the resources needed for clean-up efforts. Having a spill response and control plan in place is also an important step in preventing environmental harm.

An effective Spill Management Plan will include at least the following elements:

- Spill Prevention
- Spill Control
- Spill Communication and Notification

- Spill Reporting
- Spill response and clean-up

1.1 Spill Prevention

Spill prevention planning is a key element for protecting the environment during construction. As in many cases, a small prevention is worth a lot of cures. Best practices for preventing spills to be followed on-site include:

- Store pollutants in a secure area at least 15 metres away from natural water features, storm drains, or drainage channels;
- Maximum efforts are to be made to contain any potential spills within the area designated for fuel storage. If fuel for vehicles is going to be stored on-site, spill containment pallets are to be used as a buffer to prevent spill to the environment;
- Ensure pollutants brought on-site are delivered directly to the designated storage area, and that deliveries are supervised by knowledgeable on-site staff
- Locate any designated vehicle maintenance areas at least 15 metres away from natural features and storm drains;
- A spill kit and appropriate sorbents are to be kept in a central location and key vehicles. The staff should know how to use the kit to clean up minor spills;
- Use Drain Seals, Storm Drain Filter, and Sorbents to prevent the spread of spills;
- Ensure that the machinery and equipment used during construction operations in sensitive areas are appropriately sized for the activity and also be well-maintained.

1.2 Spill Control

Implement the required measures to control the spill as follows:

- Perform and maintain an accurate inventory of the pollutants in the workplace;

- Inspect pollutant storage areas regularly and ensure that control measures around them are kept in good working order. Ensure that pollutant storage containers are properly sealed and undamaged;

- Maintain the pollutant storage containers regularly and replace the defective containers immediately after detection;

- Any leakage is to be documented and reported immediately. Required measures to prevent the spread of the pollutant are to be identified and implemented by well-trained and qualified staff;

- All minor spills are to be immediately contained, cleaned up, and removed from the site. Documentation of the incident and clean-up actions are to be kept.

1.3 Spill Communication and Notification

Continuous communication with the staff and employees and raising awareness among the employees about the risks associated with spills will have a significant role in preventing and controlling spills. The items outlined below will help in maintaining effective communication among stakeholders:

- Spill prevention and control is to be identified as a high-priority goal for the construction site staff and employees;

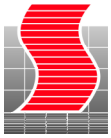
- Regular communication and information sharing among project employees and staff is to be maintained;

- Frequent spill prevention and control meetings are to be scheduled and attended by project staff involved in spill control;

- Spill Management requirements and staff achievements are to be discussed in Site Meetings;

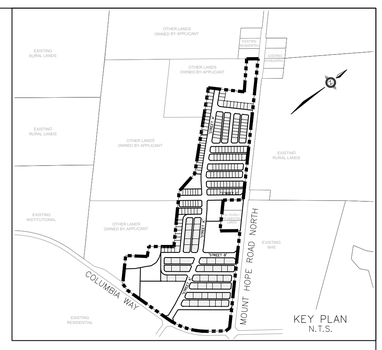
- Spill notification is to be issued as soon as a spill happens. The neighboring properties, businesses, and any communities that will be affected by the spill are to be notified

- Staff to be trained in Spill Management.



Appendix F

Engineering Drawings



KEY PLAN
N.T.S.

LEGEND

- DENOTES PROPOSED STORM MANHOLE
- DENOTES PROPOSED SANITARY MANHOLE
- DENOTES PROPOSED STORM SEWER
- DENOTES PROPOSED SANITARY SEWER
- DENOTES PROPOSED WATERMAIN
- DENOTES PROPOSED INFILTRATION TRENCH
- 246 DENOTES EXISTING CONTOUR AND ELEVATION
- DENOTES PROPERTY LIMIT
- DENOTES OVERLAND FLOW ROUTE
- × 260.09 DENOTES EXISTING ELEVATION
- × 278.60 DENOTES PROPOSED ELEVATION
- N 270.80 W 270.30 DENOTES SANITARY SEWER OBVERT
- N 270.80 W 270.30 E 270.70 DENOTES STORM SEWER OBVERT
- E 281.25 DENOTES CLEAN WATER COLLECTOR OBVERT
- 0.21HA DENOTES DRAINAGE AREA TO WETLAND (INCLUDES ROOF AREA AND BACKYARD)
- DENOTES 3:1 SLOPE

NOTE:
SANITARY INFORMATION GOING NORTH ON MOUNT HOPE ROAD TO BE CONFIRMED.

NO.	DATE	ISSUED FOR
1.	17/05/26	FIRST SUBMISSION TO THE TOWN OF CALEDON / REGION OF PEEL / TRCA

BENCH MARK:
ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF CALEDON BENCH MARK No. 23, HAVING AN ELEVATION OF 308.817 METRES.

REGISTERED PROFESSIONAL ENGINEER H.SARKISSIAN FEB 27, 2026 PROVINCE OF ONTARIO

RESIDENTIAL SUBDIVISION
UNITED HOLDINGS INC. C/O SOLMAR DEVELOPMENT CORP.

SCHAEFFERS
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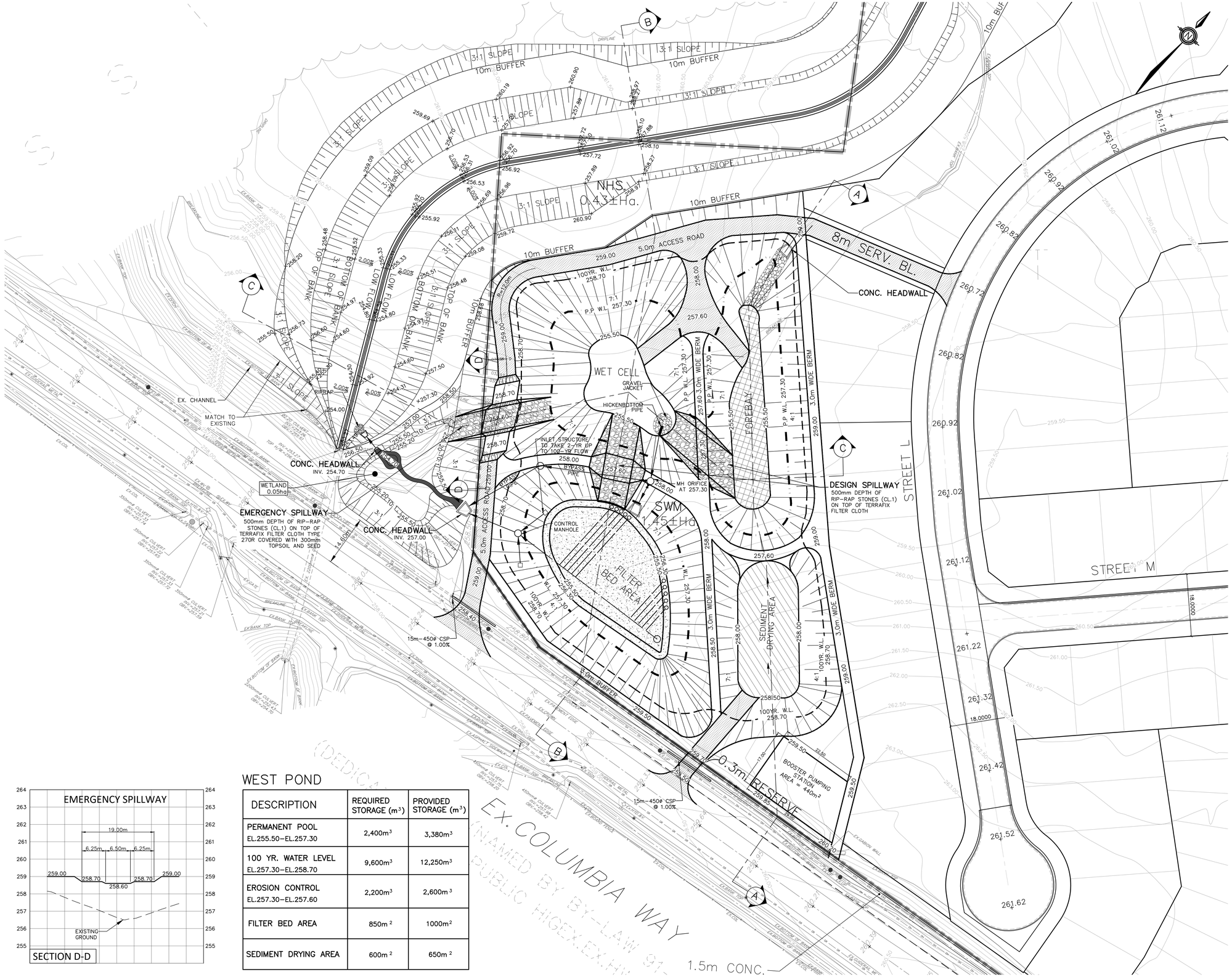
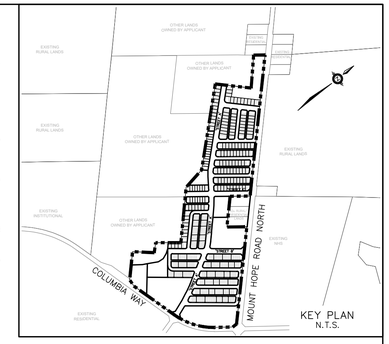
E-mail: design@schaeffers.com

Region of Peel
Working for you

TOWN OF CALEDON

SCALE: 1:1250			PROJECT No. 2023-5476
DESIGNED BY: A.C.	DRAWN BY: V.B.		DRAWING No. GR-SS-1
CHECKED BY: N.L.	DATE: DEC. 2025		





LEGEND

- 5.0m WDE MAINTENANCE ACCESS ROAD 300mm DEPTH OF 50mm CRUSHER-RUN LIMESTONE
- RIP-RAP STONE WASHED IN WITH TOPSOIL AND SEEDED, PLACED ON TOP OF 270R TERRAFIX FILTER CLOTH OR APPROVED EQUAL
- RIP-RAP STONE (150mm MIN.) ON TOP OF 270R TERRAFIX FILTER CLOTH OR APPROVED EQUAL
- FILTER BED AREA
- SEDIMENT DRYING AREA
- FILTER BED AREA
- EL.252.92 — DENOTES PROPOSED GRADE
- +260.50 — DENOTES PROPOSED ROAD GRADE
- 210.0 — DENOTES EXISTING GROUND CONTOUR LINE
- DENOTES PROP. SWM POND BOTTOM
- DENOTES NORMAL WATER LEVEL (PERMANENT POOL)
- DENOTES 100 YR. W.L. CONTOUR LINE

WEST POND

DESCRIPTION	REQUIRED STORAGE (m^3)	PROVIDED STORAGE (m^3)
PERMANENT POOL EL.255.50-EL.257.30	2,400m^3	3,380m^3
100 YR. WATER LEVEL EL.257.30-EL.258.70	9,600m^3	12,250m^3
EROSION CONTROL EL.257.30-EL.257.60	2,200m^3	2,600m^3
FILTER BED AREA	850m^2	1000m^2
SEDIMENT DRYING AREA	600m^2	650m^2

NO.	DATE	ISSUED FOR
1.	17/05/26	FIRST SUBMISSION TO THE TOWN OF CALEDON / REGION OF PEEL / TRCA

BENCH MARK:

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO THE TOWN OF CALEDON BENCH MARK No. 23, HAVING AN ELEVATION OF 308.817 METRES.

REGISTERED PROFESSIONAL ENGINEER
H. SARKISSIAN
FEB 27, 2026
PROVINCE OF ONTARIO

RESIDENTIAL SUBDIVISION

UNITED HOLDINGS INC. C/O SOLMAR DEVELOPMENT CORP.

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail: design@schaeffers.com

Region of Peel
Working for you

TOWN OF CALEDON

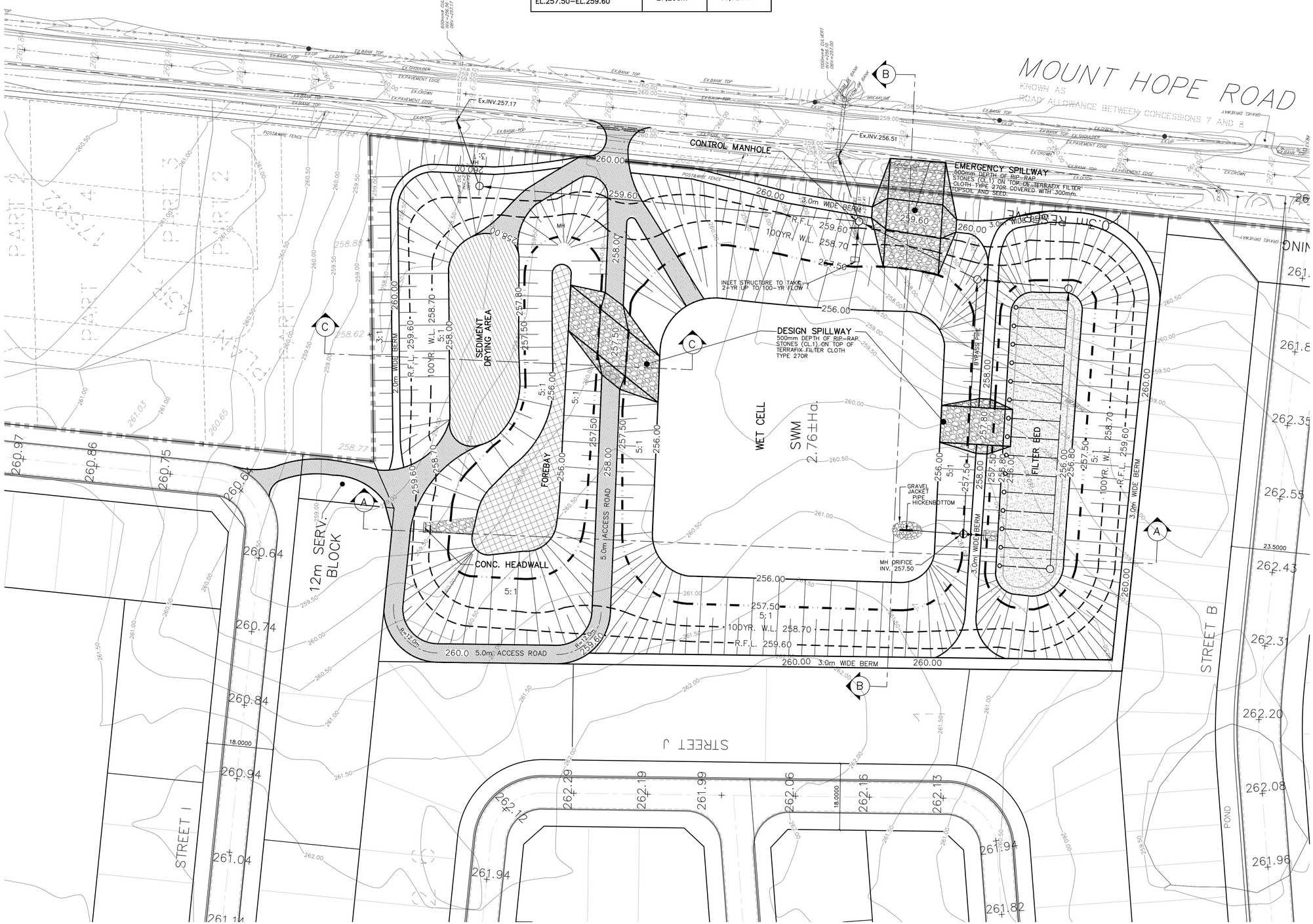
WEST SWM POND

SCALE: 1:500			PROJECT No. 2024-5476
DESIGNED BY: A.C.	DRAWN BY: V.B.		
CHECKED BY: N.L.	DATE: FEB 2025		DRAWING No. SWM-1-1

EAST POND

DESCRIPTION	REQUIRED STORAGE (m^3)	PROVIDED STORAGE (m^3)
PERMANENT POOL EL.256.00–EL.257.50	3,500m^3	12,605m^3
100 YR. WATER LEVEL EL.257.50–EL.258.70	13,100m^3	20,595m^3
REGIONAL FLOODLINE EL.257.50–EL.259.60	27,200m^3	38,926m^3

DESCRIPTION	REQUIRED STORAGE (m^3)	PROVIDED STORAGE (m^3)
EROSION CONTROL EL.257.50–EL.257.80	3,300m^3	5,149m^3
FILTER BED AREA	1,215m^2	1,500m^2
SEDIMENT DRYING AREA	1000m^2	1,000m^2


MOUNT HOPE ROAD
KNOWN AS
ROAD ALLOWANCE BETWEEN CONCESSIONS 7 AND 8
600mmø CULVERT INV.=255.10 OBV.=257.17
1000mmø CULVERT INV.=255.10 OBV.=257.00
Ex.INV.257.17
Ex.INV.256.51
CONTROL MANHOLE
EMERGENCY SPILLWAY
500mm DEPTH OF RIP-RAP STONES (CL.1) ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R COVERED WITH 300mm. TOPSOIL AND SEED
3.0m WIDE BERM
R.F.L. 259.60
100YR. W.L. 258.70
257.50
INLET STRUCTURE TO TAKE 2+YR UP TO 100-YR FLOW
DESIGN SPILLWAY
500mm DEPTH OF RIP-RAP STONES (CL.1) ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R
SEDIMENT DRYING AREA
2.0m WIDE BERM
3:1
5:1
258.00
257.80
257.50
256.00
FOREBAY
WET CELL
SWM 2.76±Ha.
5.0m ACCESS ROAD
CONC. HEADWALL
BYPASS PIPE
FILTER BED
GRAVEL JACKET PIPE HICKENBOTTOM
MH ORIFICE INV. 257.50
12m SERV. BLOCK
STREET I
STREET J
STREET B
POND
18.0000
23.5000
POST&WIRE FENCE
EX.BANK TOP
EX.DITCH
EX.SHOULDER
EX.PAVEMENT EDGE
EX.CROWN
EX.CULVERT
EX.GUIDERAIL
EX.UP
EX.WATERMAIN
EX.HYDRO
EX.GAS
EX.BELL
EX.COMM
EX.OVERHEAD HYDRO
EX.OVERHEAD COMM
EX.OVERHEAD BELL
EX.OVERHEAD GAS
EX.OVERHEAD WATERMAIN
EX.OVERHEAD
EX.TREELINE
EX.WETLAND
EX.WOODLOT
EX.TOP
EX.BOTTOM
EX.MH
EX.CB
EX.CATCHBASIN
EX.HYDRO POLE
EX.GUIDE POST
EX.SIGN
EX.MAILBOX
EX.HYDRANT
EX.VALVE
EX.WATER VALVE
EX.GAS VALVE
EX.GAS METER
EX.HYDRO METER
EX.TRANSFORMER
EX.TELEPHONE BOOTH
EX.TELEPHONE PEDESTAL
EX.TELEPHONE MANHOLE
EX.TELEPHONE POLE
EX.LIGHT STANDARD
EX.LIGHT POLE
EX.TRAFFIC LIGHT
EX.TRAFFIC SIGNAL
EX.TRAFFIC CONTROL BOX
EX.TRAFFIC CONTROL MANHOLE
EX.TRAFFIC CONTROL POLE
EX.TRAFFIC CONTROL