TOWN OF CALEDON
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Humber Station Comprehensive Environmental Impact Study and Management Plan

Phase 2: Analysis, Impact Assessment, and Mitigation

Town of Caledon, Ontario

Submitted to:
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C/O Delta Urban Inc.
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Executive Summary

The Humber Station Employment Area is a new Employment Area in the Town of Caledon which will accommodate population growth to 2031. The Humber Station Employment Area is approximately 236 ha in size and is bounded by Humber Station Road to the west, Mayfield Road to the south, Healey Road to the north and the Coleraine West Employment Area Secondary Plan Area boundary to the east. Figure 1.1 (Appendix A) illustrates the location of the Humber Station Employment Area, herein referred to as the Study Area.

The in-force Caledon Official Plan designates the majority of the Study Area as Prime Agricultural Area, as well as Environmental Policy Area, while the new Caledon Official Plan is being updated to align with the new Regional Official Plan it will continue to defer to the in-force OP (1978, 2024 consolidation) for lands within the Bolton Settlement Area.

In 2023, OPA 274 was approved which outlined that Secondary Plan requirements are to be inclusive of a local Subwatershed Study (SWS) or a CEISMP, in accordance with an approved Town Terms of Reference. The Terms of Reference for this CEISMP was submitted to the TRCA and the Town in January 2022 and approved in August 2022.

Similar to a SWS, the CEISMP is a comprehensive planning framework that describes how a wide range of elements of development will be addressed. This CEISMP will align with OPA 274 inclusive of an Environmental Impact Study to address a range of environmental and servicing issues including the protection and management of surface water, groundwater, fluvial geomorphology, terrestrial and aquatic resources and the identification of the Natural Heritage System (NHS). Municipal servicing needs, including stormwater management, sanitary and water servicing and site grading requirements are also addressed. The Management Plan component of the CEISMP informs planning and decision making so that changes in land use are compatible with natural systems and consistent with the Provincial Policy Statement (PPS; MMAH 2020) and applicable Region of Peel and Town of Caledon Official Plan policies.

This Phase 2 report fulfils the second of three phases of the CIESMP in support of the Secondary Plan application and builds upon the Phase 1 characterization/existing conditions and baseline inventory report. Phase 2 includes the analysis, impact assessment, mitigation, and recommendations. Phase 3 consists of a comprehensive implementation plan, monitoring plan, and adaptive management plan.

It is understood that the Town of Caledon has allowed Prologis Inc. (Prologis) to advance their Site Plan Application concurrently with the CEISMP. The proposed Prologis development requires the removal and compensation of small areas of woodland (woodland core area), wetland, significant wildlife habitat, as well as headwater drainage features. SGL Planning submitted a policy revision to the Humber Station Secondary Plan to the Town on October 19, 2024, to allow for minor modifications of Woodland Core Areas based on an approved Environmental Management Plan. This report assumes the proposed policy revision will be accepted by the Town.

The following summarizes the Phase 2 CEISMP key findings and recommendations.

a) **Servicing and Grading** – The servicing and grading plan for the subject lands has been developed to align with the Town of Caledon's design criteria, addressing road grading, drainage, sanitary sewer, and water supply requirements to support the proposed development effectively. Grading has been designed with gentle slopes to ensure positive drainage towards stormwater management (SWM) facilities, with all major system flows directed to capture points that discharge into these SWM ponds.

b) **Sanitary Servicing** – For sanitary servicing, the subject site will connect to existing and newly constructed sanitary sewer infrastructure under Peel Region's 2020 Water & Wastewater Master Plan. The site will utilize connections to new trunk sewers on Healey and Humber Station Roads, with grinder pumps planned at certain locations to manage grading constraints in the southern part of the site. Sanitary flow estimates based on Peel's wastewater standards confirm capacity for anticipated demand.

c) **Water Supply Servicing** – The water supply strategy builds on Peel Region's East Trunk System infrastructure and the 2020 Master Plan's outlined improvements. The area falls within Pressure Zone 6, benefiting from sufficient existing capacity in the Tullamore Pump Station and storage tanks for demand through 2041. The proposed water servicing design includes new watermains along George Bolton Parkway and Street A2 to provide reliable distribution across the development site. Demand estimates adhere to Peel Region's water design criteria, with fire flow and pressure requirements considered. A hydrant test will further validate the available pressure for water distribution.

d) **Stormwater Management Plan** – The Stormwater Management Plan (SWMP) for the Humber Station Village aims to develop a comprehensive framework for managing runoff, drainage, and treatment facilities within the CEISMP Study areas. This initiative is guided by established principles to mitigate potential negative impacts on the Humber River watershed while enhancing conditions in receiving streams. Key references for the design include the 2018 Humber River Watershed Report by the Toronto and Region Conservation Authority (TRCA) and various hydrological studies. The plan adheres to the requirements set by the TRCA, the Town of Caledon, and the Ministry of the Environment (MOE), as detailed in the MOE's Stormwater Management Planning and Design Manual.

   The SWMP encompasses several design criteria to address water quantity, quality, erosion control, and water balance specific to the Phase 2 lands. Water quantity controls will adhere to TRCA regulations, ensuring that runoff rates are appropriately managed for the Gore Road and Clarkway Tributaries. Enhanced water quality measures will achieve an 80% total suspended solids (TSS) removal, while erosion control will incorporate extended detention strategies. The plan also recognizes the area's low groundwater recharge potential, guiding the development of stormwater practices to prioritize retention and filtration, in line with the CLI-ECA requirements.

   To fulfill these objectives, the SWMP will utilize a combination of lot-level, conveyance, and end-of-pipe controls, with an emphasis on Low Impact Development (LID) practices that integrate stormwater management throughout the site. By employing various best management practices (BMPs) and LID techniques, the design seeks to optimize runoff control and minimize the footprint of conventional stormwater management ponds. The proposed LID measures will not only comply with regulatory standards but will also contribute to the overall sustainability and resilience of the Humber Station Village development.

To meet the identified stormwater management (SWM) parameters, three SWM ponds and one SWM tank are proposed. Each pond is designed with a filtration cell to comply with the Municipal Consolidated Linear Infrastructure Environmental Compliance Approvals (MECP CLI-ECA) requirements. SWM Pond 1 and SWM Pond 3 discharge to the Clarkway Tributary, while SWM Pond 2 discharges to the Gore Road Tributary, ensuring that quantity control aligns with the TRCA Stormwater Management Criteria. Additionally, a SWM tank will manage drainage from the George Bolton Parkway, incorporating LID strategies to meet quality control standards.

The conceptual design of the major and minor stormwater systems has been established to ensure comprehensive coverage of site drainage before discharging to the proposed SWM facilities. The preliminary layout, as detailed in the accompanying Stormwater Management Report, includes emergency overland flow routes and spillways to address potential system failures during regional storm events. This strategic approach to stormwater management underscores the commitment to sustainable development practices in the Humber Station Employment Area while enhancing resilience against flooding and water quality degradation.

e) **Geotechnical** – A preliminary geotechnical investigation was completed to identify areas in which potential slope instability may exist. The work was based on a review of previously completed geotechnical assessments and a preliminary soil testing.

Stormwater management (SWM) facilities were planned at the north end of the Site (including the two proposed SWM-1 and -2, as listed above); and, in the southeast end of the Site (labelled as SWM-3) as well as the existing and proposed Pond at the middle west end of the Site.

Proposed drainage channels were measured to have proposed acceptable side slopes of 1V:4H. The slopes at the existing pond were found to be a maximum of 1V:4H which are to be maintained following development and were considered to be stable. Erosion hazards following from unconfined stream channels are based on an evaluation of the toe of slope erosion allowance, and the stable slope setback with an additional allowance for access following reference to MNR guidelines. It is suggested that a mid-range value of 6.5 m toe of slope erosion allowance be applied to the Humber Station property. A 2 m stable slope setback of 2 m distance was suggested. The erosion access allowance is typically set at 6 m but was reduced in this case to a 4 m allowance based on the shallow slope angles observed and the absence of significant erosion within the Clarkway Drive Tributary and other shallow swales within the study area.

No geotechnical investigation has been completed to date to assess site servicing for deeper sanitary sewer infrastructure proposed along a portion of the Site. It is recommended that deep boreholes be advanced along the proposed alignment to review deeper soil strata and geotechnical conditions.

f) **Groundwater** – The Phase 1 CEISMP Characterization report identified will be a significant increase in impervious cover with a corresponding reduction of recharge. Various Best Management Practices (BMPs) could be incorporated into the proposed development that would promote infiltration and decrease runoff to help preserve the existing groundwater flow regime and reduced impacts associated with an increase in runoff. Halton Till clay silt deposits across the Site are interpreted to be in an area of relatively low recharge. Any loss of recharge because of an increase of impervious surfaces will be addressed as part of the proposed mitigation measures.

Significant short-term or long-term groundwater dewatering is not anticipated for the proposed structures since they will be constructed on strip footings. However, deep servicing has been proposed across a portion of the Site and these will require short-term dewatering and / or depressurization, which may interfere with any natural heritage feature at the Site or beyond the Site within the zone of influence of pumping. The estimated zone of influence for dewatering the deep services proposed is approximately 1,900 m. Clarkway Drive Tributary and HDF-3, and associated wetlands are interpreted to be perennially or intermittently connected to the groundwater table and any short-term dewatering may reduce groundwater discharge to these features.

Additional associated with installing the deep services. It is likely that a PTTW will be required to support the installation of deep servicing; however, additional hydrogeological investigations will be required to confirm the dewatering / depressurization rates and potential impacts.

g) **Surface Water** – The hydrologic assessment of the Humber Station Employment Area, situated within the Humber Hydrology Model, addresses the complexities of surface water management, focusing on the Clarkway and Gore Road tributaries. Detailed modeling parameters for the future hydrology are outlined, facilitating a comprehensive understanding of pre-development drainage areas and the potential impacts of proposed developments. A downstream regional storm assessment was conducted using hydrologic modeling tools, including Visual Otthymo (VO) and the Hydrologic Engineering Center River Analysis System (HEC-RAS). This analysis evaluated various scenarios to determine the necessity for regional controls for the proposed stormwater management (SWM) facilities.

The analysis revealed a moderate increase in peak flows under post-development uncontrolled conditions, with a notable 12% rise in the Clarkway tributary and an increase of up to 7% in the Gore Road tributary. However, these increases were effectively addressed through the proposed SWM plan, which integrates regional controls for Ponds 1 and 3, thereby ensuring that no significant adverse impacts occur at critical downstream nodes. While some increases in water levels were observed within the Gore Road tributary, these elevations were contained within the valley. Overall, the hydrologic model demonstrated that the existing conditions, combined with the planned controls, would successfully sustain flow stability.

In addition to the hydrologic analysis, a comprehensive floodplain assessment was conducted utilizing topographic data and hydraulic modeling. This assessment led to the generation of regulatory floodlines, critical for establishing development limits and ensuring compliance with floodplain management policies. The findings underscore the importance of integrating hydrologic modeling techniques and robust stormwater management strategies to achieve sustainable development within the Humber Station Employment Area, balancing growth with environmental stewardship. The detailed results and methodologies are further elaborated in the accompanying Stormwater Management Report and the Humber Station Villages Floodplain Analysis Report.

h) **Fluvial Geomorphic Assessment** – The geomorphic assessment for Phase 2 of the Humber Station Village CEISMP evaluated erosion thresholds downstream of the proposed stormwater management facilities. A detailed assessment was completed to characterize the streams downstream of the proposed stormwater management facilities. The detailed assessment identified a bankfull discharge of 1.7 m^3/s for the Clarkway Tributary to the east, and an erosion threshold of 0.66 m3/s. In the case of the Gore Road Tributary, the feature was heavily vegetated and had a limited channel definition. Due to the limiting channel morphology, the topographic survey of the site was used to determine an erosion threshold. This was found to be 0.94 m3/s. Both tributaries were assessed for sensitivity to hydrological changes. The stormwater management plan proposes 25 mm detention over 48 hours. Both the Clarkway Drive Tributary and the Gore Road Tributary were found to not be particularly sensitive to erosion, following alterations to the hydrologic regime associated with the proposed development. In the case of the Clarkway Drive tributary, the Rapid Geomorphic Assessment (RGA), completed in Phase 1 of the CEISMP, the reach was placed in the lower end of the In-transition/stressed category, with a score of 0.24. The release rates for the South Pond, which discharges to this reach, do not exceed the erosion threshold of 0.66 m3/s until above the 5-year storm event. The Goreway Drive Tributary was noted to be poorly defined, and heavily vegetated. While an RGA was not completed for this reach off-site, limited geomorphic processes were observed, which would result in a score that would imply the reach is stable. The channel itself is not sensitive, as flow velocities are low and no significant active erosion was observed in the reach downstream of the Subject Lands. The channel is well connected with its floodplain, which helps to dissipate flows across the floodplain during higher magnitude events. Outflows from the North East pond, which discharge to this reach do not exceed the erosion threshold of 0.94 m3/s until above the 100-year storm event.

To maintain and enhance the detention and retention functions with regards to flow and sediment, a natural feature enhancement design for headwater drainage feature realignment (HDF-3) was proposed, to restore the physical form of the channel, improve the function of the channel and its interaction with the floodplain, enhance aquatic habitat through the inclusion of diverse velocity and depth of flow, improve riparian habitat, and mitigate potential erosion hazards to the development as well as lands downstream. New wetland habitats totaling 0.58 ha along with bioengineering treatments will provide ecological benefits. The design anticipates a net increase in channel length, floodplain wetland area, water quality, and biodiversity. The realigned channel aims to support fish habitat, improve water quality, and provide thermal mitigation, ultimately enhancing the natural heritage system and long-term ecosystem stability.

i) **Natural Heritage** – The Phase 1 CEISMP Characterization report identified the following natural heritage features as present, on, or within 120 m, of the Study Area. These were brought forward to the Phase 2 CEISMP for an analysis of potential direct and indirect impacts to natural features based on details available through CEISMP site-specific work that address SWM, grading, servicing and other components of development. Through this site-specific analysis, mitigation and restoration measures were identified and incorporated into the CEISMP.

Significant woodlands and other woodlands – Significant and other woodlands will generally be protected with a 10 m vegetated buffer. A small portion (0.34 ha) of a significant woodland (FOD8-3) on the Prologis lands is proposed for removal and on-site compensation to accommodate the proposed building footprint. Woodland compensation will be integrated into the Natural Heritage System (NHS) and serve as a linkage connecting the Clarkway Tributary valley to the proposed drainage feature realignment and the retained significant woodland. This is anticipated to provide a net ecological benefit by creating an improved native forest ecosystem with increased native woodland vegetation, invasive species management, and increased connectivity to natural features.

Significant wetlands and other wetlands – The majority of wetlands within the Study Area will be retained and buffered with either a 30 m (significant wetland) or 10 m (other wetland) buffer. The buffers are recommended to be planted with native trees and shrubs.

Hydrogeology monitoring work to date by Arcadis suggests that groundwater discharge may contribute to the riparian wetlands associated with Clarkway Drive Tributary, as well as the wetland at the south end of HDF-3. The remainder of wetlands are fed by surface water. Provided that surface water volume and quality contributions to the wetlands are managed as per the proposed stormwater management approaches and LIDs described by Schaeffers, and that groundwater infiltration outlined by Schaeffers and best management practices can be achieved as predicted, no negative impacts associated with surface water runoff and groundwater on wetlands are expected.

To facilitate the proposed land use plan and Prologis site plan, 0.38 ha of wetland is proposed for removal. Proposed compensation and restoration are anticipated to provide 1.02 ha net gain in total wetland area within the Study Area. Wetland creation will provide an increase in native vegetation community types and species diversity through restoration plantings and will improve the overall NHS linkage between retained and compensation features within the Study Area. As such, a net gain in both total wetland feature area and wetland function is anticipated.

Potential impacts to fish habitat – Direct warm water fish habitat was identified in the Clarkway Drive Tributary as well as HDF-3. The Clarkway Drive Tributary occurs in a valley and is protected in the NHS by buffers and setbacks associated with top of slope, floodplain, significant wetland, and fish habitat.

Portions of HDF-3 are proposed for realignment to accommodate a preferred building footprint on the Prologis lands. The realignment natural channel design is anticipated to improve fish habitat compared to existing conditions (historical straightening, degradation from agricultural activities such as ploughing through or up to the feature, as well as the use of fertilizers resulting in pollution), and will result in a net gain of 351 m of fish habitat. Indirect fish habitat occurs in the form of HDFs, some of which are proposed for removal and will have their hydrological functions replicated through SWM and LID infrastructure, as well as Wetland Compensation Area 3 that will be fed by clean roof water.

Hydrogeology monitoring work to date by Arcadis suggests that Clarkway Drive Tributary has some groundwater discharge contributing to its baseflow, and that HDF-3 has upward gradients in the spring, and likely receives some seasonal groundwater discharge. Provided that surface water volume and quality contributions to the Clarkway Drive Tributary and retained HDFs are managed as per the proposed stormwater management approaches and LIDs described by Schaeffers, and that groundwater infiltration outlined by Schaeffers and best management practices can be achieved as predicted, no negative impacts associated with surface water runoff and groundwater on fish habitat are expected.

Habitat of endangered and threatened species – Bank Swallow foraging habitat occurs over the Clarkway Drive Tributary northern significant wetland and is anticipated to be protected with a proposed 30 m buffer.

Redside Dace contributing habitat occurs within the Clarkway Drive Tributary and its riparian wetlands, as well as tableland Headwater Drainage Features (HDFs). There are no direct impacts expected to the contributing habitat associated with the Clarkway Drive Tributary or its riparian wetlands as they will be protected within the NHS with a vegetated buffer.

The majority of these tableland HDFs are proposed for removal to support the land use plan for the Study Area, totaling 2369 m. These features are negatively impacted from current agricultural activity; they do not provide direct fish habitat and have no in-stream or riparian habitat. The Redside Dace contributing habitat functions (provision of baseflow and coarse sediment supply to downstream occupied habitat) are proposed to be replicated and enhanced through SWM Ponds 1 and 3 (enhanced quality control and extended detention), as well as Wetland Compensation Area 3 that will provide water polishing. Redside Dace contributing habitat will also be enhanced through thermal mitigation through plantings of native trees and shrubs surrounding Wetland Compensation Area 3. SWM Ponds 1 and 3 will have 3 m deep permanent pools for thermal mitigation and will outlet to alluvium deposits that will help supply coarse sediment to downstream habitat. These measures are anticipated to provide an overall benefit for Redside Dace compared to existing conditions.

<u>Significant wildlife habitat</u> – The majority of identified significant wildlife habitat (SWH) will be protected with appropriate vegetated buffers and as such no impacts are anticipated. These include:

- Candidate Bat Maternity Colonies;
- Candidate Over-Wintering Turtle Habitat;
- Candidate Seeps and Springs;
- Candidate Amphibian Breeding Habitat; and
- Habitat for Species of Conservation Concern (Eastern Wood Peewee, Snapping Turtle, Monarch, and Yellow-banded Bumblebee).

A total of 0.30 ha of wetland providing Terrestrial Crayfish SWH, is proposed for removal to accommodate the Prologis building footprint. A total of 0.39 ha of Terrestrial Crayfish SWH compensation area is proposed, adjacent to the retained portions of this SWH feature. Overall, there will be a net gain of 0.09 ha of appropriate terrestrial crayfish habitat. This wetland compensation area will be hydrologically connected to the enhanced HDF-3 realignment, providing connectivity between the retained and compensation wetland to allow for Terrestrial Crayfish to expand into the wetland compensation area.

j) **Policy Conformity** – The CEISMP addresses the proposed land use changes in the context of appliable planning policies and identifies how requirements are met or exceeded. A summary is provided linking the conclusions of the impact assessment to conformity with land use plans and applicable policies, including the PPS, provincial legislation, Regional and Local Municipal Official Plans, and federal legislation. Overall, this CEISMP addresses alignment, conformity and consistency with the policies.

1. Introduction

1.1 Background

GEI Consultants Canada Ltd. (GEI), in collaboration with Schaeffers Consulting Engineers (SCE), and Arcadis Professional Services (Canada) Inc. (Arcadis) have been retained by the Humber Station Village Landowners Group Inc. to prepare a Comprehensive Environmental Impact Study and Management Plan (CEISMP) in support of the Humber Station Employment Area Secondary Plan application for lands identified as Lots 1-5, Concession 5 (Albion) in the Town of Caledon, Regional Municipality of Peel (herein referred to as the Study Area; **Figure 1.1, Appendix A**. The Humber Station Employment Area is located within the West Humber River subwatershed. SGL Planning and Design Inc. (SGL) provided input and review of the policy components of the CEISMP.

The Town of Caledon policies require that a CEISMP or local Subwatershed Study be prepared in support of applications for development to address environmental and servicing issues (OPA 274), including the protection and management of surface water, groundwater, fluvial geomorphology, terrestrial and aquatic resources, and the identification of the preliminary Natural Heritage System (NHS) and municipal servicing needs, including stormwater management, sanitary and water servicing and site grading requirements. The CEISMP is intended to inform planning and decision making so that changes in land use are compatible with natural systems and consistent with the Provincial Policy Statement (PPS; MMAH 2024) and applicable Region of Peel and Town of Caledon Official Plan policies.

A CEISMP is being prepared in accordance with the Terms of Reference that were approved by the TRCA and the Town in August 2022 and consists of three phases:

- Phase 1 – Characterization/Existing Conditions and Baseline Inventory;
- Phase 2 – Analysis, Impact Assessment, Mitigation, and Recommendations; and
- Phase 3 – Comprehensive Implementation Plan, Monitoring Plan, and Adaptive Management Plan.

The CEISMP Phase 1 report was first submitted in October 2023, with a second submission in July 2024. The CEISMP Phase 1 characterizes the existing conditions relating to surface water, groundwater, terrestrial and aquatic resources, and defines the preliminary NHS. The following is a summary of the key findings and recommendations from the Phase 1 CEISMP:

- Clarkway Drive Tributary flows in a north to south direction along the east end of the Study Area boundary. The Tributary exhibits permanent flow, while other drainage features present are Headwater Drainage Features (HDFs) that generally flow intermittently or ephemerally.
- The existing geological and hydrogeological setting was characterized including site stratigraphy and hydrostratigraphy, areas of groundwater recharge and discharge, hydraulic properties of stratigraphic units including those that transmit groundwater to natural features such as watercourses and wetlands, groundwater flow patterns, surface water and groundwater supported natural features, potential surface water infiltration opportunities based on soils information, depth to water table and aquifer vulnerability.

- The existing drainage condition and hydrology features were characterized, and floodplain analyses were conducted to identify the extent of the existing floodplain which was used to help identify the preliminary NHS. Hydraulic modelling of the Study Area was also completed under existing conditions to help determine sizing for proposed drainage realignment and wetland compensation areas, as well as water elevations and extent of the floodplain mapping.
- The majority of natural vegetation communities identified within the Study Area occur along the Clarkway Drive Tributary, with two woodlots also occurring on the tableland in the north portion of the Study Area. The majority of the tablelands are dominated by active agricultural uses and residential uses that have been present on the landscape for decades.
- Three wetlands were determined by GEI to meet the criteria for significance as per the Ontario Wetland Evaluation System. Two are located in the valley of the Clarkway Drive Tributary, and the third is associated with a historical agricultural pond near Humber Station Road. Six small tableland non-significant wetlands occur in the Study Area. All of these wetlands are associated with HDF-3, with the exception of a small historical agricultural pond (MAS2-1) in the north portion of the Study Area. For the participating lands, wetlands were determined to have common and secure species present.
- Feature-based Water Balance Risk Assessments were completed to understand feature-based water balance requirements for Phase 2.
- Two forest communities in the Study Area were determined to be significant woodlands. The northwest deciduous woodlot, located within non-participating lands and a second woodland in the north-central portion of the Study Area, composed of Basswood deciduous forest.
- Fish captured in the Study Area by GEI were tolerant warmwater species, which reflects the conclusions of the TRCA Humber River Fisheries Management Plan (FMP; TRCA 2005). GEI's water temperature recordings within the Study Area were reflective of the thermal regime noted in the FMP: "small riverine warmwater". In alignment with the FMP, GEI noted that the small riverine warmwater habitats have poor infiltration rates and minimal groundwater inputs, causing many of the reaches to dry up during the summer months, or reduced to standing pools of water with the exception of the Clarkway Drive Tributary which had perennial flow, as well as HDF-3 which had perennial flow in 2017 but ephemeral flow in 2022 and 2023.
- The Clarkway Drive Tributary located at the east end of the Study Area is a partially confined valley corridor containing two significant wetlands. The tributary and associated wetlands are considered to provide contributing habitat for Redside Dace.
- HDF-8 is an ephemeral feature that drains much of the southern portion of the Study Area. The majority of the feature is ploughed through and none of the feature has riparian habitat. No fish were captured or observed in HDF-8, however it provides contributing habitat for Redside Dace.
- HDF-3 is generally characterized as having intermittent flow and provides direct fish habitat. This feature was historically altered to create an online pond for agricultural use.
- Various wildlife surveys of breeding birds, breeding amphibians, reptiles, bat habitat and acoustic monitoring, insects, and wildlife observations using camera traps and road transects occurred in various years between 2017 and 2022 utilizing standard protocols. The wildlife species occurring in the Study Area were generally found to consist of common and secure species (ranked S5).

- Two Endangered or Threatened species or their habitat have been identified within or adjacent to the Study Area. Redside Dace contributing habitat occurs within the Clarkway Drive Tributary, its associated riparian wetland communities and HDF-8. Bank Swallow foraging habitat occurs over the north riparian Significant Wetland surrounding the Clarkway Drive Tributary which extends onto a small portion of the east end of the Study Area.
- Detailed fluvial geomorphological assessments were conducted to characterize stream conditions and inform erosion threshold analysis. The confined valleyland along the Clarkway Drive Tributary and the associated long-term stable slope was also identified. Headwater drainage features (HDFs) within the Study Area were assessed using the CVC/TRCA Evaluation, Classification, and Management of Headwater Drainage Features Guidelines (2014).
- The extent of the preliminary NHS for the Study Area was confirmed through a series of analyses to identify natural hazards, natural features and functions that meet the definition of NHS components as described in the Town of Caledon Official Plan (2018) and Region of Peel Official Plan (2022).
- The preliminary NHS includes valley and stream corridors, wetlands, woodlands, significant wildlife habitat, habitat of endangered and threatened species, fish habitat, and their buffers. It also includes a conceptual drainage realignment for HDF-3 and wetland compensation which is anticipated to achieve a net ecological gain compared to existing conditions.

1.2 Purpose of the Phase 2 and Phase 3 CEISMP

The results of the Phase 1 Study, as summarized above, were utilized to complete the analysis required for Phase 2. Phase 2 introduces the land use plan and assesses the potential for impacts on natural heritage features and functions, as well as on groundwater and surface water that might result from the proposed land use changes. Phase 2 includes recommendations for how impacts can be avoided, minimized and/or mitigated.

Phase 3 of the CEISMP, which will be submitted concurrently with this Phase 2 Study, provides detailed natural heritage restoration plans, and outlines phasing considerations to ensure policy conformity and consistency with best practices for each discipline. Phase 3 also identifies a framework to implement the CEISMP recommendations through a long-term monitoring and comprehensive adaptive management plan.

2. Land Use Plan

A secondary plan submission is currently underway for the Humber Station Employment Area Lands to establish land use policies for the Secondary Plan Area. The goals of this Secondary Plan are as follows:

- Provide for a mix of employment uses that contribute to the Town's employment and commercial/industrial assessment base;
- Provide for logical and orderly development of full municipal services;
- Ensure a high standard of community design is provided along arterial roads; and
- Recognize, protect and enhance significant environmental features and functions through good planning.

As per the Land Use Plan (**Schedule C8, Appendix A**) and land use policies proposed for the Study Area, the following land uses are anticipated:

- Prestige Employment – this designation will apply to lands directly adjacent to Mayfield Road and the Highway 413W Transportation Corridor. Permitted uses are outlined in Section 5.5.4 of the Town of Caledon OP (2018) and include manufacturing, warehousing, corporate offices, and other similar uses. These uses are concentrated around the major roadways to the south of the Secondary Plan Area.
- General Employment – this designation will apply to the majority of the Secondary Plan Area; permitted uses are outlined in Section 5.5.5 of the Town of Caledon OP (2018) and may include manufacturing, warehousing, transportation terminals, automotive uses, and other similar uses.
- Environmental Policy Area – this is inclusive of the natural features and areas defined through the Phase 1 CEISMP including the eastern valley corridor and includes the conceptual drainage realignment. The Environmental Policy Area encompasses high constraint features as determined through the Phase 1 CEISMP and will include modifications related to drainage feature realignment and natural feature compensation which are intended to result in a net gain.

The conceptual road network consists of a western extension of George Bolton Parkway, which will have a Right-of-Way width of 26 metres and serve as an East-West Industrial Collector Road, providing access to the Study Area from Coleraine Drive and Humber Station Road. This road will also provide access to abutting properties. Consolidated site access may be required on the George Bolton Parkway Extension. The road extending south from the extension of George Bolton Parkway will serve as a Local Industrial Road but may also serve as a collector road linking to the south subject to an Environmental Assessment Study and thus shall be protected for a Right-of-Way width of 22.5 metres.

The stormwater management (SWM) strategy for the proposed development incorporates site constraints, including the realignment of George Bolton Parkway and the placement of SWM facilities. The site's grading allows for the placement of three SWM ponds and one SWM tank, strategically positioned to manage stormwater runoff.

Sanitary servicing will be achieved via three connections. The northeast section of the site will connect to a new 600 mm sanitary trunk sewer on Healey Road, while the remaining portion will be serviced by a 1200 mm trunk sewer on Humber Station Road. In the southern area, grading challenges will necessitate the use of grinder pumps to prevent the internal sewer systems from becoming excessively deep.

Water supply servicing will involve the installation of new 300 mm diameter watermains along the George Bolton Parkway extension and Street A2. These watermains will connect to a 400 mm watermain on Humber Station Road and an existing 300 mm watermain on George Bolton Parkway, ensuring water service to different parts of the site based on their location relative to Healey Road, Humber Station Road, and George Bolton Parkway.

The design of the Land Use Plan is the outcome of a land use planning approach that integrates the proposed NHS and areas required to accommodate future stormwater management facilities.

3. Servicing and Grading

3.1 Grading

A preliminary grading plan for the development of the Subject Lands has been prepared to demonstrate that acceptable road grading can be achieved in accordance with the Town of Caledon's design criteria. The roadways are designed with gentle slopes ranging from 0.75% to 2.5% grade.

The preliminary grading and servicing plans are provided in the drawings in **Appendix C**, along with the stormwater management report for reference. These plans consider the physical constraints of the site, the grades of the proposed George Bolton realignment, and the physical constraints of the proposed SWM facilities. The existing and proposed grading of the subject lands facilitates the placement and design of four SWM facilities within the proposed development.

Considerable effort has been made to ensure positive drainage by gravity towards each of the proposed SWM ponds. The general direction of overland flows is summarized in the Post-development Drainage **Figure 3.2**. The proposed SWM scheme is presented in **Figure 3.3**. Low points are proposed to allow all major system flows to be captured into the minor system as close as possible to the discharge points into the SWM facilities, with emergency overland flow routes provided from these capture locations to the SWM ponds.

It should be noted that between the pre-development and post-development conditions, the drainage boundary between the Gore Road Tributary and Clarkway Tributary has been modified. Refer to **Figure 3.1** for the pre-development drainage. Efforts have been made to maintain the total area draining to each reach of the river. Overall, the total area draining to the Clarkway Tributary has increased by about 10 hectares, while the Gore Road Tributary has decreased accordingly. The total tributary areas have been revised in the post-development plans. More details about the post-development drainage conditions are discussed in the *Stormwater Management Report Humber Station Villages Phase 2,* dated August 2024, prepared by Schaeffers Consulting Engineers, presented in **Appendix C.**

3.2 Sanitary Sewer

3.2.1 Existing Infrastructure

The following describes the existing sanitary infrastructure within the vicinity of the subject site:

- 525 – 600 mm sanitary sewers and 750 mm sanitary trunk sewers along Coleraine Drive which runs south and ultimately discharges to Mcvean SPS.

As per the Region's 2020 Water & Wastewater Master Plan for the Lake-Based System, the Region proposed the following sanitary projects to support the land developments west of Coleraine Drive and North of Mayfield Road which includes the subject site:

- WW-T-005 – 750 mm Sanitary Sewer – Clarkway Drive;
- WW-T-170 - Humber Station Road Sanitary Trunk Sewer (Phase 1); and
- WW-T-171 - Humber Station Road Sanitary Trunk Sewer (Phase 2).

It is noted that these sanitary projects are currently under construction. As per the EPAL of the Region, the construction of these projects was scheduled to be completed in 2026.

According to the design drawing of this new Regional sanitary trunk sewer dated May 2023, the new sanitary trunk sewer will run west along Healey Road, south along Humber Station Road and Clarkway Drive and connect to the existing sewer on Clarkway Drive. The new sanitary trunk sewer along Healey Road and Humber Station Road will be available for connections to service the subject site.

The location of the new sanitary trunk sewer is illustrated in **Figure 3.4** and the excerpt from the Master Plan are shown in **Appendix C**.

3.2.2 Proposed Sanitary Servicing

The subject site is proposed to be serviced by three connections. The northeast portion of the subject site will be serviced by making a connection to the new 600 mm sanitary trunk sewer on Haley Road while there will be two connections making to the new 1200 mm sanitary trunk sewer on Humber Station Road for servicing the remaining portion. Refer to **Figure 3.5** for the Sanitary Drainage Plan.

It is noted that there are grading constraints at the south portion of the subject site which would cause the proposed internal sewers significantly deeper with gravity sewer. To avoid deepening the proposed internal sewers, grinder pumps are proposed at several locations to pump the sewage to the proposed internal sewers.

The proposed sanitary servicing strategy and the location of the grinder pumps are shown in **Figures 3.4A.-3.4D**

The sanitary flows were estimated for the subject site for all the three connections, based on the design criteria illustrated in “Region of Peel – Linear Wastewater Standard (March 2023)”. The estimated flow is presented in **Appendix C** and summarized in **Table 3.1**.

Table 3.1: Proposed Sanitary Demand

Discharge Location	Population	Average Demand [L/s]	Peaking Factor	Peak Flow [L/s]	Total Developable Area (ha)	Infiltration [L/s]	Total Peak Flow [L/s]
Healey Road	1,293	4.041	3.73	15.05	18.46	4.80	19.85
Humber Station Road (North)	1,900	5.938	3.60	21.39	27.14	7.06	28.45

Discharge Location	Population	Average Demand [L/s]	Peaking Factor	Peak Flow [L/s]	Total Developable Area (ha)	Infiltration [L/s]	Total Peak Flow [L/s]
Humber Station Road (South)	6,435	20.109	3.14	63.18	91.92	23.90	87.08

3.3 Water Supply and Distribution

Peel Region's transmission system is divided into three main trunk systems: west, central, and east. The Humber Station Employment Area Secondary Plan Area is serviced by the East Trunk System and is located in Pressure Zone (PZ) 6. The following sections discuss the existing water servicing infrastructure within the Humber Station Employment Area Secondary Plan Area and the proposed water supply servicing scheme.

3.3.1 Existing Water Servicing

Peel Region completed their 2020 Water & Wastewater Master Plan as an update to the 2013 Master Plan to support the expected population growth in the region to 2041 horizon. According to Volume 3 of the 2020 Master Plan, the ground elevations in the Humber Station Employment Area Secondary Plan Area fall within the Pressure Zone 6 range, which spans from 214.5 m to 259.1 m. The Top Water Level in this zone is 297.2 m, resulting in a hydraulic grade line of 304.8 m.

Water supply for the area originally comes from the A.P. Kennedy Water Treatment Plant on the north shore of Lake Ontario and is conveyed by a series of pump stations and transmission mains. The Tullamore Pump Station is the final pump station which lifts water to the Bolton and West Bolton elevated storage tanks which supply water to the Pressure Zone 6 distribution watermains. The Master Plan indicates that the Bolton and West Bolton elevated storage tanks, along with the transmission main from the Tullamore Pump Station to these tanks, have sufficient capacity to meet demands through 2041. Relevant excerpts from the Region's Master Plan are provided in **Appendix C**.

The existing water infrastructure in the vicinity of the subject site consists of:

- 200mm diameter watermain on Humber Station Road;
- 200mm diameter watermain on Healey Road; and
- 300mm diameter watermain on George Bolton Parkway to the east of the site.

Refer to Figure 2.1 for a visual representation of the existing watermains in the vicinity of the subject lands.

3.3.2 *Capital Projects*

The updated 2020 Master Plan has identified new watermains to be constructed in the vicinity of the subject lands to improve the water distribution system. In coordination with the Region, the latest design drawings for the capital improvement projects concerning the subject lands have been obtained, and the sizing of the watermains has been confirmed. The capital improvements in close vicinity of the subject lands are summarized below:

- Construction of a 400 mm diameter watermain on Humber Station Road from Mayfield Road to Healey Road (W-D-191 and W-D-236), planned to be in service in 2026; and
- Construction of a 750 mm diameter sub-transmission main on Healey Road from Humber Station Road to Coleraine Drive (W-ST-186), planned to be in service in 2026.

In addition, the 2020 Master Plan identified the necessity of constructing a watermain on George Bolton Parkway, extending from Humber Station Road to Coleraine Drive (W-D-192). The sizing of the watermain and design details will be completed as part of the proposed development.

3.3.3 *Water Supply Design Criteria*

As per the Peel Region Master Plan (2020) – Volume 3 Water Master Plan, Peel Region Watermain Design Criteria (2010) and the MECP Design Guidelines for Drinking-Water System (2008), the following criteria are used in the design calculations for the water supply:

- Average consumption rate for Industrial, Commercial or Institutional (ICI) areas is 300L/cap/day;
- The non-residential MDD peaking factor of 1.4;
- The peak hour demand (PHD) peaking factor of 3.0 for both residential and ICI demands;
- Equivalent population of 70 persons/ha of industrial area;
- Minimum pressure for Maximum Day and Fire Flow demand is 140 kPa (20 psi);
- Minimum pressure for Peak Hour demand is 275 kPa (40 psi);
- Maximum pressure for Maximum Day and Fire Flow demand is 690 kPa (100 psi); and
- Fire demand shall be calculated in accordance with the latest Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection guidelines. In the absence of architectural information, a fire demand of 417 L/s is assumed, referencing to the City of Vaughan water design guidelines.

3.3.4 *Proposed Water Supply Servicing*

It is proposed to construct new 300 mm diameter watermains along the proposed George Bolton Parkway extension and Street A2. These watermains will connect the 400 mm diameter watermain on Humber Station Road, which is expected to be constructed before the subject site, to the existing 300 mm watermain on the current George Bolton Parkway to the east.

The site plans on the subject site are proposed to be serviced based on the streets they front on. Site plans on Healey Road will service from the expected 750 mm diameter watermain on

Haeley Road. Those on Humber Station Road, north of the proposed George Bolton Parkway, will use the expected 400 mm dia. watermain on Humber Station Road. The developments immediately to the north and south of the proposed George Bolton Parkway will be serviced by the proposed watermain on George Bolton Parkway. Lastly, the site plans on Humber Station Road, south of the proposed George Bolton Parkway, will be serviced by the proposed Street A2 watermain, which branches off the watermain on George Bolton Parkway. Refer to **Figure 3.5** for a schematic illustration of the proposed water servicing strategy. The estimated demands for the proposed development are summarized in **Table 3.2** below.

Table 3.2: Estimated Residential Water Supply Demands

Population (1)	Average Day Demand (L/s) (2)	Maximum Day Demand (L/s) (3)	Peak Hour Demand (L/s) (4)
9636	33.46	46.86	100.38

Note:

(1) Estimated population based on developable area.
(2) Average day consumption rate as 300 L/cap/day as per Region of Peel Design Criteria (2010)
(3) Maximum day factor as 1.4 as per Region of Peel Design Criteria (2010)
(4) Peak hour factor as 3.0 as per Region of Peel Design Criteria (2010)

As recommended by Peel Region, a hydrant test has been ordered to confirm the available pressure and flow in the existing 200 mm watermain along Humber Station Road. The test results will be provided to Peel Region once they become available.

4. Stormwater Management Plan

Stormwater management involves planning, designing, and constructing drainage and treatment facilities to collect, convey, and control runoff in the Humber Station Village CEISMP Study areas. This aims to mitigate potential negative impacts or enhance conditions in receiving streams compared to existing conditions.

The Humber River Watershed Report, updated by the TRCA in 2018, along with other relevant hydrology and hydraulic studies, will be referenced in designing the proposed stormwater management practices.

The proposed stormwater management controls will meet the requirements of the TRCA and the Town of Caledon, guided by the MOE’s Stormwater Management Planning and Design (SWMP) Manual (March 2003).

The SWM strategy and criteria presented below apply only to the Phase 2 lands. While some criteria may be relevant to non-participating landowners, the focus is solely on Phase 2 lands.

4.1 Stormwater Management Criteria

The SWM plan must meet all design requirements for the area while remaining feasible. The design must comply with the Town of Caledon, TRCA, and MOE design criteria for SWM practices, as well as any site-specific requirements for the subject lands. Various organizations provide stormwater management criteria for the site. The design criteria for the study area are provided by the Town of Caledon Development Standards Manual (2019), the TRCA Stormwater Management Criteria (2012), and the MOE SWMPD (2003). The following sections summarize these criteria as they apply to the study area.

4.1.1 Water Quantity Control

The subject lands fall under TRCA jurisdiction. The western portion of the site discharges to the Gore Road Tributary, while the eastern portion drains to the Clarkway Tributary. According to the TRCA SWM Criteria (2012), both tributaries are part of Sub Basin 36 of the Humber River Watershed. Therefore, the target release rates for this reach are determined using the unit flow rates calculated from Equation F of Table E.1. A regional control assessment should be conducted to determine if regional controls are necessitated.

4.1.2 Water Quality Control

The TRCA requires that all stormwater runoff must be treated to provide "enhanced" protection (i.e.: 80% TSS removal) as specified in Table 3.2 of the MOE's Stormwater Planning and Design Manual (2003).

4.1.3 Erosion Control

Erosion control will be provided with the following criteria:

- 25 mm, 48 hours extended detention to meet TRCA requirements.

4.1.4 Water Balance

According to Source Water Protection Atlas, the Study Area is identified to be outside of a Significant Groundwater Recharge Area (SGRA). This is supported by the soil conditions, as most of the Study Area is covered by fine-grained Halton Till at the surface, suggesting that groundwater recharge rates are minimal, though some recharge to the underlying aquifers is still expected.

4.1.5 CLI-ECA requirements

Development within Peel Region 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.

4.1.6 Additional Criteria

For all developments transitioning from pre-development to post-development stormwater management schemes, the legal outlet from the site must be considered when determining control requirements.

To meet the Quantity, Quality, Erosion, and Water Balance design criteria, as previously discussed, various lot-level, conveyance, and end-of-pipe controls are available. The Town of Caledon, the MOE, and the TRCA provide design criteria for these controls. Some lot-level and conveyance controls, known as Low Impact Developments (LID), are further discussed in the sections below.

4.1.6.1 Lot-Level Control Design Criteria

The Town of Caledon Development Standards Manual (2019) recommends lot-level controls where soils are deemed favorable by a soil report. The Town also encourages the use of LID controls for smaller drainage areas, as well as rural and industrial sites. The MOE SWMPD Criteria (2003) offers design guidelines for roof-top storage, parking lot storage, reduced lot grading, roof leaders to ponding areas, roof leaders to soakaway pits, infiltration trenches, vegetated filter strips, and rooftop gardens. Further discussion on the above-controls are included in **Section 4.23.**

4.1.6.2 Conveyance System Design Criteria

The Town of Caledon requires a dual drainage system to be designed and simulated for developments larger than 5 hectares. This dual drainage system includes a major system, consisting of rights-of-way (ROWs) and other overland routes, and a minor system, consisting of a sewer network. The minor system is designed to handle lot and street surface runoff for storms with a 10-year return period (where foundation drains are connected) and convey greater storms via the major system. For systems without foundation drains, a 5-year design will be allowed.

The Town of Caledon mandates that the minor system must not surcharge during any storm event and must convey the 10-year storm flow. The major system must be designed to convey either the regional or 100-year storm, whichever is greater. Inverts of service connections at the property line must be surcharge-free and above the 100-year hydraulic grade line of the municipal storm sewer system. Open channels must be designed to convey the regional or 100-year storm, whichever is greater, while avoiding erosion and maintaining a natural appearance, subject to approval by the Town of Caledon, the TRCA, and the MNR.

The MOE SWMPD Criteria (2003) provides design guidelines for superpipe storage, grassed swales, pervious pipe systems, pervious catch basins, and stream and valley corridor buffer strips. Further discussion on the above-mentioned lot-level controls is discussed in **Section 4.2.3**.

4.1.6.3 End-of-Pipe Stormwater Management Facilities Design Criteria

End-of-pipe facilities are used to meet the aforementioned criteria. The design of these facilities must adhere to additional specifications depending on the type of facility. Various types of end-of-pipe facilities exist, and the design criteria for many of these are outlined in the MOE SWMPD Criteria (2003) and Town of Caledon Development Standards Manual (2019).

4.2 Potential Best Management Practices (BMPs)

Conventional stormwater management relies on SWM ponds for quality, quantity, and erosion control. Incorporating LIDs as part of the BMPs for the study area can reduce the size requirements of SWM ponds by distributing quality and erosion control throughout the site. LIDs can also help achieve water balance goals. This section will discuss the various LID controls that are feasible within the site.

4.2.1 Background Material on LID Controls

The following documents have been reviewed in preparation of the assessment of LID controls within the Humber Station Employment Area Study Area:

- TRCA and CVC Low Impact Development Stormwater Management Planning and Design Guide (2010);
- TRCA Stormwater Management Criteria (2012);
- Town of Caledon Development Standards Manual (2019); and
- MOE SWMPD Criteria (2003).

4.2.2 General Considerations for LID Controls

Aa Infiltration is a key component of many LID measures. The ability for groundwater to infiltrate depends on the native soil and the fill provided. Generally, the minimum infiltration rate is 15 mm/hour. The various LID measures relying on infiltration discussed in **Section 4.2.3** require varying depths of soil with sufficient infiltration capacity. Additionally, infiltration requires that the seasonally high-water table be at least 1 meter below the bottom of the infiltration device.

A common issue for all LID measures is ownership and maintenance. If the LID measure is on private property, the property owner or manager should be educated on the maintenance requirements and incentivized or contractually obligated to maintain the feature. If the LID can be located within an easement or right-of-way, the municipality can maintain the feature if it stops working.

Pre-treatment is recommended or required for many LID controls. This can be accomplished through a filter strip, an oil grit separator (OGS), or another device that separates particulates from stormwater. Pre-treatment is typically necessary to prevent clogging of the infiltration media, filtration media, or native soil, which would inhibit infiltration and reduce the effectiveness of the measure. The treatment train approach can be used to reduce pre-treatment requirements for some measures.

4.2.3 LID Control Types

There are numerous types of LID controls that have been described and considered in the TRCA guideline (2010) and the MOE SWMPD (2003). **Table 4.1** (**Appendix B**) Illustrates the broad benefits of common LID technologies.

The following sections will describe and consider the different types of LID controls as they relate to the Humber Station Employment Area Phase 2 Study Area. Each LID type is to be considered with regard to feasibility within the study area.

4.2.3.1 Roof Downspout Disconnection

Roof downspout disconnection involves directing stormwater from the roof away from impervious areas that are directly connected to the storm sewer system. This is typically achieved by redirecting roof runoff to a landscaped area.

For successful implementation, the landscaping to which the runoff is directed must be graded to ensure at least a five-meter flow path to the nearest impervious area. If the native soils have an infiltration capacity of less than 15 mm/hour, the topsoil along the pervious flow path should be tilled and enhanced according to the TRCA guidelines (2010). Downspout disconnection is generally suited for low-density residential areas where lawns can be graded away from buildings with a sufficiently long flow path. Specific design requirements are detailed in the TRCA guidelines (2010). Therefore, downspout disconnection is likely to be applicable throughout the site.

Homeowners are generally responsible for the maintenance of downspout disconnection, which is similar to typical yard maintenance. Maintenance agreements may be required to ensure the continued effectiveness of this LID measure.

Given that the majority of developments within the Humber Station Employment Area Study Area consist of commercial site plans, it is anticipated that roof controls will be proposed for many of these developments. As a result, roof downspout disconnection is not applicable.

4.2.3.2 Bioretention

Aa Bioretention is an engineered LID device that uses plants and a specially designed soil filter media to store, treat, and often infiltrate stormwater runoff. It relies on its filter bed, stormwater management-adapted plants, and a mulch cover. The infiltration capacity of a bioretention cell can range from full infiltration to filtration only, directing water to an underdrain.

- **Pre-treatment**: Necessary to prevent clogging of the filter media, the method should be tailored to the nature of the incoming flow.
- **Underdrain Requirements**: Bioretention cells with an underdrain need sufficient head within the system to handle large storm events without flooding.
- **Slope Limitation**: Best applied in areas with slopes less than 5% to ensure a flat filter bed surface.
- **Location**: Can be built in landscaping and open spaces, typically accepting runoff from areas between 0.01 ha and 0.5 ha. Specific design requirements are detailed in the TRCA guidelines (2010).

Maintenance: Bioretention generally requires a maintenance contract to ensure long-term functionality. The contract should allow site inspections if maintenance is provided by the owner. Maintenance is generally similar to typical landscaping, but additional training specific to bioretention facilities will be required. Constructing the bioretention facility within an expanded right-of-way or an easement will enable municipal staff to monitor its effectiveness.

The Humber Station Employment Area Study Area generally has soil ranging from silt and clay to sand and silt. Detailed hydrogeological information will be required to determine the feasibility of this LID practice.

4.2.3.3 Green Roof

A green roof is a section of a building's roof designed to support growth media and vegetation, reducing rooftop runoff and retaining rainwater. Beyond stormwater management, green roofs offer additional benefits. They can vary in growth media depth and vegetation type based on the intended use of the space.

Green roofs require specific design considerations:

- **Structural Support**: The roof must be able to support the additional weight of the growth media and vegetation.
- **Slope Limitation**: The roof should have a slope of less than 10%, making this suitable primarily for flat roof buildings.
- **Fertilizer Management**: Care should be taken to avoid increasing fertilizer-based contaminant loading in the receiving watercourse.
- **Irrigation**: While irrigation may be necessary, it should be limited to maintain the effectiveness of the green roof. Specific design requirements are provided in the TRCA guidelines (2010).

Maintenance and Monitoring: Green roofs require additional maintenance and monitoring compared to conventional roofs. Regular weeding and debris removal are necessary to maintain effectiveness and prevent damage from unwanted vegetation. This process is more complex than standard landscaping and is the responsibility of the landowner, as green roofs are typically built on private buildings.

Given that the majority of developments within the Humber Station Employment Area Study Area consist of commercial site plans, it is anticipated that roof controls will be proposed for many of these developments. However, the use of green roofs may be limited depending on the design of various site plans.

4.2.3.4 Infiltration Trenches and Chambers

Infiltration trenches, infiltration chambers, and soakaways are designed to store and infiltrate stormwater runoff directly from the surface or through a pipe. These devices provide void space for storing stormwater over native soil that can absorb the water. Infiltration trenches and soakaways are often constructed near the surface and can accept rainwater directly. Infiltration chambers are typically large underground open-bottom structures that allow for the storage and infiltration of rainwater from larger sites, and they can be built under impermeable areas such as parking lots.

Sediment pre-treatment is necessary to prevent clogging and can be achieved through various means, including oil/grit separators and filter strips.

Maintenance: Infiltration trenches built on private land require the landowner or land manager to maintain the device. Installation within the right of way or an easement is possible to allow municipal access for maintenance. Training should be provided to the responsible party regarding the specific maintenance needs of the device.

Within the context of the Humber Station Employment Area, there is an opportunity to build infiltration chambers within the site plans and ROW where soil and groundwater conditions are favorable.

4.2.3.5 Permeable Pavement

Permeable pavement is a stormwater management solution that replaces typically impervious surfaces, such as roads or parking lots, with a permeable surface. This surface is generally installed over a granular medium with enough void space to store runoff and potentially allow infiltration into the subsurface. Various types of permeable pavements are available, including interlocking pavers, permeable concrete, and porous asphalt.

When used for infiltration, permeable pavement differs from other infiltration-based Low Impact Development (LID) measures because it acts as its own pre-treatment system. Regular maintenance is necessary to remove small particulates from the permeable surface. The base of the storage reservoir should be flat for infiltration purposes or have a slope between 1% and 5% for detention purposes.

Permeable pavement is ideal for light traffic roads, parking lots, and walkways to minimize salt and sediment loading. It is especially useful in space-limited areas where other LID measures are not feasible. Overall, permeable pavers are a viable option for site plans.

4.2.3.6 Rainwater Harvesting

Rainwater harvesting involves collecting and storing stormwater runoff for later use by building occupants. This rainwater can be stored in above-ground rain barrels or underground cisterns below the frost line. The stored water can be used for purposes such as irrigation or non-potable domestic water uses.

In low-rise residential areas, rainwater reuse is often seasonal, mainly for irrigation. Implementing rainwater harvesting for townhouses and detached homes for irrigation is relatively simple and can be integrated with other Low Impact Development (LID) measures, allowing the system to overflow during larger storm events.

Pre-treatment is necessary to remove dust, leaves, and other debris that could clog the system. The level of treatment should match the intended end use of the water and the type of storage system.

Since the majority of development lands at the Humber Station Employment Area are proposed for commercial site plans, which typically have less pervious areas, simple rainwater harvesting for irrigation is not recommended.

4.2.3.7 Perforated Pipe Systems

Perforated pipe systems are a type of storm sewer that allows infiltration through perforated pipes embedded in gravel bedding and wrapped in geotextile. This design enables stormwater conveyance to end-of-pipe facilities while permitting infiltration along the pipe network.

Similar to other infiltration-based Low Impact Development (LID) measures, perforated pipe systems have specific groundwater, soil, and location requirements. Pre-treatment of stormwater is necessary to extend the service life of the system.

Perforated pipe systems are typically installed within municipal rights-of-way or easements and would be owned by the municipality if located under public roads. Installation should consider existing utilities and potential maintenance needs.

These systems are suitable in areas with soils that have adequate infiltration rates. The specific locations for perforated pipe systems should be confirmed based on final grading and hydrogeological analysis.

Given the commercial nature of the Humber Station Employment Area, the use of perforated pipe systems is likely to be unfavorable.

4.2.3.8 Enhanced Grassed Swales

Enhanced grassed swales build on traditional grassed swales with additional features to reduce water velocity, improving sediment trapping, infiltration, evapotranspiration potential, and contaminant filtration.

The feasibility of a swale depends on groundwater elevation and the development density. The swale slope should be between 0.5% and 6% to maintain optimal conditions. The filtering and infiltration capabilities of the swale are effective for drainage areas up to 2 hectares; larger areas can cause excessive flow that may lead to erosive conditions. Enhanced grass swales should not receive runoff from sites with potential for highly contaminated runoff to prevent subsurface contamination. Specific design requirements are provided by the TRCA (2010).

Maintenance of an enhanced grassed swale includes mowing, trimming vegetation, and removing sediment buildup. If the swale passes through private properties, landowners or managers must be educated on proper maintenance.

The feasibility of swales within the Humber Station Employment Area depends on available space, as all other factors in the area are favorable.

4.2.3.9 Dry Swales

A dry swale is similar to the enhanced grass swale but incorporates bioretention elements to filter and infiltrate water using engineered soil and perforated pipe. The advantage of a dry swale over an enhanced grass swale is its increased treatment and infiltration capacity, comparable to a bioretention cell. However, it requires engineered soil, deeper groundwater, and native soil with an acceptable infiltration rate.

To effectively manage runoff, a dry swale needs specific groundwater, soil, and location conditions, as outlined in Section 8.3.2, typical of infiltration practices. For areas with potential for highly contaminated runoff, a non-infiltration variant of the dry swale should be used, providing filtration and treatment similar to a bioretention cell, while also offering conveyance and evapotranspiration benefits. In areas without the risk of highly contaminated groundwater, full or partial infiltration is feasible.

Maintenance of a dry swale includes trimming, mowing, and tasks associated with bioretention. If the swale is on private property, owners or managers should be educated on its maintenance requirements, which differ from typical swales and standard landscaping. They should be contractually obligated or incentivized to maintain the swale. Additionally, placing the dry swale in an expanded right-of-way allows the municipality to monitor it.

The feasibility of a dry swale in the Humber Station Employment Area Phase 2 area depends on groundwater and soil conditions. The spatial requirements and benefits of the dry swale should be evaluated within the context of the Humber Station Employment Area Study Area and its end-of-pipe management.

4.2.3.10 Vegetative Filter Strips

Vegetative filter strips are a LID measure that accepts and treats sheet flow runoff by reducing the velocity and trapping sediments. Vegetative filter strips are generally used as a pre-treatment to other LIDs. Vegetative filter strips offer snow storage and aesthetic benefits in addition to the filtering potential.

Vegetative filter strips can be used in areas with slopes between 1% and 5%, as long as adequate flow spreading is provided and sheet flow on the strip can be maintained. Flow lengths across the impermeable surface that is discharging to the filter strip must be less than 25 m to prevent the concentration of the flow and to maintain sheet flow properties. Filter strips can be used on any soil, subject to tilling if the soil is too compact to allow vegetative growth. Vegetative filter strips should not be used in areas with highly contaminated run-off, and they should not be used in areas where the seasonally high-water table is less than 1 meter below the surface.

If the vegetative filter strip is on private property, the property owner or management should be educated on the maintenance requirements, and either be incentivized or contractually obligated to maintain the feature. The vegetative filter strips can be built within the public right-of-way such that municipal staff can monitor and maintain the effectiveness of the strip.

Vegetative filter strips are versatile and serve as an effective pre-treatment for many other management practices. Therefore, if needed for the pre-treatment of other LID measures, they will be feasible in this area.

4.2.3.11 Rooftop, Surface, and Underground Storage

Runoff can be managed through volumetric detention using rooftop, surface, and underground storage methods. These storage solutions help to control peak flow from a site or subdivision, meeting the flow requirements of the site or the receiving system.

Maintenance of storage systems located on private property is the responsibility of the landowner.

For the Humber Station Employment Area Phase 2 Development, which primarily consists of site plans, rooftop, surface, and underground storage options are applicable.

4.2.3.12 Oil/Grit Separators

Oil grit separators (OGS) are devices designed for sedimentation and basic treatment of stormwater runoff. They are typically used to treat runoff from roadways, which often contains high levels of particulates and grease from vehicular traffic. The treated water is then discharged into the storm sewer system. An optional overflow feature can be included in the OGS to ensure safe operation and prevent backwater issues in the sewer.

Maintenance for an OGS involves removing accumulated sediment from the sump using a vacuum truck. Routine inspections are necessary to ensure the OGS operates properly and that the sump has not become fully filled with sediment.

4.2.3.13 Catch Basin Shields

Catch basin (CB) shields are devices installed within catch basins to enhance water quality control. These shields operate on the principle of sedimentation, reducing the total suspended solids (TSS) load entering the sewer. Generally, CB shields can be integrated into a treatment train to achieve approximately 50% TSS removal.

Maintenance involves using a vacuum truck to remove accumulated sediment from the sump of each CB. Routine inspections are necessary to ensure the CB shield functions correctly and that the sump has not become excessively filled with sediment.

While municipalities have not yet formally accepted CB shields as a Low Impact Development (LID) method for municipal properties, they can be considered in design plans if the City chooses to adopt them, as they do not involve significant additional costs. Additionally, catch basin shields are suitable for site plan properties as part of a quality control treatment train.

4.3 Application of Low Impact Development (LID) Measures

Given that the rights-of-way currently cover a total of 3.53 hectares of the development area and the majority of the Humber Station Employment Area proposed development consists of site plans, it is recommended that Low Impact Developments (LIDs) be thoroughly explored during the site plan application stage. The sections above highlight the applicability of the LIDs with the context of the subject study area.

4.4 Proposed SWM Facilities

In order to conform to the SWM parameters discussed above, three (3) SWM Ponds and one (1) SWM tank are proposed within Humber Station Employment Area Study Area. The proposed wet ponds will feature a filter bed sized to accommodate the required filtration volume to satisfy the MECP CLI-ECA (Municipal Consolidated Linear Infrastructure Environmental Compliance Approvals) criteria. The stormwater management report, as attached in **Appendix C,** consists of supporting calculations. Refer to **Figures 3.2** and **3.3** for the proposed drainage plan and servicing.

4.4.1 SWM Pond 1

SWM Pond 1 discharges to the Clarkway Tributary and, as such, requires Quantity control based on the equation for sub-basin 36 provided in the TRCA Stormwater Management Criteria (2012). SWM Pond 1 is proposed with regional controls. Quantity control for the site plan is provided within the pond. SWM Pond 1 contains a filtration cell to satisfy the CLI ECA requirements for the site plan drainage area.

4.4.2 SWM Pond 2

SWM Pond 2 discharges to the Gore Road Tributary via the proposed channel and, as such, requires Quantity control based on the equation for sub-basin 36 provided in the TRCA Stormwater Management Criteria (2012). Quantity control for the site plan is provided within the pond for 2–100-year controls. SWM Pond 2 contains a filtration cell to satisfy the CLI ECA requirements for the site plan drainage area.

4.4.3 SWM Pond 3

SWM Pond 3, which discharges to the Clarkway Tributary, requires quantity control based on the equation for sub-basin 36 as provided in the TRCA Stormwater Management Criteria (2012). For site plans discharging to SWM Pond 3, quantity control for the 2-100 year and regional events is proposed at the site plan level. Quantity control for the municipal right-of-way is provided within the pond for 2-100 years and regional events. SWM Pond 3 includes a filtration cell to meet the CLI ECA requirements for the public right-of-way only; however, quality control is proposed within the SWM Pond.

4.4.4 SWM Tank

A SWM tank is proposed to capture west drainage of the George Bolton Parkway, which discharges to the Gore Road Tributary. The SWM tank requires quantity control based on the equation for sub-basin 36 as provided in the TRCA Stormwater Management Criteria (2012). Quantity control is proposed within the SWM Tank for 2–100-year events, and LID are recommended to satisfy quality control.

All facilities provide quality control and erosion protection. Details on the sizing of all end-of-pipe SWM facilities design and associated LID measures have been provided in the Stormwater Management Report included in **Appendix C**.

4.5 Conceptual Major and Minor System Design

The conceptual major overland flow paths and the preliminary layout of the storm sewer system have been established. Most areas of the site will be fully captured before draining to the stormwater management ponds. A preliminary storm sewer layout and overland flow paths are provided in the Stormwater Management report in **Appendix C**.

Emergency overland flow routes have been planned in case of system failure. Emergency spillways for the stormwater management ponds should be sized for the regional storm event during the detailed design stage.

Please refer to **Figure 3.3** for a schematic representation of the proposed storm servicing strategy for the Study area.

5. Geotechnical

The CEISMP TOR requires that a geotechnical investigation within the Study Area be completed to identify areas in which potential slope instability exists. The current geotechnical/ slope stability review completed included a review of previously completed geotechnical investigations, as described below and summarized in **Appendix D**.

Soil conditions were first investigated in 2023 by DS Consultants Ltd. (DS) in their Preliminary Geotechnical Investigation for Proposed Employment Land. DS Consultants completed geotechnical studies on the northern-most portion of the study area, just south of Healy Road, as well as the southern section to the north of Mayfield Road. Thirteen boreholes were advanced to depths ranging from 7.9 to 8.2 m below existing grade. A supplemental geotechnical investigation for the proposed industrial development (12519 to 12713 Humber Station Rd., Caledon) was conducted by Pinchin in 2023 in advance of a proposed development of five slab-on-grade industrial warehouse buildings located at 12519 to 12713 Humber Station Road.

The CEISMP TOR requires that a geotechnical investigation within the Study Area be completed to identify areas in which potential slope instability exists. The slopes at the existing pond were found to be a maximum of 1V:4H which are to be maintained following development and were considered to be stable.

A summary of pertinent data and interpretations from these reports are provided in **Appendix D.**

5.1 Grading Within Buffers

Some areas of the property will require grading preparation during site construction, which may affect both woodland and wetland buffers. There were numerous buffers for the north-south valley at the east end of the site.

Future development will need to be prohibited from the Stable Top of Slope and Floodplain features, consistent with setback distances, although grading is possible within the buffers as this in on current agricultural tableland.

Buffer management measures that are proposed include:

i) Maintenance of hydrogeological inputs to receiving areas (ie. existing watercourses and wetlands).

ii) Ecological enhancement of the intervening buffer areas (within the development setback zones).

iii) Restricted access to sensitive wetlands or woodland buffers via suitable barriers (such as dense or thorny plantings) or with use of fencing.

5.2 Pond Berm Design

Proposed work involves creation of three stormwater management (SWM) facilities and re-use of one stormwater pond at the Study Area, listed as follows:

Proposed SWM-1

- Approximately GPS location: 4855890N 601770E
- Approximately area and perimeter: 11,132 m^2 and 427 m, respectively
- Berm Slopes: maximum of 1V:4H on proposed berm (above water level)

Proposed SWM- 2

- Approximately GPS location: 4854730N 602240E
- Approximately Area & Perimeter: 3,720 m^2 and 265 m, respectively
- Berm Slopes: maximum of 1V:4H on proposed berm

Proposed SWM-3

- Approximately GPS location: 485475N 603085E
- Approximately Area & Perimeter: 17,683 m^2 and 606 m
- Berm Slopes: max. 1V:4H on proposed berm (above water level)

Pond (Existing)

- Approximately GPS location: 4854880N 602870E
- Approximately Area & Perimeter: 120 m^2 and 95 m
- Slopes: max. 1V:4H on existing and proposed pond slopes

Stormwater management (SWM) facilities are planned at the north end of the Site (including the two proposed SWM-1 and -2, as listed above); and, in the southeast end of the Site (labelled as SWM-3) as well as the existing and proposed Pond at the middle west end of the Site. Proposed drainage channels were measured to have proposed acceptable side slopes of 1V:4H.

The slopes at the existing pond were found to be a maximum of 1V:4H which are to be maintained following development and were considered to be stable.

At the time of this report no additional details were available on the SWM facility designs.

The following general comments are provided based on the proposed SWM facility locations and soil conditions encountered. The SWM guides provided herein should be reviewed once additional information on the SWM facility design is available.

- The subsurface conditions at both proposed SWM facility locations generally comprise topsoil overlying native silty clay till deposits. At Pinchin's BH124, a deposit of sand was encountered within the silty clay glacial till. The potential for sand seams within the glacial till should be anticipated in other areas of the Site as well.

- Due to the fine-textured nature of the soils, the SWM facilities will generally not be suitable to hinder stormwater infiltration; but will be suitable for storage. A liner is recommended for installation at all SWM facilities due to the potential presence of sand layers or seams within the glacial till strata. This liner should comprise clay placed in three lifts of 150 mm thickness, each compacted to at least 98% SPMDD with a sheepsfoot roller compactor. The clay must be tested to confirm that its hydraulic conductivity is less than 1 x 10^{-7} cm/s and compacted in place with optimum moisture maintained. Portions of the native soils may be suitable for use as SWM facility liner.
- SWM facility sides should be sloped at 5 horizontal to 1 vertical below the permanent pool level; and, a maximum slope of 3 horizontal to 1 vertical above elsewhere. Any berms required for the proposed SWM facilities should be constructed using the on-site clayey silt till placed as structural fill in thin lifts under warm weather conditions and avoidance of air voids through the use of a sheepsfoot roller compactor or similar device.
- All SWM facilities are to be designed according to MECP's Stormwater Management plan and SWM facility Design recommendations from their Stormwater Management Plan and Design Manual (2003).

5.3 Erosion and Slope Stability for Stormwater Management Outfalls and Channels

All existing slopes observed were less than 3H:1V, aside from those along some reaches of the southeast portion of the Study Area (i.e., Clarkway Drive Tributary).

Arcadis reviewed topographic survey provided by David B. Searles Surveying for the northern portion of the study area (12519 to 12713 Humber Station Road, Caledon, File 19-1-22) and found an absence of steep ravine slopes through the middle of the Study Area.

It is recommended that a Sediment and Erosion Control Plan be created for SWM infrastructure including outfall and drainage channels within the Study Area. We recommend that the Erosion Control Plan include the recommendations as provided in **Appendix D**.

Following visual review of site conditions, the watercourses within the study area were characterized as confined streams, as observed in a gently rolling landscape (possibly with glaciated subsoils) and within the headwater area of the Humber Creek drainage basin under general perennial flows with a detectable shallow channel.

Erosion hazards following from unconfined stream channels are based on an evaluation of the toe of slope erosion allowance, and the stable slope setback with an additional allowance for access following reference to MNR (River & Stream Systems: Erosion Hazard Limit, 2002) guidelines. The stream courses within the study areas were observed to have a relatively straight meander belt. Local soils were found to comprise a sandy silty clay to a silty clay with sand till.

Under a confined stream system, the minimum toe erosion allowance was assessed using MNR Table 3; under a stiff cohesive till soil with evidence of active erosion and was stipulated within a range of 5 to 8 m. It is suggested that a mid-range value of 6.5 m be applied to the Humber Station property. Erosion features were compared using oblique site photos between Sept 2011 and May 2024 without any noticeable difference in bankfull widths or meandering axis.

The stable slope setback was assessed following from slope stability modelling of the 1.5 m slope height which gave a suggested stable slope setback of 2 m distance.

The erosion access allowance is typically set at 6 m but was reduced in this case to a 4 m allowance due to the minor nature of the slope height and the fact that this stream erosion is occurring in the headlands of the Humber Creek.

It is recommended that the applicable toe erosion allowance, stable slope setback and erosion access allowance be applied only to the Clarkway Drive Tributary watercourse which traverses the southeast Site property boundary.

5.4 Slope Stability Assessment

No significant valleylands are found on or adjacent to the Study Area. The steepest areas within watercourses were observed at the Clarkway Drive Tributary (labelled as WHT-1) along the southeast property boundary.

Three features were examined as part of the previous Fluvial Geomorphology assessment: drainage feature HDF-3, HDF-8, and the Clarkway Drive Tributary, a tributary of the West Humber River (labelled as WHT-1).

5.4.1 Headwater Drainage Feature (HDF) -3

Humber Station Road is found immediately west of the HDF-3 location. For HDF-3 within the Study Area, where defined, the bankfull widths ranged between 1.0 to 2.0 m, and bankfull depths ranged between 0.30 to 0.50 m. Bankfull width for HDF-3i was found to be 2.5 m and bankfull depth was 0.40 m. Drainage features with less than 2 m height were not considered as requiring slope stability modelling, based on the MNR Technical Guide (2002).

5.4.2 Headwater Drainage Feature (HDF) -8

HDF-8 is found along the North site boundary- adjacent to a beaver dam. Where defined, bankfull widths ranged between 1.0 to 2.5 m, and bankfull depths ranged between 0.20 to 0.50 m. No flow was noted during the field visit, but standing water was noted in some of the deeper sections. Drainage features with less than 2 m height were not considered as requiring slope stability modelling.

5.4.3 Clarkway Drive Tributary

For the Clarkway Drive tributary, bankfull widths ranged between 2.5 to 5.0 m, and bankfull depths ranged between 0.80 to 1.5 m. Channel substrate consisted primarily of sand and silt, with boulders and cobbles also present in some sections. Bank materials consisted of sand, silt, and clay (till). Rapid Geomorphic Assessment (RGA) on this watercourse yielded a score of 0.24 (indicating it is in transition/stressed). Evidence of aggradation was the dominant geomorphic process, with evidence of widening also observed.

Even though drainage features with less than 2 m height were not considered as requiring slope stability modelling, Arcadis assessed the stability of the existing slopes alongside the Clarkway Drive Tributary by reviewing historical geotechnical reporting and borehole logs to assess subsurface soil conditions. The soil parameters used in the slope stability analyses were estimated based on the results of prior field and laboratory testing and are presented in **Table 5.1**.

Table 5.1: Approximate Soil Parameters for Slope Stability Analysis of the Clarkway Drive Tributary

Soil Material	Unit Weight (kN/m^3)	Angle of Internal Friction	Cohesion (kPa)
Topsoil	16	29	0
Silty Clay Till	21	30	5

The groundwater level selected for modelling corresponds to the average upper groundwater level measured by Arcadis in our 2024 geotechnical report for a portion of the Site, at 4.2 m below ground surface (mbgs), along with a worst-case water table modelled as a perched condition at the upper surface of the till soil at 0.5 mbgs.

Modelling on slope stability was completed using the Slope/W software of Geostudio (Bishop Method) for several potential failure types. The various failures analyzed included a shallow slumping-type failure at the slope surface, a medium rotational depth failure occurring near the crest of the slope and a deep rotational failure occurring through the entire slope height. Several analyses were carried out for the slope profiles to determine the setback required to achieve a factor of safety (FS) of 1.5 along the crest of slope. The setback was determined based on the point at which the failure slipcircle intersects the tableland behind the crest of the slope.

Along the crest of slope, the analyses revealed that the 1.78 FS slipcircle intersects the top of slope (with assumption of a very high perched water table) at a setback distance of approximately 2 m. A static groundwater table depth at approximately 4 mbgs resulted in a FS at greater than 2, which was not of concern. There were no slope stability concerns raised for the Clarkway Drive Tributary slopes under current conditions, provided that potential surficial and seepage erosion can be prevented. An excerpt of the modelling plot is found in **Appendix D, Figure 1**.

Surficial weathering and sloughing or seepage erosion of soil on the slope face are primary factors which will contribute to long-term slope degradation along with minor erosion caused by freeze/thaw and wetting/drying cycles. A top of stable slope setback of 2 m is recommended to account for potential for weathering erosion in addition to an erosion access allowance of 4 m distance at the top of slope.

There was an absence of groundwater seeps on the slope surface although there may be erosion caused by run-off of surface water over the face of the slope. A well-vegetated slope with trees and deep-rooted plants will help minimize slope erosion and impact from run-off or groundwater seepage.

5.5 Site Servicing

Geotechnical guidance for site servicing should reference the DS report dated June 7, 2023 (Section 4.7- Underground Utilities). However, no geotechnical investigation has been completed to date to assess site servicing for deeper sanitary sewer infrastructure as the deepest boreholes in the DS study were advanced to 7.9 to 8.2 m depth in comparison to the anticipated depths for sanitary sewer infrastructure of 13.59 m below grade for the George Bolton Parkway (west end); and 11.63 m depth for Street A2 (north end). It is recommended that deep boreholes be advanced along the Geoge Bolton Parkway alignment as well as an additional deep borehole along the Street A2 alignment to review deeper soil strata and geotechnical conditions. All boreholes should extend 2 to 3 m below the invert of proposed sewer infrastructure. The potential for upward gradients associated with an underlying pressurized confined aquifer should be assessed.

Site servicing and roadwork installation will require stringent quality control to guide workmanship throughout the construction process. Therefore, it is advisable to conduct materials testing and inspections by qualified geotechnical personnel during construction. These evaluations should encompass foundation and embankment subgrade conditions, compaction testing of road subgrade fill, retaining wall and culvert backfill, as well as asphalt paving, sampling, and concrete testing.

6. Groundwater

6.1 Potential Impacts to Local Groundwater Resources

Potential impacts associated with the proposed project can manifest in the short term because of construction-related activities or in the long term if changes that occur during or after LID construction alter the natural form or function of the hydrologic system. Based on the Phase 1 CEISMP and the preliminary Concept Plan, it is anticipated that there will be a significant increase in impervious cover with a corresponding reduction of recharge. Without mitigation, this may have a significant impact to the local groundwater system related to a lowering of the water table and a decrease in groundwater discharge to groundwater-dependent surface water features. There will also be a significant increase in surface water runoff. Long-term impacts to the regional groundwater system may result from the reduced amount of groundwater infiltration to the aquifers. This impact is not anticipated to be significant since the Site occupies about 1% of the Humber River watershed.

Based on the preliminary Concept Plan, it is understood that the proposed structures will not have basements and will be constructed on strip footings. As such, significant short-term or long-term groundwater dewatering is not anticipated. There may be some short-term dewatering required related to the construction of subsurface utilities. Any potential dewatering activities can cause interference in the short-term to the groundwater system, nearby natural features, and existing water users.

The introduction of overburden material with different hydraulic properties or alterations to the local topography can affect the existing groundwater system. Installation of site services could potentially introduce preferential pathways for contaminants to the groundwater and alter the natural groundwater levels. Local groundwater quality may be affected by the application of road salt along the public roadways. The underlying overburden materials are generally fine grained and the input of sodium and chloride as to the regional deeper aquifer as a result of road salting may be retarded to some degree.

6.2 Potential Impacts to Groundwater-Supported Features

An understanding of their dependence on the groundwater system for the natural heritage features was developed as part of the Phase One CEISMP. This allows for the assessment of potential impacts to these features because of short-term or long-term changes to the groundwater system.

For groundwater dependent features, lowering the shallow groundwater level because of either short-term construction dewatering, or a long-term reduction of recharge could potentially reduce groundwater discharge to nearby natural ecosystem features due to construction dewatering. It is understood that deep servicing has been proposed across a portion of the Site and these will require some degree of short-term dewatering and / or depressurization, which may interfere with any natural heritage feature at the Site or beyond the Site within the zone of influence of pumping.

This will need to be carefully managed to avoid any impacts to these features. Management of the pumped groundwater will also be required to avoid water quality, water quantity, or erosion impacts associated with the discharge.

A lowered local water table can negatively affect ecosystems that are dependent on groundwater systems. However, Halton Till clay silt deposits have been mapped across the Site and, as such, the Site is interpreted to be in an area of relatively low recharge. Any loss of recharge because of an increase of impervious surfaces will be addressed as part of the proposed mitigation measure.

The increase in runoff due to reduced infiltration may increase the on-site stream flow, potentially resulting channel erosion and an increase in the sediment loading into on-site and nearby surface water features. The downstream water quantity and quality of these surface water features could potentially be affected by the proposed development and urbanization. This has been addressed in the proposed stormwater management measures discussed in **Section 4**.

As outlined in the Phase 1 CEISMP, headwater drainage features and / or wetland that are interpreted to be perennially or intermittently connected to the groundwater table are the Clarkway Drive Tributary and HDF-3, and associated wetland. HDF-8 was interpreted to be ephemeral and disconnected from the groundwater table. Lowering of the shallow groundwater level during dewatering may reduce groundwater discharge to headwater drainage features or wetlands permanently or seasonally connected to the groundwater table.

6.3 Potential Impacts to Other Groundwater Users

Alteration of Site grading and the introduction of preferential pathways through Site servicing could potentially reduce the quantity and quality of groundwater available to nearby groundwater users, particularly those dependent on shallow well systems. The construction of deeper services (sanitary trunk sewers) may also introduce preferential pathways particularly if they were to intercept the ORM aquifer unit.

Construction dewatering may lower the local water table which may in turn, impact the production of neighboring private wells. If the resulting water level at the private wells falls, wells may produce less, pump intermittently, or temporarily go dry. Construction related drawdown from dewatering, if necessary, should be temporary in nature. Areas surrounding the proposed development to the north, west, and south consist largely of rural properties that have domestic wells for their potable groundwater supply. Once the potential dewatering requirements and resulting zone of influence are confirmed through additional study, an expanded well survey should be completed within the interpreted zone of influence of pumping.

6.4 Preliminary Assessment of Dewatering Requirements

There are typically two (2) potential scenarios involved in construction dewatering: depressurization and dewatering. Depressurization involves lowering the piezometric pressure head in the confined aquifer while dewatering involves removal of water from the unconfined aquifer unit. Based on the borehole logs available for the project site, the encountered water table is interpreted to represent a shallow unconfined aquifer system.

Dewatering rates were estimated based on Arcadis' interpretation of the hydrogeology in the study area and review of the proposed construction depths for the sanitary servicing discussed in **Section 3**. Much of the infrastructure on-Site is proposed to be constructed below the existing water table and potentiometric surface. As such, the need for dewatering and / or depressurization during construction has been identified.

Dewatering rates presented in this section were estimated based on Arcadis' interpretation of the hydrogeological conditions on the Site and a review of the proposed depth of infrastructure. Estimates are based on observed water levels collected over the course of the monitoring period (2017 to 2024); however, these estimates should be considered preliminary as additional information will be required along the proposed alignments to adequately assess potential dewatering requirements for permitting purposes.

This section does not provide a design of dewatering operations but provides a preliminary estimation of the expected dewatering rates to obtain the desired drawdown. The most effective dewatering measures for the prevalent ground conditions and the design of the dewatering operations are the sole responsibility of the dewatering contractor on site.

A summary of the proposed infrastructure for the Site is presented in **Section 3** and **Section 4** and **Table 6.1**. The proposed locations for major storm sewers, sanitary sewers, watermains and SWMF facilities are illustrated on **Figure 6-1** through **Figure 6-9**. The approximate servicing depths are based on Schaeffers' Plan Profiles, dated August 2021.

Table 6-1: Proposed Servicing Depths

LOCATION	Approximate Maximum Servicing Depth (Future Grade to Obvert)		
	SANITARY SEWER (MBGS)	STORM SEWER (MBGS)	SWM POND
George Bolton Parkway	13.59 (West) 11.63 (East)	1.53 (West) 3.47 (East)	-
Street A2	11.63 (North) 2.35 (South)	3.47 (North) 1.39 (South)	-
SWM 1 / SWM 2			1.04
SWM Tank			1.87
SWM 3			4.78

As noted above, the proposed sanitary services along George Bolton Parkway and the northern half of Street A2 are quite deep, whereas the depth to the sanitary sewer shallows to less than 5 mbgs at the southern end of Street A2. These two broad areas were therefore considered separately as the assessment of the dewatering depends on the proposed depth and the corresponding amount of drawdown of the water table required.

A similar approach was taken when grouping the proposed infrastructure into segments for the estimation of depressurization rates. Based on Arcadis' understanding of the local hydrogeology, it is anticipated that depressurization of the confined ORAC may be required for some areas of the Site.

6.4.1 Required Drawdown

Drawdown of the water table may be required during the construction of the two road segments, the proposed SWM tank (LID feature) and one of the SWM ponds, as identified in **Table 6-1**. To maintain a safe and dry excavation during construction, the water table should be drawn down to approximately 1 m below the bottom of required excavations. The drawdown requirements are presented in **Table 6-2**.

Table 6-2: Proposed Servicing Drawdown Summary

Design Element	Closest Monitoring Well	Bottom Elevation (masl)	Drawdown Elevation (masl)
George Bolton Parkway	MW9	219.48	218.48
Street A2	BH23-3	226.66	225.66
SWM 1 / SWM 2	MW2-17s	-*	-*
SWM 3	MW5-17s	225.10	224.10
SWM Tank	MW4-17s	231.05	230.05

*Water table is observed below the required excavation depth and dewatering is not required

Additional borehole and monitoring well data are required during detailed design to refine dewatering estimates for all the above design elements, as the closest monitoring well may not be representative of local conditions.

6.4.1.1 Zone of Influence

An estimate of the Zone of Influence (ZOI) for dewatering trenches in unconfined aquifers can be calculated using the following equation (Bear, 1979):

$$R_0 = 2.45\sqrt{\frac{HK}{S_y}t}$$

where,

R0 = Zone of Influence (m), beyond which there is negligible drawdown

H = Distance from initial static water level to bottom of saturated aquifer (m)

Sy = Specific yield of the aquifer formation (assumed to be 0.10 for a silt and clay till based on Johnson (1967))

t = Time, in seconds, required to draw the static groundwater level to the desired level (assumed to range between 14 days)

K = Hydraulic Conductivity (m/s)

A summary of the ZOI estimation for the dewatering calculations is presented in **Table 6-3**.

Table 6-3: Preliminary Zone of Influence Results

Design Element	H (m)	K (m/s)	t (s)	Zone of Influence, R_0 (m)
George Bolton Parkway	4.1	1.0×10^{-4}	1209600	1889
		1.0×10^{-5}	1209600	597
Street A2	10.2	1.8×10^{-8}	1209600	3.6
SWM 1 / SWM 2	N/A			
SWM 3	4.4	5.0×10^{-9}	1209600	1.3
SWM Tank	2.1	6.8×10^{-8}	1209600	3.3

A potentially large ZOI is present, associated with depressurization during installation of the deep servicing. Insufficient hydrogeological data is available in this location, and the K-value has been derived from literature values for a sand and gravel aquifer. Additional investigation will be required to refine the understanding of local conditions.

6.4.2 Construction Dewatering Rate Calculations

Dewatering calculations for linear excavations (open trenches) were simulated as flow to both sides of a line of wellpoints, plus that to the ends of the line that is simulated as two half-wells. The trench equation was used to estimate the required dewatering rate. Our analysis includes a series of imaginary dewatering wells, within the footprint of the proposed design elements. The calculations were based on equations of radial flow (the system as a well with equivalent radius) provided in Powers *et al.*, 2013. For the purposes of analysis, steady state flow into the trench excavations has been assumed. Additionally, the equations of radial flow have the following assumptions:

- Ideal aquifer conditions (homogeneous, isotropic, uniform thickness and has infinite areal extent);
- Fully penetrating pumping well;
- Only lateral flow to the pumping well; and

- Constant pumping rate with the flow to the pumping well reaching steady state.

The following equation was used for open trenches and is based on unconfined aquifer conditions (Powers *et al.*, 2007):

$$Q = \frac{\pi K(H^2 - h^2)}{\ln(R_0 / r_s)} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right]$$

where,

Q = Anticipated pumping rate (m^3/day)

K = Hydraulic conductivity (m/day)

H = Distance from the static water level to the bottom of the saturated aquifer (m)

h = Height of the drawn down water table (m)

R_0 = Distance from a point of greatest drawdown to a point where there is zero drawdown (radius of influence) (m)

r_e = Distance to the wellpoints from the centre of the trench, equivalent well radius (m)

x = Trench length (m)

L = Distance from a line source to the trench, assumed to be equivalent to R0 (m)

The storativity (S) of a confined aquifer unit can be calculated using the following equation (Freeze and Cherry, 1979):

$$S = S_s B$$

where,

S = Storativity of the aquifer unit

S_s = Specific storage of the aquifer unit (1/m) (based on Domenico and Mifflin (1965))

B = Thickness of the aquifer (m)

The following equation was used to estimate the required pumping rate to achieve depressurization of the confined aquifer unit (Powers et al., 2007):

$$Q = \frac{2\pi KB(H - h)}{\ln(R_0 / r_s)} + 2\left[\frac{xKB(H - h)}{L}\right]$$

where,

Q = Anticipated pumping Rate (m^3/day)

K = Hydraulic Conductivity (m/day)

B = Thickness of the aquifer (m)

H = Distance from the static water level to the bottom of the saturated aquifer (m)

h = Depth of water in the well while pumping (m)

R_0 = Distance from a point of greatest drawdown to a point where there is zero drawdown (radius of influence) (m)

r_s = Distance to the wellpoints from the centre of the trench (m)

x = Trench length (m)

L = Distance from a line source to the trench, assumed to be equivalent to R_0 (m)

r_s from the above equation was estimated as follows (Powers et al., 2007):

$$r_s = \frac{a+b}{\pi}$$

where,

a = Length of the trench (m)

b = Width of the trench (m)

A summary of the dewatering/depressurization rates is presented in **Table 6-4**. The details of the dewatering calculations are presented in **Appendix E**.

The Trench equation was modified for the dewatering scenario. The footprint of each proposed design element was conceptually divided into dewatering trench sections, with a width of 1 m and length that varies depending on the design element.

To account for uncertainties and natural variability in the range of hydraulic conductivity as well as incident precipitation contribution, the calculated pumping rates were multiplied by a factor of safety of three (3). Incorporating the factor of safety in these preliminary dewatering calculations also provides flexibility to account for uncertainties in the current dataset.

Table 6-4: Preliminary Dewatering / Depressurization Volumes

Design Element	H (m)	h (m)	K (m/s)	x (m)	Zone of Influence R_0 (m)	Pumping Rate (L/day)	Pumping Rate (L/s)
George Bolton Parkway	4.1	-10.7	1.0×10^{-4}	30	1,889	1,918,000	22.2
	4.1	-10.7	1.0×10^{-5}	30	579	255,000	2.95
Street A2	10.2	2.5	1.8×10^{-8}	30	3.6	4,500	0.05

Design Element	H (m)	h (m)	K (m/s)	x (m)	Zone of Influence R_0 (m)	Pumping Rate (L/day)	Pumping Rate (L/s)
SWM 1 / SWM 2	N/A						
SWM 3	4.4	1.4	5.0×10^{-9}	240	1.3	4,400	0.05
SWM Tank	2.1	0	6.8×10^{-8}	90	3.3	1,600	0.02

Minor groundwater seepage is expected during construction due to the relatively low hydraulic conductivity associated with the screened materials, however, the depressurization requirements may be large and potentially impactful

6.4.3 Permit to Take Water / Environmental Activity and Sector Registry

For construction dewatering, water takings of more than 50,000 L/day but less than 400,000 L/day may be registered on the Environmental Activity and Sector Registry (EASR) while water takings of more than 400,000 L/day require a Permit to Take Water (PTTW) issued by the MECP.

Based on the calculated dewatering rates a PTTW may be required to support the installation of deep servicing; however, additional hydrogeological information will be required at a later stage to confirm.

6.5 Mitigation of Long-Term Impacts

On a regional scale, most aquifer recharge occurs in the ORM or in areas where coarse-grained units are found at shallow depth. The Site is not identified as an area of significant groundwater recharge (TRCA, 2008b) and does not contribute a significant amount of infiltration on a watershed scale due to the generally low overburden permeability.

Various Best Management Practices (BMPs) could be incorporated into the proposed development that would promote infiltration and decrease runoff to help preserve the existing groundwater flow regime. The proposed on-site SWM pond will capture the storm runoff and provide water quality treatment, including temperature and flow moderation prior to discharge to the creek. Combined with various BMPs, the SWM pond will help mitigate potential impacts to on-site and nearby watercourses. Use of trench plugs, anti-seepage collars or other methods to restrict the preferential movement of groundwater along the subsurface infrastructure corridors should be considered. Additionally, LID measures are proposed to promote infiltration and decrease in runoff to address the infiltration deficit and help preserve the existing groundwater flow regime, maintain groundwater contributions to nearby groundwater-dependent features as well as minimize channel erosion and sediment loading into downstream surface water features.

6.6 Post-development Water Balance

The existing Study Area is currently covered by mostly agricultural land or natural vegetated land cover. Scattered residential land use is currently present, usually inclusive of a driveway, along with a few storage yards consisting of worked dirt ground cover. The predevelopment recharge was estimated to be approximately 100 mm/year (per unit area), which reflects fine-grained soil, gently rolling hills and agricultural land.

The introduction of industrial land uses, with paved ground cover, in the proposed post-development scenario will significantly decrease net infiltration and increase overall runoff across the subject lands. It is understood that approximately 88% of the Study Area may be considered impervious based on the current proposed land use.

6.6.1 Infiltration Requirements

The decreased infiltration may impact the local and regional water table over time, which could result in negative impacts to hydrologic form and function of groundwater-dependent features and ecosystems.

A significantly reduced recharge rate of approximately 14 mm/year per unit area was calculated in the post-development scenario and should be considered when designing the stormwater management strategy of the Study Area, as discussed in Section 4.

6.6.2 Runoff Rates

The increased runoff may result in erosional impacts to nearby natural surface water features over time, as well as water quality impacts that are commonly present in urban watersheds. Runoff would commensurately be increased from approximately 165 mm/year in the pre-development scenario to 595 mm/year in the post-development scenario.

Evapotranspiration decreases from approximately 555 mm in the predevelopment scenario to 213 mm in the post development scenario due to an increase in impervious surface, which represents an approximate 62% reduction in evapotranspiration.

6.6.3 Potential Impacts from Reduced Infiltration and Increased Runoff on the Natural Environment

Natural consequences of urban development include a reduction in groundwater infiltration, diversion of this infiltration towards surface water bodies as runoff, altered flow regimes and channel erosion. Infiltrating rainwater also plays an important role in the protection of surface water and groundwater quality, as the percolation through soil pores acts as a natural filter to contaminants. An increased contaminant load to surface water bodies is a common hydrologic consequence in the urban water cycle.

6.7 Potential Impacts to Existing Wellhead Protection Zones

As previously indicated, the Study Area is not located within a significant groundwater recharge area (SGRA). Very small portions of the area are mapped as a Highly Vulnerable Aquifer (HVA), and future industrial land uses within these mapped HVAs will need to consider Source Water Protection requirements, which may restrict certain land uses within these HVAs.

7. Surface Water

7.1 Hydrologic Assessment

In the original TRCA model, the subject lands are included within the Humber Hydrology Model in Catchments 43.10, 43.06, 43.05, 43.03, 43.04, 43.02, 41.08, and 41.07 of the Humber River, draining to the Clarkway Tributary and Gore Road Tributary. **Table 7.1** (**Appendix B**) outlines the modeling parameters for the Future TRCA Humber River Model. Refer to **Figure 3.1** for the pre-development drainage areas.

7.2 Regional Storm Assessment

A downstream analysis of the subject site was conducted to determine if regional controls are required for the proposed SWM facilities. The assessment involved modeling and analyzing the following four scenarios:

- TRCA Future;
- SCE Modified Future (updated to reflect detailed topography for the subject lands);
- Post-Development Uncontrolled (Full buildout); and
- Post Development with Regional Controls for Pond 1 and 3 (Full buildout).

Visual Otthymo (VO) and Hydrologic Engineering Center River Analysis System (HEC RAS) were used to analyze the hydrologic and hydraulic conditions for these scenarios. Given that the Humber River hydrology model was updated using VO, the downstream analysis was completed using VO modeling. The downstream analysis of the proposed development along the Clarkway Tributary and Gore Road Tributary assessed how uncontrolled flows from the subject site during the regional storm event impact downstream nodes. The findings of the downstream analysis are summarized in the following subsections. The proposed drainage plan is presented in **Figure 3.2**.

7.2.1 Regional Downstream Analysis Results

Table 7.2 (**Appendix B**) summarizes the flow within the Humber River within each model during the Regional Storm.

The SCE Modified Future Model reflects the detailed topography within the subject study area. Generally, the SCE Modified Future Model when compared to TRCA Future Model flow does not significantly differ at downstream nodes. It has been demonstrated that the change in peak flows between the SCE Modified Future Model and TRCA future model are insignificant (lower than 1%). The SCE Modified Future Model was used for comparative analysis with the other scenarios to determine the impact of peak flow changes during the regional event.

Table 7.2 (**Appendix B**) shows that in the post-development uncontrolled scenario, peak flows increased by 12% in the Clarkway tributary and by up to 7% in the Gore Road tributary. However, the model updates for this scenario also led to a decrease in flow at certain nodes within the Gore Road tributary downstream of the Humber Station Employment Area development. This reduction is primarily due to the decreased area of natural drainage catchments flowing to the

Gore Road tributary and the introduction of the proposed channel. Consequently, the flow decrease is linked to the timing of peak flows in the Humber River and area diversions during the post-development phase. It is important to note that any reduction in peak flow between the release point and the downstream point is largely attributed to changes in the hazel reduction factor, as outlined in the Humber River Hydrology Update Report (2018).

The peak flows presented in the table above were added to the HEC-RAS model to observe the impact on water levels. A summary table comparing the existing condition with post-development uncontrolled is provided in the Stormwater Management Report in **Appendix C.** Overall, based on the results from HEC-RAS water level increases and VO peak flow comparisons in the post-development uncontrolled condition, it can be concluded that regional controls are required for Ponds 1 and 3, which drain into the Clarkway Tributary. It is important to note that there are existing SWM ponds near the site which discharge to the Clarkway Tributary. These existing ponds include regional controls and therefore the conclusions of the downstream analysis align with previous studies.

However, for drainage directed towards the Gore Road Tributary, minor increases in water levels were observed, primarily within valley corridors. Refer to Stormwater Management Report in **Appendix C** for supporting information and the location of the key nodes in the downstream analysis. At the confluence of the Gore Road and Clarkway tributaries, there was only a 3% peak flow increase observed. Therefore, regional controls are not proposed for Pond 2 and the SWM tank.

A final scenario was analyzed with on-site regional controls for the study area. In this scenario, Ponds 1 and 3 included regional controls, while Pond 2 and the SWM tank were modeled with 2-100 year controls. It should be noted that site plans draining to Pond 3 are proposed with on-site regional controls, while the site plans discharging to the proposed channel are planned with 2-100 year controls. The proposed regional controls are based on flow per hectare from the TRCA Humber River Model (2015). As shown in **Table 7.2 (Appendix B)**, the downstream analysis concludes that no adverse impacts are expected from the subject lands, with Ponds 1 and 3 incorporating Regional controls. Peak flows are effectively managed through the stormwater management (SWM) controls, ensuring that no significant increases are observed at key nodes.

7.3 Floodplain Assessment

As part of the floodplain mapping analysis, topographic information was obtained, and field surveys were completed. In this study, detailed topographic field data and aerial topographic data (where detailed surveys were not available) were used to produce a high-resolution Triangulated Irregular Network (TIN) for generating digital terrain layers. Additionally, major road crossings were surveyed.

Two hydraulic models, for the west and east tributaries, were combined to analyze the hydraulic conditions of the study area. The model for the west tributaries was labelled "Final-West Humber," and the model for the east tributaries was labelled "ClarkwayTrib." SCE has merged these models into a combined HEC-RAS model. The hydraulic geometric information and peak flows were updated based on the new topographic information and updated hydrologic modelling. Additional updates to the model include revisions to culvert data based on the latest survey data. The updated model, referred to as the SCE Existing Hydraulic Model, was used to generate the regulatory floodlines.

The post-development hydrology has been analyzed using the Visual OTTHYMO hydrologic model to calculate the peak uncontrolled flows under post-development conditions. The post-development areas/catchments were defined based on the proposed grading plan.

The Visual OTTHYMO (VO) hydrologic model was used to simulate hydrographs by modelling rainfall, infiltration, runoff, and routing through a watershed. Existing peak flows were calculated at the outlet of the sub-catchments. The sub-catchments were determined based on the TRCA Humber River Model, and peak flow nodes were identified for the corresponding HEC-RAS cross-sections. For sub catchments with relatively large areas, the Ministry of Transportation (MTO) flow proration equation was utilized to estimate peak flows within the sub-catchment. Details of the hydrologic modelling are presented in **Appendix F.**

Steady flow analysis in HEC-RAS was used to perform hydraulic modeling under existing conditions and post-development conditions. The existing and post-development (controlled/uncontrolled) 100-year (Atmospheric Environment Service (AES) 12-hour distributions) and Regional (Hurricane Hazel) storm event flows were utilized in the analysis. The regulatory floodlines were generated based on the post-development uncontrolled scenario, which was further used to assist in establishing the development limits. The floodlines and supporting floodplain analysis are presented in **Appendix F** in the report entitled Humber Station Villages Floodplain Analysis Report (CEISMP Phase 2), dated August 2024 by Schaeffers.

7.4 Fluvial Geomorphic Assessment

A detailed geomorphic assessment was completed to determine an erosion threshold for the Clarkway Drive Tributary east of the Study Area and the Gore Road Tributary west of the Study Area, downstream of the proposed stormwater management facilities. This consisted of the following:

- A detailed geomorphic assessment which includes a topographic survey of the watercourse, including longitudinal profile and cross sections, as well as the characterization of riparian vegetation, bed substrate, and bank materials, using standard geomorphic field methods; and
- Calculation of an estimate of bankfull discharge as well as identifying the erosion threshold (i.e., the critical discharge required to entrain the bed and / or bank materials).

7.4.1 Detailed Geomorphic Investigation

Cross-sectional measurements and bankfull dimensions, the estimate of Manning's roughness, and the gradient, were used to back-calculate bankfull hydraulics. The surveyed cross sections were entered into FlowMaster (hydraulics software) along with the estimated Manning's roughness, to obtain the relevant bankfull hydraulics.

Overall, the Clarkway Drive Tributary downstream of the Study Area had an average longitudinal profile gradient of 0.22%. Bankfull channel widths within the sections surveyed ranged between 3.2 m to 6.8 m, averaging 5.2 m. The average bankfull depth ranged between 0.84 m to 1.0 m, and averaged 0.90 m. The Manning's roughness was estimated to be 0.035. The back-calculated velocity was 0.73 m/s, which corresponded to an average bankfull discharge of 1.7 m^3/s. Bed material in the reach was found to be in the sand to gravel range, with a median grain size (D_{50}) of 12 mm, based on the pebble counts completed in the field (sample size of 200 particles).

The tributary west of the Study Area was noted to have a limited channel definition and was found to be heavily vegetated. Due to the limited channel morphology observed during the field visit, channel dimensions and gradient information were obtained from a topographic survey for the site. Overall, this tributary had an overall longitudinal profile gradient of 1.3%. Based on the level of vegetation present in the channel and banks at the time of the field assessment, the Manning's roughness was estimated to be 0.040. Bed material in the reach was found to consist of sand, silt, and clay.

7.4.2 Erosion Threshold Assessment

In natural systems, watercourses regularly see flows that entrain and transport sediment. This is part of the natural process that maintains natural channel form (TRCA 2012, CVC 2015). The erosion threshold represents the magnitude of flow at which bed and/or bank sediment within a reach is entrained. Specifically, the erosion threshold provides a depth, velocity, discharge, or shear stress at which sediment of a particular size (usually the median grain size) may potentially begin to move. This does not necessarily mean systemic erosion (i.e., widening or degradation of the channel); it simply indicates a flow which may potentially entrain sediment (CVC 2015).

There are several approaches that may be applied to determine the erosion threshold for a reach. These require information regarding the mean channel slope, cross-sectional dimensions, assessment of roughness, and substrate information (e.g., grain size), as obtained from the detailed geomorphic assessment. The TRCA (2012) Stormwater Management Criteria document provides a brief list of methods and resources for estimating thresholds for a range of conditions. The CVC (2015) Fluvial Geomorphic Guidelines document similarly provides a similar list of methods and resources. These methods may be based on the critical shear stress or the critical velocity. These parameters refer to the shear stress or velocity, based on the sediment size or class, at which sediment is entrained. For the shear stress approaches, when the mean shear stress in the channel exceeds the critical shear stress, sediment entrainment can be expected to occur. Similarly, for the velocity approaches, sediment entrainment occurs when the mean velocity in the channel exceeds the critical velocity. Critical shear stress or velocity for a given grain size can be calculated using empirical methods (e.g., Neill, 1967; Miller et al., 1977; Komar, 1987, etc.), or by graphical analysis, by referring to a chart (e.g., Hjulstrom, 1967; Chow, 1959). Authors such as Fischenich (2001), Julien (1998), Chang (1988), etc., provide tables of compiled permissible shear stresses and velocities for a range of sediment sizes. The reference cross-sections obtained from the detailed geomorphic assessment are used in the analysis to determine the erosion threshold, whereby the depth of flow in the cross-section is increased iteratively until the mean velocity (or shear stress) exceeds the permissible velocity (or critical shear stress) of the sediment.

In the case of the Clarkway Drive Tributary, the pebble count determined a grain size gradation consisting of a D_{50}, D_{75}, and D_{84} of 12 mm, 28 mm, and 48 mm, respectively. This indicates that the bed substrate consists primarily of materials in the gravel range. A method outlined by Komar (1987) is applicable to substrate consisting of gravels 1 cm and larger. The Komar (1987) formula is as follows:

$$V_{cr} = 57D^{0.46}$$

where V_{cr} is the critical velocity at which sediment is entrained (in cm/s), and D is the particle diameter to be entrained (in cm). The reference cross-sections obtained from the detailed geomorphic assessment are used in the analysis to determine the erosion threshold, whereby the depth of flow in the cross-section is increased iteratively until the mean velocity exceeds the permissible velocity of the sediment. The critical velocity for the bed materials, based on a D_{50} of 12 mm, was calculated to be 0.62 m/s. The corresponding discharge in the cross section at the point that sediment is entrained is 0.66 m^3/s.

In the case of the Gore Road Tributary to the west of the Study Area, the substrate consisted primarily of sand, silt, and clay. Empirically derived values compiled by Julien (1998) and Fischenich (2001) suggest that this material is entrained at a critical velocity of 0.53 m/s. The cross sections obtained from the topographic survey for the site were used to establish the erosion threshold, whereby the depth of flow in the cross section was increased iteratively until the mean velocity exceeds the permissible velocity of the sediment. The corresponding discharge at the critical velocity of 0.53 m/s was 0.94 m^3/s.

7.4.3 Erosion Sensitivity Analysis

Erosion sensitivity was assessed based on the catchment area and the proposed stormwater management plan, and their effects on sedimentation and erosion rates within downstream watercourses. Watercourses that are stable are unlikely to be significantly impacted by hydrological changes associated with the proposed development. The stormwater management plan developed by Schaeffers proposes 25 mm detention over 48 hours. Pond release rates are included in **Appendix F**.

Both the Clarkway Drive Tributary and the Gore Road Tributary were identified to not be particularly sensitive to erosion, following alterations to the hydrologic regime associated with the proposed development. In the case of the Clarkway Drive tributary, the Rapid Geomorphic Assessment (RGA), completed in Phase 1 of the CEISMP, the reach was placed in the lower end of the *In-transition/stressed* category, with a score of 0.24. The upstream drainage area for this reach at the downstream extent of the development is approximately 583 ha, obtained from the Ontario Flow Information Tool (OWIT, MNRF 2024). The contributing drainage area for the ponds draining to this reach is approximately 96 ha, representing a combined footprint of approximately 16%. The release rates for the South Pond, which discharges to this reach, do not exceed the erosion threshold of 0.66 m^3/s until above the 5-year storm event.

The Goreway Drive Tributary was noted to be poorly defined, and heavily vegetated. While an RGA was not completed for this reach off-site, limited geomorphic processes were observed, which would result in a score that would imply the reach is stable. At the Humber Station Road crossing, this reach drains an area of approximately 69 ha, obtained from the Ontario Flow Information Tool (OWIT, MNRF 2024). The contributing drainage area for the pond draining to this reach is approximately 38 ha, representing a footprint of approximately 55%. The channel itself is not sensitive, as flow velocities are low, and no significant active erosion was observed in the reach downstream of the Subject Lands. The channel is well connected with its floodplain, which helps to dissipate flows across the floodplain during higher magnitude events. Outflows from the North East pond, which discharge to this reach do not exceed the erosion threshold of 0.94 m^3/s until above the 100-year storm event.

8. Natural Heritage

This section of the Phase 2 CEISMP assesses the potential impacts on the natural heritage features and functions that could result from the implementation of the proposed land use plan (**Schedule C8, Appendix A**).

Impacts from land use changes will be considered in two categories:

- **Direct**: impacts associated with the removal or modification of natural features as a result of land use changes.
- **Indirect**: associated with impacts to less visible functions or pathways that could cause negative impacts to natural heritage features over time.

An analysis of existing natural features in the Study Area was completed as part of the Phase 1 CEISMP Characterization report, including an evaluation of their significance against criteria recommended in the Natural Heritage Reference Manual (NHRM; MNR 2010) and in the Significant Wildlife Habitat Criteria Schedules for Ecoregions 6E and 7E (MNRF 2015).

These analyses identified the following significant natural heritage features as present, on, or within 120 m, of the Study Area (**Figures 8.1** and **8.2, Appendix A**):

- Significant wetlands;
- Significant woodlands;
- Habitat of endangered and threatened species (Bank Swallow foraging habitat and Redside Dace contributing habitat);
- Fish habitat (HDF-3 and the Clarkway Drive Tributary);
- Significant wildlife habitat:
    - Seasonal Concentration Areas of Animals (Candidate Bat Maternity Colonies within Deciduous Forest (FOD) habitats);
    - Specialized Wildlife Habitat (Candidate Seeps and Spring); and
    - Species of Conservation Concern (Terrestrial Crayfish, Snapping Turtle, Eastern Wood Peewee, Monarch, and Yellow-banded Bumblebee).

A Natural Heritage System is made up of a diversity of ecological components; not all those natural features and associated ecological functions merit a significance designation at a provincial scale. However, there are features that merit consideration as important at a local scale. The Phase 1 characterization identified the following additional natural heritage features and functions in the Study Area and are addressed in this Phase 2 impact assessment (**Figure 8.1, Appendix A**):

- Identified non-significant wetlands; and
- Other Woodlands.

GEI understands that the Town of Caledon has allowed Prologis Inc. (Prologis) to advance their Site Plan Application concurrently with the CEISMP. The proposed Prologis development requires the removal and compensation of small areas of woodland (woodland core area) (**Section 8.1.1**), wetland (**Section 8.1.2**), significant wildlife habitat (**Section 8.1.3**), as well as headwater drainage features (**Section 8.2.2**). SGL Planning submitted a policy revision to the Humber Station Secondary Plan to the Town on October 19, 2024, to allow for minor modifications of Woodland Core Areas based on an approved Environmental Management Plan. This report assumes the proposed policy revision will be accepted by the Town.

Outside of the Prologis development footprint, additional feature removals required to support the proposed land use plan include the removal and compensation of a small MAS2-1 tableland wetland (Wetland B1; **Figure 8.1, Appendix A**) to accommodate the proposed drainage feature realignment, and the removal and mitigation of other headwater drainage features as per the Phase 1 CEISMP's recommendations. As such, the preliminary NHS has been modified to accommodate the Prologis building footprint and proposed compensation areas (**Figure 8.3**).

Section 9 identifies a post-development natural heritage system for the Study Area, comprised of retained natural heritage features and appropriate compensation for proposed natural features removal.

8.1 Potential Terrestrial Impacts

8.1.1 Woodlands

As indicated in the Phase 1 CEISMP, two woodland features are considered significant woodlands. Significant woodlands within the Study Area will be generally protected by a 10 m buffer from the dripline; this buffer width has been demonstrated to provide adequate root protection for woodland communities (Carolinian Canada, 2003), and native plantings within these buffers will help insulate significant woodlands against potential impacts of land use changes, such as those described in **Section 8.1.1.2**. To protect roots and prevent negative impacts to tree health, any required site grading is recommended to be limited within the 10 m woodland buffer.

Woodland 1

The largest significant woodland (Woodland 1) in the Study Area is the FOD woodland in the northwest portion (**Figure 8.1, Appendix A**). This feature is located within non-participating properties and was noted in the Phase 1 CEISMP to have potential for species at risk (SAR) bat habitat and the following candidate SWH types:

- Bat Maternity Colonies;
- Over-Wintering Turtle Habitat (within the Open Aquatic (OA) ponds in the FOD feature);
- Seeps and Springs; and
- Eastern Wood Peewee habitat.

Woodland 1 and associated SAR habitat and SWH will not be altered and will be protected by the aforementioned 10 m buffer (which is recommended to be planted with native trees and shrubs). To protect roots and prevent negative impacts to tree health, site grading is recommended to be limited within this 10 m woodland buffer. Where grading cannot be avoided, additional mitigative measures such as tree protection hoarding, and timely restoration of impacted areas are recommended.

Woodland 2

The other significant woodland (Woodland 2; **Figure 8.1, Appendix A**) is comprised of a Basswood Deciduous Forest (FOD8-3) and adjacent CUT1-7 communities which are comprised of Buckthorn Cultural Thickets. A small CUM1 Cultural Meadow is mostly surrounded by the woodland vegetation and is therefore considered part of Woodland 2. The FOD8-3 vegetation community is regionally and locally common and all plant species within Woodland 2 are regionally and locally common. As per wildlife surveys completed for the Study Area, no SWH types or habitat for threatened and endangered species were identified within this significant woodland feature. This feature qualifies as a Woodland Core Area as per the Town of Caledon OP (2024) and a Natural Area and Corridor under the Region of Peel Official Plan (2022).

Of note, Woodland 2 was designated significant, not due to size (1.65 ha) but because of its proximity (within 30 m) to the adjacent wetland community and HDF-3. As noted above, the CUT1-7 features are dominated by invasive Common Buckthorn, and as such provides limited ecological value to the woodland.

A small portion of the significant woodland (0.34 ha total) is proposed for removal and on-site compensation to accommodate the Prologis building footprint, as detailed in **Section 8.2.2**. Of this 0.34 ha, a total of 0.07 ha is FOD8-3, 0.21 ha is CUT1-7 (dominated by buckthorn thicket), and 0.06 ha is CUM1.

As part of the Humber Station Employment Area official plan amendment (OPA), secondary plan policies have been proposed to support the minor modification/encroachment of this feature. More details on the secondary policies, rationale for the removal of this small portion of the Woodland Core Area/Significant Woodland, and an assessment of potential impacts are discussed in **Section 8.1.1.1**.

FOD7-6

The remaining woodland feature identified in the Study Area is the non-significant Fresh -Moist Manitoba Maple Lowland Deciduous Forest (FOD7-6) in the southern portion of the Study Area, on a non-participating property. This forest community is less than 0.50 ha in size and does not meet the size criteria for significance. No wildlife surveys were completed for this off-site feature, but it is assumed it provides candidate SAR bat habitat, candidate bat maternity colony SWH, and candidate seeps and springs SWH. This woodland is located west of Clarkway Drive Tributary and is well within the floodplain buffer.

8.1.1.1 Proposed Woodland Removal and Compensation

As the OPA for the Humber Station Employment lands progresses and the Prologis site plan is advanced, the proposed development footprint for the Prologis lands requires an encroachment into 0.34 ha of Woodland Core Area (Woodland 2).

Generally, new development is prohibited within Woodland Core Areas as per Section 3.2.5.3.1 of the Town of Caledon OP (2018) except for permitted uses as specified in Section 5.7.3.1.2. Permitted uses include:

> '…*activities permitted through approved Forest Management and Environmental Management Plans'*

Based on this policy, the Humber Station Employment Lands Secondary Plan Policies have been amended and submitted to the Town to include the following provision as part of the Official Plan Amendment:

> 7.16.7.3. *The limits of wetlands, woodlands, and stream corridors within the Secondary Plan Area are established through the recommendations of the CEISMP and form the basis for the Environmental Policy Area designation. The recommendations of the CEISMP may include minor modifications (i.e. encroachment/removal and appropriate compensation) of Woodland Core Areas, which may be permitted through an approved Environmental Management Plan (in accordance with 5.7.3.1.2). Development and site alteration will not be permitted within this designation except as set out in the CEISMP*.

To facilitate the proposed encroachment, a detailed Environmental Management Plan (EMP) will be prepared and reviewed by the Town. This EMP will explore rationale for the encroachment, fulsome assessment of the encroachment, compensation, and maintenance of the minor encroachment into the Woodland Core Area. It will also provide additional assessments of further protective measures (such as invasive species control), enhancements, and restoration opportunities to support the natural heritage system. The intent of this would be to demonstrate that the post-development natural heritage system will be an enhanced system with improved features and functions. Much of this detail has already been assessed as part of this CEISMP, and rationale, impact mitigation and compensation are discussed below.

The proposed encroachment includes only a small amount of native deciduous forest (0.07 ha); the remaining encroachment would be into cultural meadow (0.06 ha) and the Buckthorn thicket (0.21 ha). As a large portion of the proposed encroachment is not native forest community, removal and compensation (in alignment with the TRCA's Ecological Compensation Guidelines) with native woodland species, would provide a net-gain to the proposed NHS. Currently, woodland compensation is proposed at a slightly greater than 1:1 ratio (0.35 ha) to provide no net-loss to woodlands within the overall NHS.

Compensation will align with the policies of Section 3.2.5.3.5 of the Caledon OP, so that the restoration of Woodland Core Areas is in alignment with the goals and objectives of the Town's OP. To do so compensation will focus on establishing, restoring, and enhancing a self-sustaining native forest ecosystems and reconnecting fragmented woodlands (Section 3.2.5.3.3).

The woodland compensation is proposed east of the retained portion of Woodland 2 and will surround Wetland Compensation Area 2 as depicted in Figure 8.3 (Appendix A). The woodland compensation area will be integrated into the NHS and serve as a linkage connecting the Clarkway Tributary valley to the proposed drainage feature realignment and the retained Significant Woodland (FOD8-3). This is anticipated to provide a net ecological benefit by creating an improved native forest ecosystem with increased connectivity; this compensation will meet several critical goals for the natural heritage system in the Study Area. The woodland compensation will also be located adjacent to the Wetland C1 compensation area, providing continued connectivity and natural buffering for this wetland feature. More details on ecological net gain are discussed in **Section 9**.

Despite this proposed encroachment, a significant portion of Woodland 2 will be retained in place and will continue to function as a significant woodland feature within the preliminary NHS. To further support this feature and improve its existing condition, it is recommended that invasive species management be undertaken for the feature to enhance the existing conditions. More details on invasive species management will be described in the Phase 3 CEISMP and the EMP.

To mitigate any impacts during the feature removal and compensation work, arboricultural best management practices should be undertaken to prevent damage to retained trees. Tree removals should also be completed outside the migratory bird breeding window (active window is approximately April 1 – August 31) and outside of the bat active window (removals to occur between December 1st to March 14).

Overall, it is anticipated that the proposed minor encroachment and compensation of Woodland 2 will not negatively impact the existing natural conditions for the Study Area, and through compensation and invasive species management of the retained woodland, these modifications will facilitate a more robust Natural Heritage System/Environmental Protection Area for the Secondary Plan Area.

8.1.1.2 Direct and Indirect Woodland Impacts

As noted previously, the majority of woodland features within the Study Area are being retained. Potential direct impacts to all retained woodland communities may include:

- Edge effects associated with the tree removal (e.g., sunscald, windthrow, increased light penetration); and
- Impacts associated with site grading and machinery (e.g., tree root damage/loss; change in drainage to/from woodland, soil compaction, invasive species colonization, stress/dieback).

Indirect impacts because of disturbance within or immediately adjacent to the woodlands could include changes to drainage post-development (whereby overland flow contributions to woodland or its buffer are reduced or increased), noise and light disturbance, as well as the introduction of invasive and non-native plants along the disturbed margins of the development footprint.

Further design considerations to mitigate these direct and indirect impacts will be considered in site specific EIS work. These may include, but are not limited to the following:

- Evaluation of LIDs or other mitigative measures to address any potential drainage concerns associated with woodland features – drainage should be assessed at subsequent planning stages;
- Tree protection fencing and Erosion and Sediment Control (ESC) measures should be installed adjacent to all retained trees at the edge of the buffer zone to mitigate against excessive disturbance caused by proposed vegetation removals, ground disturbance and dislodgement of sediment. This will also protect the integrity of the NHS and aide in preventing adverse effects from ground disturbance;
- Construction activities adjacent to the retained woodlands should be timed outside of the evening and early morning periods during the bat breeding seasons (March 15 to November 30). Some localized movement of wildlife out of these edge areas may still occur during the construction phase; however, refuge habitats exist within the broader landscape;
- New lighting should be directed away from woodlands to reduce impacts to wildlife; fencing and other barriers should be considered to limit the effects of noise and light on wildlife, particularly adjacent to roadways;
- Construction equipment should be regularly cleaned to reduce the potential for transportation of invasive material within and outside of the site;
- To slow the spread of invasive species (such as Emerald Ash Borer (*Agrilus planipennis*) and American Beech scale insects (*Cryptococcus fagisuga*) and American Beech fungus (*Neonectria faginata)* (amongst others)), all trees should be disposed of locally to reduce transportation to other local municipalities; and
- Restore affected areas and naturalize adjacent buffers with native vegetation.

There is no loss in woodland area anticipated as there is a greater than 1:1 woodland compensation provided in the preliminary NHS (**Figure 8.3, Appendix A**). It is recognized that there will be a short-term time-lag between the planting and the establishment of woodland canopy in the compensation woodland. Provided recommended mitigation measures are followed, 10 m buffers are put in place, and compensation efforts are completed, no negative impacts to significant woodlands and other woodlands within the Study Area are predicted.

8.1.2 Wetlands

8.1.2.1 Wetland Characterization and Evaluation

GEI assessed all wetlands with an area > 2 ha using the current Ontario Wetland Evaluation System (OWES) protocol (MNRF 2022) and determined that three meet the criteria for significance as per OWES. These wetlands are associated with the Clarkway Drive Tributary (Wetlands D1 and Wetland F1/F2), and the online pond at the downstream extent of HDF-3 (Wetland E1) (**Figure 8.3, Appendix A**). Significant wetland communities are as follows:

- Wetland D1 is composed of Mineral Meadow Marsh and Mineral Shallow Marsh (MAS2/MAM2), Reed-canary Grass Mineral Meadow Marsh and Forb Mineral Meadow Marsh (MAM2-2/MAM2-10), Mineral Shallow Marsh (MAS2).

- The southern wetland complex F1 is composed of Reed-canary Grass Mineral Meadow Marsh and Forb Mineral Meadow Marsh and (MAM2-2/MAM2-10) and Cattail Mineral Shallow Marsh (MAS2-1).
- The southern wetland complex Wetland F2 is composed of Reed Canary Grass Mineral Meadow Marsh (MAM2-2), Cattail Mineral Shallow Marsh (MAS2-1).
- Wetland E1 was classified as Pondweed Submerged Shallow Aquatic (SAS1-1) with Willow Mineral Thicket Swamp (SWT2-2) located north of the pond along HDF-3c.

8.1.2.2 Wetland Hydrology

Arcadis conducted pre-development wetland surface water and groundwater monitoring. Given the presence of till soils across the Study Area, groundwater recharge conditions are predominant. As such, several wetlands are considered as recharge features in which water within the wetland migrates vertically downward (i.e., downward vertical gradient) and recharges the underlying water table.

In contrast, groundwater is interpreted to discharge to several wetlands located near the southern end of both HDF-3 and the Clarkway Drive Tributary, either seasonally or permanently. In these wetlands, groundwater levels are at, near, or above the ground surface, the hydraulic gradients are seasonally or permanently upwards indicating groundwater discharge conditions.

A summary of the groundwater interactions with the various named wetlands is provided in **Table 8.1** (**Appendix B**). Seasonal groundwater discharge is interpreted to occur predominantly in the spring, early summer and fall months.

8.1.2.3 Groundwater Impacts on Wetlands

The dependence of wetlands A1, B1, and C1 on groundwater baseflow is relatively limited based upon the observations of till across much of the Study Area and the downward hydraulic gradients. Water inputs to these wetlands are interpreted to be predominantly from runoff, either during spring thaw or precipitation events.

Where an upward hydraulic gradient was observed through groundwater monitoring collected by Arcadis, as presented in the Phase 1 CEISMP, it suggests that groundwater discharge may contribute to the riparian wetlands (D1, F1/F2, G1) associated with Clarkway Drive Tributary and HDF-3.

Wetland E, associated with HDF-3 (**Figure 8.2, Appendix A**), was observed to have some upward hydraulic gradients during the spring, suggesting that there is some seasonal groundwater discharge function.

To mitigate any impacts from an annual infiltration deficit, the sizing, configuration and location of potential Low Impact Development (LID) infiltration practices are to be evaluated and developed after site configuration. This is required so that LID implementation will achieve infiltration targets. With appropriate designed LIDs, SWM facilities, and Wetland Compensation Area 3 adjacent to the Clarkway Drive Tributary, groundwater infiltration should meet post-development targets for these wetland features. As such, it is anticipated that no indirect effects associated with groundwater contributions to the tributaries and associated wetlands will occur if these mitigative measures are designed and implemented appropriately.

Changes to groundwater quality would be expected from human activities such as road salting, minor fuel and oil leaks, fertilizer application etc. Best management practices should be considered when applying salt, fertilizers etc. to minimize their application and limit changes to groundwater. Spills and leaks must be contained and remediated as soon as possible to limit damage to the environment.

Provided that groundwater infiltration and best management practices can be achieved as predicted, no negative impacts to groundwater on local or significant wetlands are expected.

8.1.2.4 Surface Water Impacts on Wetlands

Wetlands in the Study Area are generally hydrologically supported by surface water inputs, as due to tight till soils. Seven stream flow stations and two surface water monitoring stations were installed by Arcadis to monitor surface water flow under baseflow conditions, and the results were detailed in Phase 1 of the CEISMP (Figure A2-10, Appendix A2).

Based on streamflow monitoring stations, wetland E1 is mostly supported by surface water flow from HDF 3. Precipitation and surface water runoff were identified as providing the majority of water to wetland A1 (based on stream flow stations), B1, and C1 (based on wetland monitoring stations. Stream flow station monitoring data determined that riparian wetlands D1, F1, F2, G1, receive some surface water support from the adjacent Clarkway Drive Tributary and ephemeral HDFs.

Potential impacts to surface water contributions due to the proposed land use could include a degradation of surface water quality or reduction in water quantity contribution to support the health of the wetland systems.

To mitigate impacts of any quality concerns with surface water runoff into wetland features, end-of-pipe water quality treatment of stormwater runoff is proposed by Schaeffers to provide ‘enhanced’ protection of receiving waters that would contribute to wetland hydrology. As identified by Schaeffers, minor drainage systems (i.e., storm sewers) will be designed to convey the runoff from a 5-year storm event. Major drainage systems (i.e., roads and other surface routes) will convey stormwater runoff in excess of the minor system capacity up to the flows generated during a 100-year storm event.

Stormwater management design will also support appropriate water quantity retention and can be supported by the LIDs described in **Section 4.2**.

Provided that surface water volume and quality contributions to the significant and other wetlands are managed as per the proposed stormwater management approaches described in **Section 4.1** and the LID BMPs introduced in **Section 4.3**, no negative impacts associated with surface water runoff are anticipated.

8.1.2.5 Proposed Wetland Removal and Compensation

A total of 0.38 ha of other (non-significant) wetlands are proposed for removal to accommodate the proposed drainage realignment and Prologis building footprint (**Figure 8.3, Appendix A**). No significant wetlands are proposed for removal. Proposed wetland removals include a tableland wetland (Wetland B1; MAS2-1; 0.076 ha) and part of a riparian wetland (Wetland C1; MAM2-2; 0.30 ha).

The tableland isolated Cattail Mineral Shallow Marsh (Wetland B1; MAS2-1; 0.077ha) is dominated by Glaucous Cattail (*Typha x glauca*) and Narrow-leaved Cattail (*Typha angustifolia*) as well as Reed-canary Grass (*Phalaris arundinacea).* The riparian Mineral Meadow Marsh (Wetland C1; MAM2-2; 0.30 ha) is fed by HDF-3 and is dominated by Reed Canary-Grass.

These wetland vegetation communities are regionally and locally common and all plant species within these wetlands are regionally and locally common except for three locally rare species: Peachleaf Willow (*Salix amygdaloides*) present in rare abundance within MAS2-1 community (Wetland B1), and Marsh Seedbox (*Ludwigia palustris*) and Small Spikerush (*Eleocharis palustris*) occurring occasionally within the MAM2-2 community (Wetland C1). Opportunities for plant salvage and transplant within the Humber Station Employment Area NHS are discussed in the Phase 3 CEISMP.

Amphibian breeding habitat was identified within the MAS2-1 community for Northern Leopard Frog (*Lithobates pipiens*), Gray Treefrog (*Dryophytes versicolor*), and Green Frog (*Lithobates clamitans*). However, species and abundances were not met to qualify as Significant Wildlife Habitat (SWH). No calling amphibians or turtles were identified during surveys in the MAM2-2 community; however, Terrestrial Crayfish (a species of conservation concern) was observed in this wetland. As such, Terrestrial Crayfish SWH compensation will be included as part of the overall Wetland 2 compensation efforts immediately east of the existing wetland. Further discussion regarding SWH compensation is discussed in **Section 8.1.3.**

The proposed wetland removals described above total 0.38 ha will be compensated for within Wetland Compensation Areas 1 (0.08 ha) and 2 (0.39 ha). Where feasible, wetland relocation (soil salvage) will support the wetland compensation efforts. A summary of the proposed wetland compensation location, types, target vegetation communities and total compensation area provided is illustrated in **Table 8.2 (Appendix B)**.

By implementing the above wetland compensation, there are no negative impacts expected because of feature removals. Additional details are included in **Section 9**, and a fulsome restoration and enhancement plan is provided in the CEISMP Phase 3 Implementation Plan, Monitoring Plan and Adaptive Management Plan.

8.1.2.6 Wetland Buffers

It is generally recommended that a 30 m buffer be maintained for significant wetlands to support their continued function and maintain water quality (TRCA, 2014; MNRF, 2012). The significant wetlands in the Study Area are generally afforded a 30 m buffer. The remaining wetlands within the Study Area (A1, B1, C1, and G1) are other (non-significant) wetlands. These features are comprised of common and secure plants and wildlife and are afforded a 10 m buffer, as is generally recommended best practice (TRCA, 2014). The buffers for significant and other wetlands are adequate considering there is generally no existing buffering for these features due to ongoing agricultural activities. The wetland buffers are proposed to be planted with native trees and shrubs which will provide enhanced protection to these wetlands.

Some buffer averaging is proposed for Wetland E1 to accommodate the building footprint for the Prologis lands. A minor 0.15 ha buffer encroachment is proposed on the east side of the wetland, to be compensated for with an additional 0.15 ha of buffer on the west side of the wetland, adjacent to the Humber Station Road. The total buffer area will remain the same. The adjusted buffer will offer additional protection to Wetland E1 from potential direct and indirect impacts related to Humber Station Road. This includes increasing distance to roadway sediments and contaminants such as salt (Watersheds Canada, 2024) and may limit the spread of common roadside invasive species towards the wetland (Invasive Species Centre, 2024). No negative impacts to the form and function of Wetland E1 are predicted because of this proposed minor buffer encroachment.

A 10 m buffer will also be applied to Wetland Compensation Areas 2 and 3. Wetland Compensation Area 1 is small and narrow, located within the drainage realignment channel, and as such a smaller buffer will be required, to be determined at the Draft Plan stage.

The application of the aforementioned wetland buffers are anticipated to both protect features by mitigating any adverse impacts to the features and enhance the existing NHS.

8.1.2.7 Wetland Water Balance Risk Evaluation

A wetland water balance risk evaluation (TRCA 2017) was prepared for the Phase 1 CEISMP (GEI 2024) to determine the need for and type of feature-based wetland water balance analysis for all wetlands in the Study Area, including those associated with watercourses and drainages.

GEI attended a virtual meeting with TRCA, Arcadis, and Schaeffers on January 26, 2024, regarding the results of the Wetland Risk Evaluation, discussed further below. The meeting minutes are provided in **Appendix G**. The consultant team requested to use stormwater management modelling to assess the wetlands within the Study Area, of which include both retained wetlands within existing riparian channels and created wetlands within riparian channels. Post-development, the retained riparian wetlands will receive the same if not more water from stormwater outputs. While riparian wetlands vegetation communities may change (i.e., from a meadow marsh to a shallow marsh) wetlands will be retained. TRCA acknowledged that they supported using stormwater management modeling to both demonstrate that retained riparian wetland will be maintained post-development and that created wetlands will be supported in riparian channels. TRCA agreed that Feature-based Water Balance (FBWB) modeling is not required for the riparian wetlands. Instead, the consultant team will demonstrate that erosion thresholds are not exceeded, and flows are contained within the channel corridor (see Section 7.4.2 for more details on erosion thresholds). The flow to the wetland is outlined in the Floodplain Analysis Report – Phase 2 (August 2024) provided in **Appendix F**.

Modifications to two tableland wetlands are proposed, requiring wetland compensation areas 1 and 2 (Figure 8.3). These compensation areas are planned within the drainage channel (Wetland Compensation Area 1), and within a created extended floodplain (Wetland Compensation Area 2), as shown on Figure 8.3.

Wetland compensation is proposed to occur at a 1:1 ratio, close to the existing wetlands and within the NHS, as discussed in previous sections. Because the wetland relocation/compensation areas are connected to HDF-3, it is anticipated that the wetlands can be fed with sufficient volumes of water required to sustain wetland vegetation.

Wetland Compensation Area 3 is proposed to compensate for the proposed removal of HDFs 8a, 8b, 8c, 8c-1, 8d, which provide contributing habitat for Redside Dace. Schaeffers has sized this wetland to accommodate the anticipated flows from the drainage areas of these HDFs, and the wetland will be fed with clean roof water (**Appendix C**).

Schaeffers SWM approach is designed to maintain water balance (pre-development infiltration), and control peak flows through unitary rates within the SWM ponds. This aims to help stabilize water inputs to the riparian wetlands along the Clarkway Drive Tributary, reducing potential impacts on their hydrology. See **Appendix C** for more details on the results of Schaeffers' stormwater management modelling as it applies to confirming expected post-development wetland conditions.

Provided that surface water volume and quality contributions to the wetlands can be managed as predicted, utilizing the proposed stormwater management approaches outlined above, negative effects associated with surface water runoff are not predicted and no negative impacts to significant or non-significant wetlands are expected.

8.1.3 Significant Wildlife Habitat

As identified in the Phase 1 CEISMP, candidate and confirmed SWH features were identified within the Study Area. The majority of SWH will be protected with appropriate vegetated buffers and as such no impacts are anticipated. These include:

- Candidate Bat Maternity Colonies within a northwestern FOD community and southeast FOD7-6 community located in non-participating properties – these will be protected by 10 m vegetated buffers;
- Candidate Over-Wintering Turtle Habitat within OA ponds in northwestern FOD community, these will be protected within the FOD and its 10 m vegetated buffer;
- Candidate Seeps and Spring within a northwestern FOD community and southeast FOD7-6 community located in non-participating properties – these will be protected by the 10 m vegetated buffers;
- Habitat for Species of Conservation Concern including Eastern Wood Peewee (within the FOD, protected by a 10 m buffer), Snapping Turtle (within the riparian areas associated with the Clarkway Drive tributary;), Monarch (MAM2-10/MAM2-2 and MAS2-1 communities associated with the Clarkway Drive tributary), and Yellow-banded Bumblebee (MAM2-10/MAM2-2 and MAS2-1 communities associated with the Clarkway Drive tributary; which are generally buffered by wetland buffers (10 m and 30 m) and valleyland buffers (top of bank + 10 m).

Outside of the aforementioned areas, there are three types of SWH that are located within or adjacent to proposed land use changes within the Study Area.

This includes the SWH for Snapping Turtle and Candidate Amphibian Breeding Habitat (Wetland) at the SAS1-1 significant wetland (Wetland E1). This feature will be protected by a vegetated buffer of 30 m in most areas. A small buffer encroachment is being proposed along the eastern edge of the 30 m wetland buffer (0.15 ha), but this will be compensated for along the western edge closer to Clarkway Drive. The total buffer area will be maintained. This shift to allow for additional buffer width adjacent to the road will provide additional benefits to the wetland feature and the SWH. The potential benefits of increasing buffer width adjacent to the roadway was discussed in **Section 3.1.2**, including creating additional distance from contaminants and sedimentation that may runoff from the road towards the wetland feature. As such, no negative impacts are expected as a result of this buffer encroachment and compensation.

The small wetland (Wetland C1) next to the FOD8-3 provides Terrestrial Crayfish SWH and is proposed for partial removal (0.3 ha) and compensation to accommodate the Prologis Site Plan. Terrestrial Crayfish are closely associated with clay substrates and wetlands where groundwater is close to the surface.

There are two recommended options for habitat compensation to support terrestrial crayfish repopulation – these methods have been reviewed in previous work conducted by GEI (previously Savanta – a GEI company) and Dr. Premek Hamr (Canada's leading expert on terrestrial crayfish) (Savanta, 2019). These options include:

1. Retain a portion of the original wetland habitat which allows for natural recolonization by the terrestrial crayfish; and
2. Retain headwater contributions and create new habitat downstream from the original habitat to allow for contributions from upstream habitat.

As the proposed removal is only a partial removal, GEI is proposing to follow the first recommendation, whereby a portion of the original habitat is retained. The compensation wetland will be connected to the retained wetland through the drainage feature realignment. Dr. Hamr suggests that recolonization could occur quite quickly if wetlands are connected to headwater features. It is estimated that an adult breeding population could be established within 1-3 years once young crayfish have colonized an area.

The Town of Caledon OP notes that new development within Significant Wildlife Habitat is prohibited in accordance with Section 5.7, with the exception of the permitted uses as specified in policy 5.7.3.1.2. To accommodate the life cycle of terrestrial crayfish, habitat removals should occur in summer months when terrestrial crayfish burrow deepest into the substrate to limit disruption; no removals should occur during spring when terrestrial crayfish are closest to the surface. It is also noted that salvage of this species is likely difficult, as such, adherence to these habitat timing windows is the recommended approach to protect terrestrial crayfish on site.

Indirect impacts to terrestrial crayfish SWH (Wetland Compensation Area 2, retained Wetland C1, and riparian wetlands along the Clarkway Drive Tributary) could include a reduction in the water table from a decrease in groundwater discharge to these wetland features as noted in **Section 6** and **Section 8.1.2.**

For the riparian wetlands, associated with Clarkway Drive Tributary, site-specific development should consider the design and implementation of Low Impact Development (LID) best management practices (BMPs) and SWM ponds 1 and 3 (which are adjacent to the Clarkway Drive Tributary), as discussed in **Section 4.2**. By evaluating LID and SWM design for their ability to support groundwater infiltration, as part of the detailed design phase, these measures can promote infiltration to help preserve the pre-development groundwater flow regime.

The retained portion of Wetland C1 and the proposed Compensation Area 2 are generally supported by surface water input such as precipitation, runoff and seasonal thaw. The retained portion of Wetland C1 will continue to receive some surface water contributions from the realigned HDF-3 and seasonal precipitation; any potential deficits can similarly be accounted for through LID BMPs, as described in **Section 4.2**. Fulsome water balance calculations based on precipitation alone have been completed for Wetland Compensation Area 2 and are detailed further in Phase 3. It is anticipated that this wetland will be supported by local precipitation and, should drought conditions occur, the drainage realignment feature could be modified to support additional flow to this compensation feature.

Additional mitigation related to groundwater and surface water, as it relates to supporting wetland hydrology with post-development conditions are detailed in **Section 8.1.2.** Ultimately, pre-development ground water infiltration and surface water inputs should be maintained as long as post-construction ground water infiltration targets are incorporated into future LID design. If these measures are taken, changes to the water table are not expected to have a negative impact on the compensation habitat (MNRF, 2014).

The retained portions of the SWH and the compensation area will be further protected by a 10 m buffer. By vegetating this buffer, important foraging habitat can also be created which will be an improvement compared to the current agricultural land. The 10 m buffer will also provide protection to the wetland and SWH from sedimentation and surface water runoff. Dr. Hamr has also noted in previous consultations with GEI (Savanta, 2019) that while the general tolerance of these species to disturbances in unknown, these species are often found along roadside ditches and ploughed agricultural settings which suggests they may be tolerant to disturbances including road salts and pesticides. Based on their potential tolerance, and the feasibility of repopulation, the proposed removal and compensation is not expected to have any negative impacts to Terrestrial Crayfish SWH. However, feature removals should be avoided during the spring, and habitat compensation and mitigation measures described above should be completed. More details on wetland and SWH compensation design, management and monitoring will be described in Phase 3.

8.2 Potential Aquatic Impacts

8.2.1 Direct Fish Habitat

The Phase 1 CEISMP identified direct fish habitat for warm water species within the Clarkway Drive Tributary, located within the valley along the east side of the Study Area. GEI completed baseline monitoring of water temperatures for this tributary. With a summer average of 25.4 degrees Celsius, which supports the observation of warm water fish species.

HDF-3 was also identified as direct fish habitat in the Phase 1 CEISMP. This feature had perennial flow in 2017, but was dry in June 2022 and May 2023, and supports warmwater fish species. This HDF is proposed for realignment, as detailed in **Section 9.1.2**. The realignment aims to enhance aquatic habitat through the inclusion of diverse velocity and depth of flow and improve riparian habitat. A more thorough impact assessment related to the realignment of this HDF is discussed in **Section 8.2.2.**

As part of the NHS, the Clarkway Drive Tributary and realigned HDF-3 will both be protected by a warm water fish habitat buffer (15 m, MNR 2010), intended to mitigate negative impacts to water quality from adjacent land uses. Buffers with native vegetation can also contribute to bank stability and thermal regulation. The Clarkway Drive Tributary will be further protected by the buffers for adjacent features including the top of bank buffer (10 m), and significant wetland buffer (30 m) for adjacent riparian wetlands.

Additional potential indirect effects on fish habitat downstream that could occur from the proposed development include:

- Impaired fish habitat and/or negative impacts on aquatic biota (e.g., fish and benthic invertebrates), including deteriorated health or mortality, due to erosion and sediment from site alteration and development;

- Mortality or health impacts due to accidental spills of toxic materials during or post-construction;
- Short-term dewatering may be required related to the construction of subsurface utilities;.
- Alterations in watercourse water balance (e.g., timing and volume of flows) and associated negative impacts on fish habitat functions; and
- Long-term impairment of watercourse quality (including chemical contaminants, suspended solids and temperature) due to surface runoff from the proposed development.

The following mitigative measures should be considered in subsequent development applications to prevent or minimize negative effects on fish and fish habitat:

- Establishment of erosion and sediment control (ESC) measures along the limit of the NHS that should be monitored during construction and where deficiencies are identified, ESC measures must be repaired immediately to prevent adverse impacts to receiving features;
- Preparation and implementation of a spill prevention and response plan to prevent or minimize the potential for spills of potentially toxic materials during construction;
- Groundwater mitigation measures, as discussed in Section 3.2.1.1;
- Surface water quality and quantity impact mitigation measures (SWM and LIDs), as discussed in Section 3.2.1.2; and
- Considerations of fencing and/or thorny barrier plantings should also be contemplated in subsequent site plan designs to limit human disturbance.

8.2.1.1 HDF-3 Realignment

Portions of HDF-3 are proposed for realignment to accommodate a preferred development layout, as shown on **Figure 8.3 (Appendix A)** that is anticipated to achieve a net benefit for fish habitat. The realignment design includes a meandering drainage channel, native riparian vegetation, and riparian wetlands to support surface water storage along the feature. This is anticipated to improve fish habitat compared to existing conditions (historical straightening, degradation from agricultural activities such as ploughing through or up to the feature, as well as the use of fertilizers resulting in pollution). As well, the riparian wetlands are anticipated to provide extended baseflow.

The HDF-3 realignment will result in a net gain of 351 m of fish habitat (removal of 1087 m and creation of 1438 m of channel). Planted vegetation surrounding the channel realignment will also support with thermal mitigation through shading and improved water quality, helping to mitigate potential impacts from the proposed land use changes. Additional detail on the proposed drainage realignment design is provided in **Section 9.1.2**.

Positive impacts to aquatic habitat are predicted as a result of the creation of the realigned HDF3 (including wetland habitat compensation/enhancement) compared to existing conditions within actively managed agricultural fields.

8.2.1.2 Surface Water Impacts to Fish Habitat

Arcadis installed 7 surface water monitoring stations along the Clarkway Drive Tributary, HDF-3, and HDF-8 and two were installed in wetlands within the Study Area. Seasonally higher spring flows (late April) were observed due to snow melt and higher volume of precipitation compared to lower flows in the summer and fall.

Baseflow for HDF-3 was observed to be quite low and the feature was dry by late spring in 2022 and 2023. Baseflow was lowest downstream, suggesting there are upstream factors that could be contributing to water loss including a beaver dam observed in September 2023.

Based on streambed datalogger data for the Clarkway Drive Tributary, this stream likely derives flow from surface water runoff during storm events.

Potential impacts associated with the proposed development include erosion and sedimentation due to construction activities on the Subject Lands, and accidental spills during construction. A formal Erosion and Sediment Control (ESC) Plan, as well as a spill prevention and response plan, will be required to demonstrate that construction activities will not have negative impacts on downstream fish habitat.

Provided that surface water volume and quality contributions to the watercourses, retained HDFs, and wetlands can be managed as discussed in **Section 4** (Stormwater Management Plan) utilizing the proposed stormwater management approaches and mitigation measures outlined above, negative impacts to fish habitat associated with surface water are not anticipated.

8.2.1.3 Groundwater Impacts to Fish Habitat

As described in **Section 6**, monitoring work to date suggests that Clarkway Drive Tributary and its riparian wetlands have some groundwater discharge contributing to their baseflow. HDF-3 has upward gradients in the spring, and likely receives some seasonal groundwater discharge.

An annual infiltration deficit was determined by Arcadis for the Study Area (**Section 6**. Given the results of the water balance calculations and recommended infiltration, no negative impacts associated with groundwater contributions to fish habitat are predicted to occur.

Changes to groundwater quality would be expected from human activities such as road salting, minor fuel and oil leaks, fertilizer application, etc. Best management practices should be considered when applying salt, fertilizers etc. to minimize their application and limit changes to groundwater. Spills and leaks must be contained and remediated as soon as possible to limit damage to the environment.

Provided that groundwater contributions to the watercourses, retained HDFs, and wetlands can be managed as discussed in **Section 8** utilizing the proposed infiltration approaches and mitigation measures outlined above, negative impacts to fish habitat associated with groundwater are not anticipated.

8.2.2 Indirect Fish Habitat

The HDFs within the Study Area were generally ephemeral and provide indirect fish habitat, except for HDF-3 which had intermittent flow and provided direct fish habitat.

It is important to acknowledge that as with any guidelines, the HDF Guidelines (CVC and TRCA 2014) are intended to have flexibility to best reflect additional considerations regarding the site-specific nature of features, such as historical straightening for agricultural purposes, impairment related to surrounding active agriculture (i.e., siltation due to ploughing up to the edge of the feature and pollution due to fertilizers), the replication of Redside Dace contributing habitat functions, and compatibility with land uses. As such, there are situations where recommendations were made for an alternative management recommendation based on site-specific understanding of these additional factors. These features are proposed for realignment and/or compensation with replication of their functions expected to be achieved through LIDs or natural channel design.

HDF-3b, 3c, 3e, and 3h were classified as ‘Protection’ whereby these features should be maintained and protected from potential development impacts by protecting or enhancing in-situ. HDF-3e is comprised of Wetland C1 that is proposed for partial removal and compensation to accommodate the Prologis building footprint. Therefore, the southern half of HDF-3e is shown on Figure 8.2 as ‘Conservation’, as this portion of the reach is proposed for realignment.

HDF-3a, 3d, 3g, 3i, 8a1, 8a2 and 8a3 were classified as ‘Conservation’ which allows for features and their riparian zone to be maintained, relocated and/ enhanced through drainage feature realignment so long as the following are considered:

- Any lost functions to catchment drainage as a result of stormwater flow diversion, requires enhanced lot level controls to restore the original catchment drainage;
- On-site flows should be replaced or maintained through wetland creation or other mitigation measures;
- Natural channel design techniques should be used to maintain/enhance productivity of the reach; and
- The modified drainage feature must connect downstream.

The remainder of HDFs are Mitigation. As noted in the HDF Guidelines (CVC and TRCA 2014), Mitigation management allows for the replication of the function of the HDF to:

- Replicate functions by lot level conveyance measures (e.g., vegetated swales) connected to the preliminary natural heritage system, as feasible and/or Low Impact Development (LID) stormwater options;
- Replicate on-site flow and outlet flows at the top end of system to maintain feature functions; and
- Specific implementation techniques to replicate functions should be determined at the MESP stage and may include LID measures.

8.2.2.1 Drainage Feature Removal

Headwater drainage features designated as ‘Mitigation’ are proposed for removal and will have their hydrological functions replicated through SWM and LID infrastructure. SWM and LID recommendations are detailed in **Section 4.2**.

8.2.2.2 Redside Dace Contributing Habitat

Redside Dace contributing habitat was also identified within the Study Area including the Clarkway Drive Tributary and its riparian wetland communities, as well as HDFs, some of which are proposed for removal and replication. A discussion on the potential impacts to Redside Dace contributing habitat is provided in **Section 8.3.1.**

8.3 Potential Impacts to Species at Risk

8.3.1 Redside Dace

Redside Dace contributing habitat occurs within the Clarkway Drive Tributary and its riparian wetland communities, and is expected to include HDFs 4a, 8a, 8a1, 8a2, 8a3, 8b, 8c, 8c-2, 8d, 10a, 11a, 12a, 13a, and 15a (**Figure 8.2**). The contributing Redside Dace habitat status of individual HDFs will be confirmed with MECP during later design stages.

There are no direct impacts expected to the contributing habitat associated with the Clarkway Drive Tributary or its riparian wetlands as they will be protected within the NHS with a vegetated buffer.

The majority of the tableland HDFs are proposed for removal to support the land use plan for the Study Area, totaling 2369 m of HDF. These features are negatively impacted from current agricultural activity (i.e., siltation due to ploughing through the feature and pollution due to fertilizers); they do not provide direct fish habitat and have no in-stream or riparian habitat. These HDFs were given an interpreted management recommendation of ‘Mitigation’ and are proposed for removal with replication of their functions.

Other potential impacts to Redside Dace contributing habitat could occur during construction as it relates to erosion or sedimentation being conveyed to downstream habitats, and/or accidental spills. Unmitigated, this could cause negative effects on fish habitat, mortality and health effects.

8.3.1.1 Recommended Mitigation/Management Measures

The RSD contributing habitat functions (provision of baseflow and coarse sediment supply to downstream occupied habitat) are proposed to be replicated and enhanced through SWM Ponds 1 and 3, as well as Wetland Compensation Area 3. As noted by Schaeffers (**Section X**), SWM Ponds 1 and 3 will have extended detention (25 mm event over 48 hours) and are designed to deliver enhanced protection by maintaining a permanent pool, achieving an 80% removal of total suspended solids (TSS).

Wetland Compensation Area 3 will consist of a tableland wetland that will be supported by precipitation and a roof drain collector system. It will be comprised of two wetland vegetation communities: mineral meadow marsh (MAM2) which will flood seasonally and become moist-dry later in the growing season and mineral shallow marsh (MAS) where water will be standing most of the growing season.

The MNRF’s Guidance for Development Activities in Redside Dace Protected Habitat (2016) provides best management practices to support the design and construction of SWM Ponds, as well as wetland features. This guide will be followed throughout the design and construction process.

Post-construction surface water will be conveyed through SWM infrastructure to provide enhanced quality control. The proposed SWM infrastructure and LID measures will help reduce thermal loading to downstream aquatic habitats. All SWM discharge infrastructure should be designed in accordance with the MNRF's Guidance for Development Activities in Redside Dace Protected Habitat (MNRF, 2016) and the Thermal Mitigation Checklist for Stormwater Management Ponds Discharging into Redside Dace Habitat (MNRF, 2014) to minimize negative impacts on stream and riparian habitats. SWM Ponds 1 and 3 will have 3 m deep permanent pools for thermal mitigation, and additional cooling can be achieved through plantings of native trees and shrubs surrounding Wetland Compensation Area 3.

ESC measures will be used throughout construction, and spill prevention and response measures will be implemented to avoid negative effects due to accidental spills during construction.

Provided the above mitigation and compensation is carried out as recommended, no negative impacts to Redside Dace are anticipated. These measures are designed to provide an overall benefit to Redside Dace.

8.3.2 Candidate SAR Bats

SAR bats may be present within the following forest communities on non-participating lands: FOD in the northwest portion and FOD7-6 in the south end.

There is no setback requirement prescribed by MECP for SAR bats, however the woodland features will be protected by a minimum 10 m buffer.

8.3.2.1 Recommended Mitigation/Management Measures

While the features that may provide candidate SAR bat habitat are not anticipated to be altered, the following are best practices that should be followed to protect SAR bats within the Study Area:

- Any tree removals within the Study Area should be completed outside of the bat active window (approximately April 1 – September 30); and
- New lighting should be directed away from candidate SAR bat habitat to minimize disturbance.

Provided these mitigation measures are carried out as recommended, no negative impacts on candidate SAR bats are anticipated.

8.3.3 Bank Swallow

Bank Swallows were observed foraging off-site over the northern significant wetland associated with the Clarkway Drive tributary. This wetland habitat extends onto a small portion of the Study Area and is protected with a 30 m buffer.

The preliminary NHS includes marsh wetland vegetation and vegetated buffers and is anticipated to continue to contain habitat suitable for flying insects for foraging Bank Swallows.

Provided these mitigation measures are carried out as recommended, no negative impacts to Bank Swallow are anticipated.

8.3.4 Barn Swallow

Barn Swallow nesting habitat occurs in two replacement habitat structures that were installed in 2017 to mitigate for the removal of structures with Barn Swallow nests, under a Notice of Activity with MECP. The replacement habitat structures are located within the preliminary NHS. One replacement habitat structure will need to be moved a short distance (approx. 50 m) to accommodate the proposed drainage feature realignment but will remain inside the NHS.

Barn Swallows were observed foraging off-site over the northern significant wetland associated with the Clarkway Drive tributary. This wetland habitat extends onto a small portion of the Study Area and is protected with a 30 m buffer.

The preliminary NHS includes marsh wetland vegetation and vegetated buffers and is anticipated to continue to contain habitat suitable for flying insects for foraging Barn Swallows.

Provided these mitigation measures are carried out as recommended, no negative impacts to Barn Swallow are anticipated.

8.3.5 MECP Engagement

An Information Gathering Form will need to be submitted to the MECP as part of the Draft Plan stage to demonstrate how direct and indirect impacts to Endangered and Threatened species will be mitigated. It is anticipated that a 17(2)C Overall Benefit Permit will be required for the proposed removal and compensation of Redside Dace contributing habitat.

8.4 Magnitude and Longevity of Impacts to the NHS

As part of the assessment of impacts on natural heritage features and functions, the magnitude (extent of an impact) and longevity (associated with duration of an impact) were also considered in each of the above sections.

Overall, the magnitude of impacts on natural heritage features within the Study Area, including Wetlands, Woodlands, SWH, Fish Habitat (direct and indirect), and SAR habitat has been assessed as minimal. With the implementation of recommended mitigation measures and compensation, there are no negative impacts predicted.

Similarly, the longevity of impacts will be mitigated through pre-construction, during-construction, and post-construction mitigation measures, appropriate monitoring, and adaptive management. This will be fully detailed within the Long-Term Monitoring Plan and Comprehensive Management Plan, a key deliverable within the Phase 3 CEISMP.

In general, it is anticipated that most impacts to features and their functions will be mitigated, resulting in a minimal impact, or else limited to construction phases with mitigation measures in place to minimize the longevity of these impacts.

Some examples of efforts to limit the magnitude and longevity of impacts due to land use change will include:

- Erosion and Sediment Controls – these should be established so that sediment is not entering wetland features or down-stream watercourses. These measures are intended to prevent the release of debris, sediment or deleterious substances which could have long-term impacts on the aquatic ecosystem. Both magnitude and longevity of potential impacts are mitigated in this scenario; and
- Wetland Ecohydrology Monitoring – as the proposed land use plan requires some wetland feature removals, mitigating the magnitude and longevity of the feature removal will be reliant on successful implementation of the proposed compensation wetlands. This will require developing a post-construction monitoring program that assesses the created wetlands' hydroperiods, water volumes, and wetland vegetation establishment, and identifying adaptive management techniques to maintain the created wetlands.

The examples above are just a subset of methods of reducing magnitude and longevity impacts to natural heritage features and functions. By implementing the mitigative measures outlined in the previous sections and incorporating the long-term management and adaptive management recommendations that will be detailed in Phase 3, it is expected that the NHS will be a robust system with adequate protection and restoration to enhance the longevity of retained and compensated features and functions.

9. Mitigation, Compensation and Restoration/Enhancement Opportunities

The preliminary natural heritage system (NHS), compensation, restoration, and ecological enhancements are founded upon a sound technical understanding of the extent and quality of natural heritage features and functions observed within the Study Area. The overall goal of the proposed Natural Heritage System is to establish a healthy and diverse ecosystem that enhances and complements the native vegetation coverage and strengthens its ecological resilience.

The following environmental targets are being considered through this CEISMP to maintain, restore, and enhance existing conditions:

- Provide natural vegetative cover across the entire created NHS and all NHS buffers;
- Achieve an overall measurable net gain in native vegetation community type and species diversity (flora and fauna);
- Provide habitat for certain life stages of various bird and small and medium sized mammal species;
- Mitigate removal of wetlands by providing appropriate areas for wetland compensation and by increasing ecological functions within created wetland features;
- Map abundance of Category 1 invasive species (i.e., *Rhamnus cathartica*, *Phragmites australis ssp. australis*) and *Populus alba* (Category 2) within retained natural features;
- Invasive species management (risk) assessment to determine whether it is ecologically, socially, and economically viable to manage a given invasive species population;
- Where invasive species risk assessment identifies invasive management, for a given species, carry out invasive management as per Ontario Invasive Plant Council best management practices;
- Explore salvage and transplant of native species within removed features into created features and or retained feature buffers, where feasible;
- Enhance local linkages and connectivity for wildlife movement and gene flow; and
- Consider best management practices for road crossings to support movement of amphibian, reptile, small and medium sized mammals under road crossings.

The post-development preliminary NHS (**Figure 8.3, Appendix A**) represents an interconnected system of natural features and functions, and the stormwater management strategy incorporates numerous LID techniques to support the existing watercourse and wetlands.

As discussed in **Section 8**, a key mitigation measure for the protection of features within the NHS are buffers or Vegetation Protection Zones (VPZs). These buffer recommendations are made based on established best practices, the feature's form, functions, sensitivity, and location within the NHS, as well as the extent and nature of the proposed land use changes. These recommended buffers apply to both retained and compensation features within the Study Area.

To facilitate the post-development NHS, some feature compensation is required as described in **Section 8**. A high-level discussion of recommendations for these compensation areas is provided in the subsequent sections, and additional details are included in the Phase 3 CEISMP.

9.1 Natural Feature Compensation Requirements

As discussed previously, to support the Humber Station Employment Area Secondary Plan and the Prologis Site Plan a total of 0.38 ha of wetland (inclusive of 0.30 ha of Terrestrial Crayfish SWH), 0.34 ha of significant woodland, and 2639 m of HDFs that provide contributing habitat for Redside Dace are proposed for removal. Realignment and enhancement of HDF-3 (direct fish habitat) is also proposed.

These features will be compensated on site at a ratio of greater than 1:1 in an aim to replicate both form and function within the Study Area. The siting, compensation ratios, and design of these features have been established based on the field results characterizing the existing features, appropriate collaboration between all disciplines, and adherence with relevant regulations and policies that apply to natural heritage features and natural hazards.

9.1.1 Ecological Offsetting Policy Considerations

Ecological offsetting is a mitigation strategy that is often considered to achieve a net ecological benefit to projects, subject to the approval of the planning authority. This compensation strategy quantifies the loss of natural features to provide compensation through habitat re-creation or an alternative through a consultation process. Ecological offsetting approaches are typically applied as a last resort (after avoidance and mitigation have been considered). In this case, ecological offsetting is proposed to achieve additional ecological benefit by meeting and/or exceeding the replication requirement.

As per O. Reg. 41/24, the TRCA no longer has planning jurisdiction over natural heritage features and instead regulates natural hazard features only. This includes flood and erosion risks that relate to the alteration of rivers, streams, valleys, and wetlands, and consideration of the regulation and permitting requirements that will impact these features will be incorporated into the feature compensation design.

The Town of Caledon is responsible for administering the in-force Town of Caledon OP (2018) and the Region of Peel's OP (2022). The Town does not have any ecological offsetting guidance available. The Region of Peel OP notes the following policy considerations for ecological compensation in Section 2.14.30:

> "*Support the appropriate use of ecosystem compensation guidelines by the local municipalities and other agencies in accordance with the policies of this Plan subject to federal and provincial policy requirements and provided that development or site alteration will not result in negative impacts to the natural features or ecological functions of the Greenlands System. Where ecosystem compensation is determined to be an acceptable mitigation option, it should be applied to achieve a no net loss and if possible, a net gain, in natural heritage feature area or function.*"

TRCA has also developed a 'Guideline for Determining Ecosystem Compensation' (TRCA, 2023) which highlights best practices for the compensation of features and their functions. This guiding document could be considered when finalizing compensation efforts during detailed design. At the CEISMP level, to help achieve no net loss in natural heritage feature areas or functions, the post-development NHS is proposed to have a greater than 1:1 compensation for both wetland and woodland removal (**Figure 8.3, Appendix A**).

One of the main goals for ecological compensation will be to target a net gain for the natural heritage system. This concept is not fully defined within the Town of Caledon OP (2018); however, net gain should be measured at "relevant timescales" for the project, recognizing that actions to restore and offset actions may lead to short-term adverse effects before it is achieved (IUCN, 2021). The TRCA's compensation guidelines Section 1.3 also notes:

> "*Compensation outcomes should strive to fully replace the same level of lost ecosystem structure and function in proximity to where the loss occurs and, where possible, achieve an overall gain*."

The following sections outline high-level natural feature compensation considerations for the wetland, woodland, and SWH habitat removal, as well as drainage feature realignment, with details on how the principles of net gain will be achieved by providing ecosystem structure and function. Natural feature compensation requirements should be further reviewed at later design stages based on the final channel realignment design and Site Plan Application.

More detailed restoration, and monitoring and adaptive management plans are included in the Phase 3 CEISMP.

9.1.2 Drainage Feature Realignment Design

To maintain and enhance the detention and retention functions with regards to flow and sediment, natural feature enhancement design for headwater drainage feature realignment (HDF-3) needs to provide connection to the floodplain, as well as diversity in channel and floodplain morphology. Therefore, the primary design objectives are to restore the physical form of the channel, improve the function of the channel and its interaction with the floodplain, enhance aquatic habitat through the inclusion of diverse velocity and depth of flow, improve riparian habitat, and mitigate potential erosion hazards to the development as well as lands downstream.

9.1.2.1 Bankfull Channel

The design creates a riffle-pool morphology, which is intended to provide enhancements to aquatic habitat. Dimensions for the riffles and pools were governed by the bankfull discharge. The bankfull discharge is the flow that reaches the transition between the channel and its floodplain (Leopold et al. 1964) and is significant because it is the flow at which the channel is the most effective at moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing work that results in the shaping of the channel (Dunne & Leopold 1978). Typically, the recurrence interval/frequency of the bank forming flow event is typically that of the spring freshet, or 1-2-years recurrence.

The proposed realignment flows between several wetlands, including retained features and new features integrated into the realignment design. As such, reach breaks were placed at each wetland, resulting in the delineation of three separate reaches. Reach 1 is the most upstream (northern) reach, just downstream of the Healey Road crossing, while Reach 3 is the most downstream (southern) reach, just upstream of the Humber Station Road crossing.

There are several methods to determine an appropriate bankfull discharge, including through a survey of a ‘reference reach’, based on field indicators of bankfull geometry. However, due to the lack of channel definition, back-calculation of bankfull discharge through a reference reach could not be completed. Therefore, the bankfull discharge was calculated through hydrological modelling completed by Schaeffers (**Appendix E**). **Table 9.1**, (**Appendix B**), summarizes the modelled flow through the system, where Station 1002 is located within Reach 1 and 2, while Station 991 is located within Reach 3. The design bankfull discharge was assumed to be approximately equal to two-thirds of the 2-year flow (0.27 m^3/s in Reaches 1 and 2, and 0.37 m^3/s in Reach 3), and therefore equal to 0.18 m^3/s in Reaches 1 and 2 and 0.25 m^3/s in Reach 3.

Proposed riffle and pool geometries are provided in **Table 9.2 (Appendix B)**. The channel was sized by iteratively adjusting the dimensions, until the bankfull flow could be accommodated within the channel. Reach 1, located upstream of the first wetland, had an overall gradient of 0.2%, Reach 2, between the two wetlands, had an overall gradient of 0.35%, and Reach 3, immediately downstream of the second wetland, had an overall gradient of 0.73%. Average riffle gradients for Reaches 1, 2, and 3 are 2.0%, 3.0%, and 4.0%. The modelled values for the riffles provide a prediction of the channel capacity.

9.1.2.2 Substrate Sizing

The substrate in the channel was sized based on the proposed hydraulics (i.e., velocity and shear stress) within the typical channel cross sections. A range of methods were used to determine the appropriate grain size, using both the anticipated velocity and shear stress and included a factor of safety, where appropriate.

It should be noted that, during typical flows, riffles will not be flowing at bankfull depth due to their relatively high gradient. At bankfull flow, depths will ‘drown’ the riffles, negating the effects of the steeper slope. As such, the empirical relations used to size substrate significantly oversize the substrate in riffles. Nonetheless, the substrate in the riffles was sized to provide stability and limit entrainment at more frequent flows, and consist of the following gradation: D_{100} = 100 mm, D_{90} = 85 mm D_{84} = 75 mm, D_{50} = 50 mm, and D_{16} = 35 mm, and D_{10} = 30 mm. Pools are proposed to consist of finer materials with an equal mix of granular ‘b’ and existing materials.

9.1.2.3 Bioengineering Treatments

The proposed channel includes the following bioengineering treatments on the outside bend of some meanders to mitigate the erosion hazard, while also providing habitat enhancements. Specifically, brush mattresses are proposed, which consists of a layer of live cuttings placed flat against the sloped face of the bank. The branches provide immediate protection from parallel streamflow, and as the cuttings establish, they provide additional reinforcement to the soil.

9.1.2.4 Channel Realignment Wetland Enhancements

As noted above, as part of the drainage feature realignment design, the channel will include the creation of 0.58 ha of riparian wetland habitat. These riparian wetlands will be located along the length of the drainage feature and will include a variety of wetland vegetation communities including Willow Thicket Mineral Swamp (SWT2-2, Cattail Shallow Marsh (MAS2-1), and Mineral Meadow Marsh (MAM2). These wetlands are expected to be hydrologically supported by precipitation and their proximity to the realigned drainage feature.

9.1.2.5 Ecological Net Gain

In total, this realignment will result in a net gain of 351 m of length and 0.58 ha of floodplain wetlands added to HDF-3 providing additional capacity for flow control, recharge, storage, sediment control, and water quality improvements. This is expected to have a positive impact on direct fish habitat, overall biodiversity and provide general benefits to water quality and quantity downstream.

As well, the naturalization of the area adjacent to the feature banks and integration of wetland communities will provide enhancements to the adjacent terrestrial environment, by providing habitat and foraging areas, and will also provide shade for thermal mitigation.

Overall, it is anticipated that the natural heritage system will be improved by enhanced water quality, quantity, and thermal conditions as compared to the current conditions of HDF-3 (frequently disturbed by agricultural practices). In the long-term, biodiversity of HDF-3 should be improved as a result of the feature design and naturalization.

9.1.3 Wetland Compensation

The majority of wetland features within the Study Area will be retained in-place and buffered with either a 10 m or 30 m buffer, as noted in **Section 8.1.2**. To facilitate the proposed land use plan and Prologis site plan, 0.38 ha of wetland is proposed for removal.

Three wetland compensation areas are proposed (**Figure 8.3, Appendix A**)**:** Wetland Compensation Area 1 (within the HDF-3 realignment; 0.077 ha) for the removal of Wetland B1 (0.076 ha); Wetland Compensation Area 2 (within the extended floodplain next to FOD3-8; 0.39 ha) for Wetland C1 removal (0.30 ha); and Wetland Compensation Area 3 (south end of HDF-8; 0.35 ha) to compensate for the removal of Redside Dace contributing habitat HDFs.

This provides for a greater than 1:1 compensation ratio (**Figure 8.3, Appendix A**). The total wetland creation, including the riparian wetland creation (0.58 ha) for the HDF-3 realignment, is 1.40 ha, which is a net gain of 1.02 ha. Compensation details for all wetlands are found in **Table 8.2**, (**Appendix B**).

Wetland compensation areas will be constructed in close proximity to removal locations, as is recommended for feature removal offsetting and compensation. As confirmed in **Section 8.1.2**, it is expected that all three compensation wetlands can be fed with sufficient volumes of clean water required to sustain a range of water depths and proposed wetland vegetation community types.

9.1.3.1 Ecological Net Gain

The goal of the wetland compensation design will be to achieve a net gain in overall function of the community compared to existing conditions in the Study Area. As noted, the proposed ecological compensation will provide a greater than 1:1 replacement for proposed wetland and SWH removals and will also add additional wetland communities to the Study Area through the RSD contributing habitat compensation wetland compensation design and additional wetland creation associated with the drainage feature realignment. This design, detailed in the Phase 3 CEISMP, is intended to include wildlife enhancements including the creation of breeding amphibian habitat for Northern Leopard Frog, Gray Treefrog, Green Frog, and Terrestrial Crayfish habitat.

Compensation areas will provide an increase in native vegetation community types and species diversity through restoration plantings and will improve the overall NHS linkage between retained and compensation features within the Study Area. As such, there is expected to be a net gain in both total wetland feature area and wetland function. In total, there will be a 1.02 ha net gain in total wetland area within the Study Area.

More detailed information on design, water availability, vegetation community targets, and implementation for these compensation areas are further described in the Phase 3 CEISMP.

9.1.4 Redside Dace Contributing Habitat Compensation and Enhancements

Wetland Compensation Area 3 (**Figure 8.3**) will be designed to replicate the functions HDFs 8a, 8b, 8c, 8c-1, 8d, which provide contributing habitat for Redside Dace. These HDFs are impaired due to agricultural practices such as ploughing through the features, causing siltation of water, and use of fertilizers resulting in pollution. As such, the creation of the compensation wetland area is expected to be a considerable benefit to contributing habitat for Redside Dace. This compensation area will be fed by clean roof water to achieve the volume of water input required as determined through the water balance assessment (**Section 8.1.2**). The wetland is anticipated to act as filtering system, improving water quality by removing sediment and pollutants from water. The wetland will also outlet to alluvium deposits that will help supply coarse sediment to downstream habitat, and the surrounding area will be planted with native trees and shrubs to provide shade for thermal mitigation.

SWM Ponds 1 and 3 (**Figure 8.3, Appendix A**) will replicate the functions of HDFs 4a,10a, 11a, 12a, 13a, and 15a, which provide contributing habitat for Redside Dace. These HDFs are also impaired due to currently active agricultural practices. SWM Ponds 1 and 3 will discharge to the Clarkway Drive Tributary, deliver enhanced protection (80% removal of TSS), and have 3 m deep permanent pools for thermal mitigation. These SWM ponds will outlet to alluvium deposits that will help supply coarse sediment to downstream habitat.

Wetland Compensation Area 3 and SWM Ponds 1 and 3 will follow the guidelines set out in the Guidance for development activities in the Redside Dace Development Guidance (MNRF, 2016) and Thermal Mitigation Checklist for Stormwater Management Ponds Discharging into Redside Dace Habitat (MNRF, 2014).

9.1.4.1 Ecological Net Gain

The proposed wetland compensation area for the removal of Redside Dace contributing habitat, and design of SWM Ponds 1 and 3, is anticipated to be a considerable improvement compared to the existing conditions of the ploughed HDFs that are expected to be polluted due to fertilization.

Anticipated net gains for Redside Dace include extended baseflow, improved water quality, thermal mitigation, and provision of coarse sediment supply to downstream habitat.

9.1.5 Woodland Compensation

The proposed woodland removal (Woodland 2) required to facilitate the Prologis site plan is 0.34 ha, with a proposed woodland compensation of 0.35 ha (**Figure 8.3**, **Appendix A**), providing for a greater than 1:1 compensation ratio. This removal has been contemplated in the proposed Humber Station Employment Area Secondary Plan Area Policy 7.16.7.3, submitted as part of this OPA. The woodland compensation discussed in this section is dependent on the implementation of this policy to permit minor modifications (encroachment/removal and appropriate compensation) to Woodland Core Areas, as per an Environmental Management Plan.

The woodland compensation area is planned to surround Wetland Compensation Area 2, which will provide enhanced connectivity between the retained woodland feature, Wetland Compensation Area 2, and the Clarkway Drive Tributary valley. A lowland (fresh-moist) woodland community is planned for the compensation area to allow for accurate replication of woodland community type proposed for removal (FOD8-3).

9.1.5.1 Ecological Net Gain

The proposed removal of Woodland 2, which is designated a significant woodland and meets the criteria for Core Woodland Area under the Town of Caledon OP (2018), is comprised of FOD8-3, CUT1-7 and some interior cultural meadow (CUM1-1). The rationale for this removal as it relates to magnitude, invasive species control, and overall net-gain is described in Section 8.1.1.1. In general, the total amount of native woodland removal is relatively minor (0.07 ha), while the remaining removals include cultural meadow (0.06 ha) and Buckthorn thicket CUT1-7 (0.21 ha). The removal of the CUT1-7 community as part of this post-development NHS will provide some invasive species management to the retained feature. Additional invasive species management will also be recommended through the Phase 3 CIESMP and EMP as indicated in the proposed Humber Station Employment Area Secondary Plan Area Policy 7.16.7.3. The proposed compensation plan provides woodland compensation to the east of the FOD8-3 to provide improved ecological connectivity to the NHS associated with the valley surrounding the Clarkway Drive Tributary (**Figure 8.3, Appendix A**).

The proposed woodland compensation is anticipated to provide a net benefit to the overall natural heritage system by providing an increase in native woodland vegetation, invasive species management, and increasing connectivity between natural features.

9.1.6 Species of Conservation Concern Habitat Compensation

The small wetland (Wetland C1; **Figure 8.3**) next to the FOD8-3 provides Terrestrial Crayfish SWH and is proposed for partial removal (0.30 ha) and compensation to accommodate the Prologis Site Plan. As noted in **Section 8.1.3**; by retaining a portion of Wetland C1 and compensating SWH removal through Wetland Compensation Area 2 and connecting to the HDF, young crayfish will have the ability to move to available wetland habitat where a breeding population has potential to establish within 2-3 years (Savanta, 2019). This compensation protocol is based on consultative discussions with Dr. Premek Hamr, a leading expert in the terrestrial crayfish field (Savanta, 2019).

9.1.6.1 Ecological Net Gain

In total, 0.30 ha of Wetland C1, which was characterized as Terrestrial Crayfish SWH, is proposed for removal. A total of 0.39 ha of habitat compensation area is proposed in Compensation Wetland 2, adjacent to the retained portions of this SWH feature. Overall, there will be a net gain of 0.09 ha of appropriate terrestrial crayfish habitat. This wetland compensation area will be hydrologically connected to the enhanced HDF-3 realignment, ensuring continued connectivity between the retained and compensation habitat.

The retained portions of the SWH and the compensation area will be further protected by a minimum 10 m buffer that will be planted with native trees and shrubs. This naturalization aims to provide important foraging habitat which is anticipated to be an improvement to the current agricultural areas adjacent to the SWH area. The vegetated buffer is expected to provide protection to the wetland and SWH from sedimentation and surface water runoff.

More details on this habitat compensation, detailed wetland compensation design, management and monitoring are explored in Phase 3.

9.2 Policy Conformity

One of the goals of the CEISMP is to address the proposed land use changes in the context of applicable planning policies and to clearly identify how requirements are met or exceeded. The following is a summary linking the conclusions of the above impact assessment to conformity with land use plans and applicable policies, including the PPS, provincial legislation, Regional and Local Municipal Official Plans, and federal legislation. Overall, this CEISMP addresses alignment, conformity and consistency with the following policies:

9.2.1.1 Fisheries Act, 1985

The *Fisheries Act* prohibits the death of fish by means other than fishing (subsection 34.4 (1)) and the harmful alteration, disruption or destruction of fish habitat (HADD; subsection 35. (1)). A HADD is defined under the *Fisheries Act* as “any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat’s capacity to support one or more life processes” (DFO 2019).

The Clarkway Drive Tributary and HDF-3 provide direct fish habitat. The Clarkway Drive Tributary, its associated riparian communities, and HDF-8 provide contributing habitat for Redside Dace. All direct fish habitat is anticipated to be protected or enhanced. No negative impacts are expected to fish habitat as the Clarkway Drive Tributary and associated riparian wetlands will all be maintained with riparian buffers (15 m for fish habitat, 30 m for significant wetlands, 10 m for non-significant wetlands). HDF-3 will be realigned and enhanced to provide improved aquatic habitat conditions for fish species (**Section 9.1.2**).

Some HDFs that provide indirect fish habitat, including Redside Dace contributing habitat, are proposed for removal. The functions of these features will be replicated through Schaeffers' SWM strategy, as well as through a wetland compensation area. Any potential impacts to fish habitat will be mitigated through the measures discussed in **Section 8.2.1**.

9.2.1.2 Migratory Birds Convention Act, 1994

The federal *Migratory Birds Convention Act* prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. Tree removals should be undertaken outside of the core breeding period, which is approximately April 1 to August 31. In rare circumstances where this window cannot be avoided, a nest search is recommended, and a buffer will be marked off surrounding any active nests that must be maintained until activity in the nest has ceased. The *Migratory Birds Convention Act* applies at all times, even outside of the peak breeding period.

9.2.1.3 Federal Species at Risk Act (2002) and Provincial Endangered Species Act (2007)

Bank Swallow (federally and provincially listed) was observed foraging off-site, east of the Study Area over the north riparian Significant Wetland surrounding the Clarkway Drive Tributary; this habitat extends onto a small portion of the east end of the Study Area. No land use changes are proposed in these areas, and they are to be protected as part of the proposed NHS, with a 30 m Significant Wetland buffer.

SAR bats (federally and provincially listed) may be present within non-participating properties where appropriate woodland habitat exists; no land use changes are proposed in these areas, and they are to be protected as part of the proposed NHS with a 10m woodland buffer.

Redside Dace (federally and provincially listed) contributing habitat was identified in the Study Area for the Clarkway Drive Tributary, its riparian wetlands, as well as HDFs. The Clarkway Drive Tributary and associated wetlands will be protected within the NHS that includes feature buffers. Some of the HDFs are proposed for removal, replication, and enhancements, as described in **Section 8.2.2**.

For all future site-specific development, additional efforts may be required to demonstrate compliance with the *Species at Risk Act* and *Endangered Species Act*. It is anticipated that a 17(2)C Overall Benefit Permit will be required for the proposed removal and replication of HDFs that are Redside Dace contributing habitat.

9.2.1.4 Provincial Policy Statement (PPS, 2024)

The Provincial Policy Statement (2024) is the guiding document providing policy direction on matters of Provincial interest related to land use and development. Section 3(5) of the *Planning Act* requires that all decisions that affect planning matters be consistent with the PPS, which is issued under the Act. The following PPS features were identified and considered in the Study Area: Habitat for Threatened and Endangered Species (Section 8**.3**), Significant Wetlands (**Section 8.1.2**), Significant Woodlands (**Section 8.1.1**), SWH (**Section 8.1.3**) and Fish Habitat (**Section 8.2.1**). As described in these sections, provided the recommended mitigation, SWM strategy, and compensation are achieved, no negative impacts to these features are anticipated. The preliminary NHS is expected to meet the intent of the policies of the PPS.

It should be noted that the PPS has gone through a recent update. As of October 20th, 2024, the new 2024 Provincial Policy Statement is in effect.

9.2.1.5 Ontario Regulation 41/24: Prohibited Activities, Exemptions and Permits

O. Reg. 41/24 allows Conservation Authorities to implement Section 28 *Conservation Authorities Act, 1990* (amended 2024), which states under Section 28(1) that:

> 28 (1) *No person shall carry on the following activities, or permit another person to carry on the following activities, in the area of jurisdiction of an authority:*
>
> 1. *Activities to straighten, change, divert or interfere in any way with the existing channel of a river, creek, stream or watercourse or to change or interfere in any way with a wetland.*
> 2. *Development activities in areas that are within the authority's area of jurisdiction and are,*
>   *i. hazardous lands,*
>   *ii. wetlands,*
>   *iii. river or stream valleys the limits of which shall be determined in accordance with the regulations,*
>   *iv. areas that are adjacent or close to the shoreline of the Great Lakes-St. Lawrence River System or to an inland lake and that may be affected by flooding, erosion or dynamic beach hazards, such areas to be further determined or specified in accordance with the regulations, or v. other areas in which development should be prohibited or regulated, as may be determined by the regulations. 2017, c. 23, Sched. 4, s. 25.*

Pursuant to O. Reg. 41/24, any interference with or development in or on areas stated in the Conservation Authorities Act (e.g., hazardous lands, wetlands, river or stream valleys) requires permission from the Conservation Authority. The Conservation Authority may issue permits under Section 28.1 and may attach conditions on the permits per Section 9(1) of the Regulation.

The land use plan and post-development NHS will be in alignment with this regulation; no significant wetlands or watercourses will be impacted. Permits will be required from the Conservation Authority (TRCA) to facilitate the alteration and compensation of the regulated wetlands within the Study Area.

9.2.1.6 Region of Peel Official Plan (2022)

Region of Peel's OP (RPOP) outlines policies to guide growth and development in the Region. The Regional Greenlands System is based on natural heritage features and areas and the linkages among them.

As per Section 2.14 of the RPOP, development and site alteration is not permitted in Core Areas, however refinements to the Greenlands System may be permitted through an approved development plan as per Section 2.14.10. Greenland System features are shown in Schedule C-1 (”Greenlands System”) and Figure 7 (“Regional Greenlands System- Core Areas, Natural Areas and Corridors and Potential Natural Areas and Corridors”).

In general, it would be expected that any impact shall be mitigated through restoration and enhancement or compensation.

The Clarkway Drive Tributary, the northern woodlot and pond associated with HDF-3 are identified as part of the Greenlands System as per Schedule C-1 (“Greenlands System”).

Further, the Clarkway Drive Tributary is designated as Core Areas of the Greenlands System and Natural Areas and Corridors (NAC) while the northern woodlot is shown as NAC as per Figure 7 (“Regional Greenlands System- Core Areas, Natural Areas and Corridors and Potential Natural Areas and Corridors”). The northern portion of the Clarkway Drive Tributary and the pond associated with HDF-3 are identified as Potential Natural Areas and Corridors (PNAC).

Section 2.14.39(b) directs local municipalities to not permit development or site alteration within or adjacent to Natural Areas and Corridors and Potential Natural Areas and Corridors unless it is demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

These features have all been delineated and assessed by GEI through the CEISMP process. This CEISMP has evaluated the ecological form and functions of Core Areas, NACs, and PNACs and determined that all impacts will be mitigated such as buffering, erosion control, restoration and enhancement or compensation as outlined in this report.

9.2.1.7 Caledon Official Plan (2018)

To implement new secondary plans, an official plan amendment (OPA) is required to the Town of Caledon Official Plan. Secondary plans require a subwatershed study or comprehensive environmental impact study and management plan (CEISMP) prepared in accordance with an approved terms of reference.

The CEISMP should include a consideration of cumulative environmental impacts from existing and planned development and considerations that avoid or minimize impacts, strategies to meet environment targets and objectives to protect, improve, restore and enhance the natural environment system (Section 5.5.9.2).

This CEISMP has identified existing conditions within the Study Area and has evaluated the impacts of the proposed land use concept on the existing system while providing mitigative and enhancement opportunities to improve the overall NES.

Within the Study Area, the following features of the Town of Caledon's Ecosystem Framework for Environmental Protection Areas (EPAs) were identified:

Natural Core Areas:

- Significant Woodlands (Northwestern FOD community and FOD8-3 community);
- Significant Wetlands associated with Clarkway Drive Tributary (MAS2/MAM2, MAM2-2/MAM2-10, MAS2 and MAM2-2/MAM2-10, MAS2-1);
- Significant Wetlands (SWT2-2, SAS1-1);
- Candidate Habitats of Endangered Species (bat SAR; northwestern FOD community, southern FOD7-6 community);
- SWH:
  - Seasonal Concentration Areas of Animals (Candidate Bat Maternity Colonies within FOD habitats; Candidate Over-Wintering Turtle Habitat within pond in northwestern FOD community);
  - Specialized Wildlife Habitat (Candidate Seeps and Spring; Candidate Amphibian Breeding Habitat (Wetland) within pond associated with Humber Station Road); and
  - Species of Conservation Concern (Terrestrial Crayfish, Snapping Turtle, Eastern Wood Peewee, Monarch, and Yellow-banded Bumblebee).

Natural Corridors:

- Valley and Stream Corridor (Clarkway Drive Tributary).

Supporting Natural Systems:

- Other woodlands (southern FOD7-6 community); and
- All other wetlands.

Through this CEISMP, a fulsome impact assessment has been completed and determined that there are no negative impacts anticipated to the features listed above. Any impacts to features, including Woodland 2 (a core woodland area) and Terrestrial Crayfish SWH will be compensated for/replicated and enhanced in the post-development NHS.

Within the Natural Environment System, the Town of Caledon includes all Natural Core Areas and Natural Corridors as part of the Environmental Policy Area (EPA) designation. New development is generally prohibited within the EPA designation, except for the uses permitted in Section 5.7.3.12 which include the following:

> "The uses permitted in EPA shall be limited to: legally existing residential and agricultural uses; a building permit on a vacant existing lot of record; portions of new lots; activities permitted through approved Forest Management and Environmental Management Plans; limited extractive industrial; non-intensive recreation; and, essential infrastructure."

To support the modifications to the Core Woodland, the Humber Station Employment Area Secondary Plan policies have been refined to include the following provision:

> *7.16.7.3. The limits of wetlands, woodlands, and stream corridors within the Secondary Plan Area are established through the recommendations of the CEISMP and form the basis for the Environmental Policy Area designation. The recommendations of the CEISMP may include minor modifications (i.e. encroachment/removal and appropriate compensation) of Woodland Core Areas, which may be permitted through an approved Environmental Management Plan (in accordance with 5.7.3.1.2). Development and site alteration will not be permitted within this designation except as set out in the CEISMP.*

It is assumed that upon approval of the secondary plan policies submitted as part of the OPA for this Secondary Plan area, that the post-development NHS can proceed to include minor compensation and enhancement of the Core Areas, as addressed in this CEISMP and through the delivery of an EMP.

10. Conclusions and Recommendations

This Phase 2 CEISMP Analysis, Impact Assessment, and Mitigation report provides support to the Humber Station Employment Area Secondary Plan on a range of environmental and engineering matters. It outlines existing conditions relating to surface water, groundwater, terrestrial and aquatic resources, defines the preliminary NHS, and assesses and recommends stormwater management, site grading, water and wastewater servicing requirements. This Phase 2 CEISMP report also identifies potential impacts and mitigative measures, such as conceptual design requirements for stormwater management ponds, LID measures, site grading, management of headwater drainage features, wetland water balance, wetland and floodplain storage replication and other restoration/enhancement recommendations.

A detailed summary of Phase 2 CEISMP findings and conclusions is provided in the Executive Summary at the start of this report.

The next and final phase of the CEISMP (Phase 3) provides an implementation plan, monitoring plan, and adaptive management plan based on the findings from this Phase 2 report. Phase 3 focuses on providing a detailed restoration plan for the preliminary Natural Heritage System, including retained natural feature buffers, compensation feature (woodland, wetland, drainage channel realignment) design and stormwater management pond outfall design. NHS phasing considerations are addressed from a planning, ecology, geotechnical and engineering perspective for conformity with policies and best management practices by discipline. Finally, the Phase 3 CEISMP includes a comprehensive monitoring and adaptive management plan, from pre-development throughout construction and post-development until assumption.

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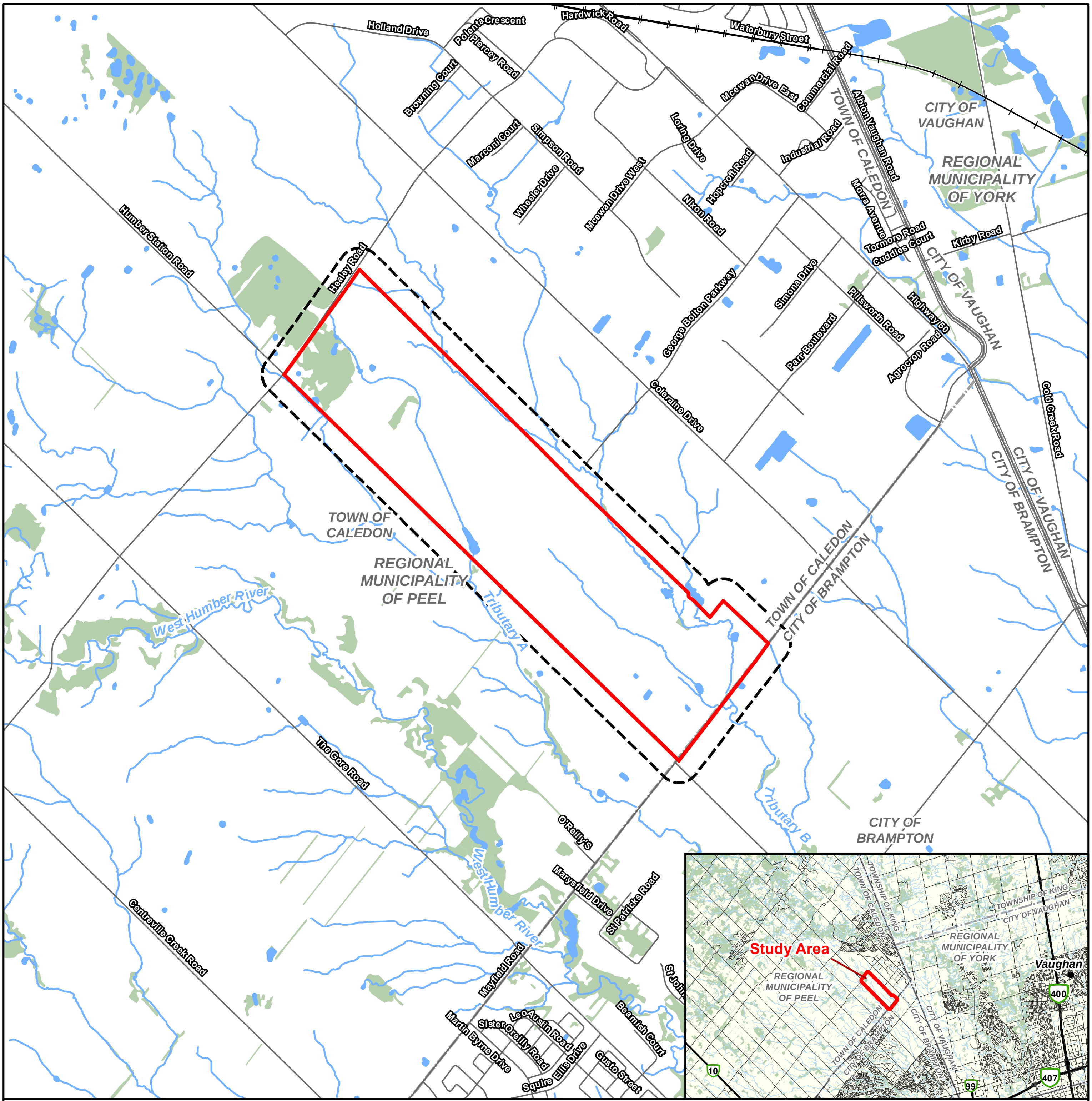
APPENDIX A

Figures



NOTES:

1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2024.

Legend

- 🟥 Study Area
- ▭ 120 m Adjacent Lands
- ┼ Railway
- ▭ Municipal Boundary, Lower/Single Tier
- ▭ Municipal Boundary, Upper Tier
- ─ Watercourse
- 🟦 Waterbody
- 🟩 Wooded Area

Project 1901485

Humber Station, Town of Caledon, ON

Figure 1.1
Location of Study Area

0 500 m

1:30,000

N

GEI Consultants

Path: \\bos-pzcc-1\data_storage\Working\HUMBER STATION VILLAGE LANDOWNERS GROUP INC\1901485 Humber Station Village Caledon CEISMP\05_GIS\figures\report_figures\2024-09 Phase 2 report\1901485_rpt_fig01.1_LocationOfStudyArea.mxd Date Saved: Thursday, September 12, 2024

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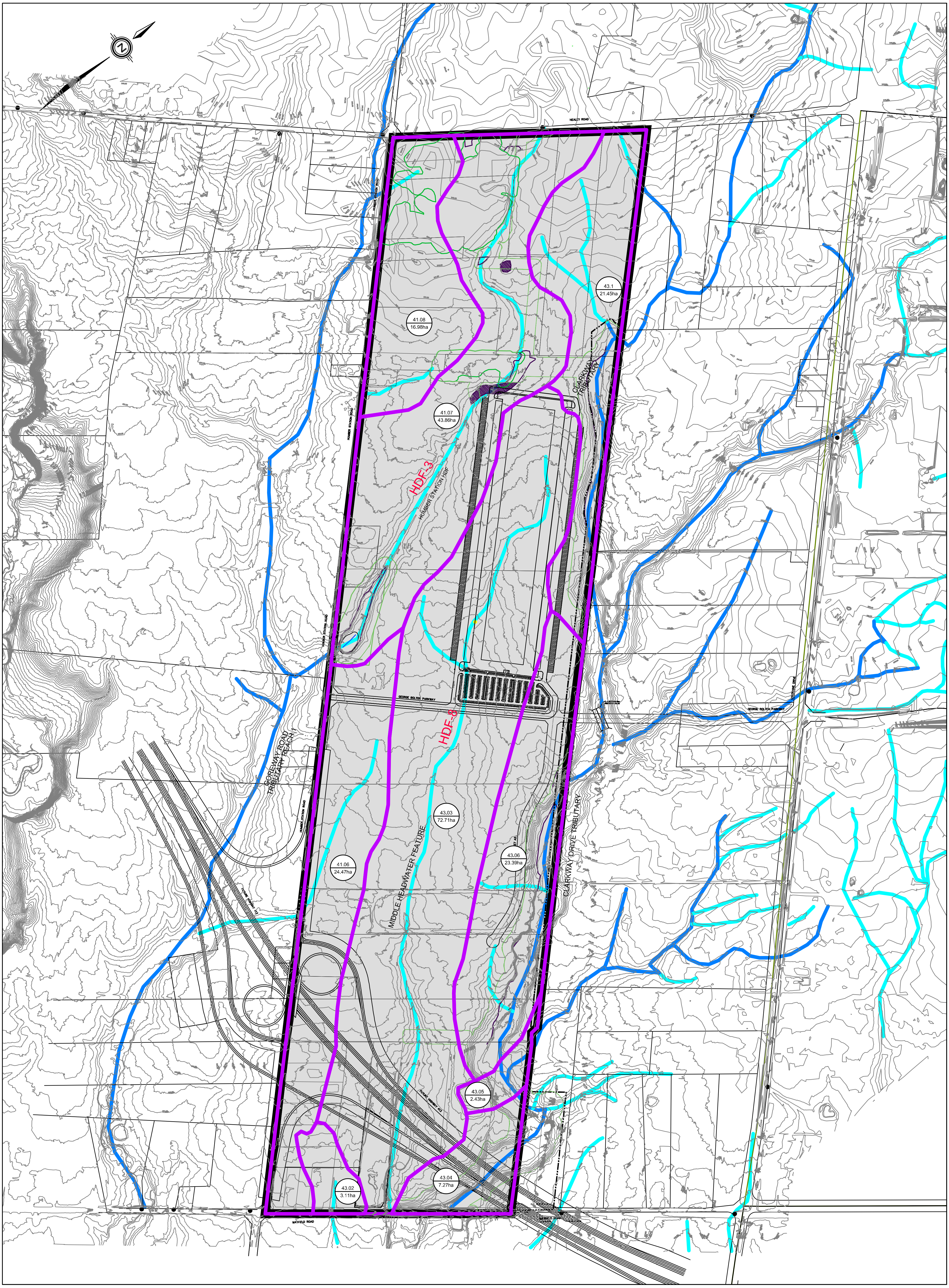
Phil Gotfried



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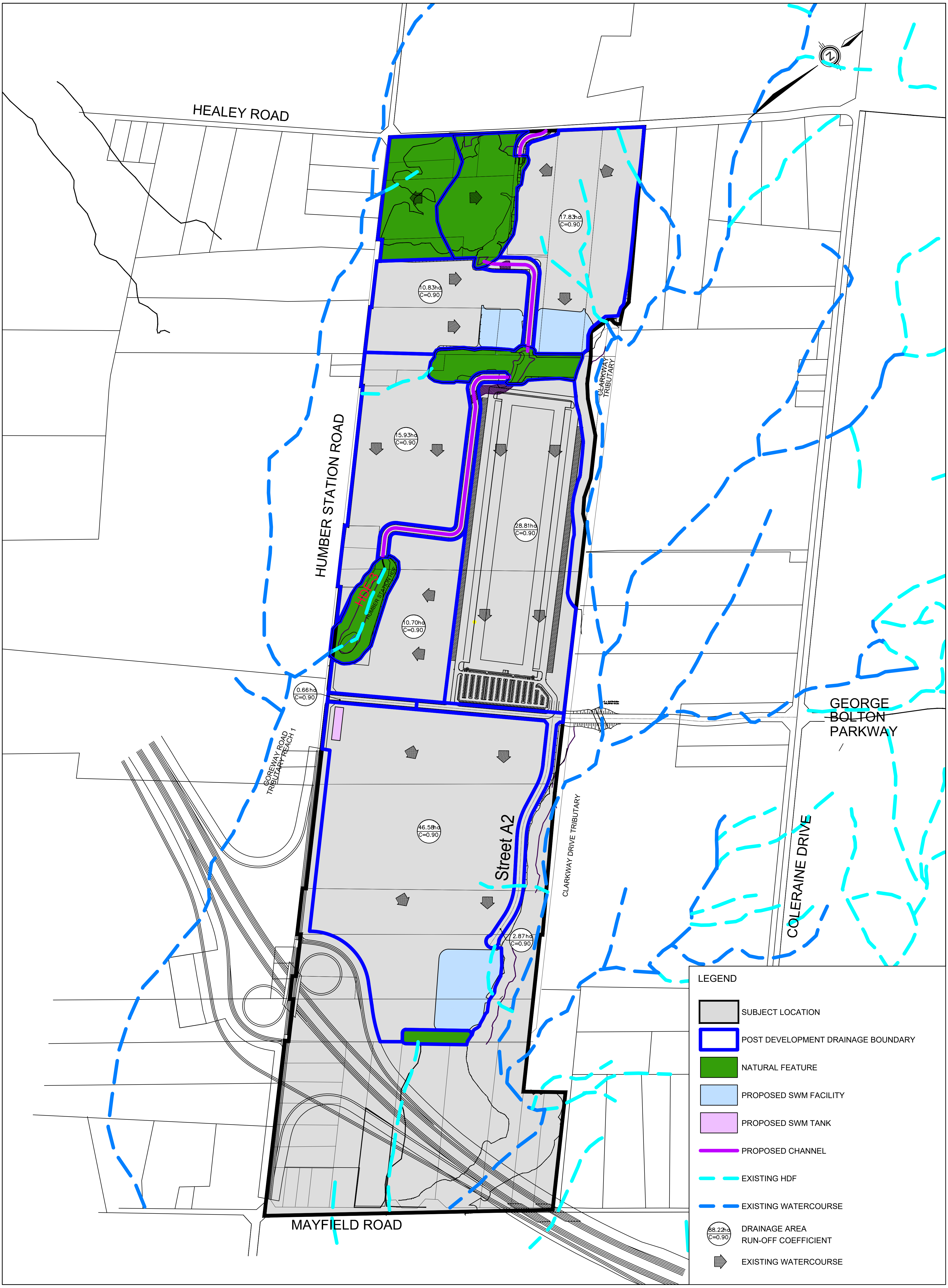
LEGEND

▨	SUBJECT LOCATION	━	WATERCOURSE
☐	PRE DEVELOPMENT DRAINAGE BOUNDARY	━	HDF
43.02 / 3.11ha	TRCA CATCHMENT ID TRCA AREA IN HECTARES		

FIGURE 3.1
PRE-DEVELOPMENT
DRAINAGE PLAN

2021-5139	SEPTEMBER 2024	SCALE: N.T.S.



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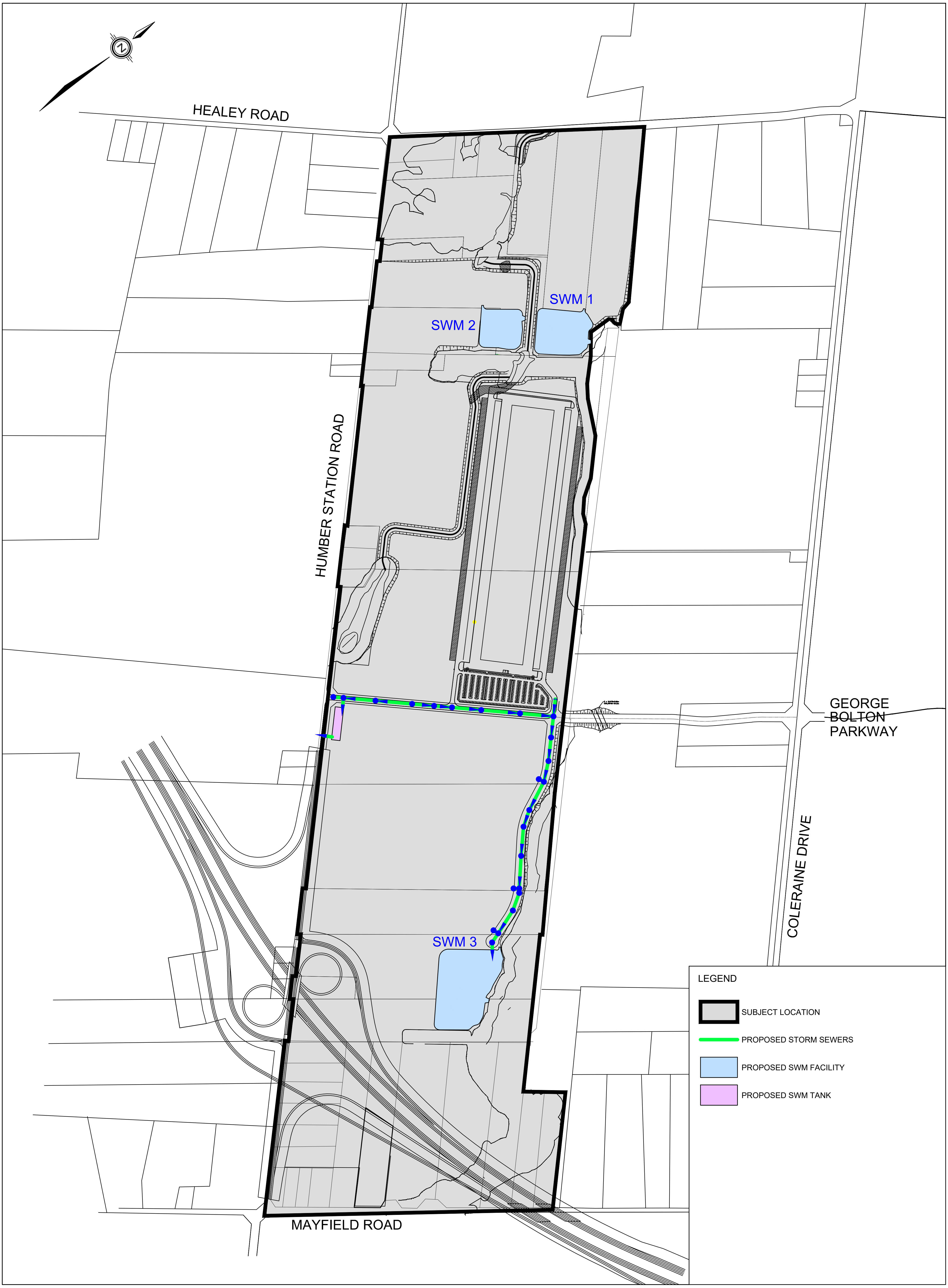
LEGEND
(SEE ABOVE)

FIGURE 3.2
POST-DEVELOPMENT
BOUNDARIES

2021-5139	SEPTEMBER 2024	SCALE: N.T.S.



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LEGEND
(SEE ABOVE)

FIGURE 3.3
POST DEVELOPMENT SERVICING

2021-5139 AUGUST 2024 SCALE: N.T.S.

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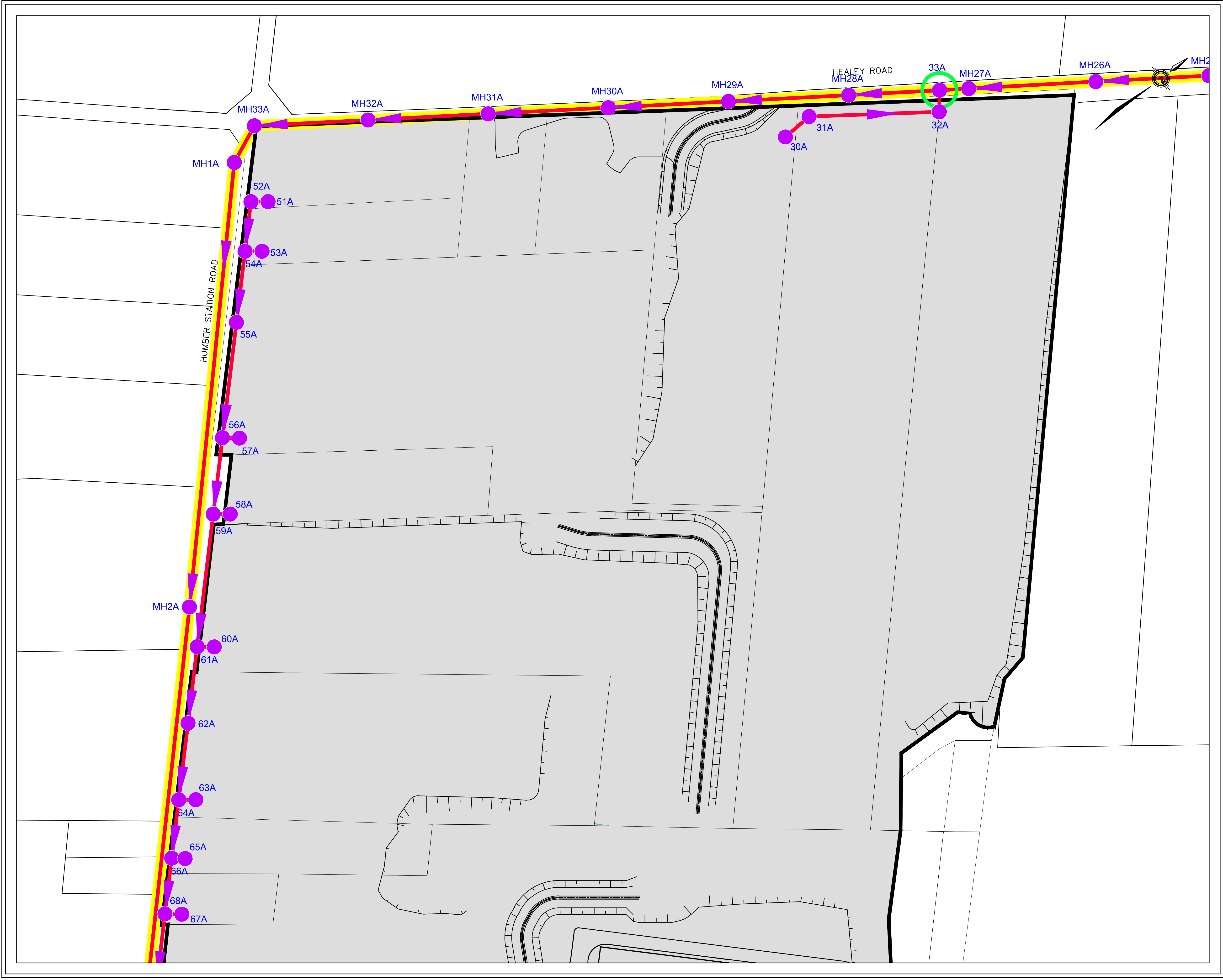

HUMBER STATION VILLAGES
TOWN OF CALEDON

LEGEND

▭ SUBJECT AREA

PROPOSED SANITARY SEWER

PROPOSED
REGIONAL TRUNK SEWER

MH29A ● PROPOSED
SANITARY MANHOLE & ID

○ CONNECTION POINT
FOR SERVICING

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FIGURE 3.4A
PROPOSED SANITARY SERVICING
(PART 1)

2022-5139 | SEPTEMBER 2024 | SCALE: N.T.S.

HUMBER STATION VILLAGES
TOWN OF CALEDON

LEGEND

▭ SUBJECT AREA

— PROPOSED SANITARY SEWER

— PROPOSED REGIONAL TRUNK SEWER

MH29A ● PROPOSED SANITARY MANHOLE & ID

○ CONNECTION POINT FOR SERVICING

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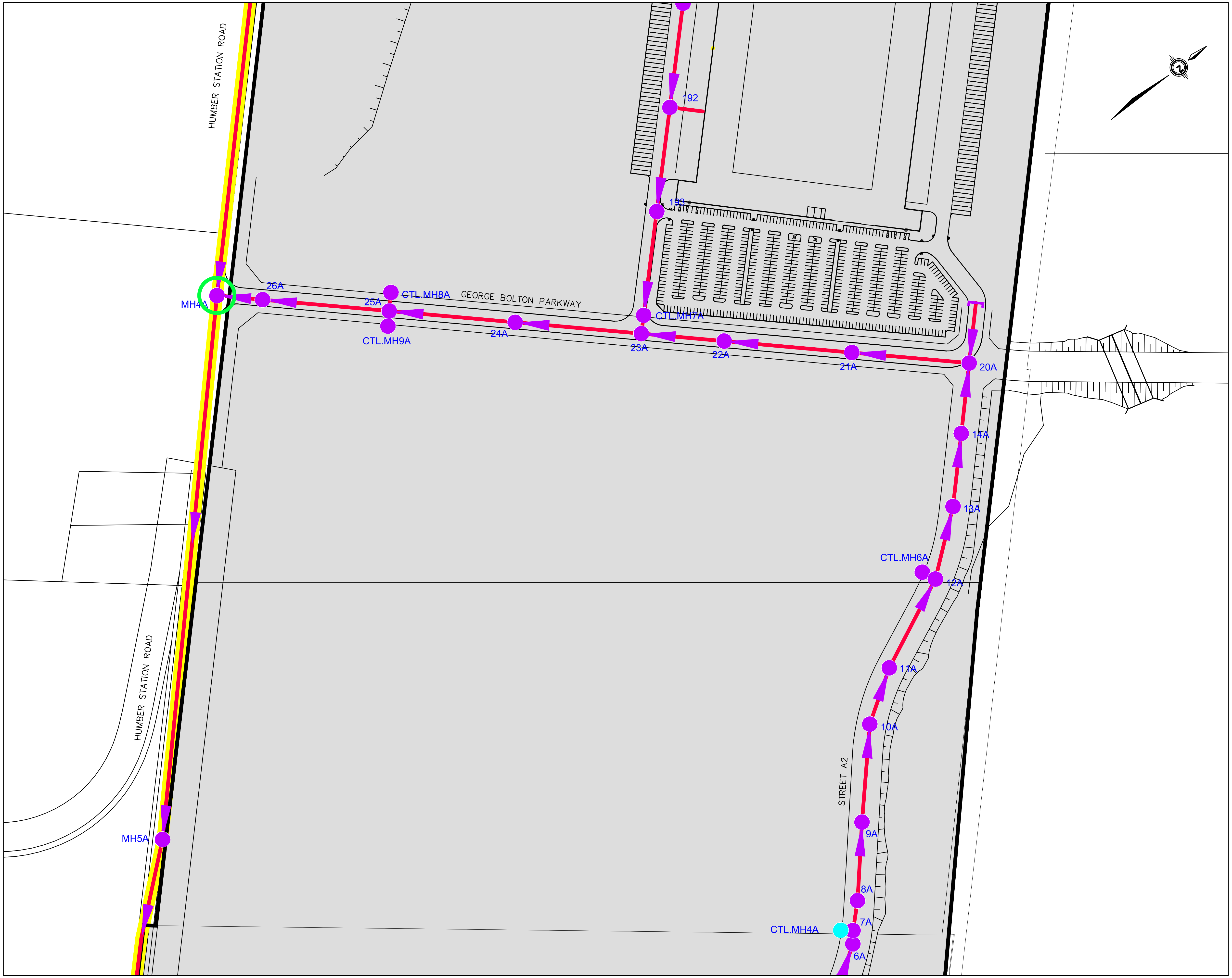
FIGURE 3.4B
PROPOSED SANITARY SERVICING
(PART 2)

2022-5139 | SEPTEMBER 2024 | SCALE: N.T.S.

HUMBER STATION VILLAGES
TOWN OF CALEDON



LEGEND

▭	SUBJECT AREA
—	PROPOSED SANITARY SEWER
—	PROPOSED REGIONAL TRUNK SEWER
MH29A ●	PROPOSED SANITARY MANHOLE & ID
○	CONNECTION POINT FOR SERVICING

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FIGURE 3.4C
PROPOSED SANITARY SERVICING
(PART 3)

2022-5139	SEPTEMBER 2024	SCALE: N.T.S.

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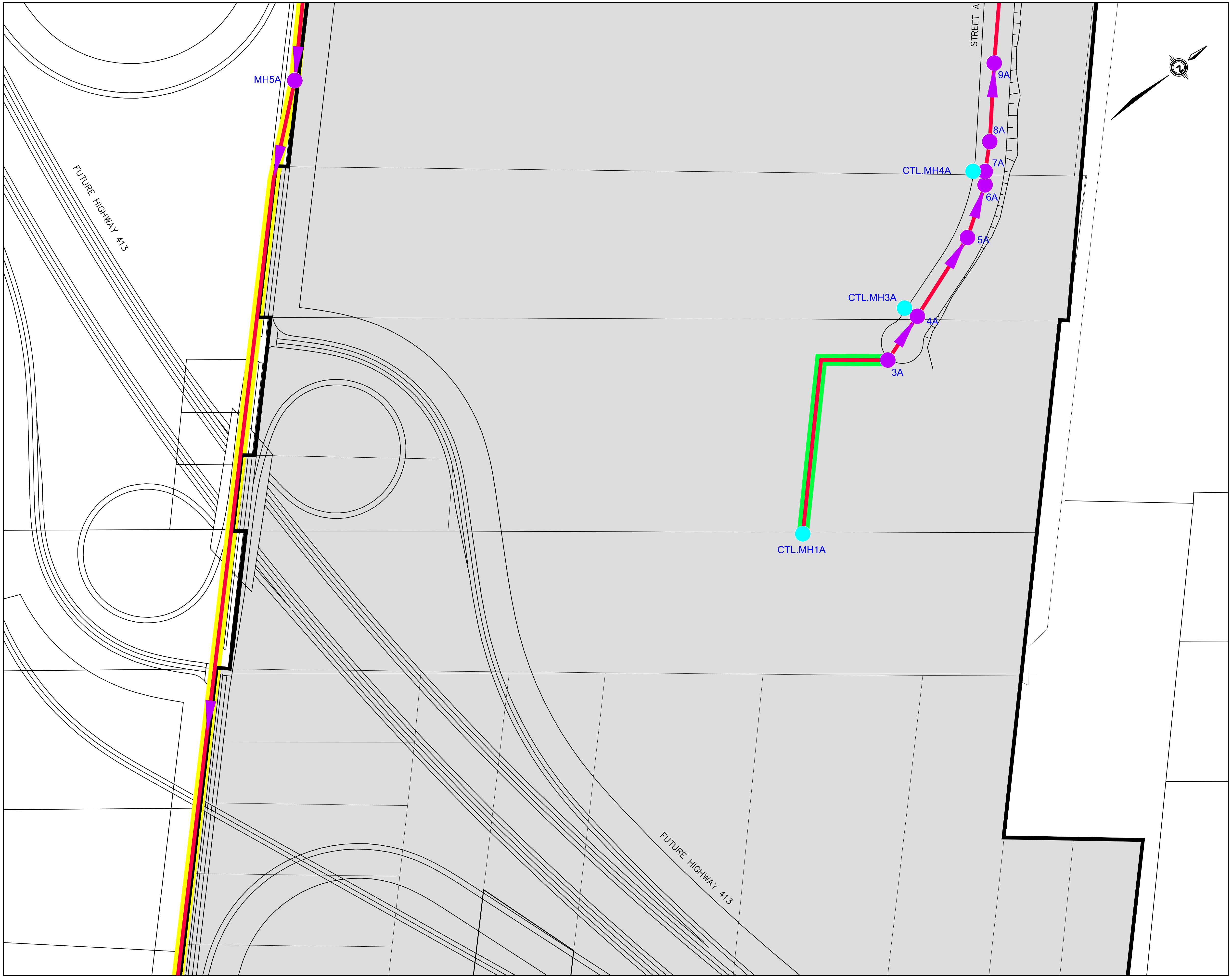
Phil Gotfried



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HUMBER STATION VILLAGES
TOWN OF CALEDON

LEGEND

▨	SUBJECT AREA
—	PROPOSED SANITARY SEWER
🟩	PROPOSED FORCEMAIN
🟨	PROPOSED REGIONAL TRUNK SEWER
MH29A ●	PROPOSED SANITARY MANHOLE & ID
○	CONNECTION POINT FOR SERVICING
●	PROPOSED GRINDER PUMP

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FIGURE 3.4D
PROPOSED SANITARY SERVICING
(PART 4)

2022-5139 | SEPTEMBER 2024 | SCALE: N.T.S.

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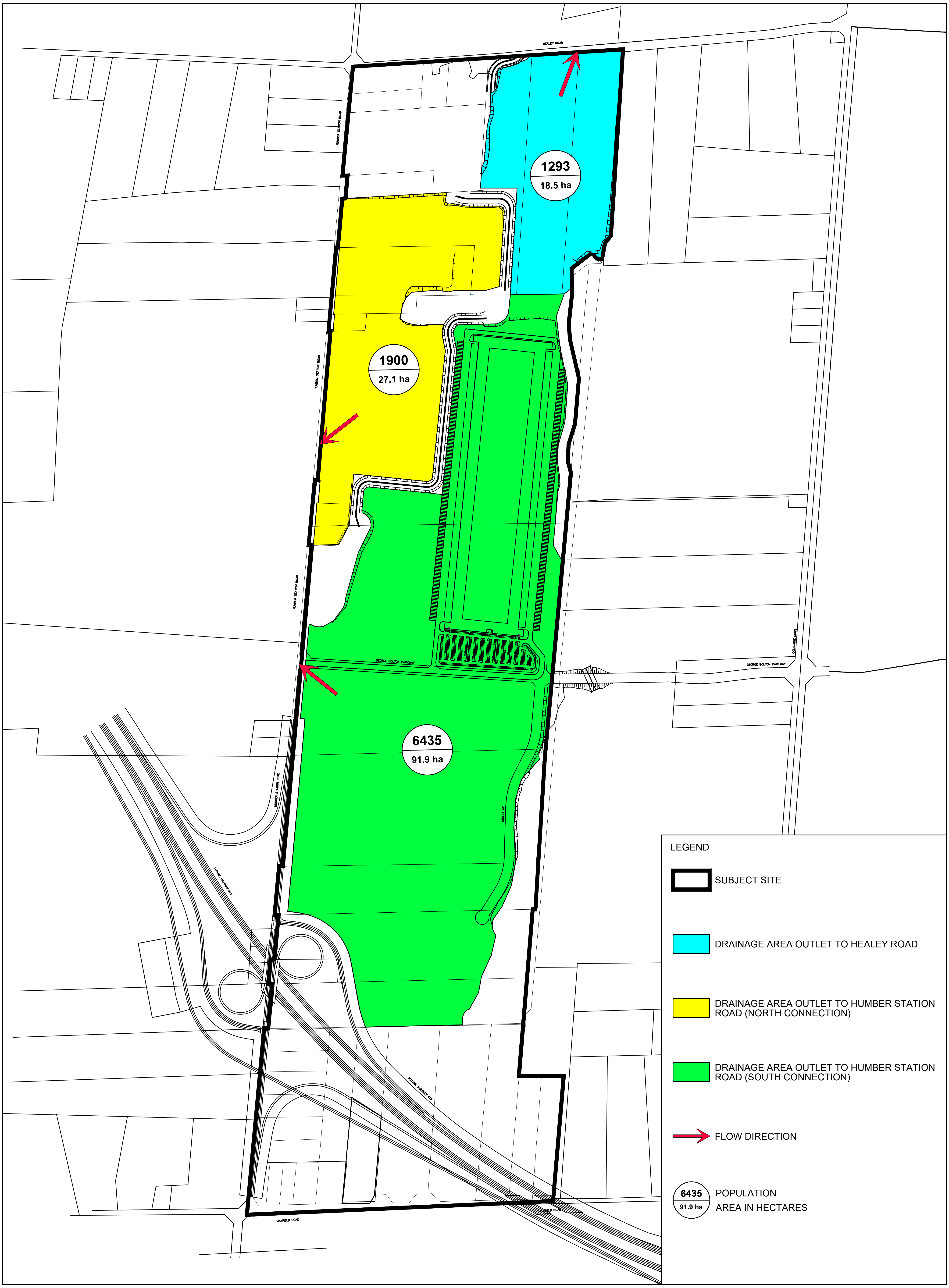

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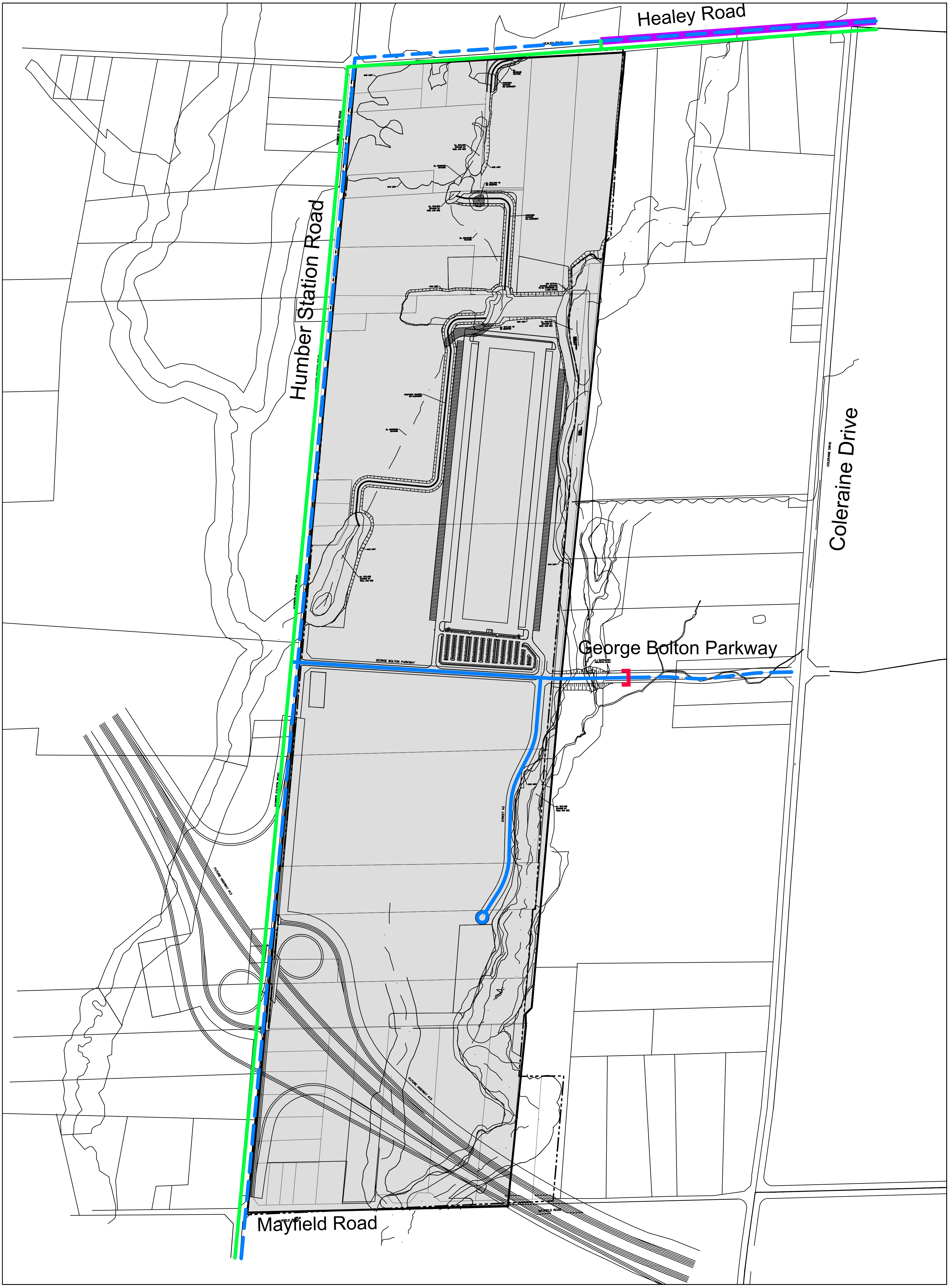
LEGEND
(AS SHOWN ABOVE)

FIGURE 3.5
PROPOSED
SANITARY DRAINAGE AREA PLAN

2022-5139	SEPTEMBER 2024	SCALE: N.T.S.



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TOWN OF CALEDON

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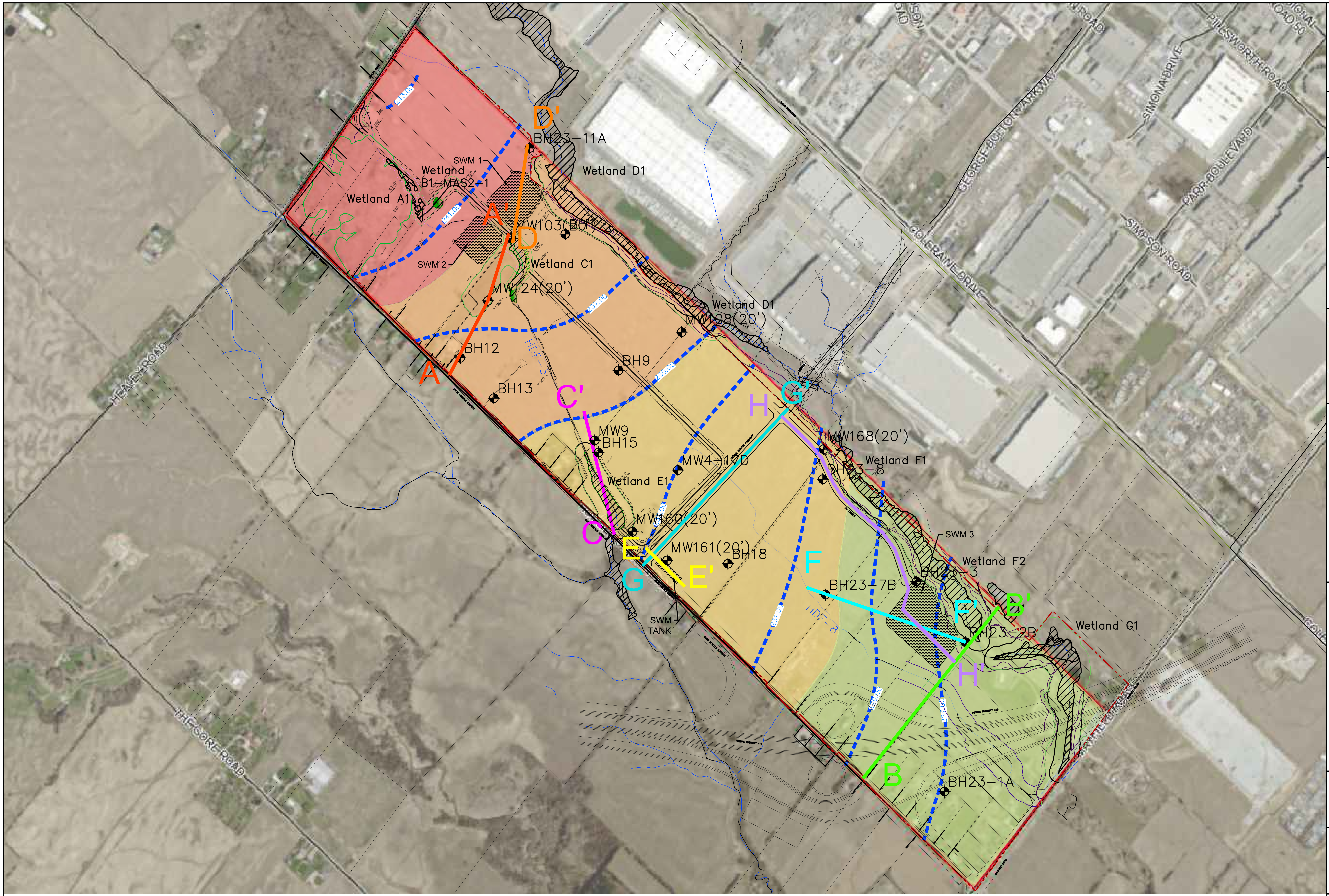
www.schaeffers.com

LEGEND
- ▨ SUBJECT AREA
- ━ PROPOSED WATERMAIN
- ━ PROPOSED UPGRADE WATERMAIN
- ━ EXPECTED REGIONAL WATERMAIN
- ╌ EXISITNG WATERMAIN

FIGURE 3.6
PROPOSED
WATER SUPPLY SERVICING

2022-5139	SEPTEMBER 2024	SCALE: N.T.S.



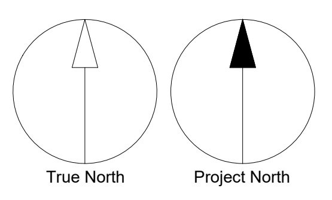
LEGEND:

- SOIL CROSS-SECTION ALIGNMENT A-A'
- SOIL CROSS-SECTION ALIGNMENT B-B'
- SOIL CROSS-SECTION ALIGNMENT C-C'
- SOIL CROSS-SECTION ALIGNMENT D-D'
- SOIL CROSS-SECTION ALIGNMENT E-E'
- SOIL CROSS-SECTION ALIGNMENT F-F'
- SOIL CROSS-SECTION ALIGNMENT G-G'
- SOIL CROSS-SECTION ALIGNMENT H-H'
- BH18 MONITORING WELL
- STUDY AREA
- ROADS
- WATERCOURSE
- 260.00 GROUNDWATER CONTOUR

GROUNDWATER LEVEL (masl):

- 🟥 240.00 - 245.00
- 🟧 235.00 - 240.00
- 🟨 230.00 - 235.00
- 🟩 225.00 - 230.00

▨ WETLAND



1:6000

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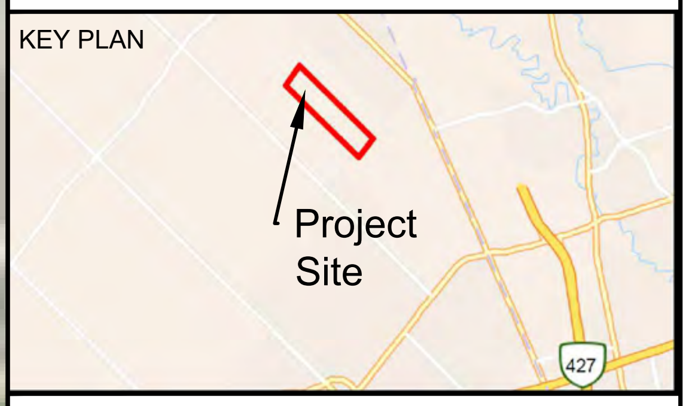

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Characterization / Existing
Condition & Baseline Inventory
Bolton, ON

PROJECT NO:
141438

DRAWN BY: NL
CHECKED BY: SD
PROJECT MGR: SD
APPROVED BY: SD

SHEET TITLE

CROSS-SECTION PLAN

SHEET NUMBER
Figure 6-1

ISSUE
1

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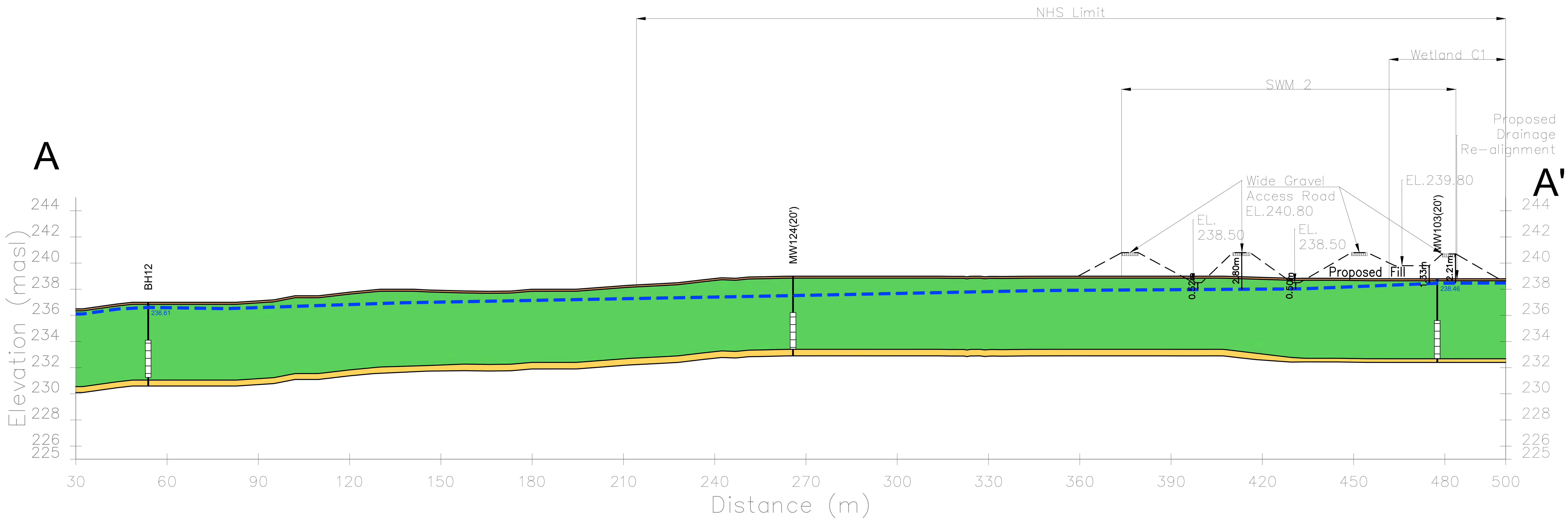
SCALE CHECK
1 in
10mm

CROSS-SECTION A–A'



LEGEND:

🟩 CLAY SILT TILL, SILT CLAY TILL, SILT TILL

🟩 SANDY SILT TILL, SILTY SAND TILL

🟦 SILT, CLAY SILT, SANDY SILT

▨ CLAY, SILT CLAY

🟫 TOPSOIL

⬜ FILL

🟨 SAND, SANDY SILT, SILTY SAND

264.13▽ — GROUNDWATER LEVEL

—— BOTTOM LEVEL OF PROPOSED FEATURES

— — — BOTTOM LEVEL OF PROJECTED PROPOSED FEATURES

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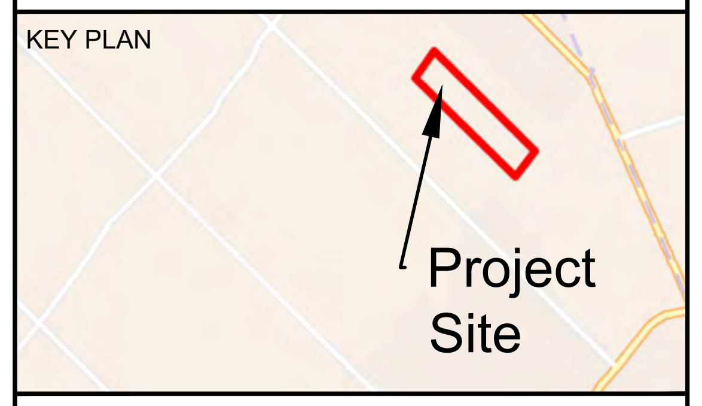

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CHECKED BY:
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PROJECT MGR:
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APPROVED BY:
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SHEET TITLE
CROSS-SECTION A-A'

SHEET NUMBER
Figure 6-2

ISSUE
1

SCALE CHECK
1 in
10mm

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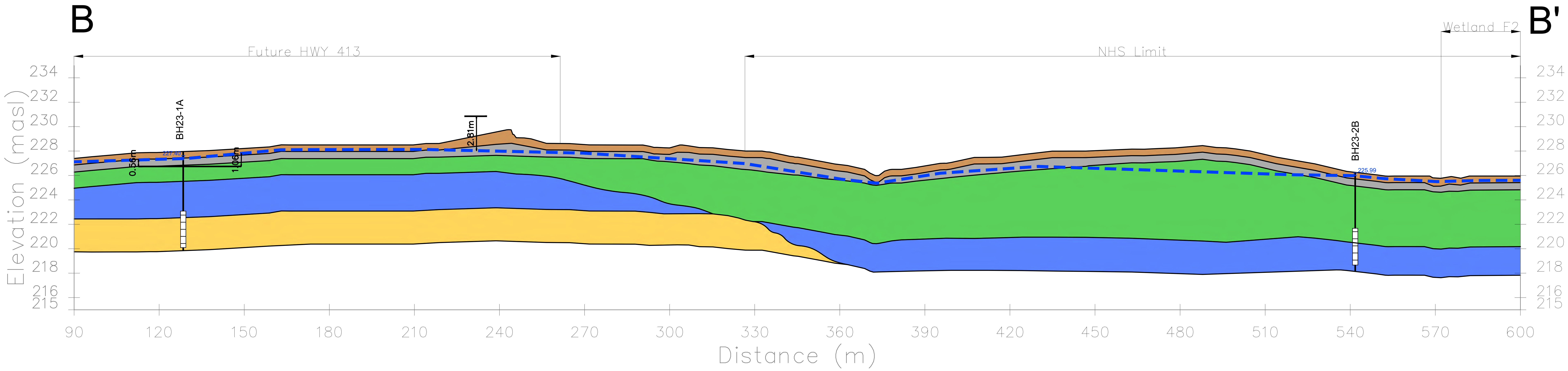
CROSS-SECTION B-B'



LEGEND:

🟩 CLAY SILT TILL, SILT CLAY TILL, SILT TILL

🟩 SANDY SILT TILL, SILTY SAND TILL

🟦 SILT, CLAY SILT, SANDY SILT

▨ CLAY, SILT CLAY

🟫 TOPSOIL

⬜ FILL

🟨 SAND, SANDY SILT, SILTY SAND

264.13 ▽ – – GROUNDWATER LEVEL

—— BOTTOM LEVEL OF PROPOSED FEATURES

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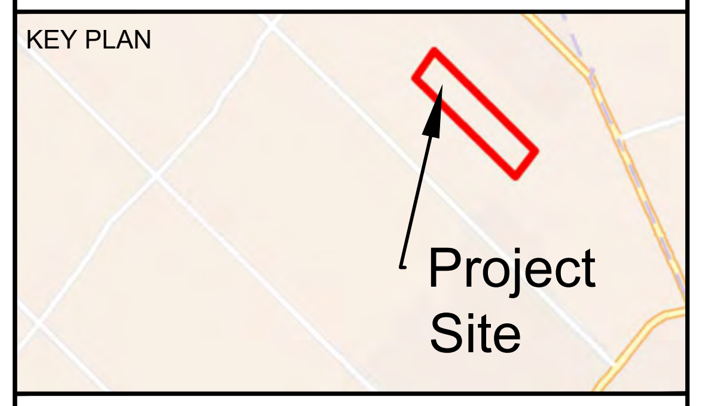

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PROJECT MGR: **SD**
APPROVED BY: **SD**

SHEET TITLE
CROSS-SECTION B-B'

SHEET NUMBER
Figure 6-3

ISSUE
1

SCALE CHECK
1 in
10mm

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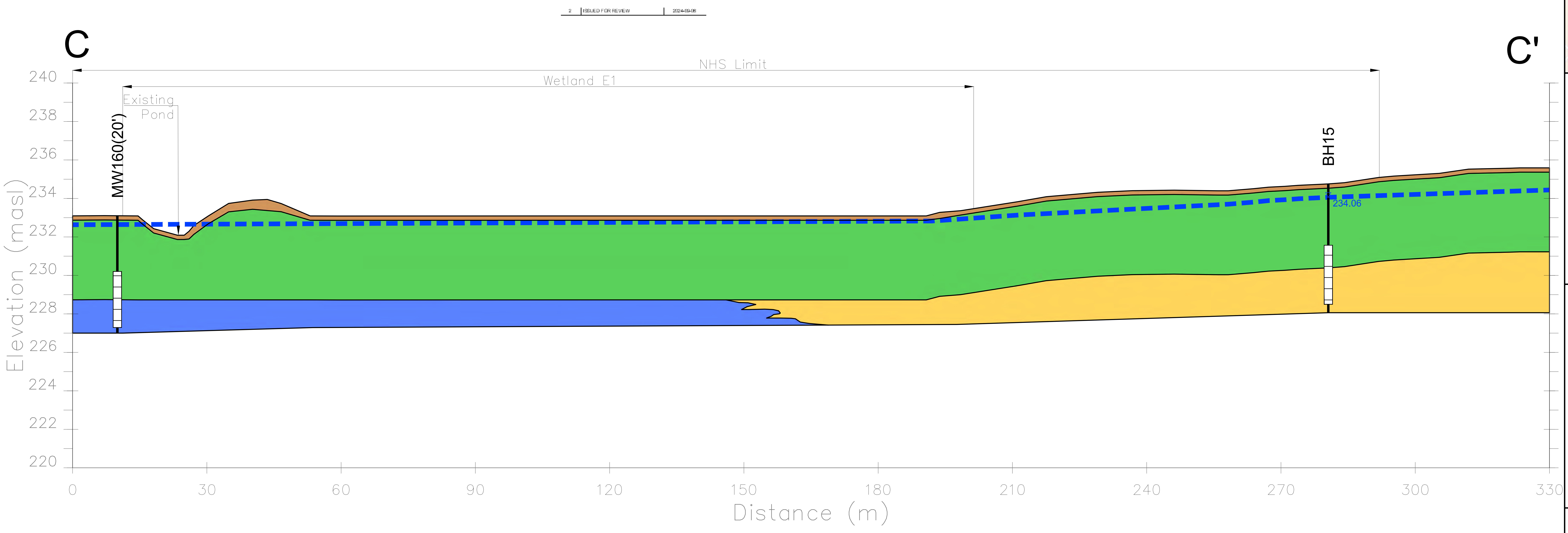
CROSS-SECTION C-C'



LEGEND:

🟩 CLAY SILT TILL, SILT CLAY TILL, SILT TILL

🟩 SANDY SILT TILL, SILTY SAND TILL

🟦 SILT, CLAY SILT, SANDY SILT

▨ CLAY, SILT CLAY

🟫 TOPSOIL

⬜ FILL

🟨 SAND, SANDY SILT, SILTY SAND

264.13▽ — — GROUNDWATER LEVEL

—— BOTTOM LEVEL OF PROPOSED FEATURES

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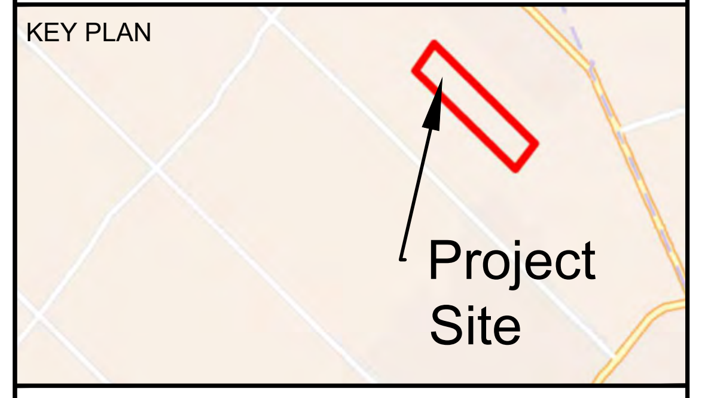

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PROJECT MGR: SD
APPROVED BY: SD

SHEET TITLE
CROSS-SECTION C-C'

SHEET NUMBER
Figure 6-4

ISSUE
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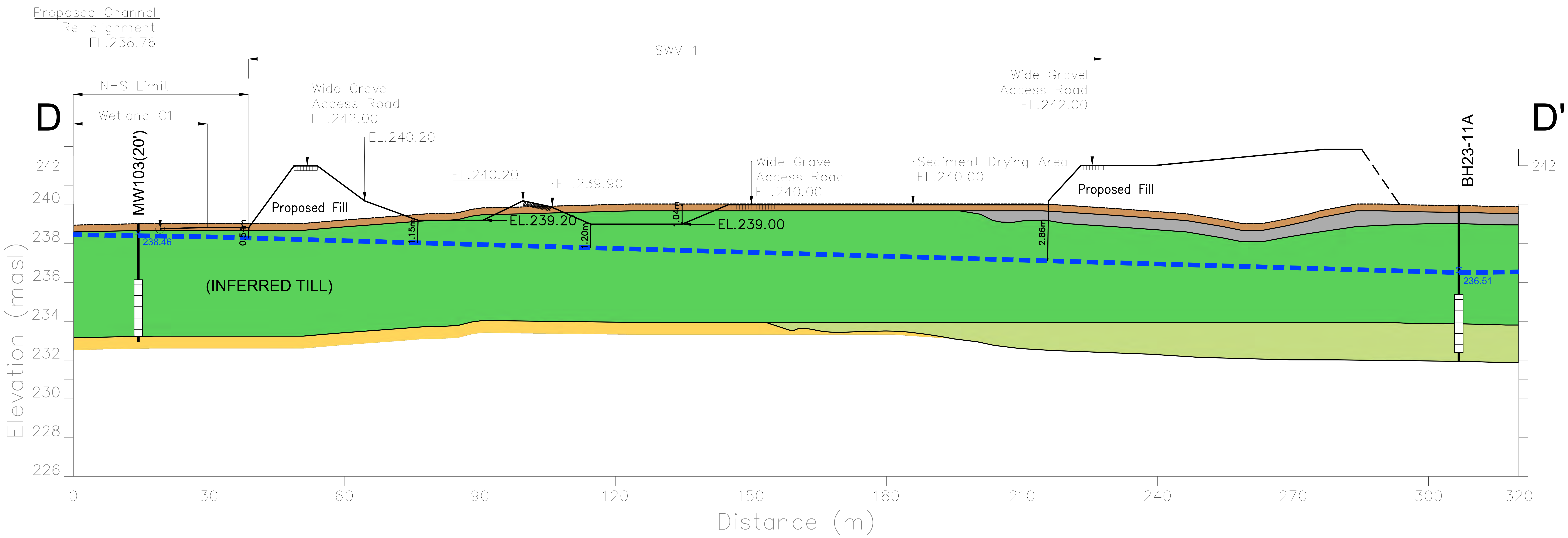
SCALE CHECK
1 in
10mm

CROSS-SECTION D–D'



LEGEND:

🟩 CLAY SILT TILL, SILT CLAY TILL, SILT TILL

🟩 SANDY SILT TILL, SILTY SAND TILL

🟦 SILT, CLAY SILT, SANDY SILT

▨ CLAY, SILT CLAY

🟫 TOPSOIL

⬜ FILL

🟨 SAND, SANDY SILT, SILTY SAND

264.13 ▽ — GROUNDWATER LEVEL

—— BOTTOM LEVEL OF PROPOSED FEATURES

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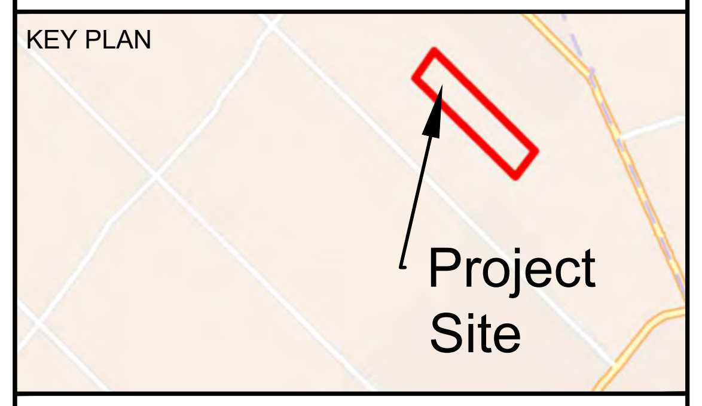

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SHEET TITLE
CROSS-SECTION D-D'

SHEET NUMBER
Figure 6-5

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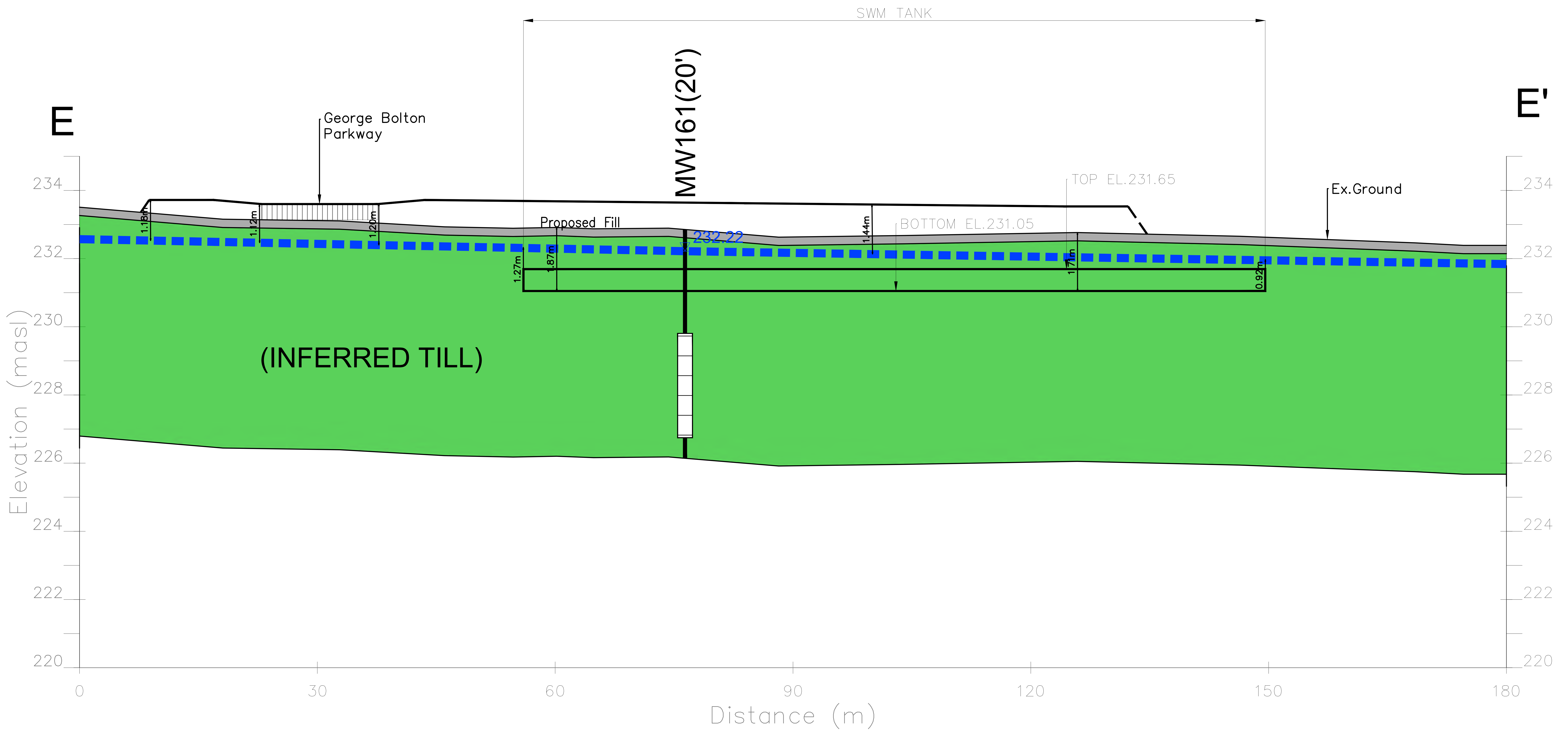
SCALE CHECK
1 in
10mm

CROSS-SECTION E-E'



LEGEND:

🟩	CLAY SILT TILL, SILT CLAY TILL, SILT TILL
🟩	SANDY SILT TILL, SILTY SAND TILL
🟦	SILT, CLAY SILT, SANDY SILT
▨	CLAY, SILT CLAY
🟫	TOPSOIL
⬜	FILL
🟨	SAND, SANDY SILT, SILTY SAND
264.13▽ —	GROUNDWATER LEVEL
—	BOTTOM LEVEL OF PROPOSED FEATURES

Note: Groundwater level at MW161 was based on manual measurements collected on July 24, 2024.

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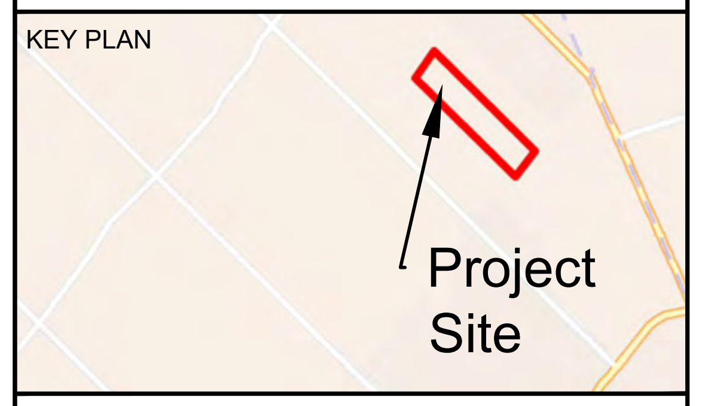

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PROJECT MGR: SD	APPROVED BY: SD

SHEET TITLE
CROSS-SECTION E-E'

SHEET NUMBER
Figure 6-6

ISSUE
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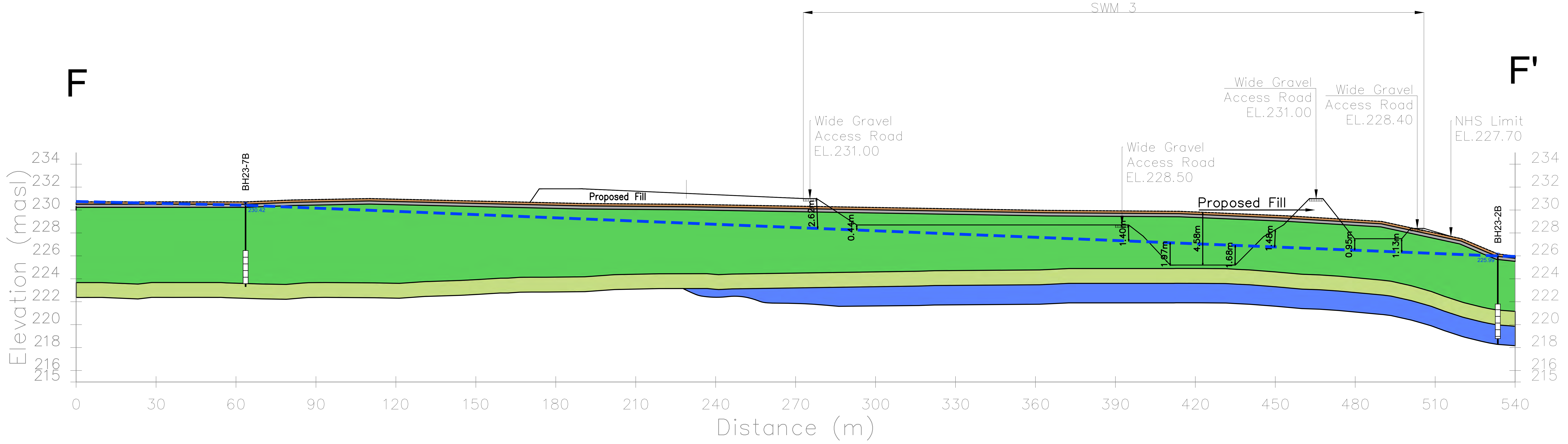
SCALE CHECK 1 in 10mm

CROSS-SECTION F–F'



LEGEND:

- 🟩 CLAY SILT TILL, SILT CLAY TILL, SILT TILL
- 🟩 SANDY SILT TILL, SILTY SAND TILL
- 🟦 SILT, CLAY SILT, SANDY SILT
- ▨ CLAY, SILT CLAY
- 🟫 TOPSOIL
- ⬜ FILL
- 🟨 SAND, SANDY SILT, SILTY SAND
- 264.13 ▽ – – GROUNDWATER LEVEL
- —— BOTTOM LEVEL OF PROPOSED FEATURES

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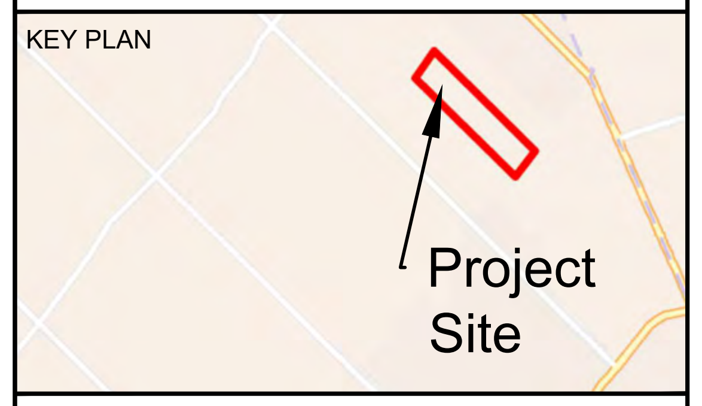

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Bolton, ON

PROJECT NO:
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DRAWN BY:
NL

CHECKED BY:
SD

PROJECT MGR:
SD

APPROVED BY:
SD

SHEET TITLE
CROSS-SECTION F-F'

SHEET NUMBER
Figure 6-7

ISSUE
1

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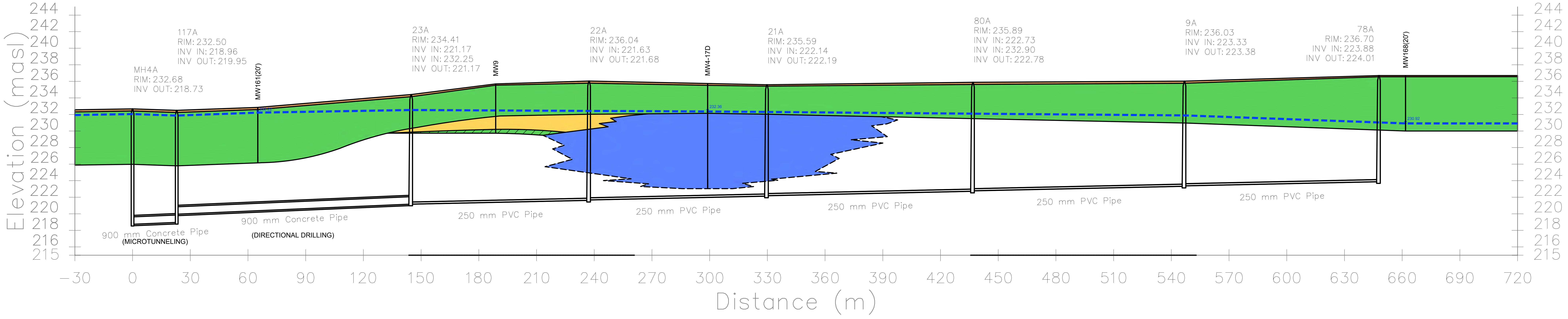
SCALE CHECK
1 in
10mm

CROSS-SECTION G–G'



LEGEND:

🟩 CLAY SILT TILL, SILT CLAY TILL, SILT TILL

🟩 SANDY SILT TILL, SILTY SAND TILL

🟦 SILT, CLAY SILT, SANDY SILT

▨ CLAY, SILT CLAY

🟫 TOPSOIL

⬜ FILL

🟨 SAND, SANDY SILT, SILTY SAND

264.13▽ - - - GROUNDWATER LEVEL

═ SANITARY SEWER PIPE (SECTION VIEW)

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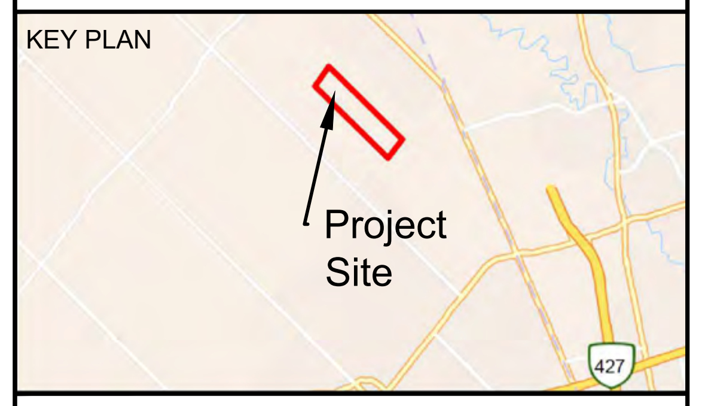

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PROJECT NO:
141438

DRAWN BY:
NL

CHECKED BY:
SD

PROJECT MGR:
SD

APPROVED BY:
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SHEET TITLE

SANITARY SEWER
CROSS-SECTION G-G'

SHEET NUMBER
Figure 6-8

ISSUE
1

SCALE CHECK
1 in
10mm

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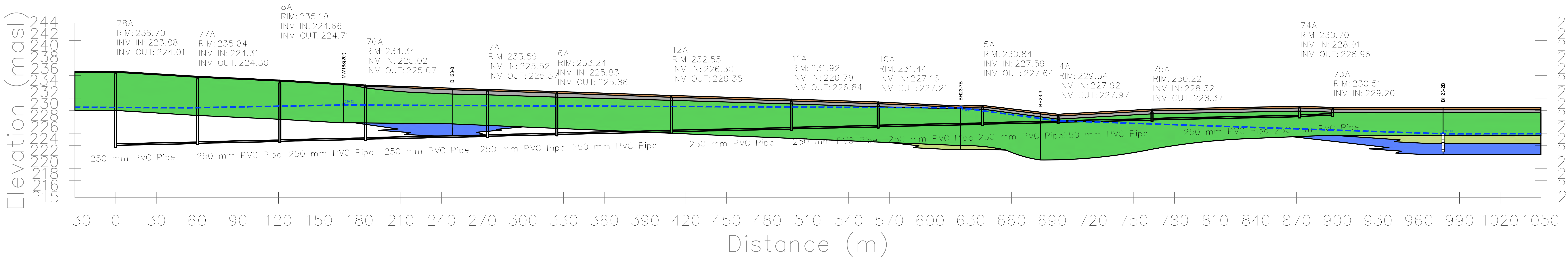
CROSS-SECTION H-H'



LEGEND:

🟩 CLAY SILT TILL, SILT CLAY TILL, SILT TILL

🟩 SANDY SILT TILL, SILTY SAND TILL

🟦 SILT, CLAY SILT, SANDY SILT

▨ CLAY, SILT CLAY

🟫 TOPSOIL

⬜ FILL

🟨 SAND, SANDY SILT, SILTY SAND

264.13▽ – – GROUNDWATER LEVEL

═ SANITARY SEWER PIPE (SECTION VIEW)

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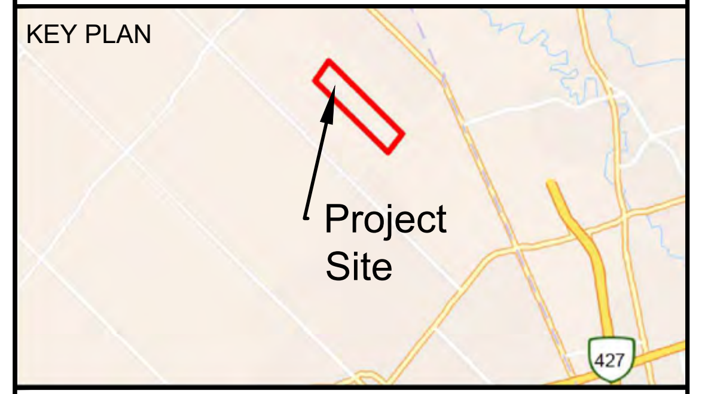
KEY PLAN



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Characterization / Existing
Condition & Baseline Inventory
Bolton, ON

PROJECT NO:
141438

DRAWN BY:
NL

CHECKED BY:
SD

PROJECT MGR:
SD

APPROVED BY:
SD

SHEET TITLE

SANITARY SEWER
CROSS-SECTION H-H'

SHEET NUMBER
Figure 6-9

ISSUE
1

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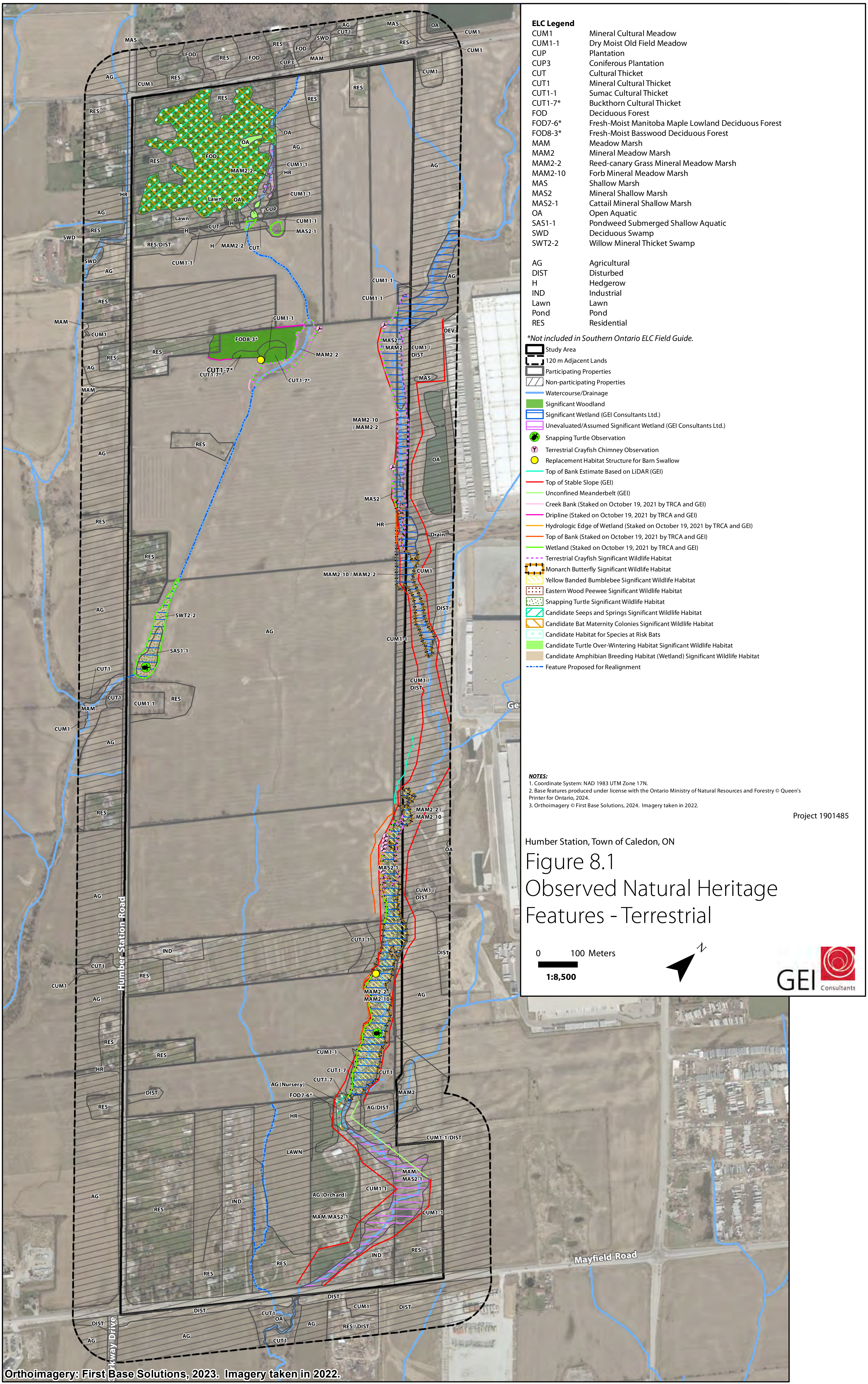
SCALE CHECK
1 in
10mm



Orthoimagery: First Base Solutions, 2023. Imagery taken in 2022.

ELC Legend

CUM1	Mineral Cultural Meadow
CUM1-1	Dry Moist Old Field Meadow
CUP	Plantation
CUP3	Coniferous Plantation
CUT	Cultural Thicket
CUT1	Mineral Cultural Thicket
CUT1-1	Sumac Cultural Thicket
CUT1-7*	Buckthorn Cultural Thicket
FOD	Deciduous Forest
FOD7-6*	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FOD8-3*	Fresh-Moist Basswood Deciduous Forest
MAM	Meadow Marsh
MAM2	Mineral Meadow Marsh
MAM2-2	Reed-canary Grass Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAS	Shallow Marsh
MAS2	Mineral Shallow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
OA	Open Aquatic
SAS1-1	Pondweed Submerged Shallow Aquatic
SWD	Deciduous Swamp
SWT2-2	Willow Mineral Thicket Swamp
AG	Agricultural
DIST	Disturbed
H	Hedgerow
IND	Industrial
Lawn	Lawn
Pond	Pond
RES	Residential

**Not included in Southern Ontario ELC Field Guide.*

- ▭ Study Area
- ▭ 120 m Adjacent Lands
- ▭ Participating Properties
- ▨ Non-participating Properties
- — Watercourse/Drainage
- 🟩 Significant Woodland
- ▨ Significant Wetland (GEI Consultants Ltd.)
- ▨ Unevaluated/Assumed Significant Wetland (GEI Consultants Ltd.)
- ● Snapping Turtle Observation
- ● Terrestrial Crayfish Chimney Observation
- ● Replacement Habitat Structure for Barn Swallow
- — Top of Bank Estimate Based on LiDAR (GEI)
- — Top of Stable Slope (GEI)
- — Unconfined Meanderbelt (GEI)
- — Creek Bank (Staked on October 19, 2021 by TRCA and GEI)
- — Dripline (Staked on October 19, 2021 by TRCA and GEI)
- — Hydrologic Edge of Wetland (Staked on October 19, 2021 by TRCA and GEI)
- — Top of Bank (Staked on October 19, 2021 by TRCA and GEI)
- — Wetland (Staked on October 19, 2021 by TRCA and GEI)
- ┅ Terrestrial Crayfish Significant Wildlife Habitat
- ▨ Monarch Butterfly Significant Wildlife Habitat
- ▨ Yellow Banded Bumblebee Significant Wildlife Habitat
- ▨ Eastern Wood Peewee Significant Wildlife Habitat
- ▨ Snapping Turtle Significant Wildlife Habitat
- ▨ Candidate Seeps and Springs Significant Wildlife Habitat
- ▨ Candidate Bat Maternity Colonies Significant Wildlife Habitat
- ▨ Candidate Habitat for Species at Risk Bats
- 🟩 Candidate Turtle Over-Wintering Habitat Significant Wildlife Habitat
- ▨ Candidate Amphibian Breeding Habitat (Wetland) Significant Wildlife Habitat
- ┅ Feature Proposed for Realignment

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2024.
3. Orthoimagery © First Base Solutions, 2024. Imagery taken in 2022.

Project 1901485

Humber Station, Town of Caledon, ON

Figure 8.1 Observed Natural Heritage Features - Terrestrial

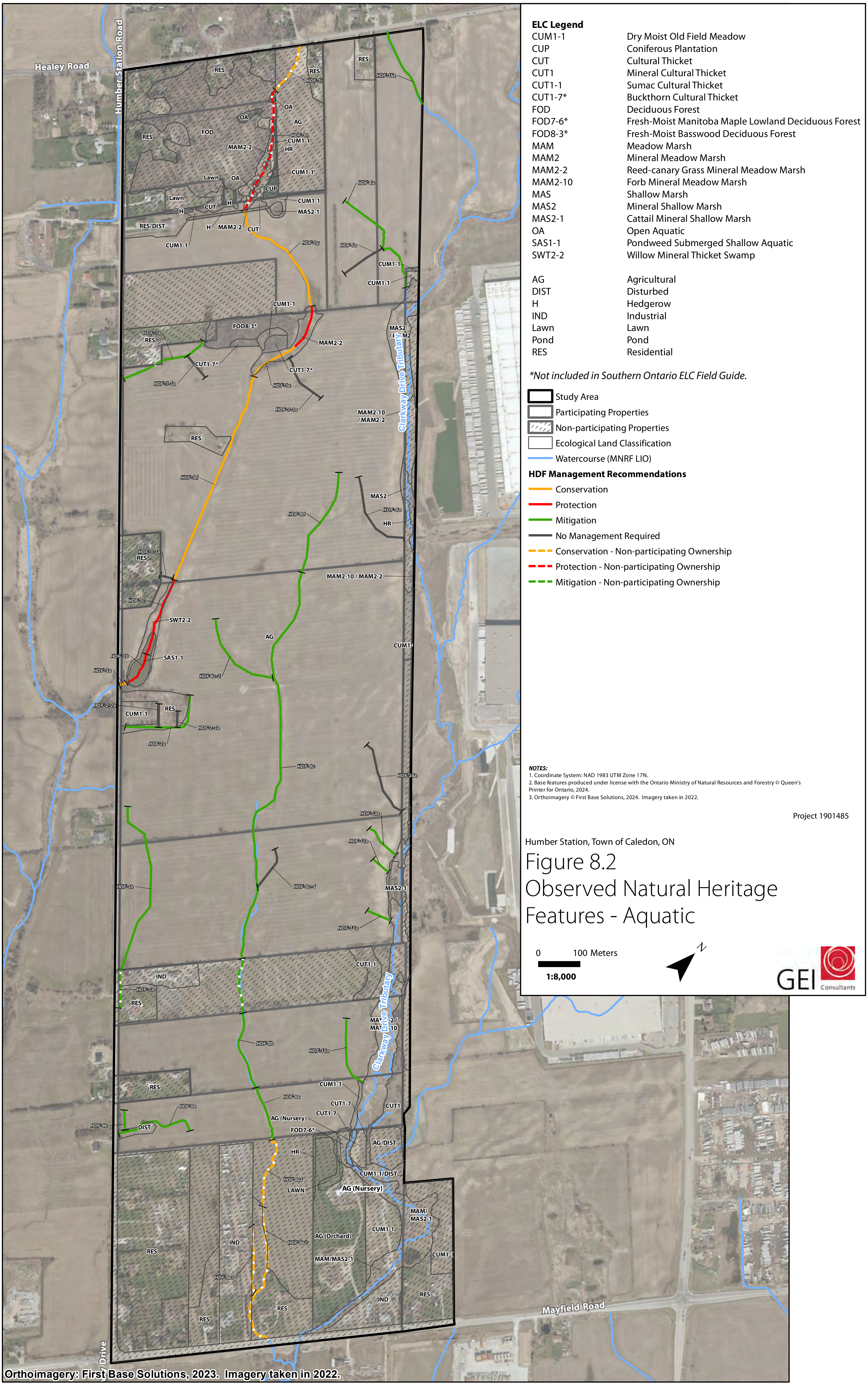
0 100 Meters

1:8,500

N

GEI Consultants

Path: \\bos-pzcc-1\Data_Storage\Working\HUMBER STATION VILLAGE LANDOWNERS GROUP INC\1901485 Humber Station Village Caledon CEISMP\05_GIS\figures\report_figures\2024-09 Phase 2 report\1901485_rpt_fig8.1_observed_nhf_terrestrial.mxd REVISED: Wednesday, October 30, 2024



Orthoimagery: First Base Solutions, 2023. Imagery taken in 2022.

ELC Legend

CUM1-1	Dry Moist Old Field Meadow
CUP	Coniferous Plantation
CUT	Cultural Thicket
CUT1	Mineral Cultural Thicket
CUT1-1	Sumac Cultural Thicket
CUT1-7*	Buckthorn Cultural Thicket
FOD	Deciduous Forest
FOD7-6*	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FOD8-3*	Fresh-Moist Basswood Deciduous Forest
MAM	Meadow Marsh
MAM2	Mineral Meadow Marsh
MAM2-2	Reed-canary Grass Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAS	Shallow Marsh
MAS2	Mineral Shallow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
OA	Open Aquatic
SAS1-1	Pondweed Submerged Shallow Aquatic
SWT2-2	Willow Mineral Thicket Swamp
AG	Agricultural
DIST	Disturbed
H	Hedgerow
IND	Industrial
Lawn	Lawn
Pond	Pond
RES	Residential

**Not included in Southern Ontario ELC Field Guide.*

- Study Area
- Participating Properties
- Non-participating Properties
- Ecological Land Classification
- Watercourse (MNRF LIO)

HDF Management Recommendations

- Conservation
- Protection
- Mitigation
- No Management Required
- Conservation - Non-participating Ownership
- Protection - Non-participating Ownership
- Mitigation - Non-participating Ownership

NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
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Humber Station, Town of Caledon, ON

Figure 8.2
Observed Natural Heritage Features - Aquatic

GEI Consultants

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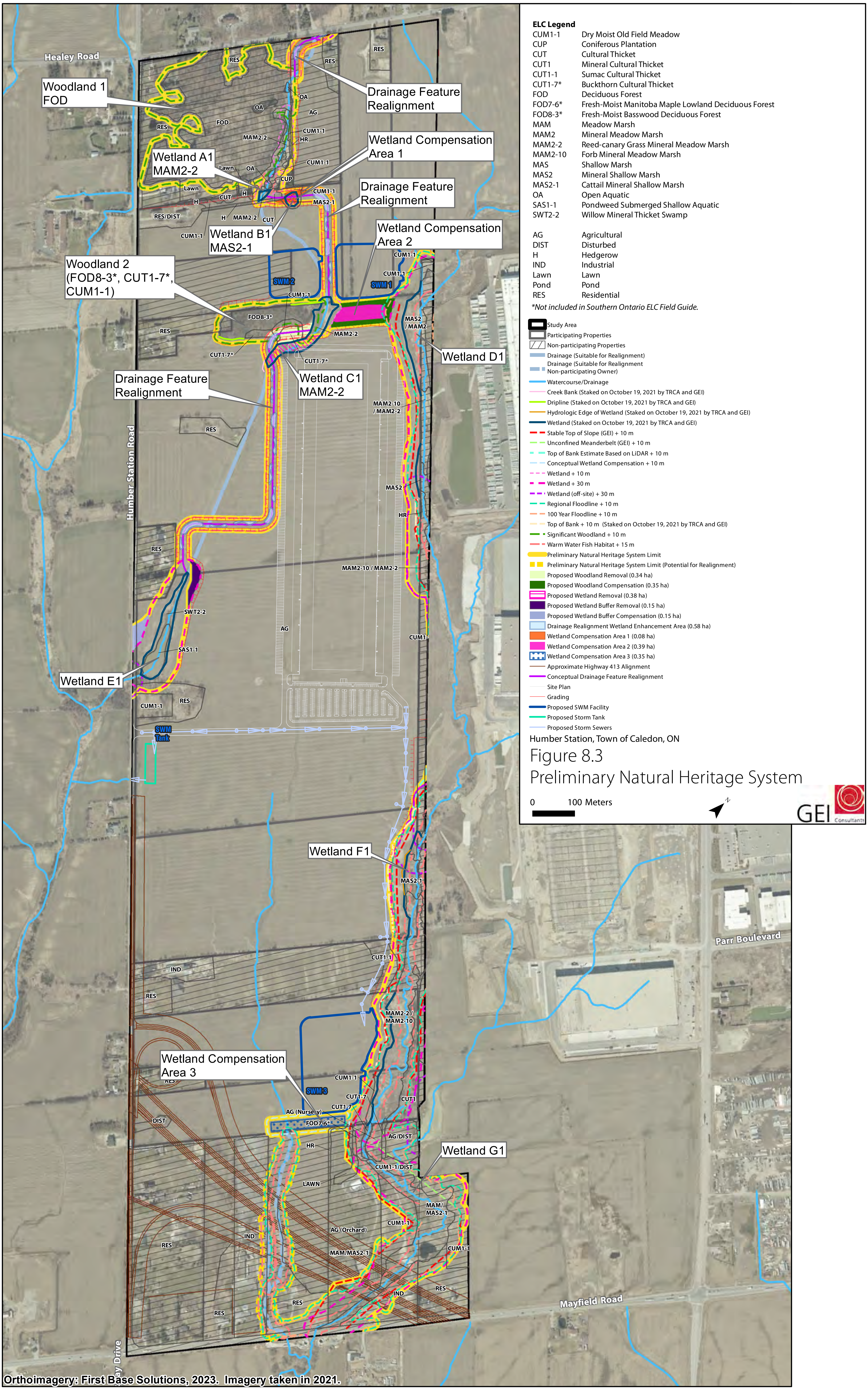

Humber Station, Town of Caledon, ON

Figure 8.3
Preliminary Natural Heritage System

Orthoimagery: First Base Solutions, 2023. Imagery taken in 2021.

Path: \\bos-pzcc-1\Data_Storage\Working\HUMBER STATION VILLAGE LANDOWNERS GROUP INC\1901485 Humber Station Village Caledon CEISMP\05_GIS\figures\report_figures\2024-09 Phase 2 report\1901485_rpt_fig8.3_preliminary_natural_heritage_system.mxd REVISED: Wednesday, October 30, 2024

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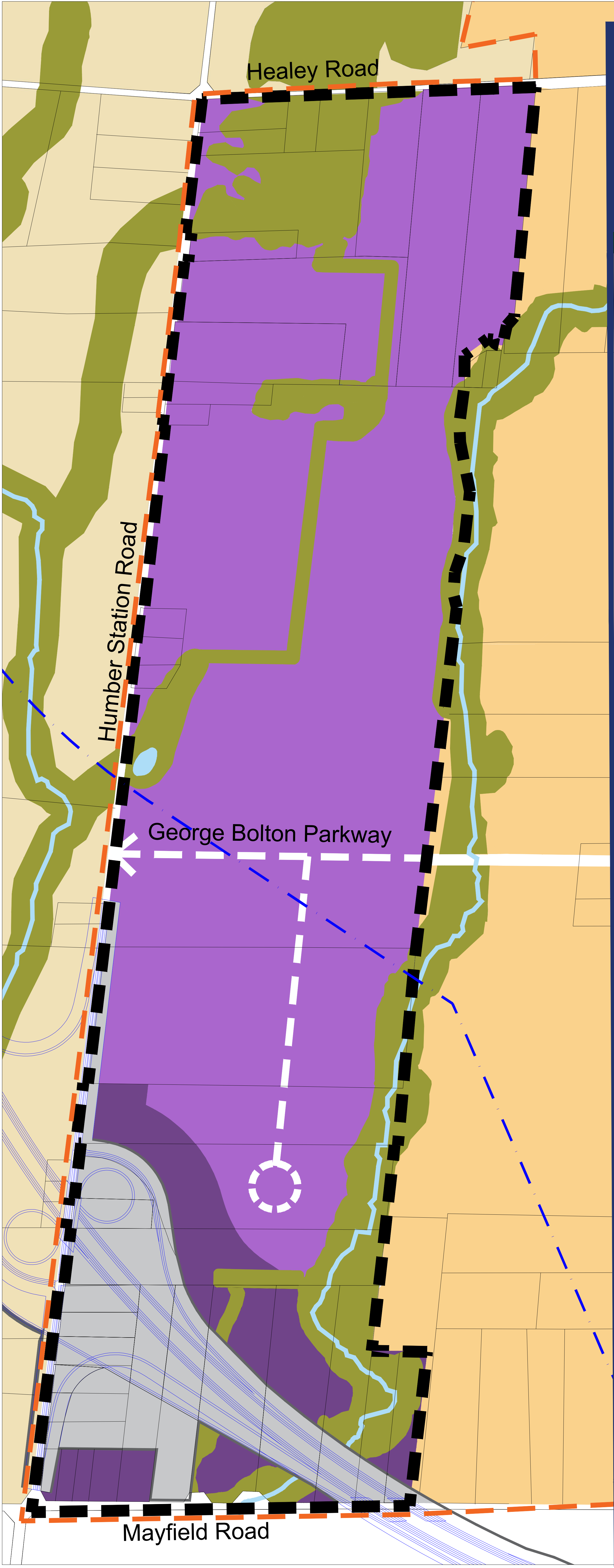
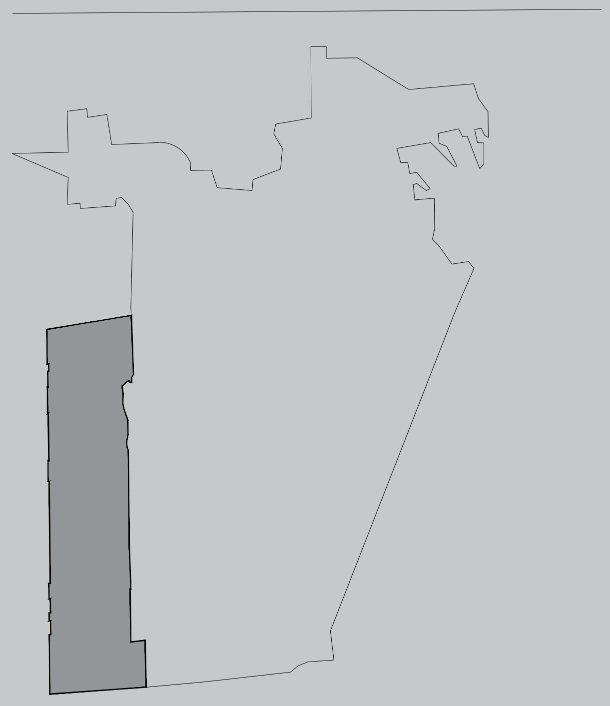


TOWN OF CALEDON

SCHEDULE C8
HUMBER STATION EMPLOYMENT AREA
LAND USE PLAN

Legend

▭	Bolton Settlement Area
▭	Secondary Plan Area
🟩	Environmental Policy Areas
🟪	Prestige Employment
🟪	General Employment
- -	Conceptual Road Network
▭	Highway 413 Transportation Corridor
-·-	Highway 413 Focus Area



Base Data Source: Town of Caledon

APPENDIX B

Tables

Table 4.1: Low-Impact Development Technology Benefits

LID Measures	Potential Benefits						
	Increase Evaporation / Evapotranspiration	Increase Infiltration Potential	Increase Travel Time	Disconnect Imperviousness	Decrease Runoff Volume	Improve Water Quality	Decrease Peak Flows
Canopy Cover	√		√		√		√
Enhanced Vegetation	√		√		√	√	√
Bioretention Swales	√	√	√	√	√	√	√
Bioretention Cells / Rain Gardens	√	√	√	√	√	√	√
Tree Box Filters	√	√	√	√	√	√	√
Rear Yard Grassed Swales		√	√	√	√	√	√
Roadside Swales		√	√	√	√	√	√
Vegetated Filters / Buffer Strips	√	√	√	√	√	√	√
Lot Level Depressions	√	√	√		√	√	√
Direct Roof Leaders to Pervious Areas	√	√	√	√	√	√	√
Direct Roof Runoff to Soak-away Pits		√	√	√	√	√	√
Constructed Infiltration Facilities		√	√	√	√	√	√
Pervious Pipe Systems		√	√	√	√	√	√
Pervious Catchbasins		√	√	√	√	√	√
Roof Storage	√		√				√
Green Roofs	√		√	√	√		√
Parking Lot Storage	√		√				√
Superpipes			√				√
Reduced Lot Grading		√	√		√	√	√
Increased Topsoil Depth	√	√	√		√	√	√
Soil Amendments	√	√	√		√	√	√
Permeable Pavers		√	√	√	√	√	√
Porous Asphalt Pavement		√	√	√	√	√	√
Rain Barrels (garden)			√	√	√		√
Cisterns (irrigation)			√	√	√		√

Table 7.1 Humber River Model Parameters

Catchment Name/ID	Area (ha)	Hydrograph	Model Parameters	Regional Storm
				Future Regional (CNIII)
43.1	202.72	Standhyd	Curve number	97
			TIMP	0.219
			XIMP	0.217
			IA (mm) (losses)	5
			TP (hours)	N/A
43.06	35.79	Nashyd	Curve number	96
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	1.17
43.05	39.74	Nashyd	Curve number	99
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP	1.63
43.03	63.04	Nashyd	Curve number	97
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	2.76
43.04	24.96	Nashyd	Curve number	98
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	1
43.02	129.13	Nashyd	Curve number	99
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	2.15
41.06	127.87	Nashyd	Curve number	97
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	1.9
41.07	101.08	Nashyd	Curve number	96
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	2.53
41.08	362.27	Nashyd	Curve number	97
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	3.09

Table 7.2: Summary of Regional Flows

Tributary	Area Reduction Factor	Node	TRCA Future Model Peak Flows (m^3/s)	SCE Modified Future Model Flows (m^3/s)	Post Development Uncontrolled Future Model Flows (m^3/s)	Post Development with Controls Model Flows (m^3/s)	SCE Modified Future /TRCA Future	Post Development Uncontrolled Future /SCE Modified Future	Post Development with Controls / SCE Modified Future
Clarkway Tributary	100	**857**	76.14	76.41	85.95	75.95	**1.00**	**1.12**	**0.99**
	100	1458	90.29	90.66	100.61	90.07	**1.00**	**1.11**	**0.99**
	97.1	1012	107.49	107.87	115.69	107.18	**1.00**	**1.07**	**0.99**
	97.1	1766	129.44	129.78	137.35	129.1	**1.00**	**1.06**	**0.99**
	97.1	1545	132.27	132.69	140.53	131.79	**1.00**	**1.06**	**0.99**
	94.8	1307	144.88	145.45	152.6	144.26	**1.00**	**1.05**	**0.99**
	94.8	1100	147.2	147.84	154.92	146.52	**1.00**	**1.05**	**0.99**
Gore Road Tributary	100	846	40.85	40.29	36.39	37.01	**0.99**	**0.9**	**0.92**
	99.2	1393	39.9	39.35	38.42	37.43	**0.99**	**0.98**	**0.95**
	99.2	1461	51.03	50.66	54.37	50.96	**0.99**	**1.07**	**1.01**
	97.1	1819	68.92	68.62	70.07	67.82	**1.00**	**1.02**	**0.99**
	97.1	1962	77.72	77.48	78.71	76.82	**1.00**	**1.02**	**0.99**
	97.1	1853	84.33	84.09	85.23	83.43	**1.00**	**1.01**	**0.99**
	97.1	1696	84.31	84.04	85.49	83.38	**1.00**	**1.02**	**0.99**
	97.1	1389	99.22	98.95	100.6	98.35	**1.00**	**1.02**	**0.99**
	95.4	1690	99.29	99.04	100.41	98.28	**1.00**	**1.01**	**0.99**
	95.4	1959	107.85	107.6	108.65	106.84	**1.00**	**1.01**	**0.99**
Combined	94.2	727	258.89	259.26	267.21	257.16	**1.00**	**1.03**	**0.99**
	89.4	7589	245.52	245.94	254.4	243.76	**1.00**	**1.03**	**0.99**

Table 8.1: Wetland Groundwater Interactions

Wetland	Groundwater Observations	Conditions
A1	Groundwater varies from ground surface to 2 mbgs. Downward vertical gradients.	Recharge conditions
B1	Groundwater varies from ground surface to 2 mbgs. Downward vertical gradients.	Recharge conditions
C1	Groundwater varies from ground surface to 2.2 m below ground surface. Downward vertical hydraulic gradients were noted indicating recharge conditions.	Recharge conditions
D1	Located within the Clarkway Drive Tributary valley. Groundwater varies from slightly below ground surface to 1.1 m below ground surface. Downward vertical hydraulic gradients were noted indicating predominantly recharge conditions; however, some groundwater discharge may occur based on shallow groundwater levels, permanent flow and location within the valley.	Recharge conditions to discharge conditions.
E1	Wetland E1 located within HDF-3. Groundwater was observed to range from slightly above ground surface to 0.3 m below ground surface. Variable vertical hydraulic gradients were observed indicating occasional groundwater discharge to surface.	Seasonal groundwater discharge.
F1	Wetland F1 is located within the Clarkway Drive Tributary valley. Groundwater was observed to range in depth from ground surface to 1.1 m below ground surface. Predominantly upward gradients were observed indicating groundwater discharge conditions. Streamflow in Clarkway Drive Tributary may be supported by local groundwater discharge.	Seasonal to permanent groundwater discharge
F2	Wetland F2 is located within the Clarkway Drive Tributary valley. Groundwater was observed to range in depth from slightly above ground surface to 2.2 m below ground surface. Variable hydraulic gradients were observed indicating seasonal groundwater discharge. Streamflow in Clarkway Drive Tributary may be supported by local groundwater discharge	Seasonal to permanent groundwater discharge
G1	Wetland G1 is located within the Clarkway Drive Tributary valley. No monitoring stations are located within the wetland, and groundwater conditions are assumed to be similar to Wetland F2	Seasonal to permanent groundwater discharge

Table 8.2: Wetland and Headwater Drainage Feature Compensation and Enhancement Details

Proposed Wetland Removal Unique ID	Proposed Wetland Removal Vegetation Type	Proposed Wetland Removal Area (ha)	Wetland Compensation/ Enhancement Unique ID	Wetland Compensation/ Enhancement Location	Targeted Vegetation Community	Total Wetland Area Provided (ha)
Wetland B1	MAS2-1 Cattail Mineral Shallow Marsh	0.076	Wetland Compensation Area 1	Proposed Drainage Realignment	Meadow Marsh and Shallow Marsh	0.077
Wetland C1	MAM2-2 Reed-canary grass Mineral Meadow Marsh	0.30	Wetland Compensation Area 2	Extended Floodplain (Receives 1 year flow event)	Mineral Marsh and Shallow Marsh	0.39
Redside Dace Contributing Habitat HDFs	Redside Dace Contributing Habitat HDFs	2639 m of HDF	Wetland Compensation Area 3	Tableland Wetland* (precipitation and roof collector input)	Mineral Marsh and Shallow Marsh	0.35
Headwater Drainage Feature HDF-3 (Realignment, not removal)	Headwater Drainage Feature HDF-3 (Realignment, not removal)	Proposed realignment of HDF-3 will result in a net gain of 351 m of fish habitat (1087 m removed and 1438 m created)	Drainage Realignment Wetland Enhancement Area	Proposed Drainage Realignment	Meadow Marsh and Shallow Marsh	0.58
					Total Area of Wetland Removal	0.38
					Total Area of Wetland Compensation and HDF Enhancement	1.40
					Total Area of New Wetland (Net Gain)	1.02

*Tableland Wetland community is compensation for removal of Contributing Redside Dace Habitat; it is not wetland removal compensation. This is provided here only to provide a full summary of new wetlands to be created.

Table 9.1: **Flows Modelled by Schaeffer's Consulting Engineers**

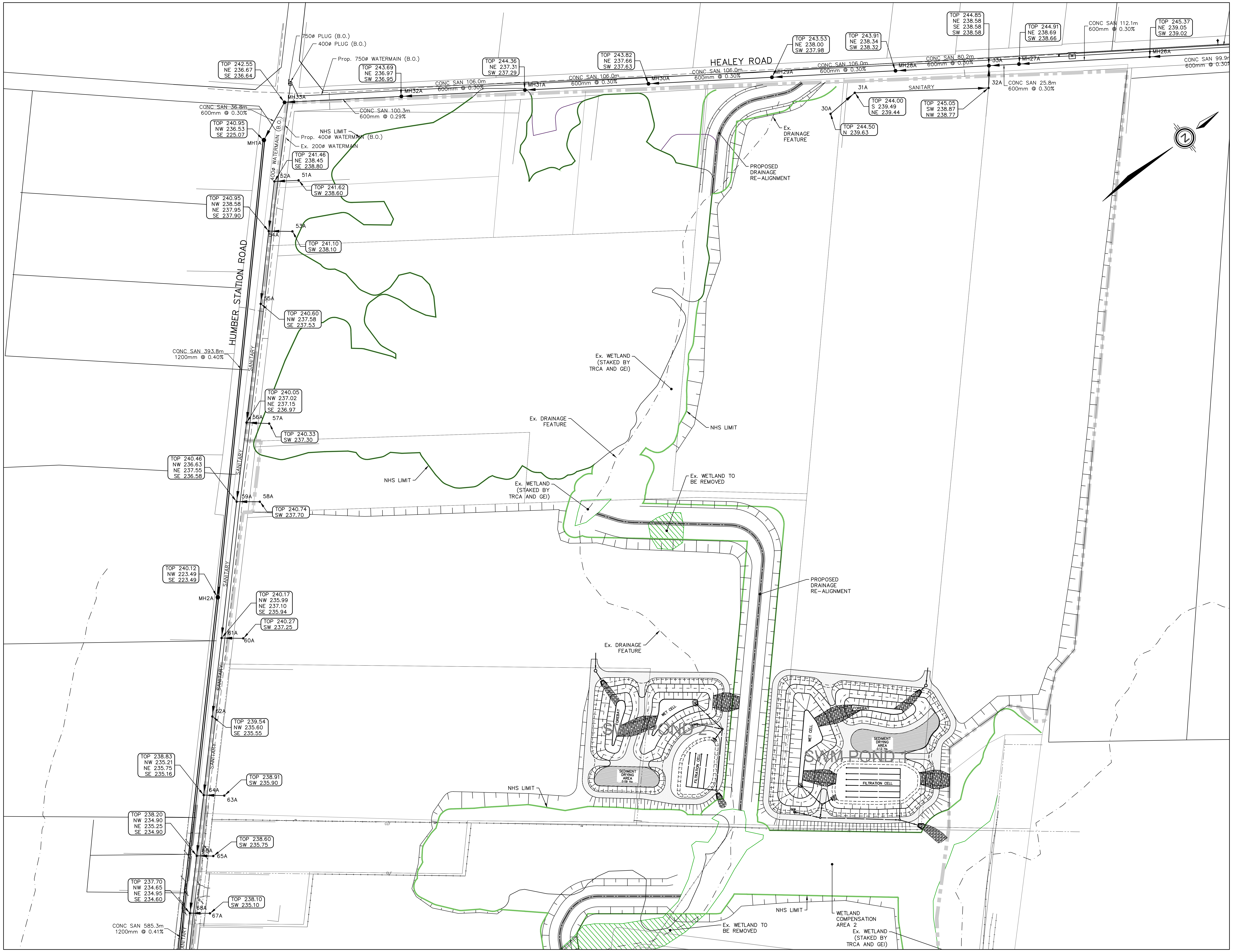
Channel Parameter	Flow at Node 1002 (m3/s)	Flow at Node 991 (m3/s)
2-year Peak Flow	0.27	0.37
5-year Peak Flow	0.47	0.64
10-year Peak Flow	0.98	1.34
25-year Peak Flow	1.24	1.7
50-year Peak Flow	1.43	1.96
100-year Peak Flow	1.63	2.23
Regional Peak Flow	4.16	5.69

Table 9.2: Parameters of the Proposed Channel

Channel Parameter	Reach 1		Reach 2		Reach 3	
	Riffle	Pool	Riffle	Pool	Riffle	Pool
Gradient (%)	2.0	0.2	3.0	0.35	4.0	0.73
Roughness (Manning’s n)	0.040	0.035	0.040	0.035	0.040	0.035
Bankfull width (m)	2.00	2.40	1.80	2.40	1.80	2.40
Average bankfull depth (m)	0.23	0.22	0.20	0.22	0.20	0.22
Maximum bankfull depth (m)	0.40	0.50	0.35	0.50	0.35	0.55
Bankfull discharge (m3/s)	0.18	0.23	0.18	0.31	0.26	0.44
Bankfull velocity (m/s)	0.40	0.44	0.49	0.58	0.70	0.83
Froude number	0.26	0.30	0.34	0.39	0.50	0.57
Bankfull shear stress (N/m2)	8	10	12	17	25	36
Stream power (W/m)	4	5	6	11	18	32
Stream power per unit width (W/m2)	2	2	3	4	10	13
Maximum grain size entrained (mm)	8	10	12	18	26	36
Mean grain size entrained (mm)	5	5	7	9	15	19

APPENDIX C

Municipal Servicing



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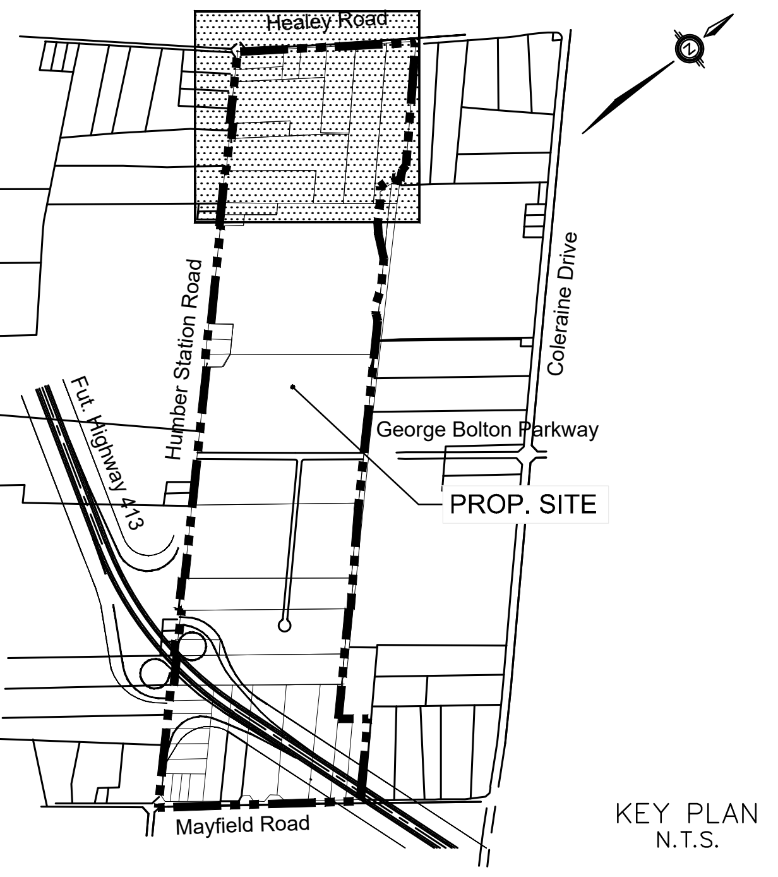


KEY PLAN
N.T.S.

LEGEND

- ○ DENOTES STORM MANHOLE
- — — DENOTES STORM SEWER
- ● DENOTES SANITARY MANHOLE
- —— DENOTES SANITARY SEWER
- TOP 236.02 / SW 232.65 / NE 232.63 DENOTES TOP ELEVATION / DENOTES STORM IN OBVERT ELEVATION / DENOTES STORM OUT OBVERT ELEVATION
- TOP 195.45 / N 192.15 / S 192.10 DENOTES TOP ELEVATION / DENOTES SANITARY IN OBVERT ELEVATION / DENOTES SANITARY OUT OBVERT ELEVATION
- ▬ ▪ ▪ ▬ DENOTES LIMIT OF DEVELOPMENT BOUNDARY
- 🟦 DENOTES PROPOSED LID/SWM FACILITY
- 🟩 DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

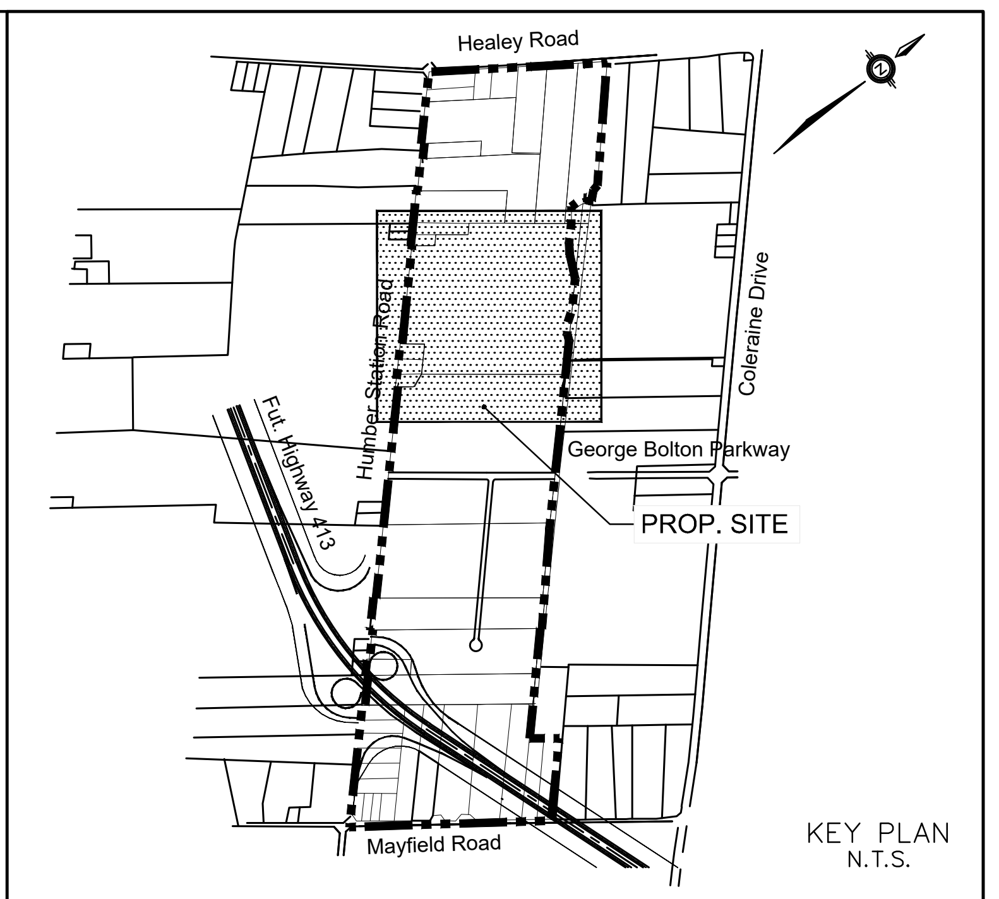
6 Ronrose Drive, Concord,
Ontario L4K 4R3
Tel: (905) 738-6100
Fax: (905) 738-6875
E-mail:
design@schaeffers.com

Region of Peel
Working for you

TOWN OF CALEDON

GENERAL PLAN
PART 1

SCALE: 1:2000
DESIGNED BY: M.Z.
DRAWN BY: M.Z.
CHECKED BY: P.S.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. GP-1



KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
—	DENOTES SANITARY SEWER
TOP 236.02 SW 232.65 NE 232.63	DENOTES TOP ELEVATION DENOTES STORM IN OBVERT ELEVATION DENOTES STORM OUT OBVERT ELEVATION
TOP 195.45 N 192.15 S 192.10	DENOTES TOP ELEVATION DENOTES SANITARY IN OBVERT ELEVATION DENOTES SANITARY OUT OBVERT ELEVATION
▬ ▮ ▮ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
▨	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

HUMBER STATION VILLAGES

SCHAEFFERS
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GENERAL PLAN
PART 2

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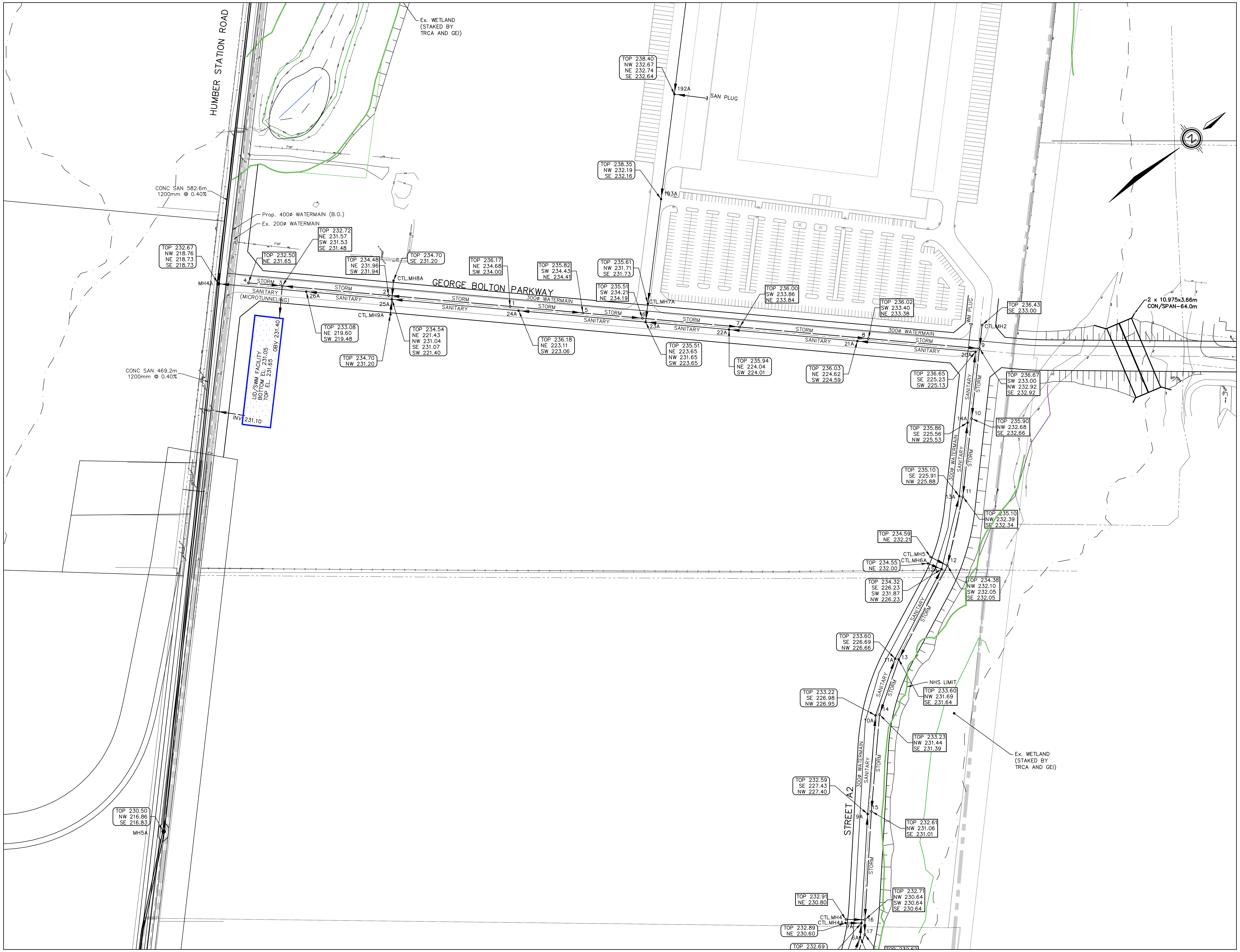

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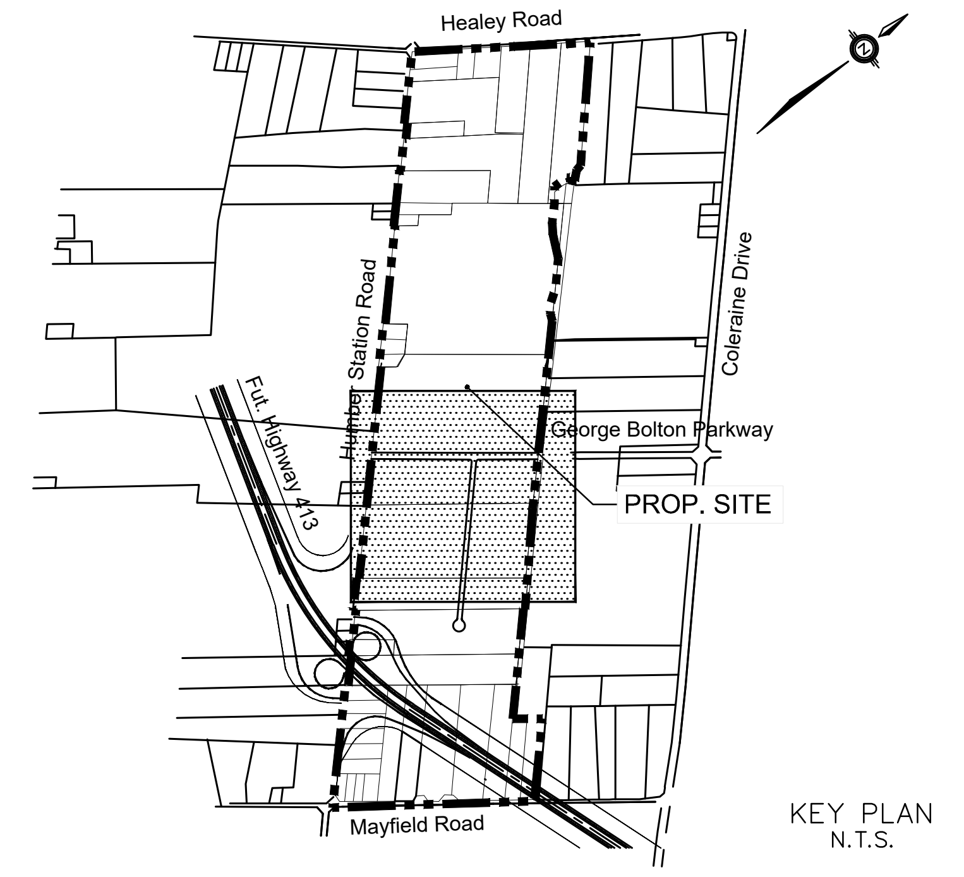
REFER TO DWG. GP-4



KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— · —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
———	DENOTES SANITARY SEWER
TOP 236.02 SW 232.65 NE 232.63	DENOTES TOP ELEVATION DENOTES STORM IN OBVERT ELEVATION DENOTES STORM OUT OBVERT ELEVATION
TOP 195.45 N 192.15 S 192.10	DENOTES TOP ELEVATION DENOTES SANITARY IN OBVERT ELEVATION DENOTES SANITARY OUT OBVERT ELEVATION
▬ ▪ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
▨	DENOTES PROPOSED LID/SWM FACILITY
▬	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

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H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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TOWN OF CALEDON

GENERAL PLAN
PART 3

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DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. GP-3
CHECKED BY: P.S.	DATE: AUGUST 2024	

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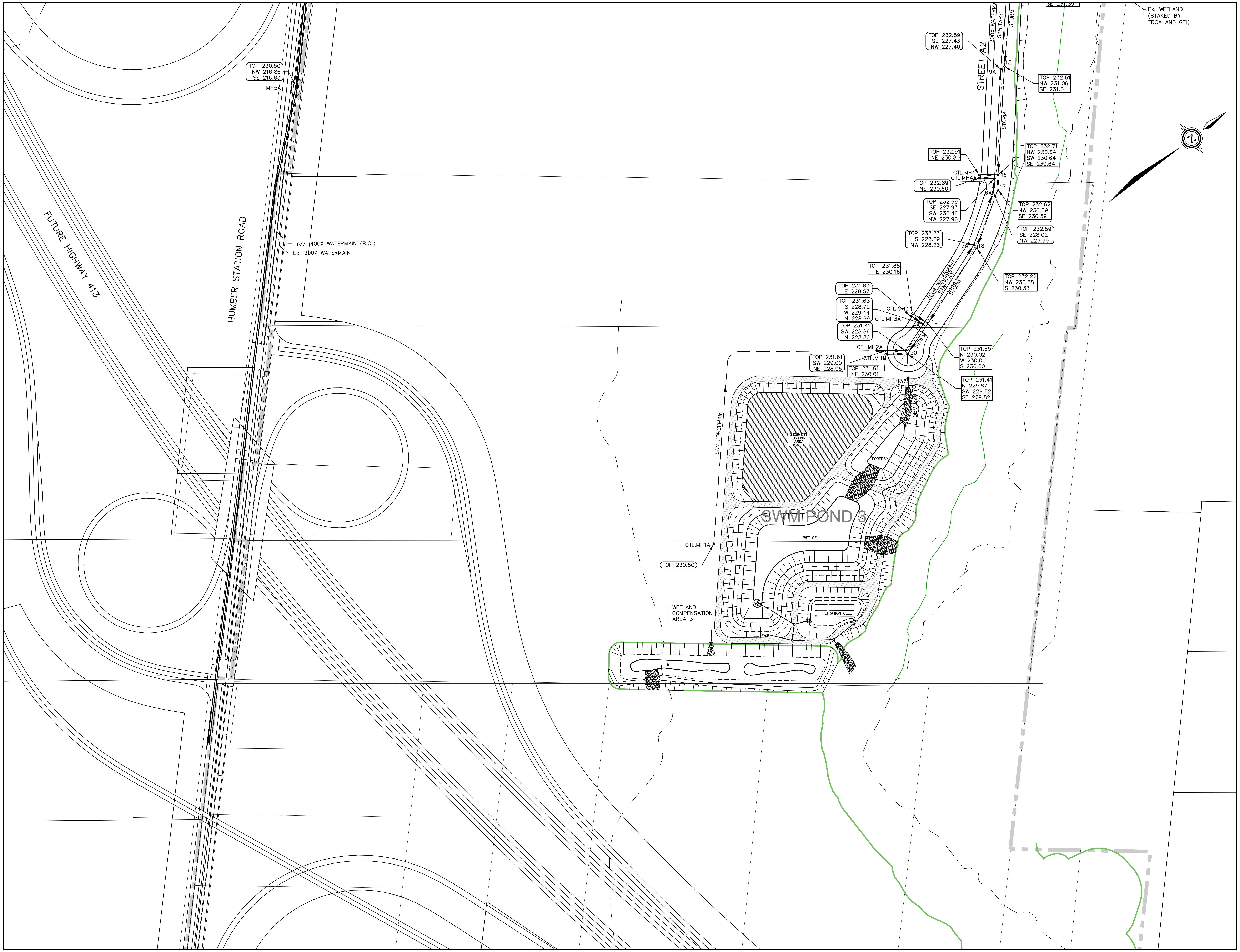
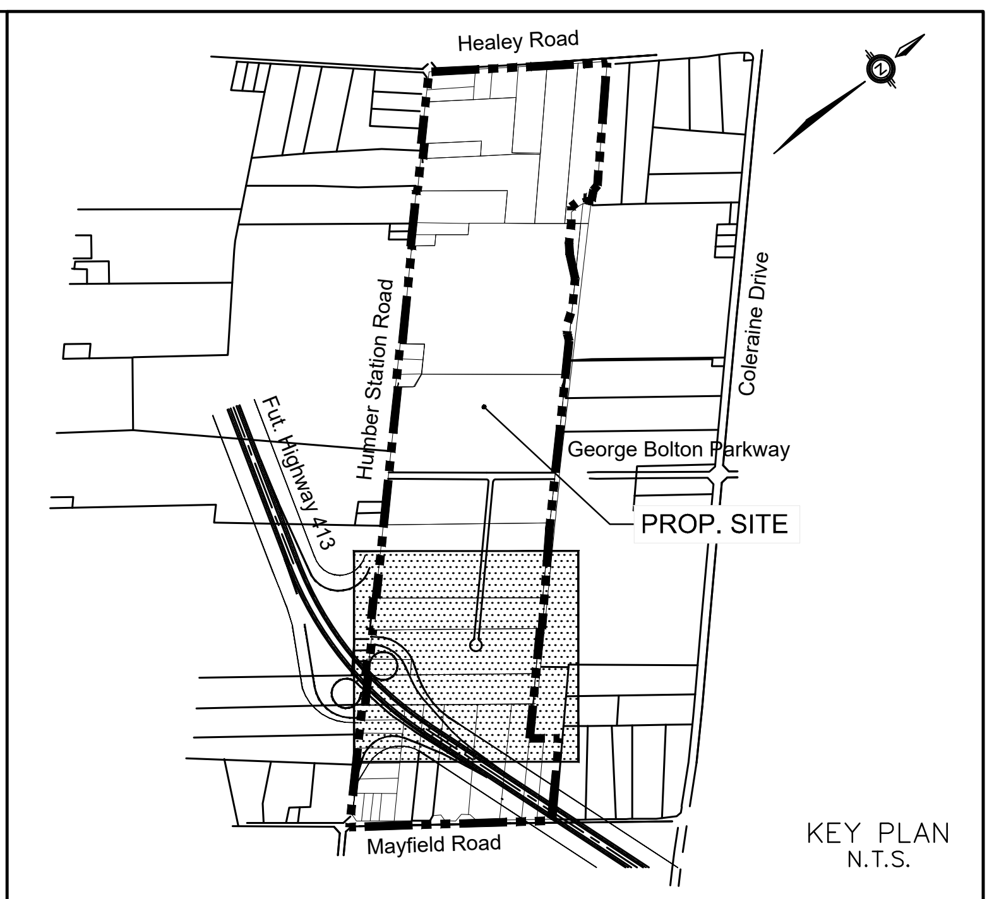




KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
—	DENOTES SANITARY SEWER
TOP 236.02 SW 232.65 NE 232.63	DENOTES TOP ELEVATION DENOTES STORM IN OBVERT ELEVATION DENOTES STORM OUT OBVERT ELEVATION
TOP 195.45 N 192.15 S 192.10	DENOTES TOP ELEVATION DENOTES SANITARY IN OBVERT ELEVATION DENOTES SANITARY OUT OBVERT ELEVATION
▬ ▪ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
🟦	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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

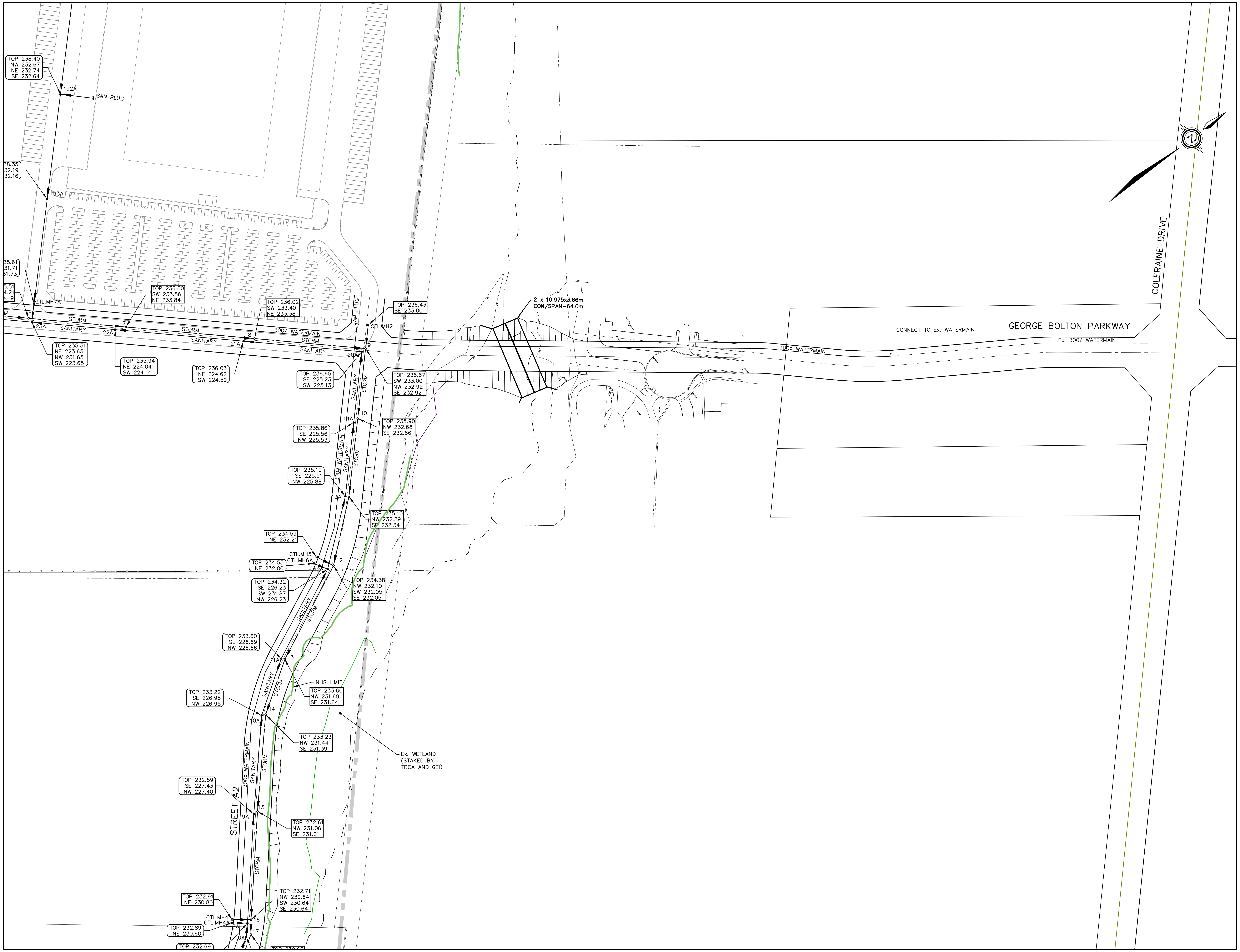
Region of Peel
Working for you

TOWN OF CALEDON

GENERAL PLAN
PART 4

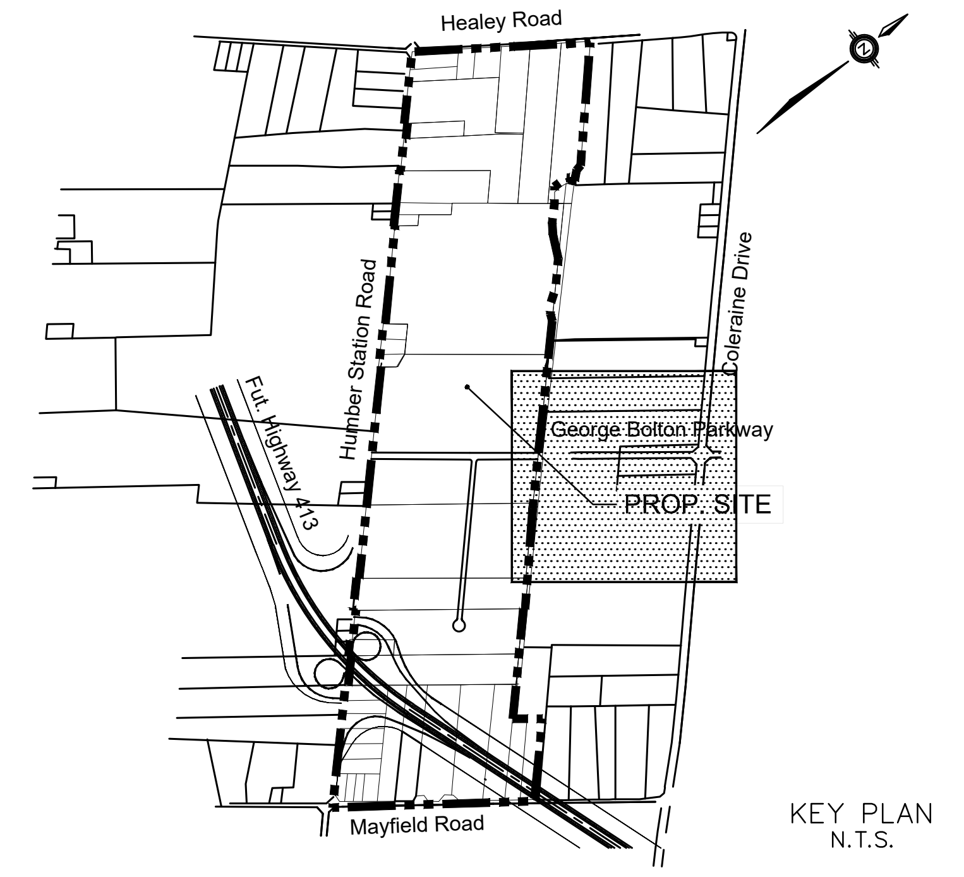
SCALE: 1:2000		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. GP-4
CHECKED BY: P.S.	DATE: AUGUST 2024	

REFER TO DWG. GP-2



REFER TO DWG. GP-3

REFER TO DWG. GP-4



KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
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🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

HUMBER STATION VILLAGES

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Region of Peel
Working for you

TOWN OF CALEDON

GENERAL PLAN
PART 5

SCALE: 1:2000		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. GP-5
CHECKED BY: P.S.	DATE: AUGUST 2024	

Sanitary Servicing

Population Estimate

Project No. 5139 **Date:** 30-May-24

Outlet to Healey Road

Total Site Area: **18.46** ha

Parcel	Industrial Area (ha)	Population Density (pp/ha)	Non Res. Population
10	3.45	70	242
11	8.32	70	582
12	6.69	70	468
Total	**18.46**		***1293***

Outlet to Humber Station Road Trunk Sewer (North Connction)

Total Site Area: **27.14 ha**

Parcel	Industrial Area (ha)	Population Density (pp/ha)	Non Res. Population
1 (West)	12.57	70	880
13	0.11	70	7
14	0.91	70	64
15	6.27	70	439
16	4.53	70	317
17	0.88	70	62
18	0.38	70	27
19	0.53	70	37
20	0.55	70	39
21	0.41	70	29
Total	**27.14**		***1900***

Outlet to Humber Station Road Trunk Sewer (South Connction)

Total Site Area: **91.92 ha**

Parcel	Industrial Area (ha)	Population Density (pp/ha)	Non Res. Population
1	18.80	70	1316
2	37.02	70	2591
3	17.79	70	1245
22	7.41	70	519
4	7.26	70	508
5	3.64	70	255
Total	**91.92**		***6435***

Proposed Sanitary Flow Calculation

Project No. 5139

30-May-24

Infiltration Rate: 0.26 L/s/ha
Non-Residential Generation Rate: 270 L/capita/day

Outlet to Healey Road

Total Developable Land Area (ha): 18.46 ha

Summary of Sanitary Design Flow Calculation

Average Demand (L/s)	Total Population	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)
4.041	1293	3.73	15.05	18.46	0.26	4.80	**19.85**

Outlet to Humber Station Road (North Connection)

Total Developable Land Area (ha): 27.14 ha

Summary of Sanitary Design Flow Calculation

Average Demand (L/s)	Total Population	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)
5.938	1900	3.60	21.39	27.14	0.26	7.06	**28.45**

Outlet to Humber Station Road (South Connection)

Total Developable Land Area (ha): 91.92 ha

Summary of Sanitary Design Flow Calculation

Average Demand (L/s)	Total Population	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)
20.109	6435	3.14	63.18	91.92	0.26	23.90	**87.08**

$M = 1 + 14/(4 + (P/1000)^{0.5})$ Maximum M=4

*Population Estimate based on the Region of Peel's Linear Wastewater Standards (March 2023)

Water Supply Servicing

Water Supply Calculation

Project No. 2021-5139

Proposed Industrial Development, Healey Road and Humber Station Road, Town of Caledon

Fire Flow:	**25000**	L/min	or	**417**	L/s
Water Supply Demand:	**300**	L/capita/day			

Parcel	Land Use	Area (ha)	Pop. Density (persons/ha)†	Population	Average Day Demand (L/s)‡
1	Industrial	31.43	70	2201	**7.64**
2	Industrial	36.96	70	2588	**8.99**
3	Industrial	17.79	70	1246	**4.33**
4	Industrial	7.26	70	509	**1.77**
5	Industrial	3.64	70	255	**0.89**
10	Industrial	3.45	70	242	**0.84**
11	Industrial	8.32	70	583	**2.02**
12	Industrial	6.69	70	469	**1.63**
13	Industrial	0.11	70	8	**0.03**
14	Industrial	0.91	70	64	**0.22**
15	Industrial	6.27	70	439	**1.52**
16	Industrial	4.53	70	318	**1.10**
17	Industrial	0.88	70	62	**0.22**
18	Industrial	0.38	70	27	**0.09**
19	Industrial	0.53	70	38	**0.13**
20	Industrial	0.55	70	39	**0.14**
21	Industrial	0.41	70	29	**0.10**
22	Industrial	7.41	70	519	**1.80**
Total Industrial		137.52		9636	**33.46**

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)	Max Demand + Fire Flow (L/s)
Industrial	**33.46**	3.0	100.38	1.4	46.84	**463.84**

† As per Region of Peel Design Guidelines

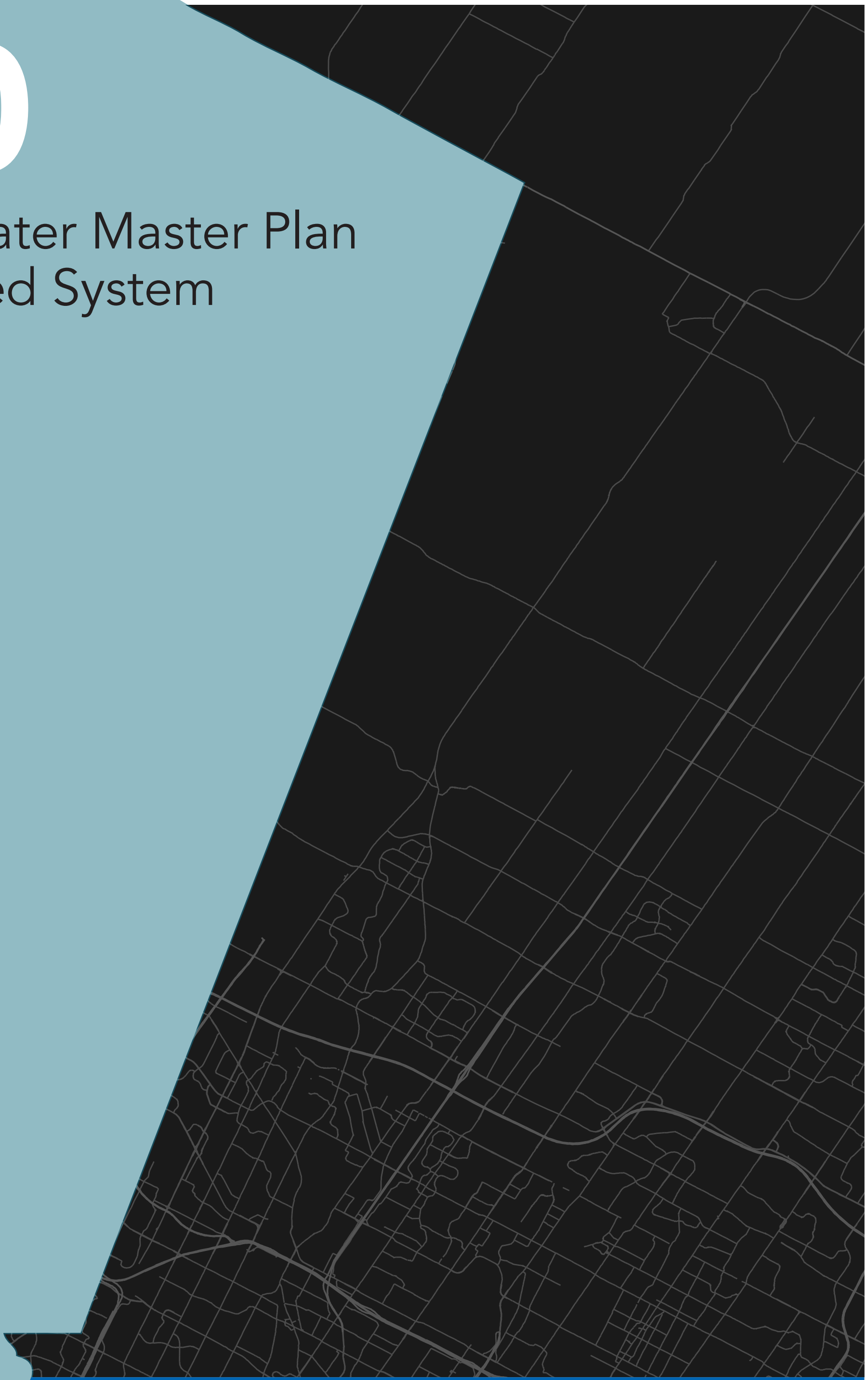
‡ Based on Region of Peel Design Guidelines of 300 L/cap/day

Fire demand of 417 L/s is assummed referencing to the City of Vaughan Water Design Guidelines

Region of Peel
working with you

2020

Water & Wastewater Master Plan for the Lake-Based System



VOLUME 3

Water Master Plan

Prepared by: GM BluePlan ENGINEERING

3.0 Existing Water Transmission System

3.1 Existing Infrastructure

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. Water is supplied from Lake Ontario by two water treatment plants (WTP) and conveyed by the transmission and distribution systems.

The transmission system consists of two treatment facilities, transmission mains, 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 main trunk systems: west, central and east. The transmission system provides direct supply to the local water distribution system which consists of the water mains 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 30-metre intervals of elevation.

The Region of Peel also maintains four municipal groundwater systems servicing rural communities in the Town of Caledon. These municipal groundwater systems are not included in the 2020 Master Plan. **Table 2** and **Figure 6** provides an overview of the Region's existing water lake-based transmission system.

Table 2 – **Existing lake-based water transmission facilities.**

West Trunk System	Central Trunk System	East Trunk System
Snelgrove Elevated Tank (WS6) Alloa Reservoir (WS5) and Pumping Station (LLP6W, HLP7W) West Brampton Reservoir (WS4) and Pumping Station (LLP5W, HLP6W) Meadowvale North Reservoir (WS3) and Pumping Station (LLP4W, HLP5W) Streetsville Reservoir (WS2) and Pumping Station (LLP3W, HLP4W) Herridge Reservoir (WS1) and Pumping Station (HLP3W, LLP2W)	Mayfield West Elevated Tank (CS7) North Brampton Reservoir (CS5) and Pumping Station (LLP6C, HLP7C) East Brampton Reservoir (CS4) and Pumping Station (LLP5C, HLP6C) Beckett Sproule Reservoir (CS3) and Pumping Station (LLP4C, HLP5C) Hanlan Reservoir (CS2) and Pumping Station (LLP3C, HLP4C) Silverthorn Reservoir (CS1) and Pumping Station (LLP2C, HLP3C) A. P. Kennedy Water Treatment Plant and Pumping Stations (HLP1C, HLP2C)	Bolton Elevated Tank, West Bolton Elevated Tank and Standpipes (BS6) Tullamore Reservoir (ES4) and Pumping Station (LLP5E, HLP6E) Airport Road Reservoir (ES3) and Pumping Station (LLP4E, HLP5E, York Transfer) Beckett Sproule Transfer Pumping Station

**Nomenclature of transmission facilities: (W)-West, (C)-Central, (E)-East, (S)-Storage, (LLP)-Low Lift Pump, (HLP)-High Lift Pump, # - pressure zones serviced by facility*

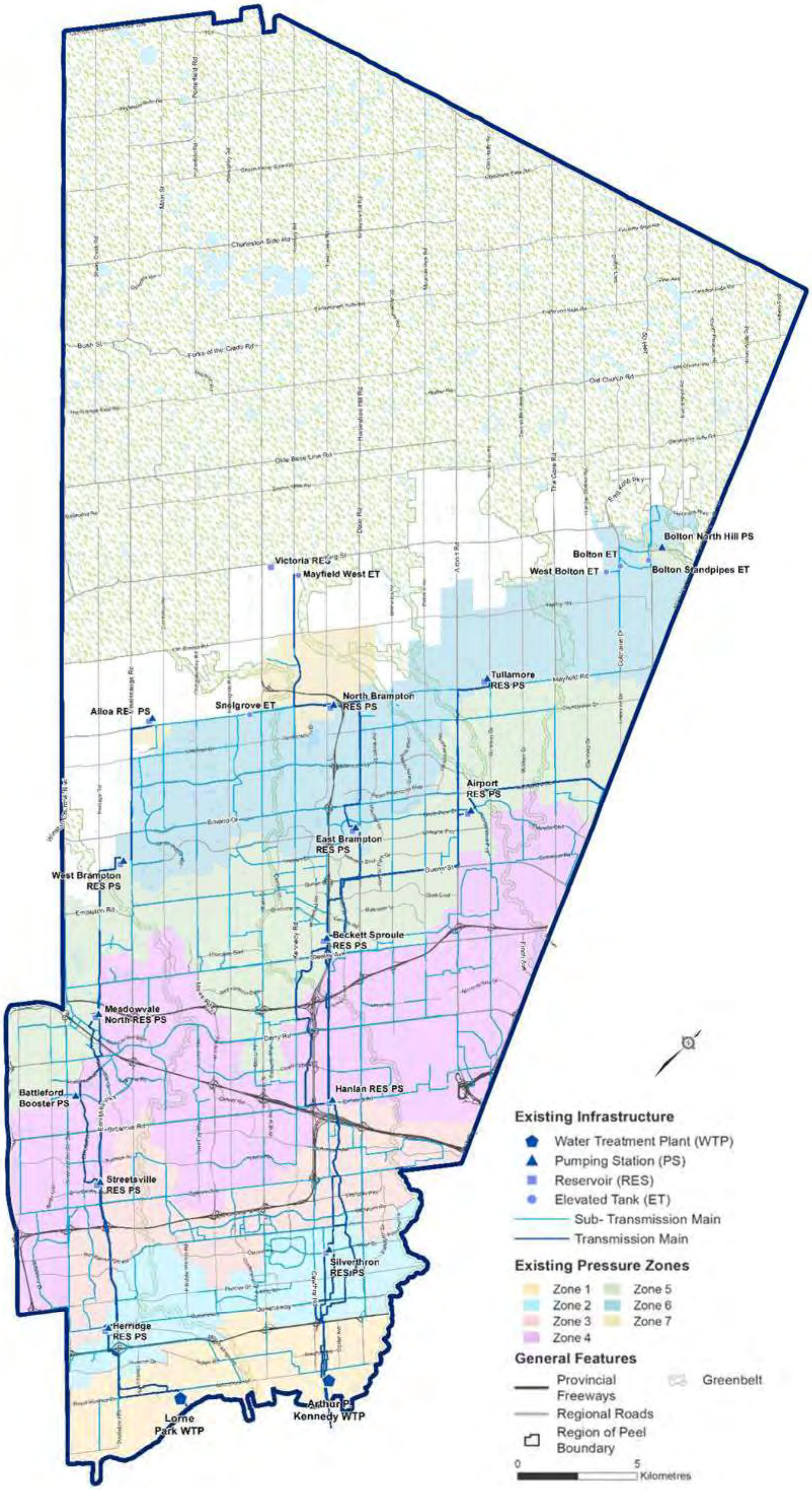


Figure 6 – Existing Region of Peel lake-based water transmission system.

3.1.2 Pressure Zones

The Region of Peel transmission and distribution systems deliver water to users through seven pressure zones separated by approximately 30-metre intervals of elevation. **Table 3** presents a summary of the lake-base water system pressure zones.

Table 3 – Lake-based water system pressure zones.

Pressure Zone	Top Water Level	Hydraulic Grade Line	Serviceable Elevation
Zone 1	144.8 m	152.4 m	75.0 – 106.7 m
Zone 2	175.3 m	182.9 m	87.8 – 137.2 m
Zone 3	205.7 m	213.4 m	135.9 – 167.6 m
Zone 4	236.2 m	243.8 m	166.4 – 210.6 m
Zone 5	266.7 m	274.3 m	182.4 – 236.2 m
Zone 6	297.2 m	304.8 m	214.5 – 259.1 m
Zone 7	327.7 m	335.3 m	243.4 – 289.6 m

3.1.3 Transmission Mains

The Region Peel transmission system is divided into three main trunk systems: West, Central and East. In reviewing the flow transfer capability of the transmission main, two important factors are considered; theoretical capacity and actual capacity. The capacity of the transmission main is defined based on the watermain characteristics as follows:

Theoretical capacity

- Size of the transmission main,
- Expected resistance (or energy loss) of the transmission main, and
- Standard/assumed roughness coefficient for a new transmission main.

Actual capacity

- Size of the transmission main,
- Expected resistance (or energy loss) of the transmission main, and
- Roughness coefficient obtained from the calibrated hydraulic model.

3.1.3.4 East Trunk System

ET3A: Beckett Sproule Transfer Pumping Station to the Airport Road Reservoir (Airport Road Transfer)

2100-mm diameter transmission main from the Beckett Sproule Pumping Station to the Airport Road Reservoir to transfer water from the central to the east transmission system. The theoretical capacity of this transfer main is approximately 657 ML/d. However, the current actual transmission capacity is estimated at approximately 612 ML/d.

ET5Y: Airport Road Pumping Station to York Region (York Transfer)

1800-mm diameter transmission main from the Airport Road Pumping Station to the York-Peel boundary to supply water to York Region as per the York-Peel Water Supply Agreement. The theoretical capacity of this transmission main is 438 ML/d. However, the current actual transmission capacity is estimated at approximately 421 ML/d.

ET4: Airport Road Pumping Station to the Tullamore Reservoir (Pressure Zone 4)

1050-mm diameter Pressure Zone 4 transmission main from the Airport Road Pumping Station to the Tullamore Reservoir. The theoretical and actual transmission capacities of this main is approximately 106 ML/d.

BT6: Tullamore Pumping Station to the Bolton Elevated Tank (Pressure Zone 6)

750-mm diameter Pressure Zone 6 transmission main from the Tullamore Pumping Station to the Bolton Elevated Tanks. The theoretical transmission capacity of this main is approximately 44 ML/d. However, the actual capacity is estimated at 40 ML/d.

The east transmission system is shown in **Figure 9**.

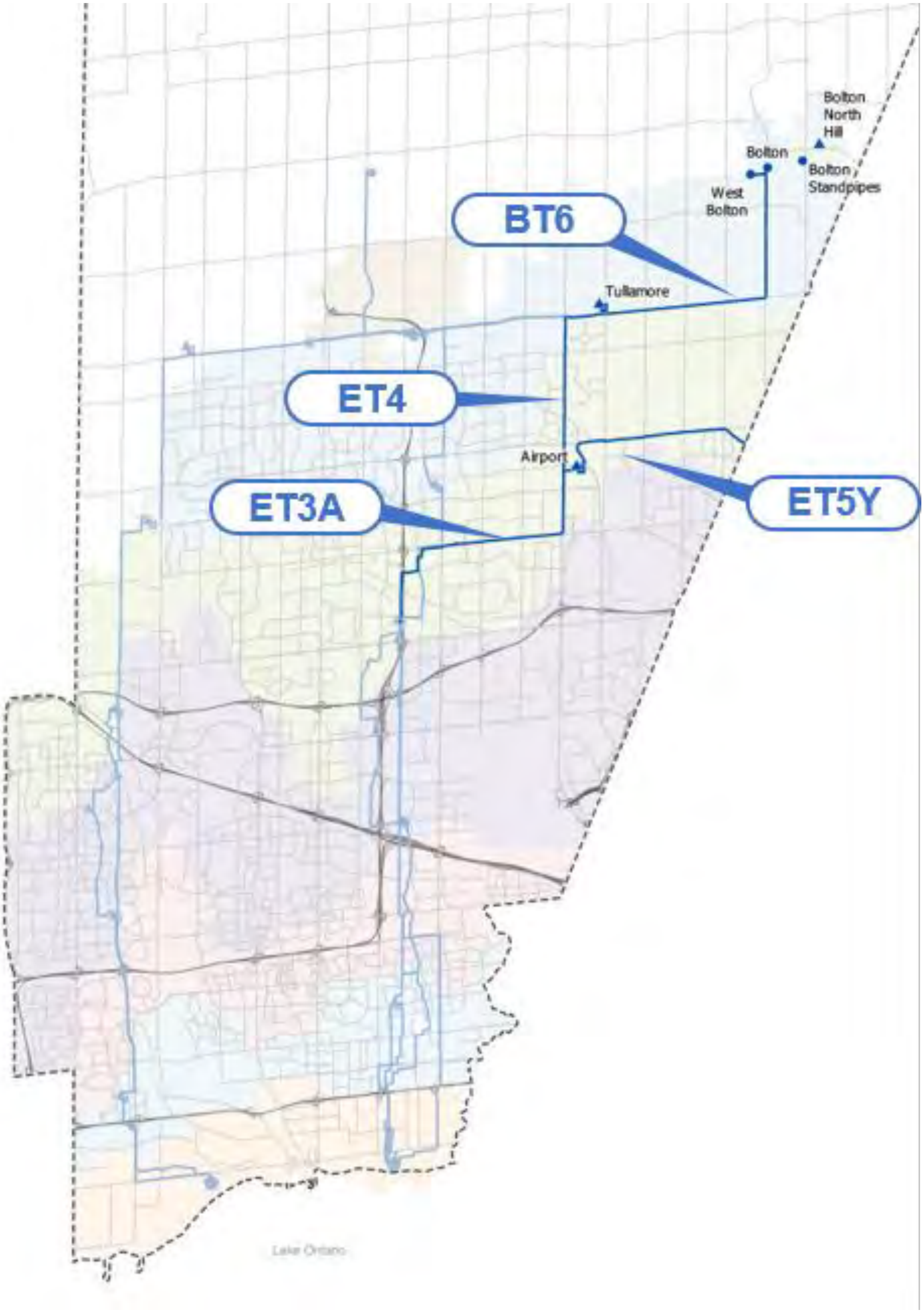


Figure 9 – East transmission system.

Table 6 – Lake-based water pumping stations (east transmission system).

Facility	Serviced Pressure Zone	No. of Pumps	Installed Capacity (ML/d)	Firm Capacity (ML/d)	Actual Firm Capacity* (ML/d)
Airport Road Pumping Station	York	10	458	402	n/a
	LLP4E	4	182	126	149
	HLP5E	4	180	135	131
Beckett Sproule Transfer Pumping Station	Transfer	4	408	306	2750
Tullamore Pumping Station	LLP5E	3	90	60	48
	HLP6E	4	160	120	120
Bolton North Hill Pumping Station	6B	3	14	9	n/a

**Actual Firm Capacity generated from model runs accounts for head losses due to friction*

Table 7 – **Lake-based water system reservoirs.**

	Facility Name	Serviced Pressure Zone	Total Reservoir Capacity (ML*)
WEST	Lorne Park Water Treatment Plant	WS1	23
	Herridge Reservoir	WS1	47
	Streetsville Reservoir	WS2	48
	Meadowvale North Reservoir	WS3	55
	West Brampton Reservoir	WS4	40
	Alloa Reservoir	WS5	35
	Snelgrove Elevated Tank	WS6	4
CENTRAL	A.P. Kennedy Water Treatment Plant	CS1	25
	Silverthorn Reservoir	CS1	46
	Hanlan Reservoir	CS2	74
	Beckett Sproule Reservoir	CS3	93
	East Brampton Reservoir	CS4	39
	North Brampton Reservoir	CS5	53
	Mayfield West Elevated Tank	CS7	9
EAST	Airport Road Reservoir	ES3	54
	Tullamore Reservoir	ES4	48
	Bolton Elevated Tanks and Standpipes	BS6	19

**ML: Million Litres*

6.0 Preferred Water Servicing Strategy

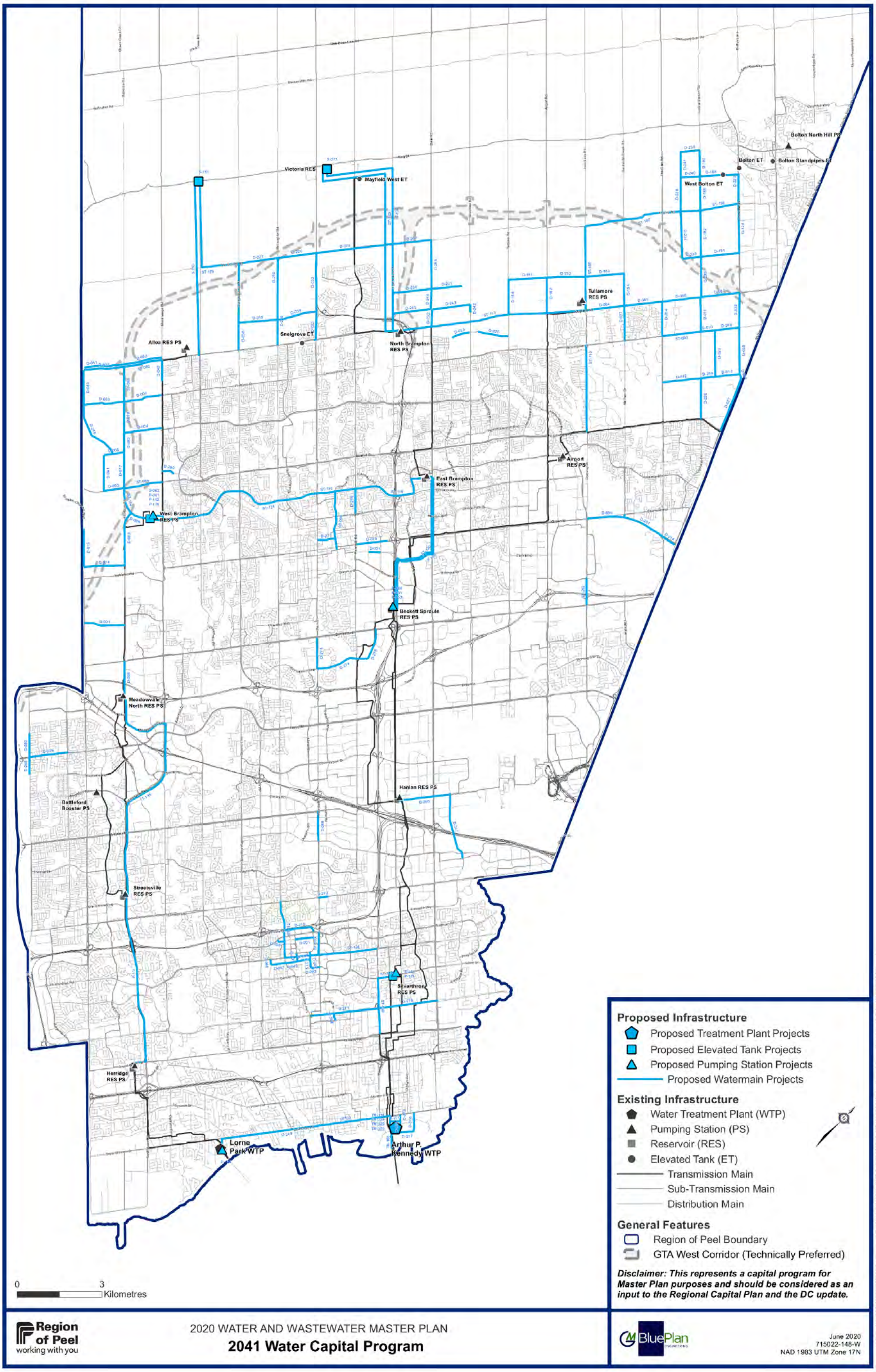


Figure 25 – Preferred water servicing strategy capital program for the lake-based system.

Master Plan ID	Project Name	Project Description	Year in Service	Municipality	Pressure Zone	Class EA	Project Type	Size/Capacity	Length (m)	Total Estimated Cost ($2020)
W-ST-179	600-mm Water Main - Chinguacousy Road/Creditview Road	Construction of a 600-mm sub-transmission main on Chinguacousy Road/Creditview Road from the future West Caledon Elevated Tank to future east-west road in Mayfield West Phase 2.	2027	Caledon	7	Schedule C	WSTM	600 mm	6500	$ 20,680,000
W-D-180	400-mm Water Main - Torbram Road (Tullamore Industrial)	Construction of a 400-mm water main on Torbram Road from Mayfield Road northerly to a future street.	2036	Caledon	6	Schedule A+	WDM	400 mm	1300	$ 3,838,200
W-D-181	400-mm Water Main - Future Street (Tullamore Industrial)	Construction of a 400-mm water main on a future street north of Mayfield Road from Torbram Road to Airport Road.	2036	Caledon	6	Schedule A+	WDM	400 mm	1360	$ 2,100,900
W-D-182	400-mm Water Main - Airport Road (Tullamore Industrial)	Construction of a 400-mm water main on Airport Road from Mayfield Road northerly to a future street.	2036	Caledon	6	Schedule A+	WDM	400 mm	1300	$ 2,202,500
W-D-183	400-mm Water Main - Future Street (Tullamore Industrial)	Construction of a 400-mm water main on a future street north of Mayfield Road from Innis Lake Road to Centreville Creek Road.	2036	Caledon	6	Schedule A+	WDM	400 mm	1360	$ 3,235,000
W-D-184	400-mm Water Main - Centreville Creek Road (Tullamore Industrial)	Construction of a 400-mm water main on Centerville Creek Road from Mayfield Road to 1300 metres northerly.	2036	Caledon	6	Schedule EA+	WDM	400 mm	1300	$ 3,838,200
W-ST-185	750-mm Water Main - Innis Lake Road	Construction of a 750-mm sub-transmission main on Innis Lake Road from the Tullamore Pumping Station to Healey Road.	2032	Caledon	6	Schedule A+	WSTM	750 mm	3000	$ 8,746,100
W-ST-186	600-mm Water Main - Healey Road (Bolton West)	Construction of a 600-mm sub-transmission main on Healy Road from Humber Station Road to Coleraine Drive.	2026	Caledon	6	Schedule A+	WSTM	600 mm	1350	$ 3,842,700
W-ST-187	600-mm Water Main - Healey Road	Construction of a 600-mm sub-transmission main on Healy Road from Innis Lake Road to Humber Station Road.	2031	Caledon	6	Schedule A+	WSTM	600 mm	4160	$ 14,992,500
W-D-188	400-mm Water Main - Future Street (Bolton West)	Construction of a 400-mm water main on a future street north of Healey Road from West Bolton Elevated Tank to Humber Station Road.	2026	Caledon	6	Schedule A+	WDM	400 mm	810	$ 1,070,200
W-D-189	400-mm Water Main - Humber Station Road (Bolton West)	Construction of a 400-mm water main on Humber Station Road from Healey Road to a future street northerly.	2027	Caledon	6	Schedule A+	WDM	400 mm	1220	$ 2,074,900
W-D-190	400-mm Water Main - Humber Station Road (Bolton West)	Construction of a 400-mm water main on Humber Station Road from a future street north of Healey Road to approximately 1200 metres northerly.	2028	Caledon	6	Schedule A+	WDM	400 mm	1200	$ 1,867,000
W-D-191	400-mm Water Main - Future Street (Bolton West)	Construction of a 400-mm water main on a future street north of Mayfield Road from Humber Station Road to Coleraine Drive.	2026	Caledon	6	Schedule A+	WDM	400 mm	1350	$ 2,086,300
W-D-192	400-mm Water Main - Humber Station Road (Bolton West)	Construction of a 400-mm water main on Humber Station Road from a future street north of Mayfield Road to Healey Road.	2026	Caledon	6	Schedule A+	WDM	400 mm	1650	$ 3,242,500
W-D-200	600-mm Water Main - Britannia Road East	Construction of a 600-mm water main on Britannia Road East from the Hanlan Pumping Station to Atlantic Drive.	2020	Mississauga	3	Schedule A+	WDM	600 mm	2000	$ 10,357,733
W-D-201	Growth-Related Water Mains in the Mississauga City Centre	Construction of several growth-related water mains in the Mississauga City Centre.	2019	Mississauga	3	Schedule A+	WDM	400 mm	640	$ 3,900,000
W-D-202	Growth-Related Water Mains in the Mississauga City Centre	Construction of several growth-related water mains in the Mississauga City Centre.	2019	Mississauga	3	Schedule A+	WDM	400 mm	300	$ 5,000,000

Master Plan ID	Project Name	Project Description	Year in Service	Municipality	Pressure Zone	Class EA	Project Type	Size/Capacity	Length (m)	Total Estimated Cost ($2020)
W-ST-203	750-mm Water Main - Hurontario Street (Mississauga City Centre)	Construction of a 750-mm sub-transmission main on Hurontario Street from Burnhamthorpe Road to Rathburn Road.	2019	Mississauga	3	Schedule A+	WSTM	750 mm	780	$ 8,161,000
W-D-204	400-mm Water Main - The Gore Road	Construction of a 400-mm water main on The Gore Road from Mayfield Road to north of Countryside Drive.	2018	Brampton	5	Schedule A+	WDM	400 mm	1100	$ 2,687,000
W-D-205	400-mm Water Main - McLaughlin Road (Mayfield West Phase 2)	Construction of a 400-mm water main on McLaughlin Road from Mayfield Road to 1800 metres northerly to the creek.	2019	Caledon	7	Schedule A+	WDM	400 mm	1800	$ 2,699,200
W-D-206	400-mm Water Main - Kariya Drive (Mississauga City Centre)	Construction of a 400-mm water main on Kariya Drive from Webb Drive to Elm Drive West.	2024	Mississauga	3	Schedule A+	WDM	400 mm	300	$ 4,444,000
W-D-207	400-mm Water Main - Queen Street East (Bram East)	Construction of a 400-mm water main on Queen Street East from McVean Drive to the Gore Road.	2024	Brampton	4	Schedule A+	WDM	400 mm	1400	$ 4,786,100
W-D-208	400-mm Water Main - Camilla Road	Construction of a 400-mm water main on Camilla Road from Dundas Street East to King Street East.	2027	Mississauga	2	Schedule A+	WDM	400 mm	260	$ 628,400
W-D-209	400-mm Water Main - Future Square One Drive Extension	Construction of a 400-mm water main on the future extension of Square One Drive from Rathburn Road West to Confederation Parkway.	2021	Mississauga	3	Schedule A+	WDM	400 mm	320	$ 743,600
W-D-210	400-mm Water Main - Centre View Drive (Mississauga City Centre)	Construction of a 400-mm water main on Centre View Drive from Confederation Parkway to Duke of York Boulevard.	2028	Mississauga	3	Schedule A+	WDM	400 mm	360	$ 2,575,900
W-D-213	Growth-Related Water Mains in the Mississauga City Centre	Construction of several growth-related water mains in the Mississauga City Centre.	2019	Mississauga	3	Schedule A+	WDM	600 mm	300	$ 5,444,000
W-D-214	400-mm Water Main - Queen Street East (Bram East)	Construction of a 400-mm water main on Queen Street East from The Gore Road to Highway 50.	2028	Brampton	4	Schedule A+	WDM	400 mm	630	$ 1,763,300
W-D-215	400-mm Water Main - Future Street (Heritage Heights)	Construction of a 400-mm water main on a future street from Wanless Drive southeasterly to a future street.	2030	Brampton	6	Schedule A+	WDM	400 mm	2170	$ 2,703,500
W-D-216	400-mm Water Main - Hydro Road (Inspiration Lakeview)	Construction of a 400-mm water main on Hydro Road from Lakeshore Road East to the future Street A.	2031	Mississauga	1	Schedule A+	WDM	400 mm	660	$ 969,200
W-D-217	400-mm Water Main - Future Street (Inspiration Lakeview)	Construction of a 400-mm water main on the future Street A from the future Street F to the future Street H.	2031	Mississauga	1	Schedule A+	WDM	400 mm	470	$ 718,200
W-D-218	400-mm Water Main - Lakefront Promenade (Inspiration Lakeview)	Construction of a 400-mm water main on Lakefront Promenade from Rangeview Road to the future Street A.	2031	Mississauga	1	Schedule A+	WDM	400 mm	570	$ 849,800
W-D-223	600/400-mm Water Main - Coleraine Drive (Bolton)	Construction of a 600-mm water main on Coleraine Drive from the Bolton Elevated Tank to Healey Road and a 400-mm water main on Coleraine Drive from Healey Road to George Bolton Parkway. (Section 2 of 2)	2019	Caledon	6	Schedule A+	WSTM	600 mm	1540	$ 5,329,000
W-TR-224	A.P. Kennedy Water Treatment Plant - Reservoir Expansion	Construction of a new 35-million-litre treated water reservoir at the A.P. Kennedy Water Treatment Plant.	2031	Mississauga		Schedule A+	WTP	35 ML	-	$ 68,275,000
W-TR-225	A.P. Kennedy Water Treatment Plant - Waste Building Expansion	Expansion of the Waste Building at the A.P. Kennedy Water Treatment Plant.	2036	Mississauga		Schedule A+	WTP	-	-	$ 26,450,000
W-D-226	600-mm Water Main - Clarkway Drive	Construction of a 600-mm water main on Clarkway Drive from Castlemore Road northerly to the future east-west road.	2022	Brampton	5	Schedule A+	WDM	600 mm	1450	$ 3,931,615

Master Plan ID	Project Name	Project Description	Year in Service	Municipality	Pressure Zone	Class EA	Project Type	Size/Capacity	Length (m)	Total Estimated Cost ($2020)
W-D-227	400-mm Water Main - Old School Road (Mayfield West Phase 3)	Construction of a 400-mm water main on Old School Road from Chinguacousy Road to McLaughlin Road.	2036	Caledon	7	Schedule A+	WDM	400 mm	1400	$ 4,786,100
W-D-228	400-mm Water Main - Old School Road (Mayfield West Phase 3)	Construction of a 400-mm water main on Old School Road from McLaughlin Road to Hurontario Street.	2036	Caledon	7	Schedule A+	WDM	400 mm	1390	$ 2,826,500
W-D-229	400-mm Water Main - Old School Road (Mayfield West Phase 3)	Construction of a 400-mm water main on Old School Road from Hurontario Street to Heart Lake Road.	2036	Caledon	7	Schedule A+	WDM	400 mm	2720	$ 6,863,800
W-D-230	400-mm Water Main - Future Street (Mayfield West Phase 4)	Construction of a 400-mm water main on a future street from Heart Lake Road to Dixie Road, north of Mayfield Road.	2031	Caledon	7	Schedule A+	WDM	400 mm	1380	$ 1,754,700
W-D-231	400-mm Water Main - Future Street (Mayfield West Phase 4)	Construction of a 400-mm water main on a future street from Dixie Road to Bramalea Road, north of Mayfield Road.	2033	Caledon	7	Schedule A+	WDM	400 mm	1370	$ 1,742,500
W-D-232	400-mm Water Main - Dixie Road (Mayfield West Phase 4)	Construction of a 400-mm water main on Dixie Road from Mayfield Road to 1,340 metres northerly.	2031	Caledon	6	Schedule A+	WDM	400 mm	1340	$ 3,690,800
W-D-233	400-mm Water Main - Future Street (Tullamore Industrial)	Construction of a 400-mm water main on a future street from Airport Road to Innis Lake Road, north of Mayfield Road.	2036	Caledon	6	Schedule A+	WDM	400 mm	1380	$ 2,122,000
W-D-234	400-mm Water Main - Future Street (Bolton West)	Construction of a 400-mm water main on a future street from Healy Road to approximately 1680 metres southerly, east of Humber Station Road.	2032	Caledon	6	Schedule A+	WDM	400 mm	1680	$ 2,482,100
W-D-235	400-mm Water Main - Future Street (Bolton West)	Construction of a 400-mm water main on a future street from Humber Station Road to 660 metres westerly.	2032	Caledon	6	Schedule A+	WDM	400 mm	660	$ 3,059,500
W-D-236	400-mm Water Main - Humber Station Road (Bolton West)	Construction of a 400-mm water main on Humber Station Road from Mayfield Road to 1450 metres northerly.	2024	Caledon	6	Schedule A+	WDM	400 mm	1450	$ 6,950,800
W-D-238	400-mm Water Main - Future Street (Bolton West)	Construction of a 400-mm water main on a future street from Healey Road to 1220 metres northerly, west of Humber Station Road.	2036	Caledon	6	Schedule A+	WDM	400 mm	1220	$ 1,562,900
W-D-239	400-mm Water Main - Future Street (Bolton West)	Construction of a 400-mm water main on a future street from Humber Station Road to 680 metres westerly, south of King Street.	2036	Caledon	6	Schedule A+	WDM	400 mm	680	$ 913,100
W-D-240	400-mm Water Main - Future Street (Bolton West)	Construction of a 400-mm water main on a future street from Humber Station Road to 680 metres westerly.	2036	Caledon	6	Schedule A+	WDM	400 mm	680	$ 913,100
W-D-241	400-mm Water Main - Future Street (Bolton West)	Construction of a 400-mm water main on a future street from future street north of Healey Road to 910 metres northerly, west of Humber Station Road.	2036	Caledon	6	Schedule A+	WDM	400 mm	910	$ 1,189,500
W-D-242	400-mm Water Main - Bramalea Road (Mayfield West Phase 4)	Construction of a 400-mm water main on Bramalea Road from north of Mayfield Road to 290 metres northerly.	2033	Caledon	6	Schedule A+	WDM	400 mm	290	$ 1,410,200
W-D-243	400-mm Water Main - Future Street (Mayfield West Phase 4)	Construction of a 400-mm water main on a future street from Dixie Road to Bramalea Road.	2032	Caledon	6	Schedule A+	WDM	400 mm	1360	$ 2,098,500
W-D-244	400-mm Water Main - Dixie Road (Mayfield West Phase 1)	Construction of a 400-mm water main on Dixie Road from the future Abbotside Way to 720 metres northerly.	2021	Caledon	7	Schedule A+	WDM	400 mm	720	$ 1,272,600

STORMWATER MANAGEMENT REPORT

HUMBER STATION VILLAGES PHASE 2

TOWN OF CALEDON

PROJECT: 2021-5139 AUGUST 2024

Revision	Description	Prepared		Checked	
		By	Date	By	Date
0.0	Original Report	I. Chandan	August 2024	K. Shahbikian	August 2024

SCHAEFFERS
CONSULTING ENGINEERS

6 Ronrose Drive
Concord, Ontario L4K 4R3

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1.0 INTRODUCTION

This report presents comprehensive calculations supporting the stormwater management design outlined in the Humber Station Villages Comprehensive Environmental Impact Study and Management Plan (CEISMP) Phase 2 for the Town of Caledon, located within the Regional Municipality of Peel. The subject lands fall under the jurisdiction of the Toronto and Region Conservation Authority (TRCA) and are part of the Humber River watershed.

The purpose of this report is to provide an in-depth description and supplementary calculations for the proposed stormwater management design, ensuring alignment with applicable design criteria and standards.

This stormwater management (SWM) report has been prepared to support the Humber Station Villages Employment Area Secondary Plan application for the properties designated as Lots 1-5, Concession 5 (Albion) in the Town of Caledon.

1.1 Study Area

The Study Area encompasses approximately **236 hectares** within the West Humber River watershed, bordered by Humber Station Road to the west, Mayfield Road to the south, Healey Road to the north, and the eastern boundary of the Coleraine West Employment Area Secondary Plan Area. A location plan is provided in **Figure 1.1**.

The subject area is primarily composed of actively cultivated fields, with natural and cultural vegetation largely concentrated in the eastern valley surrounding a tributary of the West Humber River, known as the Clarkway Drive Tributary. Additionally, two woodlots are located in the northwest and north-central portions of the Study Area, with scattered residential dwellings along the bordering roads. For the development plan, please refer to **Figure 1.2**.

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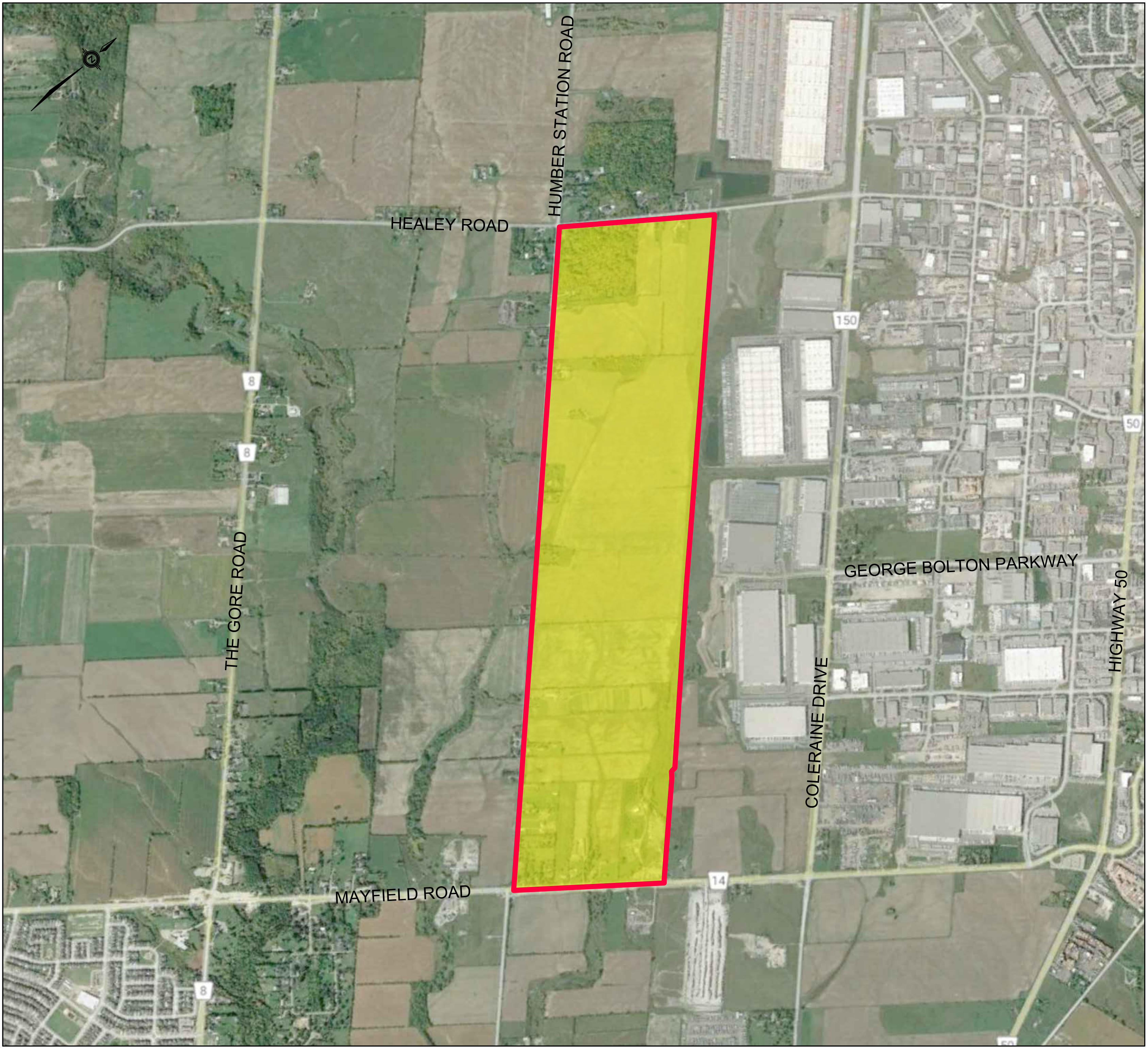

HUMBER STATION VILLAGES
TOWN OF CALEDON

LEGEND

🟨 SUBJECT LOCATION

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FIGURE 1.1
LOCATION PLAN

2021-5139	AUGUST2024	SCALE: N.T.S.

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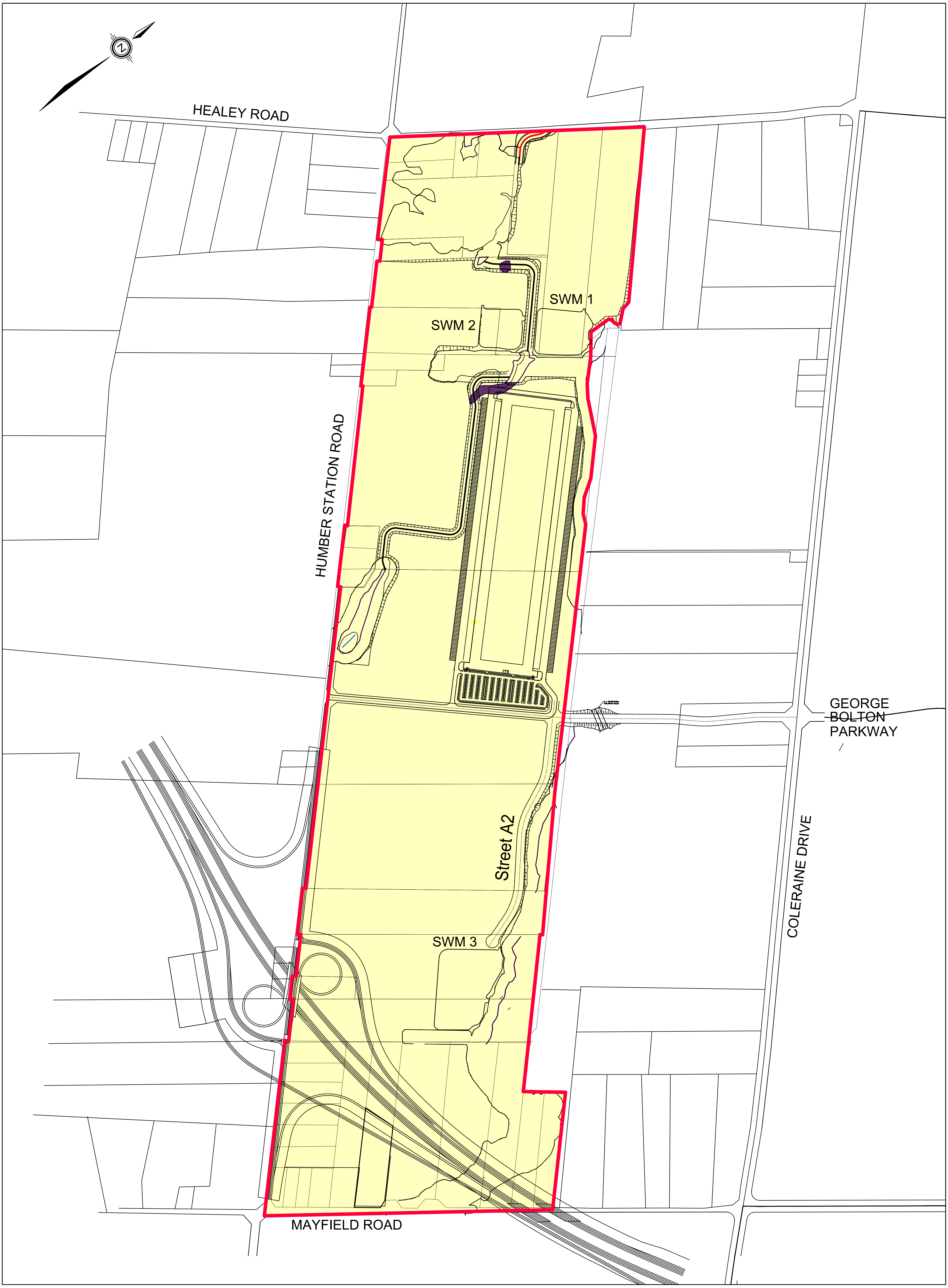

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FIGURE 1.2
DEVELOPMENT PLAN

2021-5139	AUGUST2024	SCALE: N.T.S.

2.0 EXISTING DRAINAGE PATTERN

The Humber Station Villages Study Area, situated within the Humber River Watershed, is predominantly agricultural land interspersed with smaller residential parcels and woodlots. This area contains several hydrological features that play a critical role in drainage and landscape sustainability.

Key Hydrological Features

Headwater Drainage Feature (HDF-3)

HDF-3 enters the Study Area from Healey Road, flows diagonally across the landscape, and exits via Humber Station Road. This feature plays a significant role in the site's drainage as it converges with Gore Road Tributary Reach 1 immediately west of the Humber Station Road crossing.

Clarkway Drive Tributary Reach 2

Running along the eastern boundary, Clarkway Drive Tributary Reach 2 is the primary drainage conduit for approximately 60% of the Study Area. The tributary's position along this boundary directs significant surface water flow.

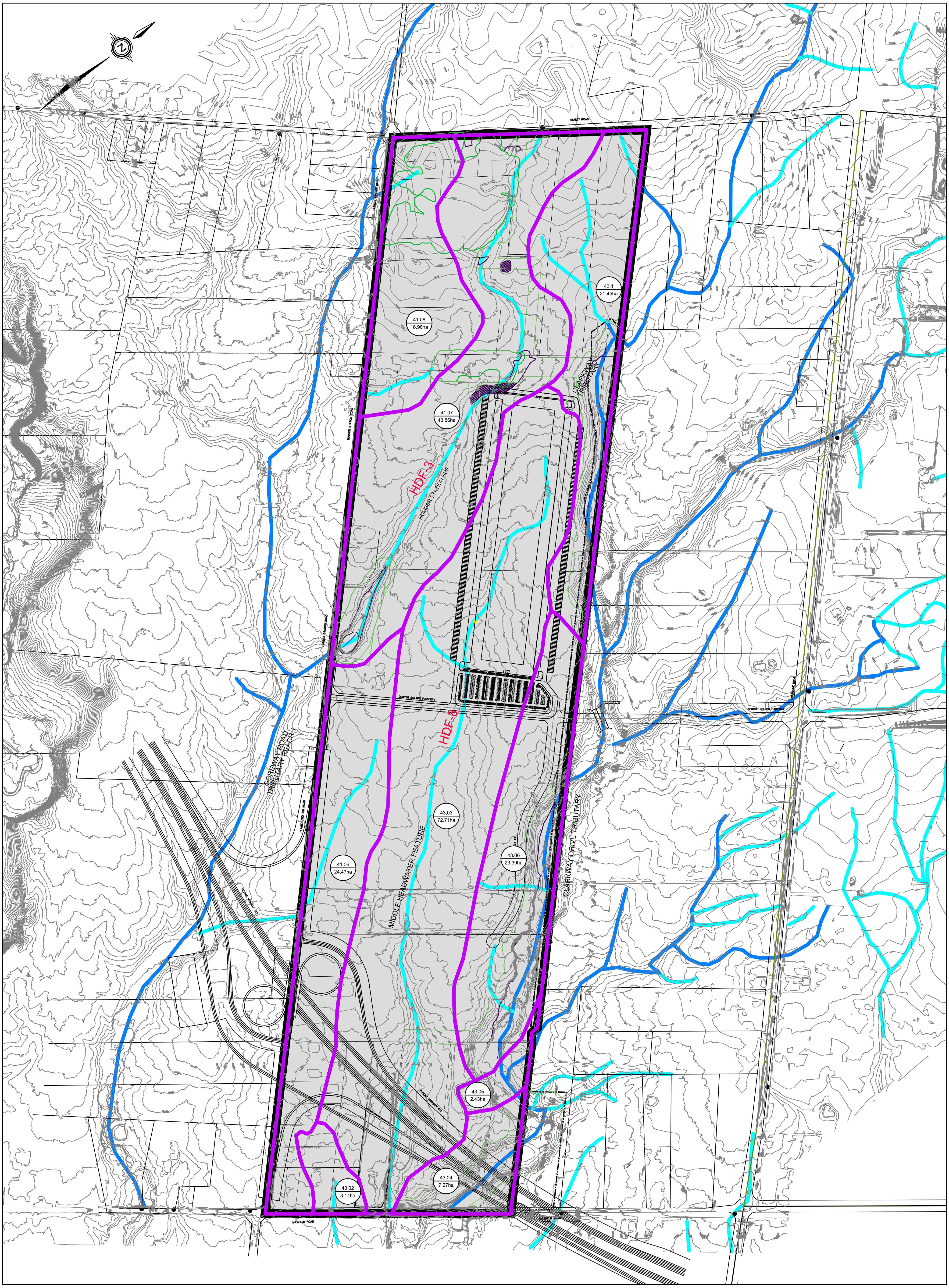
Headwater Drainage Feature (HDF-8)

Oriented along a north-south axis through the central part of the site, HDF-8 connects to Clarkway Drive Tributary Reach 2 just south of Mayfield Road, beyond the Study Area's southern boundary. HDF-8 drains approximately **72.71** hectares north of Mayfield Road, with no external drainage area. North of the proposed Highway 413 corridor, the drainage area for this feature encompasses around **52** hectares.

Gore Road Tributary Reach 1

This tributary drains the northwestern section of the Study Area, covering about 40% of the total area. Gore Road Tributary Reach 1 is integral to the site's drainage infrastructure, working in conjunction with other features to optimize water management across the landscape.

For a detailed visual of these drainage features and their respective locations, please refer to **Figure 2.1**.



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▨	SUBJECT LOCATION	▬	WATERCOURSE
☐	PRE DEVELOPMENT DRAINAGE BOUNDARY	▬	HDF
43.02 3.11ha	TRCA CATCHMENT ID TRCA AREA IN HECTARES		

FIGURE 2.1
PRE-DEVELOPMENT DRAINAGE PLAN

2021-5139	AUGUST 2024	SCALE: N.T.S.

3.0 STORMWATER MANAGEMENT CRITERIA

The following studies and design criteria were utilized in the preparation of this Stormwater Management Report:

- Stormwater Planning and Design Manual (SWMP), by *Ministry of the Environment, Conservation, and Parks (MECP)*, March 2003;
- Stormwater Management Criteria, by *Toronto and Region Conservation Authority*, August 2012;
- Humber Station Villages Master Environmental Servicing Plan (September 2007; Stonybrook Consulting, Savanta Inc., Stantec Consulting Ltd., KLM Planning Partners Inc., Parish Geomorphic Ltd., R.J. Burnside & Associates, Schaeffers Consulting Engineers; Prepared for Solmar Development Company);
- Region of Peel Official Plan (2022);
- Town of Caledon Official Plan (2018);
- Town of Caledon: Development Standards Manual (2019)
- Ministry of Natural Resources: Natural Heritage Reference Manual: Second Edition (OMNR 2010);
- Humber River Watershed Plan (TRCA, 2008a);
- Humber River Watershed Plan Implementation Guide (TRCA, 2008b);
- Humber River Watershed Report Card (TRCA, 2018a);
- Final Report Humber River Hydrology Update (TRCA, 2015a) for Existing Condition;
- Final Report Humber River Hydrology Update (TRCA, 2018b) for Future Condition;
- TRCA Master Environment and Servicing Plan Guideline (TRCA, 2015b);
- The Guidance for Development Activities in Reside Dace Protected Habitat", March 2016, by the Ontario Ministry of Natural Resources and Forestry

3.1 Water Quantity Control

As the subject lands fall within the TRCA jurisdiction, quantity flood control measures are required based on unitary release rates. For this development, located within Sub Basin 36 of the Humber River Watershed, target release rates are determined using the unit flow rates outlined in Equation F from Table E.1 in the TRCA SWM Criteria. Storage requirements have been analyzed using the 6-hour and 12-hour AES distributions, Hurricane Hazel distribution, and the 4-hour Chicago storm distribution.

3.2 Water Quality Control

End-of-pipe water quality treatment for stormwater runoff is proposed to provide an "enhanced" level of protection for receiving waters, as outlined in Table 3.2 of the *Stormwater Planning and Design Manual* (March 2003) issued by the Ministry of the Environment (MOE).

3.3 Erosion Control

According to the CEISMP Phase 2 report, both the Clarkway Drive Tributary and the Gore Road Tributary have been determined to exhibit low sensitivity to erosion, considering modifications to the hydrologic regime associated with the proposed development. In line with TRCA requirements for stormwater management facilities, extended detention of the 25mm rainfall event over a 48-hour period is mandated for effective erosion control.

3.4 Water Balance

According to Source Water Protection Atlas, the Study Area lies outside of a Significant Groundwater Recharge Area (SGRA). This is supported by the soil conditions, as most of the Study Area is covered by fine-grained Halton Till at the surface, suggesting that groundwater recharge rates are minimal, though some recharge to the underlying aquifers is still expected.

3.5 CLI ECA

Developments within the Peel Region must adhere to the requirements set forth by the CLI-ECA. The CLI-ECA mandates that at least 27mm of water be managed through retention methods, such as infiltration and reuse, to the greatest extent feasible, with filtration applied to any remaining volume. Conventional water quality control measures may only be implemented after all opportunities for maximizing retention and filtration have been exhausted.

3.6 Thermal Mitigation

The subject site drains to a tributary that is Redside Dace habitat and therefore, measures should be implemented to provide thermal mitigation. Requirements stated in the "*The Guidance for development activities in Redside Dace protected habitat*", dated March 2016 should be implemented.

4.0 STORMWATER MANAGEMENT

To comply with the stormwater management (SWM) parameters outlined above, three (3) SWM ponds and one (1) SWM tank are proposed within the Humber Station Villages Study Area. The hydrologic models reflecting both existing and proposed conditions of the Humber River, as well as the design parameters for the SWM ponds, are discussed and summarized in the following subsections.

It is important to note that the CEISMP Phase 2 evaluates potential Low Impact Development (LID) measures that may be implemented, considering site constraints, and assesses their applicability. A treatment train approach that includes filtration, in conjunction with the proposed SWM ponds, is recommended for the site. Notably, SWM Pond 1, SWM Pond 2, and the third SWM pond are designed to incorporate filtration facilities to assist in meeting CLI-ECA requirements.

4.1 Existing TRCA Hydrology

In the original TRCA model, the subject lands are included within the Humber Hydrology Model in Catchments 43.10, 43.06, 43.05, 43.03, 43.04, 43.02, 41.08, and 41.07 of the Humber River, draining to the Clarkway Tributary and Gore Road Tributary. The following **Table 4.1**, outlines the modeling parameters for the Future TRCA Humber River Model.

Table 4.1: Humber River Model Parameters

Catchment Name/ID	Area (ha)	Hydrograph	Model Parameters	Regional Storm
				Future Regional (CNIII)
43.10	202.72	Standhyd	**Curve number**	**97**
			TIMP	**0.219**
			XIMP	**0.217**
			IA (mm) (losses)	**5**
			TP (hours)	**N/A**
43.06	35.79	Nashyd	**Curve number**	**96**
			TIMP	**N/A**
			XIMP	**N/A**
			IA (mm)	**10**
			TP (hours)	**1.17**
43.05	39.74	Nashyd	**Curve number**	**99**
			TIMP	**N/A**
			XIMP	**N/A**
			IA (mm)	**10**
			TP	**1.63**
43.03	63.04	Nashyd	**Curve number**	**97**
			TIMP	**N/A**
			XIMP	**N/A**
			IA (mm)	**10**
			TP (hours)	**2.76**
43.04	24.96	Nashyd	**Curve number**	**98**
			TIMP	**N/A**
			XIMP	**N/A**
			IA (mm)	**10**
			TP (hours)	**1**
43.02	129.13	Nashyd	**Curve number**	**99**
			TIMP	**N/A**
			XIMP	**N/A**
			IA (mm)	**10**

Catchment Name/ID	Area (ha)	Hydrograph	Model Parameters	Regional Storm
				Future Regional (CNIII)
			TP (hours)	2.15
41.06	127.87	Nashyd	Curve number	97
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	1.9
41.07	101.08	Nashyd	Curve number	96
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	2.53
41.08	362.27	Nashyd	Curve number	97
			TIMP	N/A
			XIMP	N/A
			IA (mm)	10
			TP (hours)	3.09

4.2 Regional Storm Downstream Analysis

A downstream analysis of the subject site was conducted to determine if regional controls are required for the proposed SWM facilities. The assessment involved modelling and analyzing the following four scenarios:

- TRCA Future
- SCE Modified Future (updated to reflect detailed topography for the subject lands)
- Post-Development Uncontrolled (Full buildout)
- Post Development with Regional Controls for Pond 1 and 3 (Full buildout)

The hydrologic and hydraulic conditions for these scenarios were analyzed using Visual Otthymo (VO) and HEC-RAS modeling software. The Humber River hydrology model was updated utilizing VO, and consequently, the downstream analysis was conducted using VO modeling.

The analysis specifically focused on the proposed development along the Clarkway Tributary and Gore Road Tributary, assessing how uncontrolled flows from the subject site during a regional storm event would affect downstream nodes. Based on the results from the VO model analysis, it was concluded that regional controls are necessary for discharges to the Clarkway Tributary (i.e., Ponds 1 and 3); however, such controls are not required for drainage directed to the Gore Road Tributary (i.e., Pond 2 and the SWM Tank). Therefore, regional controls are proposed for Ponds 1 and 3.

The findings of the downstream analysis are summarized in the following subsections. The table below compares the peak flows for each scenario based on the SCE Modified Future model generated using VO. Refer to **Appendix A** for the area breakdown for the modelling scenarios.

4.2.1 Regional Downstream Analysis Results

Table 4.2 summarizes the flow within the Humber River within each model during the Regional Storm.

Table 4.2: Summary of Regional Flows

Tributary	**Area Reduction Factor**	**Node**	**TRCA Future Model Peak Flows (m^3/s)**	**SCE Modified Future Model Flows (m^3/s)**	**Post Development Uncontrolled Future Model Flows (m^3/s)**	**Post Development with Controls Model Flows (m^3/s)**	**SCE Modified Future /TRCA Future**	**Post Development Uncontrolled Future /SCE Modified Future**	**Post Development with Controls / SCE Modified Future**
Clarkway Tributary	100	857	76.14	76.41	85.95	75.95	**1.00**	**1.12**	**0.99**
	100	1458	90.29	90.66	100.61	90.07	**1.00**	**1.11**	**0.99**
	97.1	1012	107.49	107.87	115.69	107.18	**1.00**	**1.07**	**0.99**
	97.1	1766	129.44	129.78	137.35	129.10	**1.00**	**1.06**	**0.99**
	97.1	1545	132.27	132.69	140.53	131.79	**1.00**	**1.06**	**0.99**
	94.8	1307	144.88	145.45	152.60	144.26	**1.00**	**1.05**	**0.99**
	94.8	1100	147.20	147.84	154.92	146.52	**1.00**	**1.05**	**0.99**
Gore Road Tributary	100	846	40.85	40.29	36.39	37.01	**0.99**	**0.90**	**0.92**
	99.2	1393	39.90	39.35	38.42	37.43	**0.99**	**0.98**	**0.95**
	99.2	1461	51.03	50.66	54.37	50.96	**0.99**	**1.07**	**1.01**
	97.1	1819	68.92	68.62	70.07	67.82	**1.00**	**1.02**	**0.99**
	97.1	1962	77.72	77.48	78.71	76.82	**1.00**	**1.02**	**0.99**
	97.1	1853	84.33	84.09	85.23	83.43	**1.00**	**1.01**	**0.99**

Tributary	Area Reduction Factor	Node	TRCA Future Model Peak Flows (m^3/s)	SCE Modified Future Model Flows (m^3/s)	Post Development Uncontrolled Future Model Flows (m^3/s)	Post Development with Controls Model Flows (m^3/s)	SCE Modified Future /TRCA Future	Post Development Uncontrolled Future /SCE Modified Future	Post Development with Controls / SCE Modified Future
	97.1	1696	84.31	84.04	85.49	83.38	**1.00**	**1.02**	**0.99**
	97.1	1389	99.22	98.95	100.60	98.35	**1.00**	**1.02**	**0.99**
	95.4	1690	99.29	99.04	100.41	98.28	**1.00**	**1.01**	**0.99**
	95.4	1959	107.85	107.60	108.65	106.84	**1.00**	**1.01**	**0.99**
Combined	94.2	727	258.89	259.26	267.21	257.16	**1.00**	**1.03**	**0.99**
	89.4	7589	245.52	245.94	254.40	243.76	**1.00**	**1.03**	**0.99**

*Refer to **Appendix A** for Map of node locations

The SCE Modified Future Model serves as an enhancement of the TRCA Future Model, integrating detailed topographical data relevant to the study area. A comparative analysis of the SCE Modified Future Model against the TRCA Future Model reveals minimal differences in flow at downstream nodes, with variations in peak flows being negligible—less than 1%. The SCE Modified Future Model was utilized for comparative analysis with other scenarios to assess the impact of peak flow changes during the regional event.

Table 4.2 illustrates that in the post-development uncontrolled scenario, the Clarkway Tributary experienced a 12% increase in peak flows, while the Gore Road Tributary exhibited increases of up to 7% at Node 1461. However, it is important to note that these model updates also resulted in a reduction of flow at certain nodes within the Gore Road Tributary downstream of the Humber Station Villages development. This reduction can be primarily attributed to a decrease in the area of natural drainage catchments contributing to the Gore Road Tributary and the introduction of a proposed channel. Consequently, the observed flow decrease is linked to the timing of peak flows in the Humber River and area diversions during the post-development phase. Furthermore, any observed reduction in peak flow between the release point and downstream locations is predominantly associated with modifications to the Hazel Reduction Factor, as detailed in the Humber River Hydrology Update Report (2018).

The peak flow values detailed in the aforementioned table were incorporated into the HEC-RAS model to evaluate their effects on water levels. A summary comparing existing conditions with the post-development uncontrolled scenario is included in **Appendix A**. The HEC-RAS analysis indicates that while regional controls are necessary for Ponds 1 and 3, which discharge into the Clarkway Tributary, the situation is markedly different for the Gore Road Tributary.

For the Gore Road Tributary, only marginal increases in water levels were recorded, predominantly within valley corridors. Additionally, at the confluence of the Gore Road and Clarkway Tributaries, a mere 3% increase in peak flow was documented. These findings demonstrate that the hydrologic response of the Gore Road Tributary does not warrant the implementation of regional controls for Pond 2 and the SWM Tank.

In a further assessment that included on-site regional controls, Ponds 1 and 3 were designed with regional controls, while Pond 2 and the SWM Tank were modeled utilizing 2-100 year controls. Site plans directing drainage to Pond 3 are proposed to include on-site regional controls, whereas developments discharging into the proposed channel are aligned with 2-100 year controls. The proposed regional controls are derived from flow per hectare calculations based on the TRCA Humber River Model, as depicted **in Figure 4.3**, which illustrates the regional release rate on an area basis.

Table 4.2 demonstrates that the downstream analysis identifies no anticipated adverse impacts from the subject lands with regional controls applied to Ponds 1 and 3. The proposed stormwater management (SWM) strategies successfully mitigate peak flows, ensuring that no significant increases occur at critical nodes, as detailed in the key node map in **Appendix A**. This analysis strongly supports the conclusion that additional regional controls are not required for the Gore Road Tributary, as current hydrological conditions can be managed effectively within the existing framework.

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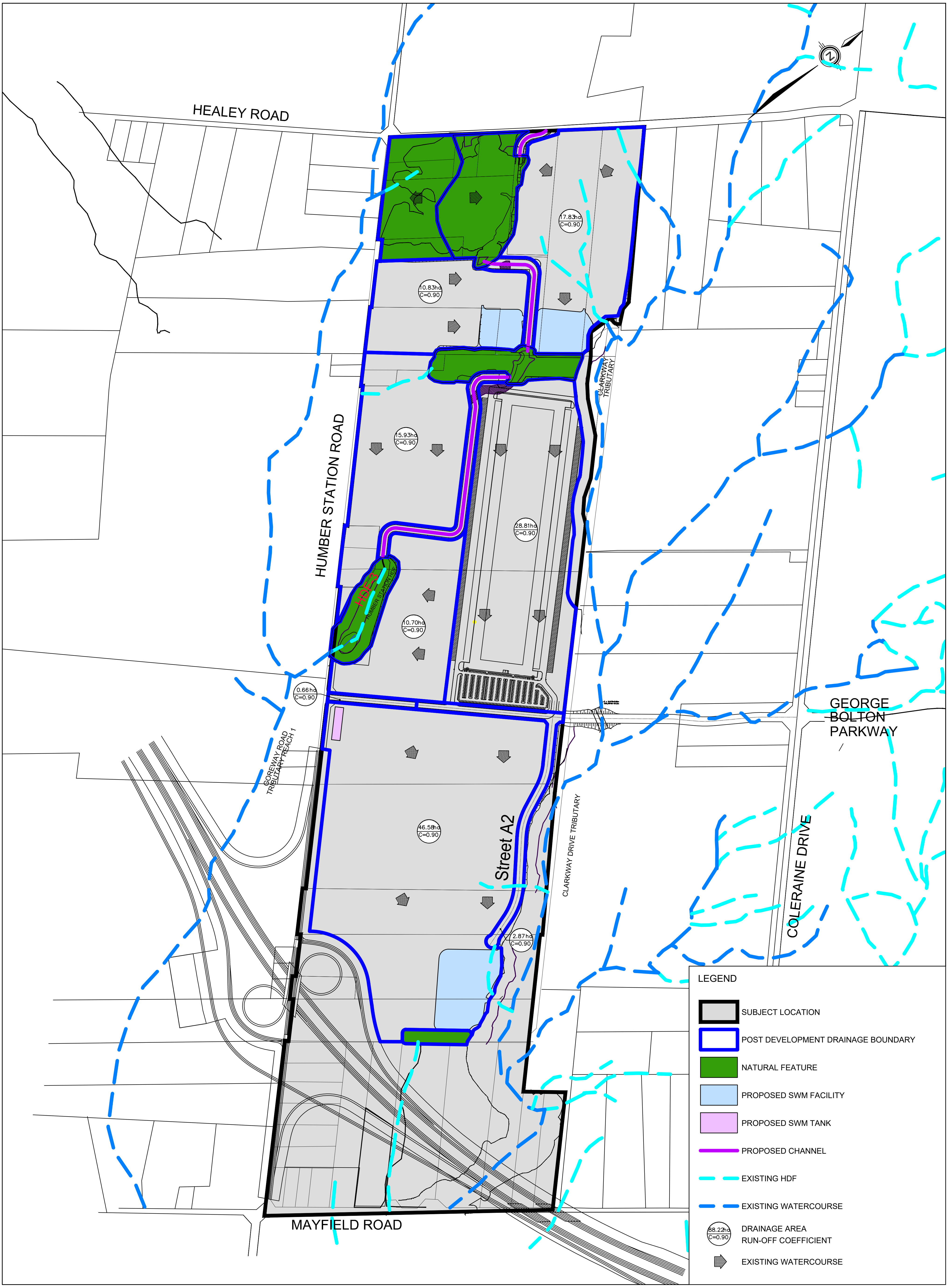

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LEGEND
(SEE ABOVE)

FIGURE 4.1
POST-DEVELOPMENT BOUNDARIES

2021-5139 | AUGUST 2024 | SCALE: N.T.S.

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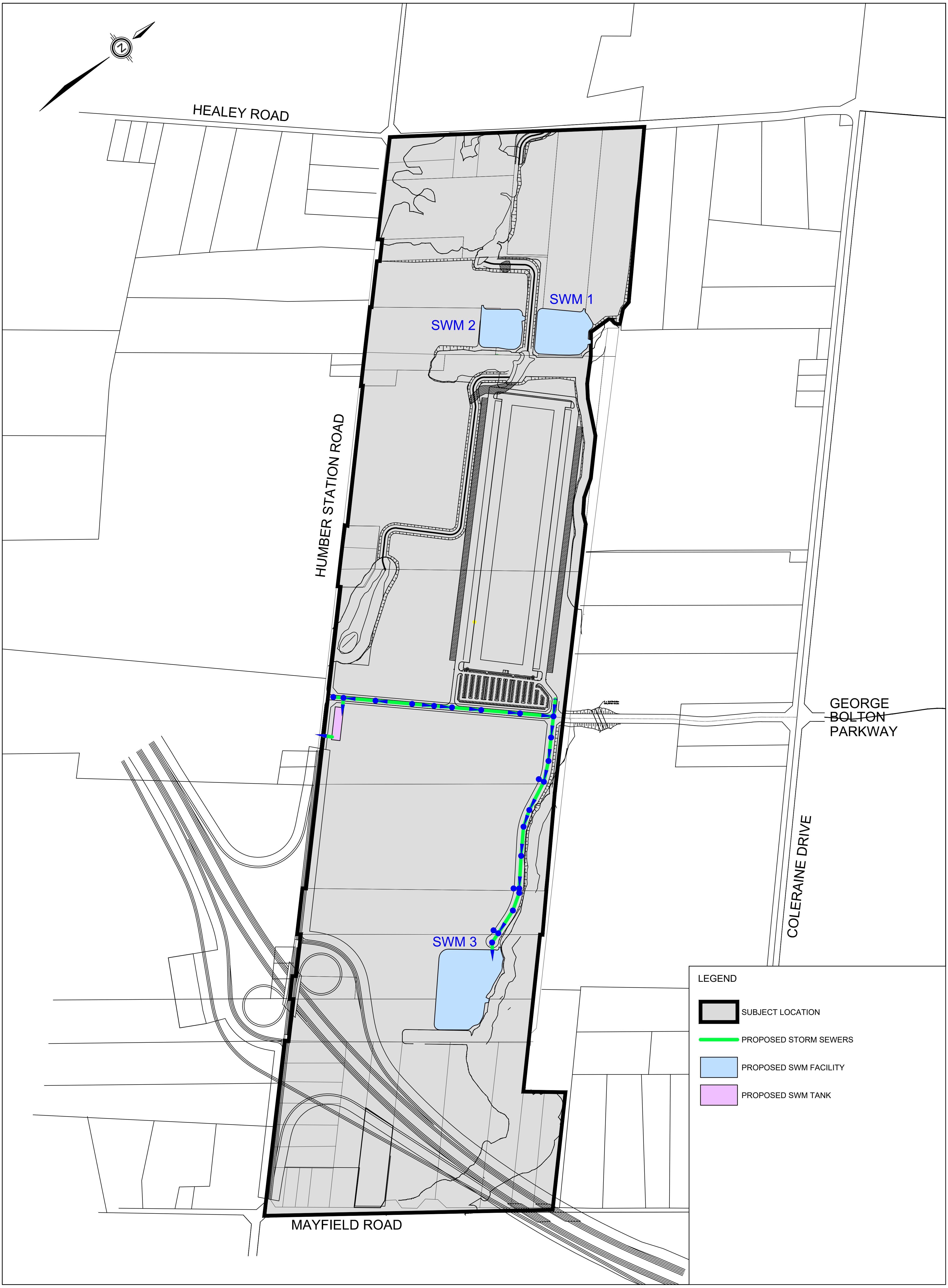

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LEGEND
(SEE ABOVE)

FIGURE 4.2
POST DEVELOPMENT SERVICING

2021-5139	AUGUST 2024	SCALE: N.T.S.

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LEGEND

▭ SUBJECT LOCATION

41.08 / 88L/s/ha PRE-DEVELOPMENT CATHCMENT ID / REGIONAL RELEASE RATE

FIGURE 4.3
REGIONAL RELEASE RATE

2021-5139 AUGUST 2024 SCALE: N.T.S.

4.3 Model Parameters, Hydrographs, and Assumptions

The input parameters for the catchments under both existing and proposed conditions are detailed in **Appendix A**. Consistent with the TRCA Humber River Watershed Criteria, the 6-hour and 12-hour AES design storms were utilized, along with the 4-hour Chicago Distribution as specified by the Town of Caledon. It is important to highlight that the design storm yielding the highest required volume was selected to ensure a conservative approach to the design.

4.4 SWM Pond 1

In this section, the design parameters of SWM Pond 1 are discussed in more detail.

4.4.1 Drainage Area to SWM Pond 1

The contributing drainage area to SWM Pond 1 encompasses **17.83 ha**. Key catchment parameters for this area are provided in **Table 4.3**.

Table 4.3: Catchment Parameters of SWM Pond 1 Drainage Area

Area (ha)	Catchment Type	TIMP (%)	XIMP (%)
17.83	StandHYD	99	99

4.4.2 Quality Control

As discussed previously, level one (1) protection should be provided from the SWM Pond 1 as part of a treatment train approach to quality control. As per the following calculations, the SWM Pond 1 requires **4,190 cubic meters** of permanent pool volume to meet “Enhanced” Level 1 protection.

Estimated Imperviousness =	99%				
Area =	17.83 ha				
Level of Protection:	1				
SWMP Type:	Wet Pond				
Calculation:					
Total Storage Volume Required =	275	m3/ha	→	4,903	m^3
Permanent Pool Volume =	235	m3/ha	→	4,190	m^3
Active Storage Volume =	40	m3/ha	→	713	m^3

It should be noted that the provided volume for SWM Pond 1 is **4,800 cubic meters** which exceeds the required volume.

4.4.3 Erosion Control

Erosion control for Pond 1 will be provided by detaining the 25mm rainfall event over 48 hours. The following calculation summarizes the erosion control volume and peak release rates for extended detention.

Input:			
Area =	ha	17.83	
R.V =	mm	23.86	Simulating a 25mm rainfall (VO model)
Draw Down Time =	hrs.	48	
Calculations:			
Required Storage =	m3	4,255	
Average Outflow =	m3/s	0.025	
Peak Outflow =	m3/s	0.037	(Estimated at 1.5 times Average Outflow)

4.4.4 CLI ECA Requirements

To satisfy CLI-ECA requirements, the site must filter or infiltrate 27mm of runoff volume. Due to unfavorable site soils for infiltration, filtration is proposed, requiring a total filtration volume of

4,766 m³. A filter bed was used sized using equation 4.12 of the MOE SWM Design Manual, it was determined that a filter bed with a **1,300 m²** footprint is required, based on a sand media with a depth of 0.8m and a drawdown time of 48-hours. The filter bed within SWM Pond 1 has been designed to provide a surface area of **1,800 m²**.

4.4.5 Thermal Mitigation

As per the Humber Station CEISMP Phase 1 report, the presence of contributing habitat for Redside Dace has been confirmed within the Study Area. The Clarkway Tributary, along its associated riparian wetland communities and HDF-8 are identified as contributing habitat for Redside Dace. Consequently thermal mitigation is proposed for any discharge to the Clarkway Tributary such as Pond 1.

Measures have been adopted to reduce the thermal impact of the proposed SWM concept on Redside Dace habitat downstream of the subject site. These include incorporating infiltration of runoff and an end of pipe system to achieve cooling prior to discharge to the watercourse.

In regard to infiltration, as described in **Section 4.8** the different LID options are discussed in the CEISMP Phase 2 Report. Through retaining runoff, the total volume of heated runoff can be reduced, mitigating the thermal impacts to the watercourse.

Moreover, the filter bed in the proposed SWM pond will provide cooling at the outlet of the system just prior to discharge to the Clarkway Tributary. This will cool remaining runoff not previously infiltrated, that is subject to higher temperatures including runoff from the site plans impervious surfaces. It will serve to reduce temperatures of runoff from a projected 30 ºC to 15 ºC. The surrounding area of the SWM pond and filter bed is recommended to have natural landscaping to provide shade to contribute to temperature control. The filter bed has been sized to convey a 27mm storm. Excess runoff from major storms will overflow and drain into the watercourse. Detailed sizing of the filter bed can be finalized in detail design stage.

4.4.6 Quantity Control

To meet the allowable release rates of the prescribed unit flow rates, the following volumes should be provided for each storm event.

Table 4.4: Allowable Release Rate SWM Pond 1

Storm	Tributary Area		Target Release Rate	
	Existing (ha)	Proposed (Controlled) (ha)	Unit flow (*) (L/s/ha)	Discharge (m^3/s)
2-year	12.24	17.83	7.71	0.094
5-year			11.81	0.145
10-year			14.52	0.178
25-year			18.28	0.224
50-year			21.35	0.261
100-year			24.11	0.295
Regional			--	1.670

Note:
(*) Unit flow calculated based on the existing tributary area using the TRCA equation
(**) Release rate = (Unit flow) x (Pre-development controlled tributary area)

A hydrologic analysis using Visual OTTHYMO software was completed to determine the required SWM Pond 1 storage. It should be noted that the design storm that yields the highest required volume has been used at this stage to provide the most conservative design. The provided active storage for Pond 1 is **15,400m^3** for 100-year storm event and **23,700m^3** for the regional storm event.

Table 4.5: SWM Pond 1 Storage Requirement

Storm	Allowable Release Rate	VO Required Storage*
	(m^3/s)	(m^3)
25mm Erosion Control	0.037	4,255
2 - Year	0.094	5,850
5 - Year	0.145	7,390
10 - Year	0.178	8,770
25 - Year	0.224	10,750
50 - Year	0.261	12,100
100 - Year	0.295	13,580
Regional	1.670	21,210

**Note: Based on governing storm event*

4.5 SWM Pond 2

In this section, the design parameters of SWM Pond 2 are discussed in more detail.

4.5.1 Drainage Area to SWM Pond 2

The drainage area to SWM Pond 2 consists of **10.83 ha** of land.

Table 4.6: Catchment Parameters Drainage Area to SWM Pond 2

Area (ha)	Catchment Type	TIMP (%)	XIMP (%)
10.83	StandHYD	99	99

4.5.2 Quality Control

As discussed previously, level one (1) protection should be provided from the SWM Pond as part of a treatment train approach to quality control. As per the following calculations, SWM Pond 2 requires **2,527 cubic meters** of permanent pool volume to meet “Enhanced” Level 1 protection.

Estimated Imperviousness = 99%
Area = 10.83 ha
Level of Protection: 1
SWMP Type: Wet Pond

Calculation:
Total Storage Volume Required = 273 m3/ha → 2,960 m^3
Permanent Pool Volume = 233 m3/ha → 2,527 m^3
Active Storage Volume = 40 m3/ha → 433 m^3

It should be noted that the provided volume for SWM Pond 2 is **2,950 cubic meters** which exceeds the required volume.

4.5.3 Erosion Control

Erosion control for Pond 2 will be provided by detaining the 25mm rainfall event over 48 hours. The following calculation summarizes the erosion control volume and peak release rates for extended detention.

Input:				
	Area =	ha	10.83	
	R.V =	mm	23.73	Simulating a 25mm rainfall (VO model)
	Draw Down Time =	hrs.	48	
Calculations:				
	Required Storage =	m3	2,570	
	Average Outflow =	m3/s	0.0149	
	Peak Outflow =	m3/s	0.0223	(Estimated at 1.5 times Average Outflow)

4.5.4 CLI ECA Requirements

To meet CLI-ECA requirements, 27mm of runoff volume needs to be infiltrated or filtered. Given that the site's soils are not favourable for infiltration, filtration is proposed. The filter bed within SWM Pond 2 was sized in accordance with Equation 4.12 from the MOE SWM Design Manual, it was determined that a filter bed with a **900 m²** footprint is required, based on a sand media with a depth of 0.8m and a drawdown time of 48-hours. This design provides a filter bed surface area of **1,080 m²**, sufficient to accommodate the contributing drainage area.

4.5.5 Quantity Control

To meet the allowable release rates of the prescribed unit flow rates, the following volumes should be provided for each storm event.

Table 4.7: Allowable Release Rate for Pond 2

Storm	**Tributary Area**		**Target Release Rate**	
	Existing (ha)	**Proposed (Controlled) (ha)**	**Unit flow (*) (L/s/ha)**	**Discharge (m^3/s)**
2-year	8.88	10.83	7.94	0.070
5-year			12.17	0.108
10-year			14.96	0.133
25-year			18.84	0.167
50-year			22.02	0.196
100-year			24.85	0.221

Note:
(*) Unit flow calculated based on the existing tributary area using the TRCA equation

(**) Release rate = (Unit flow) x (Pre-development controlled tributary area)

A hydrologic analysis using Visual OTTHYMO software was completed to determine the required SWM Pond 2 storage. It should be noted that the design storm that yields the highest required volume has been used at this stage to provide the most conservative design. The provided active storage for Pond 2 is **8,900m^3** for a 100-year storm event.

Table 4.8: SWM Pond 2 Storage Requirement

Storm	**Allowable Release Rate**	**VO Required Storage***
	(m^3/s)	**(m^3)**
25mm Erosion Control	0.022	2,570
2 - Year	0.070	3,460
5 - Year	0.108	4,380
10 - Year	0.133	5,210
25 - Year	0.167	6,380
50 - Year	0.196	7,180
100 - Year	0.221	8,070

**Note: Based on governing storm event*

4.6 SWM Pond 3

In this section, the design parameters of SWM Pond 3 are discussed in more detail.

4.6.1 Drainage Area to the SWM Pond

The drainage area to SWM Pond 3 consists of a total of **78.26 ha** of land, with **75.39 ha** from site plans and **2.87 ha** from proposed municipal roadways.

Table 4.9: Catchment Parameters for SWM Pond 3

Area (ha)	**Catchment Type**	**TIMP (%)**	**XIMP (%)**
2.87	StandHYD	80	80
75.39	StandHYD	99	99

4.6.2 Quality Control

As discussed previously, level one (1) protection should be provided from the SWM Pond as part of a treatment train approach to quality control. As per the following calculations, SWM Pond 3 requires **18,261 cubic meters** of the permanent pool to meet Level 1 protection.

Input:				
Estimated Imperviousness =	99%			
Area =	78.26 ha			
Level of Protection:	1			
SWMP Type:	Wet Pond			
Calculation:				
Total Storage Volume Required =	273	m^3/ha →	21,391	m^3
Permanent Pool Volume =	233	m^3/ha →	18,261	m^3
Active Storage Volume =	40	m^3/ha →	3,130	m^3

It should be noted that the provided permanent pool volume for SWM Pond 3 is **19,510 cubic meters** which exceeds the required volume.

4.6.3 Erosion Control

Erosion control will be provided by detaining the 25mm rainfall event over 48 hours within SWM Pond 3. The following calculation summarizes the erosion control volume and peak release rates for extended detention.

Input:			
Area =	ha	78.26	
R.V =	mm	23.74	Simulating a 25mm rainfall (VO model)
Draw Down Time =	hrs.	48	
Calculations:			
Required Storage =	m3	18,577	
Average Outflow =	m3/s	0.1075	
Peak Outflow =	m3/s	0.1613	(Estimated at 1.5 times Average Outflow)

4.6.4 CLI ECA Requirements

To meet CLI-ECA requirements, 27mm of runoff volume needs to be infiltrated or filtered. Given that the site's soils are not favorable for infiltration, filtration is proposed. A filtration volume of **767 m^3** is required. The filter bed in SWM Pond 3 was designed following Equation 4.12 of the MOE SWM Design Manual, providing a surface area of **750 m^2** to adequately accommodate the contributing drainage area.

Please note that the filter bed for Pond 3 is specifically designed to meet CLI ECA requirements for the right-of-way (ROW) exclusively. Individual site plans upstream of Pond 3 are responsible for fulfilling their respective CLI ECA criteria independently.

4.6.5 Thermal Mitigation

Measures have been implemented to reduce the thermal impact of the proposed SWM concept on Redside Dace habitat downstream of the site. These measures include incorporating runoff infiltration and an end-of-pipe system designed to cool the water before it discharges into the watercourse.

As detailed in **Section 4.8** and discussed in the CEISMP Phase 2 Report, various Low Impact Development (LID) options are considered for infiltration. By retaining runoff, the total volume of heated water is reduced, thereby mitigating thermal impacts on the watercourse.

Additionally, the filter bed in the proposed SWM pond will provide cooling at the system's outlet just before discharge into the Clarkway Tributary. This will cool the remaining runoff, including water from impervious surfaces, which may have higher temperatures. The filter bed is expected to reduce runoff temperatures from approximately 30°C to 15°C. It is recommended that the area surrounding the SWM pond and filter bed be landscaped naturally to provide shade and further contribute to temperature control. The filter bed is sized to handle a 27mm storm for the ROW, with excess runoff from major storms designed to overflow and drain into the watercourse. Detailed filter bed sizing will be determined during the detailed design stage.

4.6.6 Quantity Control

To meet the allowable release rates of the prescribed unit flow rates, the following volumes should be provided for each storm event.

Table 4.10: Allowable Release Rate for Pond 3

Storm	Tributary Area		Target Release Rate	
	Existing (ha)	Proposed (Controlled) (ha)	Unit flow $^{(*)}$ (L/s/ha)	Discharge (m^3/s)
2-year	64.22	78.26	6.51	0.418
5-year			9.92	0.637
10-year			12.24	0.786
25-year			15.39	0.989
50-year			17.90	1.150
100-year			20.27	1.302
Regional			--	4.953

Note:
(*) Unit flow calculated based on the existing tributary area using the TRCA equation
(**) Release rate = (Unit flow) x (Pre-development controlled tributary area)

A hydrologic analysis using Visual OTTHYMO software was completed to determine the required SWM Pond 3 storage. It should be noted that the design storm that yields the highest required volume has been used at this stage to provide the most conservative design. The provided active storage for Pond 3 is **29,670m^3** for 100-year storm event and **48,500m^3** for the Regional storm event.

Table 4.11: SWM Pond 3 Storage Requirement

Storm	Allowable Release Rate	VO Required Storage*
	(m^3/s)	(m^3)
25mm Erosion Control	0.006	18577
2 - Year	0.418	23,164
5 - Year	0.637	24,230
10 - Year	0.786	24,794
25 - Year	0.989	25,773
50 - Year	1.150	26,431
100 - Year	1.302	27,235
Regional	4.953	44,047

**Note: Based on governing storm event*

4.7 SWM Tank

In this section, the design parameters of the proposed SWM Tank are discussed in more detail.

4.7.1 Drainage Area to the SWM Tank

The drainage area to the SWM Tank consists of **0.66 ha** of proposed municipal roadways.

Table 4.12: Catchment Parameters for SWM Pond 3

Area (ha)	Catchment Type	TIMP (%)	XIMP (%)
0.66	StandHYD	99	99

4.7.2 Quality Control

As previously mentioned, Level 1 protection should be implemented for the SWM Tank as part of a treatment train approach to quality control. Based on the following calculations, the SWM Tank requires a permanent pool volume of **154 cubic meters** to achieve Level 1 protection.

SWM Tank Quality Control

Input:

Estimated Imperviousness =	99%			
Area =	0.66 ha			
Level of Protection:	1			
SWMP Type:	Wet Pond			

Calculation:

Total Storage Volume Required =	273	m^3/ha →	180	m^3
Permanent Pool Volume =	233	m^3/ha →	154	m^3
Active Storage Volume =	40	m^3/ha →	26	m^3

Alternatively, a treatment train approach incorporating Oil Grit Separators (OGS) and bioretention (stormwater planters) may be considered to achieve quality control requirements. Preliminary sizing and calculations for OGS and bioretention are provided in **Appendix A**. Final selection of the quality control method for this right-of-way will be confirmed in consultation with the city to determine the preferred approach.

4.7.3 Erosion Control

Erosion control will be provided by detaining the 25mm rainfall event over 48 hours within the SWM Tank. The following calculation summarizes the erosion control volume and peak release rates for extended detention.

Input:				
	Area =	ha	0.66	
	R.V =	mm	19.04	Simulating a 25mm rainfall (VO model)
	Draw Down Time =	hrs.	48	
Calculations:				
	Required Storage =	m3	126	
	Average Outflow =	m3/s	0.0007	
	Peak Outflow =	m3/s	0.0011	(Estimated at 1.5 times Average Outflow)

Given that the peak flows required for extended detention for this right-of-way (ROW) are minimal, it is recommended that, if extended detention peak rates are unattainable, a retention volume of 5mm be implemented, subject to groundwater conditions.

4.7.4 CLI ECA Requirements

In order to comply with CLI-ECA requirements, a runoff volume of 27 mm must be either infiltrated or filtered. Due to the unfavorable soil conditions for infiltration at the site, filtration is recommended. Bio-filters will be implemented along the right-of-way (ROW) to satisfy these requirements. Preliminary sizing based on MOE Equation 4.12 suggest a minimum filter area of **65m^2** is required.

4.7.5 Quantity Control

To meet the allowable release rates of the prescribed unit flow rates, the following volumes should be provided for each storm event.

Table 4.13: Allowable Release Rate for SWM Tank

Storm	Tributary Area		Target Release Rate	
	Existing (ha)	Proposed (Controlled) (ha)	Unit flow (*) (L/s/ha)	Discharge (m^3/s)
2-year	0.66	0.66	9.80	0.006
5-year			15.12	0.010
10-year			18.53	0.012
25-year			23.36	0.015
50-year			27.43	0.018
100-year			30.87	0.020

Note:
(*) Unit flow calculated based on the existing tributary area using the TRCA equation
(**) Release rate = (Unit flow) x (Pre-development controlled tributary area)

A hydrologic analysis using Visual OTTHYMO software was completed to determine the required SWM Tank storage. It should be noted that the design storm that yields the highest required volume has been used at this stage to provide the most conservative design.

Table 4.14: SWM Tank Storage Requirement

Storm	Allowable Release Rate	VO Required Storage*
	(m^3/s)	(m^3)
25mm Erosion Control	0.001	126
2 - Year	0.006	195
5 - Year	0.010	252
10 - Year	0.012	301
25 - Year	0.015	369
50 - Year	0.018	415
100 - Year	0.020	466

**Note: Based on governing storm event*

4.8

4.8 Application of Low Impact Development (LID) Measures

The right-of-ways cover a total of **3.53 ha** within the development area and given that the majority of the proposed Humber Station Villages development comprises site plans, it is recommended to comprehensively evaluate Low Impact Development (LID) measures at the site plan application stage based on site specific details. The proposed development concept suggests a centralized treatment approach within stormwater management (SWM) facilities to achieve quality control objectives.

For the selection of Best Management Practices (BMPs) across the site, various treatment train options were reviewed based on feasibility within the study area and alignment with the overarching SWM requirements. A detailed discussion on the applicable LID methods is available in the CEISMP Phase 2 report.

4.9 Water Balance

A comprehensive Water Balance analysis and consultation with the Toronto and Region Conservation Authority (TRCA) are required at the Master Environmental Servicing Plan (MESP) stage, in alignment with the TRCA 2012 Stormwater Management (SWM) Criteria. As per the Source Water Protection Atlas, the study area is located outside of a Significant Groundwater Recharge Area (SGRA). This finding is corroborated by the soil composition, predominantly fine-grained Halton Till, which characterizes much of the area and suggests inherently low groundwater recharge potential, although some recharge to underlying aquifers is still anticipated.

The proposed development encompasses approximately **3.53 hectares** of right-of-way (ROW) and **130.78 ha** of site plan area. It is recommended that each site plan adhere to post-to-pre-water balance requirements to maintain the water balance objectives for the study area. Based on water balance calculations in **Appendix C**, the pre-development infiltration rate is estimated at **348 282 m^3/year**. A deficit of **215,428 m^3/year** between post- and pre-development infiltration volumes has been and should be addressed in the post-development phase through appropriate mitigation measures. To meet the post-to-pre infiltration targets for the study area, it is recommended that site plans achieve an infiltration target of **4.20 mm** or make best efforts to attain this target. Supporting calculations are provided in **Appendix A**.

4.10 Wetland Compensation Area

A proposed wetland compensation area is planned south of SWM Pond 3. As the upper 340 meters of the HDF-8 drainage feature will be removed under the proposed conditions, a wetland compensation area (referred to as Wetland Compensation Area 3) will be established upstream of the remaining HDF-8 section to compensate for this change. This compensation area will receive clean roof runoff from the proposed employment lands. Refer to the CEISMP Phase 2 Report for additional details.

4.11 Floodplain Analysis

A floodplain analysis was conducted, and floodplain mapping was generated for the portions of the Gore Road Tributary and Clarkway Tributary within the Humber Station Villages lands. The results and analysis of the floodplain study are detailed in the reports prepared as part of the CEISMP Phase 2 submission for Humber Station Villages.

The floodplain analysis was based on the latest TRCA hydraulic model, updated to incorporate the most recent topographic and hydrology data. The regional floodline, which serves as the regulatory floodline, is situated below the spillways of the SWM ponds. For more information, please refer to the “Floodplain Analysis Report Phase 2, Humber Station Villages,” prepared by Schaeffers Consulting Engineers (August 2024), included in **Appendix D**.

5.0 SUMMARY

This report provides the hydrologic model and SWM Pond designs for the proposed development of Humber Station Villages in the Town of Caledon. A summary of this report is provided below.

1. The TRCA Humber River model Catchments 43.10, 43.06, 43.05, 43.03, 43.04, 43.02, 41.08, and 41.07 were modified to reflect the detailed topography of the study area and subsequently the proposed conditions to ensure there is no downstream impact on Humber River as a result of the development. Based on the downstream analysis regional controls are proposed for Ponds 1 and 3.

2. The SWM Ponds are designed in accordance with the relevant governing documents including the TRCA SWM Criteria, and the MOE SWM Criteria.

3. The water balance criteria of maintaining pre-development infiltration volumes will be achieved via site plans.

Should you have any questions or comments, please do not hesitate to contact our office.

Respectfully Submitted,

SCHAEFFERS & ASSOCIATES LTD.

LICENSED PROFESSIONAL ENGINEER
K. SHAHBIKIAN
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Aug 29/2024
PROVINCE OF ONTARIO

Ishraque Chandan

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Water Resources Analyst

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Partner

APPENDIX A

Hydrology Calculations

Humber Station Road

Project 5139

SCHAEFFERS
CONSULTING ENGINEERS

Pond 1 North East Side

Pre-Development Parameters	
Area (ha) Catchment 43.01	12.24
Total Area	**12.24 ha**

Post Development Parameters	
Area (ha)	17.83
Total Area (ha)	**17.83**

TIMP	0.99
XIMP	0.99

Release Rates

Storm Event	**Unit Flow Rate (m^3/s/ha)**	**Target* Rate (m^3/s)**	**Storage**			
			6-Hour AES (m3)	**12-Hour AES (m3)**	**4-hour Chicago (m3)**	**Max**
Erosion Event		**0.0369**				**4255**
2 Year	0.0077	0.094	5400	5850	5140	5850
5 Year	0.0118	0.145	7080	7380	7390	7390
10 Year	0.0145	0.178	8200	8410	8770	8770
25 Year	0.0183	0.224	9620	9710	10750	10750
50 Year	0.0214	0.261	10760	10780	12100	12100
100 Year	0.0241	0.295	11820	11770	13580	13580
Regional		**1.67**				21210

Note:Based on Unit Flow Equation F (Sub Basin 36)
*** Based on Pre-development Area**

Humber Station Road

Project 5139

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Pond 2 North West Side

Pre-Development Parameters	
Area (ha) Catchment 41.07	8.88
Total Area	**8.88 ha**

Post Development Parameters	
Area (ha)	10.93
Total Area (ha)	**10.93**

TIMP	0.99
XIMP	0.99

Release Rates

Storm Event	**Unit Flow Rate (m^3/s/ha)**	**Target Rate (m^3/s)**	**Storage**			
			6-Hour AES (m3)	**12-Hour AES (m3)**	**4-hour Chicago (m3)**	**Max**
Erosion Event *		**0.0223**				**2570**
2 Year	0.0079	0.0705	3220	3460	3060	3460
5 Year	0.0122	0.1081	4190	4310	4380	4380
10 Year	0.0150	0.1328	4850	4900	5210	5210
25 Year	0.0188	0.1673	5670	5660	6380	6380
50 Year	0.0220	0.1955	6580	6600	7180	7180
100 Year	0.0249	0.2207	7220	7200	8070	8070
Regional *						

Note:Based on Unit Flow Equation F (Sub Basin 36)

*** Based on Pre-development Area**

Humber Station Road

Project 5139

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Post Development Parameters	
Area (ha)	0.66
Total Area (ha)	**0.66**

Pre-Development Parameters	
Area (ha) Catchment 41.07	
	0.66
Total Area	**0.66 ha**

TIMP 0.99
XIMP 0.99

Release Rates

Storm Event	Unit Flow Rate (m³/s/ha)	Target* Rate (m³/s)	Storage			
			6-Hour AES (m3)	12-Hour AES (m3)	4-hour Chicago (m3)	Max
Erosion Event		**0.0011**				**126**
2 Year	0.0098	0.0065	187	195	180	195
5 Year	0.0151	0.0100	241	244	252	252
10 Year	0.0185	0.0122	279	278	301	301
25 Year	0.0234	0.0154	327	322	369	369
50 Year	0.0274	0.0181	363	354	415	415
100 Year	0.0309	0.0204	398	386	466	466
Regional						

e:RR Based on Unit Flow Equation F (Sub Basin 36)

*** Based on Pre-development Area**

Humber Station Road

Project 5139

Pond 2 South East

Pre-Development Parameters	
Area (ha)	
43.06	12.82
43.03	51.40
Total Area	**64.22 ha**

Post Development Parameters			
Area (ha)	Site Plans	75.39	75.28
	ROW	2.87	
	Total Area (ha)	**78.26**	

Release Rates

Storm Event	Unit Flow Rate (m^3/s/ha)	Target* Rate (m^3/s)	Storage			
			6-Hour AES (m3)	12-Hour AES (m3)	4-hour Chicago (m3)	Max
Erosion Event						
2 Year	0.0065	0.4183	4,118	4,587	3,948	4,587
5 Year	0.0099	0.6373	5,293	5,653	5,490	5,653
10 Year	0.0122	0.7862	5,965	6,217	6,202	6,217
25 Year	0.0154	0.9885	6,681	6,946	7,196	7,196
50 Year	0.0179	1.1496	7,240	7,468	7,854	7,854
100 Year	0.0203	1.3019	7,762	7,992	8,658	8,658
Regional		4.953				25,470

e:RR Based on Unit Flow Equation F (Sub Basin 36)

*** Based on Pre-development Area**

27,239

Humber Station Road

Project 5139

Site Plans to Pond 3

Pre-Development Parameters	
Area (ha)	
	75.39
Total Area	**75.39 ha**

Regional rates

Pre- Catchment	Contributing Area
41.06	10.56
43.03	51.4
43.06	10.76
41.07	2.67

Post Development Parameters	
Area (ha)	75.39
Total Area (ha)	**75.39**

75.28

Release Rates

Storm Event	**Unit Flow Rate (m^3/s/ha)**	**Target* Rate (m^3/s)**	**Storage**			
			6-Hour AES (m3)	**12-Hour AES (m3)**	**4-hour Chicago (m3)**	**Max**
Erosion Event						
2 Year	0.0064	0.4823	21,836	23,068	21,037	23,068
5 Year	0.0097	0.7344	28,956	29,573	30,305	30,305
10 Year	0.0120	0.9063	33,643	33,926	36,110	36,110
25 Year	0.0151	1.1394	39,580	39,445	44,340	44,340
50 Year	0.0176	1.3243	44,039	43,547	49,942	49,942
100 Year	0.0199	1.5003	48,387	47,599	56,083	56,083
Regional		5.813				94,020

e:RR Based on Unit Flow Equation F (Sub Basin 36)

*** Based on Pre-development Area**

EROSION CONTROL CALCULATIONS
SWM Pond 1 North East

Based on 25mm Storm Event Releasing over 48-Hour Period

Input:

Area = 17.83 ha
R.V = 23.86 mm
Draw Down Time = 48 hrs
TIMP = 99 %

Calculations:

Required Storage = 4,255 m^3
Average Outflow = 0.0246 m^3/s
Peak Outflow = 0.0369 m^3/s (Estimated at 1.5 times Average Outflow)

2024-07-25

EROSION CONTROL CALCULATIONS
SWM Pond 2 North West

Based on 25mm Storm Event Releasing over 48-Hour Period

Input:

Area = 10.83 ha
R.V = 23.729 mm
Draw Down Time = 48 hrs
TIMP = 99 %

Calculations:

Required Storage = 2,570 m^3
Average Outflow = 0.0149 m^3/s
Peak Outflow = 0.0223 m^3/s (Estimated at 1.5 times Average Outflow)

2024-07-25

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EROSION CONTROL CALCULATIONS
SWM Pond 3 South

Based on 25mm Storm Event Releasing over 48-Hour Period

Input:

Area = 78.26 ha
R.V = 23.74 mm
Draw Down Time = 48 hrs
TIMP = 99 %

Calculations:

Required Storage = 18,577 m^3
Average Outflow = 0.1075 m^3/s
Peak Outflow = 0.1613 m^3/s (Estimated at 1.5 times Average Outflow)

2024-07-25

EROSION CONTROL CALCULATIONS
SWM Underground Tank

Based on 25mm Storm Event Releasing over 48-Hour Period

Input:

Area = 0.66 ha
R.V = 19.04 mm
Draw Down Time = 48 hrs
TIMP = 99 %

Calculations:

Required Storage = 126 m^3
Average Outflow = 0.0007 m^3/s
Peak Outflow = 0.0011 m^3/s (Estimated at 1.5 times Average Outflow)

2024-07-25

Humber Station
WATER QUALITY REQUIREMENT CALCULATIONS
SWM Pond 1 North East

Table 3.2: 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	Infiltration	16.25	25	30	35	40	45
Level 1	Wetlands	36.25	80	105	120	140	160
Level 1	Hybrid Wet Pond/Wetland	40	110	150	175	195	215
Level 1	Wet Pond	52.5	140	190	225	250	275
Level 2	Infiltration	20	20	20	25	30	35
Level 2	Wetlands	42.5	60	70	80	90	100
Level 2	Hybrid Wet Pond/Wetland	48.75	75	90	105	120	135
Level 2	Wet Pond	55	90	110	130	150	170
Level 3	Infiltration	20	20	20	20	20	20
Level 3	Wetlands	60	60	60	60	60	60
Level 3	Hybrid Wet Pond/Wetland	42.5	60	70	75	80	85
Level 3	Wet Pond	33.75	60	75	85	95	105
Level 3	Dry Pond (Continuous Flow)	0	90	150	200	240	280

* For wet ponds, wetlands, and hybrid facilities, all of the storage, except for 40 m ^{3}/ha represents the permanent pool volume.

The 40 m^3/ha represents extended detention storage.

SWM Pond 1 North East

Input:

Estimated Imperviousness = 99%

Area = 17.83 ha

Level of Protection: Level 1

SWMP Type : Wet Pond

Calculation:

Total Storage Volume Required = 275 m^3/ha → 4,903 m^3

Permanent Pool Volume = 235 m^3/ha → 4,190 m^3

Active Storage Volume = 40 m^3/ha → 713 m^3

Humber Station
WATER QUALITY REQUIREMENT CALCULATIONS
SWM Pond 2 North West

Table 3.2: 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	Infiltration	16.25	25	30	35	40	45
Level 1	Wetlands	36.25	80	105	120	140	160
Level 1	Hybrid Wet Pond/Wetland	40	110	150	175	195	215
Level 1	Wet Pond	52.5	140	190	225	250	275
Level 2	Infiltration	20	20	20	25	30	35
Level 2	Wetlands	42.5	60	70	80	90	100
Level 2	Hybrid Wet Pond/Wetland	48.75	75	90	105	120	135
Level 2	Wet Pond	55	90	110	130	150	170
Level 3	Infiltration	20	20	20	20	20	20
Level 3	Wetlands	60	60	60	60	60	60
Level 3	Hybrid Wet Pond/Wetland	42.5	60	70	75	80	85
Level 3	Wet Pond	33.75	60	75	85	95	105
Level 3	Dry Pond (Continuous Flow)	0	90	150	200	240	280

* For wet ponds, wetlands, and hybrid facilities, all of the storage, except for 40 m^3/ha represents the permanent pool volume.
The 40 m^3/ha represents extended detention storage.

SWM Pond 2 North West

Input:

Estimated Imperviousness = 99%
Area = 10.83 ha
Level of Protection: Level 1 ▾
SWMP Type : Wet Pond ▾

Calculation:

Total Storage Volume Required =	273	m^3/ha →	2,960	m^3
Permanent Pool Volume =	233	m^3/ha →	2,527	m^3
Active Storage Volume =	40	m^3/ha →	433	m^3

Humber Station
WATER QUALITY REQUIREMENT CALCULATIONS
SWM Pond 3 South

Table 3.2: 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	Infiltration	16.25	25	30	35	40	45
Level 1	Wetlands	36.25	80	105	120	140	160
Level 1	Hybrid Wet Pond/Wetland	40	110	150	175	195	215
Level 1	Wet Pond	52.5	140	190	225	250	275
Level 2	Infiltration	20	20	20	25	30	35
Level 2	Wetlands	42.5	60	70	80	90	100
Level 2	Hybrid Wet Pond/Wetland	48.75	75	90	105	120	135
Level 2	Wet Pond	55	90	110	130	150	170
Level 3	Infiltration	20	20	20	20	20	20
Level 3	Wetlands	60	60	60	60	60	60
Level 3	Hybrid Wet Pond/Wetland	42.5	60	70	75	80	85
Level 3	Wet Pond	33.75	60	75	85	95	105
Level 3	Dry Pond (Continuous Flow)	0	90	150	200	240	280

* For wet ponds, wetlands, and hybrid facilities, all of the storage, except for 40 m^3/ha represents the permanent pool volume.

The 40 m^3/ha represents extended detention storage.

SWM Pond 3 South

Input:

Estimated Imperviousness = 99%

Area = 78.26 ha

Level of Protection: Level 1 ▾

SWMP Type : Wet Pond ▾

Calculation:

Total Storage Volume Required = 273 m^3/ha → 21,391 m^3

Permanent Pool Volume = 233 m^3/ha → 18,261 m^3

Active Storage Volume = 40 m^3/ha → 3,130 m^3

Humber Station
WATER QUALITY REQUIREMENT CALCULATIONS
SWM Underground Tank

Table 3.2: 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	Infiltration	16.25	25	30	35	40	45
Level 1	Wetlands	36.25	80	105	120	140	160
Level 1	Hybrid Wet Pond/Wetland	40	110	150	175	195	215
Level 1	Wet Pond	52.5	140	190	225	250	275
Level 2	Infiltration	20	20	20	25	30	35
Level 2	Wetlands	42.5	60	70	80	90	100
Level 2	Hybrid Wet Pond/Wetland	48.75	75	90	105	120	135
Level 2	Wet Pond	55	90	110	130	150	170
Level 3	Infiltration	20	20	20	20	20	20
Level 3	Wetlands	60	60	60	60	60	60
Level 3	Hybrid Wet Pond/Wetland	42.5	60	70	75	80	85
Level 3	Wet Pond	33.75	60	75	85	95	105
Level 3	Dry Pond (Continuous Flow)	0	90	150	200	240	280

* For wet ponds, wetlands, and hybrid facilities, all of the storage, except for 40 m^3/ha represents the permanent pool volume.

The 40 m^3/ha represents extended detention storage.

SWM Underground Tank

Input:

Estimated Imperviousness = 99%

Area = 0.66 ha

Level of Protection: Level 1 ▾

SWMP Type : Wet Pond ▾

Calculation:

Total Storage Volume Required = 273 m^3/ha → 180 m^3

Permanent Pool Volume = 233 m^3/ha → 154 m^3

Active Storage Volume = 40 m^3/ha → 26 m^3

Project: *Humber Station*
Project No.: *5139*

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SWM Pond 1 Sediment Drying Area Calculation

Annual Sediment Loading -South Pond (SWM Pond 1)		
Catchment Imperviousnes (%)	*Annual Loading (m^3/ha)*	*Area (ha)*
85	3.8	17.83

Total Sediment Volume for 10 year period (m^3)	677.54

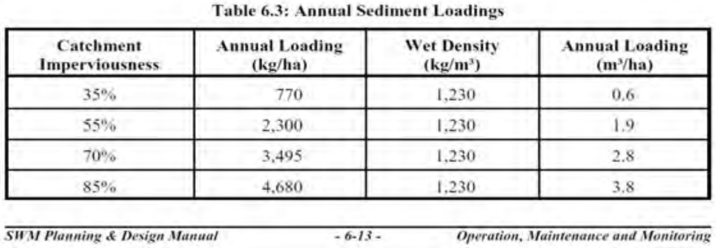


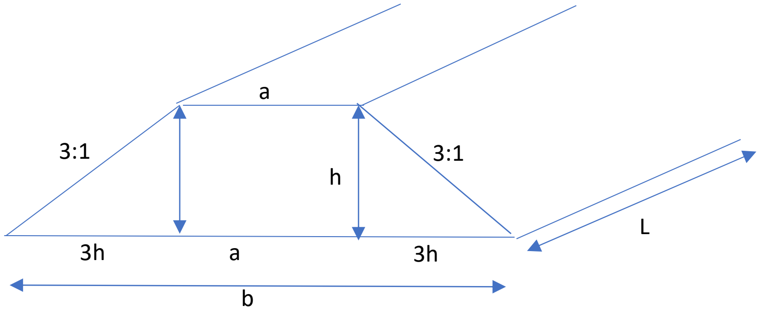
Table 6.3: Annual Sediment Loadings

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*

Area Req'd (m^2)	819.00

Sediment Drying Area Req'd



Volume, V = (1/2)*(a+b)/2*h*L

Top width, a (m)	15.0
Bottom width, b (m)	21.0
Height, h (m)	1
Length, L (m)	39

<--- Minimum depth

Volume Provided 702.00

Project: *Humber Station*
Project No.: *5139*

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SWM Pond 2 Sediment Drying Area Calculation

Annual Sediment Loading -South Pond (SWM Pond 2)		
Catchment Imperviousnes (%)	*Annual Loading (m^3/ha)*	*Area (ha)*
85	3.8	10.83 *

*Note the 0.61ha area is added as major flows drain to SWM Pond 2

Total Sediment Volume for 10 year period (m^3)	411.54

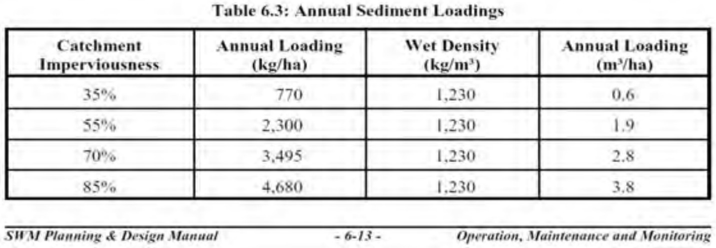


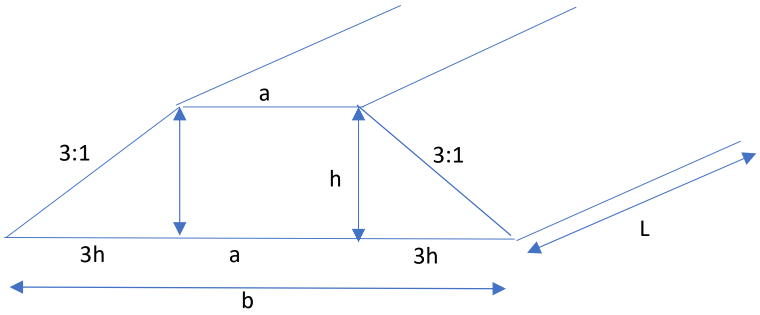
Table 6.3: Annual Sediment Loadings

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*

Area Req'd (m^2)	529.00

Sediment Drying Area Req'd



Volume, V = (1/2)*(a+b)/2*h*L

Top width, a (m)	17.0
Bottom width, b (m)	23.0
Height, h (m)	1 <--- Minimum depth
Length, L (m)	23

Volume 460.00

Project: *Humber Station*
Project No.: *5139*

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SWM Pond 3 Sediment Drying Area Calculation

Annual Sediment Loading -South Pond (SWM Pond 3)

Catchment Imperviousnes (%)	*Annual Loading (m^3/ha)*	*Area (ha)*
85	3.8	78.26 *

*Note the 0.61ha area is added as minor flows drain to SWM Pond 3 (likely to carry majority of the sediments on road due to first flush principle)

Total Sediment Volume for 10 year period (m^3)	2973.88

Sediment Drying Area Req'd

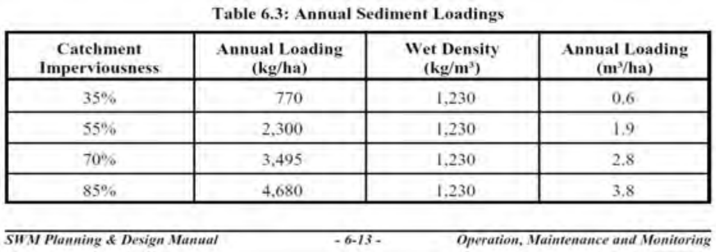


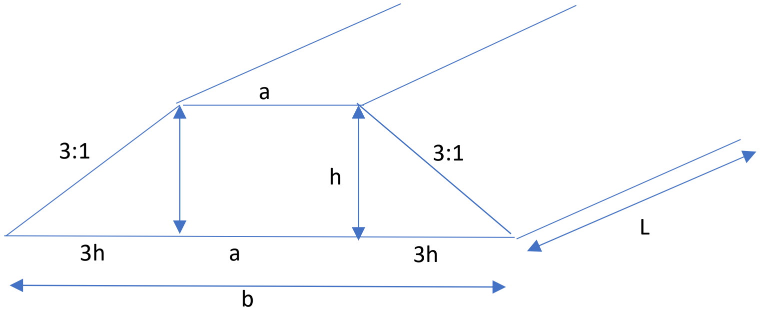
Table 6.3: Annual Sediment Loadings

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*

Area Req'd (m^2)	3500.00

Volume, V = (1/2)*(a+b)/2*h*L



Top width, a (m)	44.0	
Bottom width, b (m)	50.0	
Height, h (m)	1	<--- Minimum depth
Length, L (m)	70	

Provided Volume 3290.00

Filter Bed Sizing **Project: 5139**

Using MOE 2003 - Equation 4.12 Pond 1

V	**4766**	Required Filter Volume (27mm)
d	0.80	m
K	45	mm/hr
h	0.60	m
t	48.0	hrs
Required Filter Area	**1261**	m^2

Site 27mm Requirement		
Area	17.83	ha
IMP	99	%
VCTL	27	mm
Volume	**4766**	m^3

Filter Bed Sizing **Project:** **5139**

Using MOE 2003 - Equation 4.12 Pond 2

V	**2895**	Required Filter Volume (27mm)
d	0.80	m
K	45	mm/hr
h	0.60	m
t	48.0	hrs
Required Filter Area	**766**	m^2

Site 27mm Requirement		
Area	10.83	ha
IMP	99	%
VCTL	27	mm
Volume	**2895**	m^3

Filter Bed Sizing **Project: 5139**

Using MOE 2003 - Equation 4.12 Pond 3

V	**767**	Required Filter Volume (27mm)
d	0.80	m
K	45	mm/hr
h	0.60	m
t	48.0	hrs
Required Filter Area	**203**	m^2

Site 27mm Requirement

Area	2.87	ha
IMP	99	%
VCTL	27	mm
Volume	**767**	m^3

Filter Bed Sizing **Project:** **5139**

Using MOE 2003 - Equation 4.12 Tank

V	**176**	Required Filter Volume (27mm)
d	0.80	m
K	45	mm/hr
h	0.60	m
t	48.0	hrs
Required Filter Area	**47**	m^2

Site 27mm Requirement

Area	0.66	ha
IMP	99	%
VCTL	27	mm
Volume	**176**	m^3

Filter Bed Sizing **Project: 5139**

Using MOE 2003 - Equation 4.12 ROW

V	**176**	Required Filter Volume (27mm)
d	0.80	m
K	45	mm/hr
h	0.20	m
t	48.0	hrs
Required Filter Area	**65**	m^2

Site 27mm Requirement		
Area	0.66	ha
IMP	99	%
VCTL	27	mm
Volume	**176**	m^3

TRCA Future Model Pre-Development Parameters

Catchment Name	Area (ha)	Hydrograph	Model Parameters	Regional Storm
				Future (CNIII)
43.10	202.72	**Standhyd**	**Curve number**	97
			TIMP	0.7519
			XIMP	0.7517
			IA (losses)	5
			TP	N/A
43.06	35.79	**Nashyd**	**Curve number**	96
			TIMP	N/A
			XIMP	N/A
			IA	10
			TP	1.17
43.05	39.74	**Standhyd**	**Curve number**	99
			TIMP	0.6417
			XIMP	0.6417
			IA (losses)	5
			TP	N/A
43.03	63.04	**Nashyd**	**Curve number**	98
			TIMP	N/A
			XIMP	N/A
			IA	10
			TP	2.76
43.04	24.96	**Nashyd**	**Curve number**	99
			TIMP	N/A
			XIMP	N/A
			IA	10
			TP	1
43.02	129.13	**Standhyd**	**Curve number**	98
			TIMP	0.6469
			XIMP	0.6388
			IA (losses)	5
			TP	N/A
41.06	127.87	**Nashyd**	**Curve number**	97
			TIMP	N/A
			XIMP	N/A
			IA	10
			TP	1.9
41.07	101.08	**Nashyd**	**Curve number**	96
			TIMP	N/A
			XIMP	N/A
			IA	10
			TP	2.53
41.08	362.27	**Nashyd**	**Curve number**	97
			TIMP	N/A
			XIMP	N/A
			IA	10
			TP	3.09

Table 3: D/S Analysis Area Breakdown

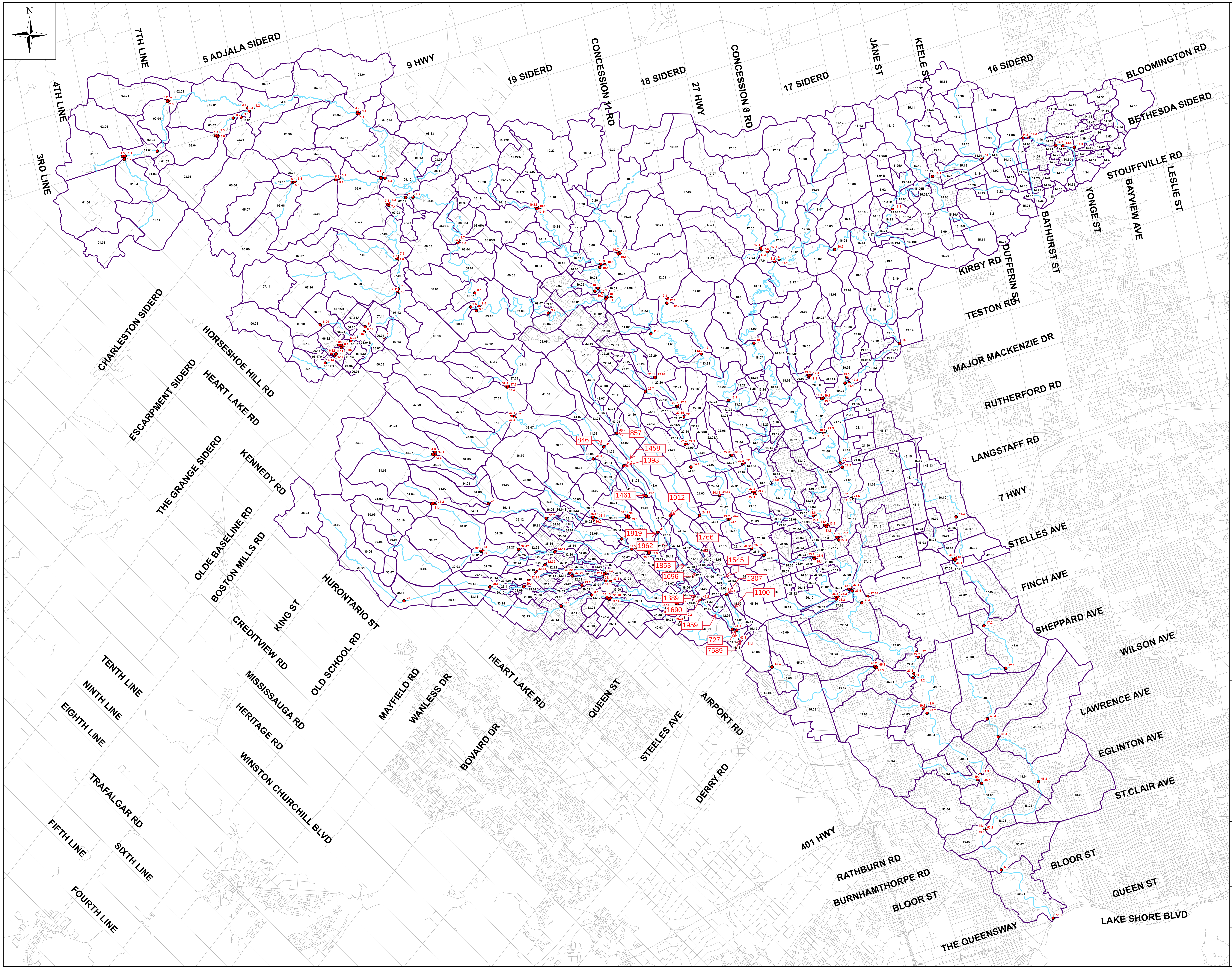
TRCA Future		SCE Revised Within Subject Area		Revised Outside the Subject Area	
ID	Area	ID	Area	ID	Area
41.07	101.08			41.07	27.77
		41.072	19.36		
		41.073	24.49		
				41.074	25.29
Sub Total			**43.85**		**53.06**
41.08	362.27	41.081	6.68	41.08	341.57
		41.082	10.3		
Sub Total			**16.98**		
43.03	63.04	43.031	56.26		0
		43.032	16.45		
Sub Total			**72.71**		
43.1	202.72	43.11	21.45	43.1	179.84
Sub Total			**21.45**		
43.06	35.79	43.061	23.39	43.06	10.69
Sub Total			**23.39**		
43.05	39.74	43.051	2.43	43.05	38.55
Sub Total			**2.43**		
43.04	24.96	43.041	7.27	43.04	17.02
Sub Total			**7.27**		
43.02	129.13	43.021	3.11	43.02	126.77
Sub Total			**3.11**		
41.06	127.87	41.061	24.47	43.02	103.43
Sub Total			**24.47**		
Total	**1086.6**		**215.66**		**870.93**

Post Development Model

Within Subject Area		Outside the Subject Area	
ID	Area	ID	Area
Channel and I	17.63	41.07	27.77
41.072	23.02		
41.073	-23.04		
Site Plan	26.63		
Post Pond	**10.83**	41.074	25.290
	55.07		**53.060**
41.081	6.48	41.080	341.570
	6.48		
			0.000
43.032	17.31		
	17.31		
43.110	6.80	43.100	179.840
Post	**17.83**		
	24.63		
43.061	10.54	43.060	10.690
Post	**78.26**		
	88.80		
43.051	2.43	43.050	38.550
	2.43		
43.041	7.27	43.040	17.020
	7.27		
43.021	3.11	43.020	126.770
	3.11		
41.061	11.32	43.020	103.430
Post	**0.66**		
	11.98		
Total	**217.080**		**870.930**

Regional Flows (m3/s)

Tributary	Area Reduction Factor	Adhyd Node	TRCA Future Model	SCE Modified Future Model	Post Dev Updated TP Future Model	Post Dev with Controlls	ratio= SCE Modified Future Model/TRCA Future Model	ratio= Post Dev Updated TP Future Model/SCE Modified Future Model	ratio= Post with Controlsl/SCE Modified Future Model
		A	B	C	E	F	**I = B/C**	**L = E / C**	**N = F/C**
Clarkway Tributary	100	**857**	76.14	76.41	85.95	75.95	**1.00**	**1.12**	**0.99**
	100	1458	90.29	90.66	100.61	90.07	**1.00**	**1.11**	**0.99**
	97.1	1012	107.49	107.87	115.69	107.18	**1.00**	**1.07**	**0.99**
	97.1	1766	129.44	129.78	137.35	129.10	**1.00**	**1.06**	**0.99**
	97.1	1545	132.27	132.69	140.53	131.79	**1.00**	**1.06**	**0.99**
	94.8	1307	144.88	145.45	152.60	144.26	**1.00**	**1.05**	**0.99**
	94.8	1100	147.20	147.84	154.92	146.52	**1.00**	**1.05**	**0.99**
Gore Road Tributary	100	846	40.85	40.29	36.39	37.01	**0.99**	**0.90**	**0.92**
	99.2	1393	39.90	39.35	38.42	37.43	**0.99**	**0.98**	**0.95**
	99.2	1461	51.03	50.66	54.37	50.96	**0.99**	**1.07**	**1.01**
	97.1	1819	68.92	68.62	70.07	67.82	**1.00**	**1.02**	**0.99**
	97.1	1962	77.72	77.48	78.71	76.82	**1.00**	**1.02**	**0.99**
	97.1	1853	84.33	84.09	85.23	83.43	**1.00**	**1.01**	**0.99**
	97.1	1696	84.31	84.04	85.49	83.38	**1.00**	**1.02**	**0.99**
	97.1	1389	99.22	98.95	100.60	98.35	**1.00**	**1.02**	**0.99**
	95.4	1690	99.29	99.04	100.41	98.28	**1.00**	**1.01**	**0.99**
	95.4	1959	107.85	107.60	108.65	106.84	**1.00**	**1.01**	**0.99**
Combined	94.2	727	258.89	259.26	267.21	257.16	**1.00**	**1.03**	**0.99**
	89.4	7589	245.52	245.94	254.40	243.76	**1.00**	**1.03**	**0.99**



Legend

- ● Flow Node
- General River
- ▭ Subcatchment

TORONTO AND REGION Conservation for The Living City

CIVICA

Humber River Hydrology

Figure 5.4 Catchments for Future Scenario

Drawn By: M.Y. Date: Dec. 20, 2017

0 1.25 2.5 5 Kilometers

Date: July 10, 2024

Humber Station Downstream Flow and Water Surface Elevation Analysis

VO Node	River	TRCA Future Model Flows		SCE Modified Future Model Flows		SCE Modified Future Model Controlled Flows		Post Dev Updated TP Future Model Uncontrolled Flows		Comparison (SCE Modified Future & TRCA Future Model Results)				Comparison (Post Dev Controlled & SCE Modified Future Model Results)				Comparison (Post Dev Updated TP Uncontrolled & SCE Modified Future Model Results)			
		A	B	C	D	E	F	G	H	Flows		Water Surface Elevation		Flows		Water Surface Elevation		Flows		Water Surface Elevation	
		Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	[C - A]	[C - A]/ [A]	[D - B]	[D - B]/ [B]	[E - C]	[E - C]/ [C]	[F - D]	[F - D]/ [D]	[G - C]	[G - C]/ [C]	[H - D]	[H - D]/ [D]
		(m3/s)	(m)	(m3/s)	(m)	(m3/s)	(m)	(m3/s)	(m)	m^3/s	%	m	%	m^3/s	%	m	%	m^3/s	%	m	%
857	Clarkway Trib A	76.14	221.93	76.41	221.93	75.95	221.93	85.95	222.02	0.27	0.35%	0.00	0.00%	-0.46	-0.60%	0	0.00%	9.54	12.49%	0.09	0.04%
	Clarkway Trib A	76.14	221.43	76.41	221.43	75.95	221.43	85.95	221.53	0.27	0.35%	0.00	0.00%	-0.46	-0.60%	0	0.00%	9.54	12.49%	0.1	0.05%
	Clarkway Trib A	76.14	220.59	76.41	220.59	75.95	220.59	85.95	220.69	0.27	0.35%	0.00	0.00%	-0.46	-0.60%	0	0.00%	9.54	12.49%	0.1	0.05%
	Clarkway Trib A	76.14	219.8	76.41	219.8	75.95	219.79	85.95	219.9	0.27	0.35%	0.00	0.00%	-0.46	-0.60%	-0.01	0.00%	9.54	12.49%	0.1	0.05%
	Clarkway Trib A	76.14	218.56	76.41	218.56	75.95	218.56	85.95	218.64	0.27	0.35%	0.00	0.00%	-0.46	-0.60%	0	0.00%	9.54	12.49%	0.08	0.04%
	Clarkway Trib A	76.14	218.49	76.41	218.5	75.95	218.49	85.95	218.61	0.27	0.35%	0.01	0.00%	-0.46	-0.60%	-0.01	0.00%	9.54	12.49%	0.11	0.05%
	Clarkway Trib A	76.14	217.27	76.41	217.27	75.95	217.26	85.95	217.35	0.27	0.35%	0.00	0.00%	-0.46	-0.60%	-0.01	0.00%	9.54	12.49%	0.08	0.04%
	Clarkway Trib A	76.14	216.6	76.41	216.61	75.95	216.6	85.95	216.71	0.27	0.35%	0.01	0.00%	-0.46	-0.60%	-0.01	0.00%	9.54	12.49%	0.1	0.05%
	Clarkway Trib A	76.14	215.71	76.41	215.72	75.95	215.71	85.95	215.81	0.27	0.35%	0.01	0.00%	-0.46	-0.60%	-0.01	0.00%	9.54	12.49%	0.09	0.04%
	Clarkway Trib A	76.14	215.41	76.41	215.41	75.95	215.4	85.95	215.48	0.27	0.35%	0.00	0.00%	-0.46	-0.60%	-0.01	0.00%	9.54	12.49%	0.07	0.03%
	Clarkway Trib A	76.14	215.38	76.41	215.39	75.95	215.38	85.95	215.45	0.27	0.35%	0.01	0.00%	-0.46	-0.60%	-0.01	0.00%	9.54	12.49%	0.06	0.03%
	Clarkway Trib A	76.14	215.34	76.41	215.34	75.95	215.34	85.95	215.42	0.27	0.35%	0.00	0.00%	-0.46	-0.60%	0	0.00%	9.54	12.49%	0.08	0.04%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
1458	Clarkway Trib A	90.29	214.6	90.66	214.61	90.07	214.6	100.61	214.67	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.06	0.03%
	Clarkway Trib A	90.29	214.4	90.66	214.4	90.07	214.39	100.61	214.45	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.05	0.02%
	Clarkway Trib A	90.29	214.19	90.66	214.19	90.07	214.19	100.61	214.26	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.07	0.03%
	Clarkway Trib A	90.29	214.17	90.66	214.18	90.07	214.17	100.61	214.25	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.07	0.03%
	Clarkway Trib A	Culvert		0		Culvert		Culvert													
	Clarkway Trib A	90.29	214.1	90.66	214.1	90.07	214.1	100.61	214.19	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.09	0.04%
	Clarkway Trib A	90.29	214.1	90.66	214.1	90.07	214.09	100.61	214.19	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.09	0.04%
	Clarkway Trib A	90.29	213.85	90.66	213.86	90.07	213.85	100.61	213.95	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.09	0.04%
	Clarkway Trib A	90.29	213.05	90.66	213.05	90.07	213.05	100.61	213.15	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.1	0.05%
	Clarkway Trib A	90.29	212.75	90.66	212.75	90.07	212.75	100.61	212.85	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.1	0.05%
	Clarkway Trib A	90.29	212.32	90.66	212.33	90.07	212.32	100.61	212.43	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.1	0.05%
	Clarkway Trib A	90.29	211.92	90.66	211.92	90.07	211.92	100.61	212.02	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.1	0.05%
	Clarkway Trib A	90.29	211.82	90.66	211.83	90.07	211.83	100.61	211.92	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.09	0.04%
	Clarkway Trib A	90.29	211.79	90.66	211.8	90.07	211.8	100.61	211.89	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.09	0.04%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
	Clarkway Trib A	90.29	211.66	90.66	211.67	90.07	211.67	100.61	211.75	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	211.67	90.66	211.67	90.07	211.68	100.61	211.76	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0.01	0.00%	9.95	10.98%	0.09	0.04%
	Clarkway Trib A	90.29	211.6	90.66	211.61	90.07	211.61	100.61	211.69	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	211.58	90.66	211.59	90.07	211.59	100.61	211.67	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
	Clarkway Trib A	90.29	211.27	90.66	211.27	90.07	211.3	100.61	211.35	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0.03	0.01%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	211.02	90.66	211.02	90.07	211.01	100.61	211.1	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	210.47	90.66	210.47	90.07	210.46	100.61	210.56	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.09	0.04%
1458	Clarkway Trib A	90.29	210.22	90.66	210.23	90.07	210.22	100.61	210.31	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	210.2	90.66	210.2	90.07	210.2	100.61	210.28	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	210.14	90.66	210.14	90.07	210.14	100.61	210.21	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.07	0.03%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
	Clarkway Trib A	90.29	209.86	90.66	209.86	90.07	209.85	100.61	209.92	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.06	0.03%
	Clarkway Trib A	90.29	209.49	90.66	209.49	90.07	209.5	100.61	209.61	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0.01	0.00%	9.95	10.98%	0.12	0.06%
	Clarkway Trib A	90.29	208.39	90.66	208.39	90.07	208.39	100.61	208.47	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	208.07	90.66	208.07	90.07	208.06	100.61	208.15	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	207.67	90.66	207.67	90.07	207.67	100.61	207.74	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.07	0.03%
	Clarkway Trib A	90.29	207.37	90.66	207.37	90.07	207.37	100.61	207.44	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.07	0.03%
	Clarkway Trib A	90.29	207.31	90.66	207.32	90.07	207.31	100.61	207.38	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.06	0.03%
	Clarkway Trib A	90.29	207.31	90.66	207.31	90.07	207.31	100.61	207.37	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.06	0.03%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
	Clarkway Trib A	90.29	206.87	90.66	206.87	90.07	206.87	100.61	206.95	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	206.85	90.66	206.86	90.07	206.85	100.61	206.93	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.07	0.03%
	Clarkway Trib A	90.29	206.17	90.66	206.17	90.07	206.17	100.61	206.25	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	205.33	90.66	205.34	90.07	205.33	100.61	205.41	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.07	0.03%
	Clarkway Trib A	90.29	205.08	90.66	205.09	90.07	205.08	100.61	205.17	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	204.77	90.66	204.78	90.07	204.77	100.61	204.86	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.08	0.04%
	Clarkway Trib A	90.29	204.42	90.66	204.42	90.07	204.42	100.61	204.49	0.37	0.41%	0.00	0.00%	-0.59	-0.65%	0	0.00%	9.95	10.98%	0.07	0.03%
	Clarkway Trib A	90.29	204.2	90.66	204.21	90.07	204.2	100.61	204.26	0.37	0.41%	0.01	0.00%	-0.59	-0.65%	-0.01	0.00%	9.95	10.98%	0.05	0.02%
1012	Clarkway Trib A	107.49	203.67	107.87	203.68	107.18	203.67	115.69	203.72	0.38	0.35%	0.01	0.00%	-0.69	-0.64%	-0.01	0.00%	7.82	7.25%	0.04	0.02%
	Clarkway Trib A	107.49	202.99	107.87	202.99	107.18	202.99	115.69	203.03	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.04	0.02%
	Clarkway Trib A	107.49	202.86	107.87	202.86	107.18	202.86	115.69	202.91	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.05	0.02%
	Clarkway Trib A	107.49	202.49	107.87	202.49	107.18	202.49	115.69	202.53	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.04	0.02%
	Clarkway Trib A	107.49	201.45	107.87	201.45	107.18	201.45	115.69	201.52	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.07	0.03%
	Clarkway Trib A	107.49	201.06	107.87	201.06	107.18	201.05	115.69	201.17	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	-0.01	0.00%	7.82	7.25%	0.11	0.05%
	Clarkway Trib A	107.49	200.47	107.87	200.48	107.18	200.46	115.69	200.71	0.38	0.35%	0.01	0.00%	-0.69	-0.64%	-0.02	-0.01%	7.82	7.25%	0.23	0.11%
	Clarkway Trib A	107.49	200.4	107.87	200.41	107.18	200.39	115.69	200.65	0.38	0.35%	0.01	0.00%	-0.69	-0.64%	-0.02	-0.01%	7.82	7.25%	0.24	0.12%
	Clarkway Trib A	107.49	200.15	107.87	200.17	107.18	200.14	115.69	200.41	0.38	0.35%	0.02	0.01%	-0.69	-0.64%	-0.03	-0.01%	7.82	7.25%	0.24	0.12%
	Clarkway Trib A	Culvert		0		Culvert		Culvert													
1012	Clarkway Trib A	107.49	199.12	107.87	199.12	107.18	199.12	115.69	199.18	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.06	0.03%
	Clarkway Trib A	107.49	199.07	107.87	199.07	107.18	199.07	115.69	199.13	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.06	0.03%
	Clarkway Trib A	107.49	198.53	107.87	198.53	107.18	198.52	115.69	198.59	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	-0.01	-0.01%	7.82	7.25%	0.06	0.03%
	Clarkway Trib A	107.49	198.27	107.87	198.27	107.18	198.27	115.69	198.33	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.06	0.03%
	Clarkway Trib A	107.49	197.74	107.87	197.75	107.18	197.74	115.69	197.79	0.38	0.35%	0.01	0.01%	-0.69	-0.64%	-0.01	-0.01%	7.82	7.25%	0.04	0.02%
	Clarkway Trib A	107.49	196.9	107.87	196.9	107.18	196.9	115.69	196.96	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.06	0.03%
	Clarkway Trib A	107.49	196.5	107.87	196.51	107.18	196.5	115.69	196.57	0.38	0.35%	0.01	0.01%	-0.69	-0.64%	-0.01	-0.01%	7.82	7.25%	0.06	0.03%
	Clarkway Trib A	107.49	196.39	107.87	196.39	107.18	196.39	115.69	196.46	0.38	0.35%	0.00	0.00%	-0.69	-0.64%	0	0.00%	7.82	7.25%	0.07	0.04%
1766	Clarkway Trib A	129.44	196.38	129.78	196.39	129.1	196.38	137.35	196.45	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.06	0.03%
	Clarkway Trib A	129.44	196.32	129.78	196.33	129.1	196.32	137.35	196.39	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.06	0.03%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
	Clarkway Trib A	129.44	195.62	129.78	195.62	129.1	195.61	137.35	195.66	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.04	0.02%
	Clarkway Trib A	129.44	195.55	129.78	195.55	129.1	195.55	137.35	195.6	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	195.31	129.78	195.31	129.1	195.31	137.35	195.35	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.04	0.02%
	Clarkway Trib A	129.44	194.81	129.78	194.81	129.1	194.81	137.35	194.86	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	194.81	129.78	194.82	129.1	194.81	137.35	194.86	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.04	0.02%
	Clarkway Trib A	129.44	194.63	129.78	194.63	129.1	194.63	137.35	194.68	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	194.42	129.78	194.42	129.1	194.42	137.35	194.47	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	194.27	129.78	194.27	129.1	194.26	137.35	194.32	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.05	0.03%
1766	Clarkway Trib A	129.44	194.01	129.78	194.02	129.1	194.01	137.35	194.07	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	193.69	129.78	193.69	129.1	193.68	137.35	193.74	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	193.41	129.78	193.41	129.1	193.41	137.35	193.46	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	192.06	129.78	192.07	129.1	192.06	137.35	192.13	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.06	0.03%
	Clarkway Trib A	129.44	192.18	129.78	192.18	129.1	192.17	137.35	192.23	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	192.02	129.78	192.02	129.1	192.02	137.35	192.07	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	192.02	129.78	192.02	129.1	192.02	137.35	192.07	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	191.82	129.78	191.83	129.1	191.82	137.35	191.86	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.03	0.02%
	Clarkway Trib A	129.44	191.81	129.78	191.81	129.1	191.81	137.35	191.84	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.03	0.02%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
1766	Clarkway Trib A	129.44	190.59	129.78	190.59	129.1	190.59	137.35	190.65	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.06	0.03%
	Clarkway Trib A	129.44	190.54	129.78	190.55	129.1	190.54	137.35	190.61	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.06	0.03%
	Clarkway Trib A	129.44	190.11	129.78	190.12	129.1	190.11	137.35	190.18	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.06	0.03%
	Clarkway Trib A	129.44	189.64	129.78	189.65	129.1	189.64	137.35	189.69	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.04	0.02%
	Clarkway Trib A	129.44	189.67	129.78	189.68	129.1	189.67	137.35	189.73	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.05	0.03%
	Clarkway Trib A	129.44	189.12	129.78	189.12	129.1	189.12	137.35	189.19	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	0	0.00%	7.57	5.83%	0.07	0.04%
	Clarkway Trib A	129.44	188.37	129.78	188.38	129.1	188.37	137.35	188.48	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.1	0.05%
	Clarkway Trib A	129.44	187.91	129.78	187.91	129.1	187.9	137.35	188.11	0.34	0.26%	0.00	0.00%	-0.68	-0.52%	-0.01	-0.01%	7.57	5.83%	0.2	0.11%
	Clarkway Trib A	129.44	187.7	129.78	187.71	129.1	187.69	137.35	187.96	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.02	-0.01%	7.57	5.83%	0.25	0.13%
	Clarkway Trib A	129.44	187.63	129.78	187.64	129.1	187.61	137.35	187.91	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.03	-0.02%	7.57	5.83%	0.27	0.14%
	Clarkway Trib A	129.44	187.57	129.78	187.59	129.1	187.56	137.35	187.89	0.34	0.26%	0.02	0.01%	-0.68	-0.52%	-0.03	-0.02%	7.57	5.83%	0.3	0.16%
	Clarkway Trib A	129.44	187.54	129.78	187.55	129.1	187.52	137.35	187.86	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.03	-0.02%	7.57	5.83%	0.31	0.17%
	Clarkway Trib A	129.44	187.53	129.78	187.54	129.1	187.51	137.35	187.85	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.03	-0.02%	7.57	5.83%	0.31	0.17%
	Clarkway Trib A	129.44	187.52	129.78	187.54	129.1	187.51	137.35	187.84	0.34	0.26%	0.02	0.01%	-0.68	-0.52%	-0.03	-0.02%	7.57	5.83%	0.3	0.16%
	Clarkway Trib A	129.44	187.51	129.78	187.53	129.1	187.5	137.35	187.84	0.34	0.26%	0.02	0.01%	-0.68	-0.52%	-0.03	-0.02%	7.57	5.83%	0.31	0.17%
	Clarkway Trib A	129.44	187.25	129.78	187.26	129.1	187.23	137.35	187.59	0.34	0.26%	0.01	0.01%	-0.68	-0.52%	-0.03	-0.02%	7.57	5.83%	0.33	0.18%
	Clarkway Trib A	Culvert		0		Culvert		Culvert													
1545	Clarkway Trib A	132.27	185.51	132.69	185.51	131.79	185.5	140.53	185.59	0.42	0.32%	0.00	0.00%	-0.9	-0.68%	-0.01	-0.01%	7.84	5.91%	0.08	0.04%
	Clarkway Trib A	132.27	185.63	132.69	185.63	131.79	185.62	140.53	185.72	0.42	0.32%	0.00	0.00%	-0.9	-0.68%	-0.01	-0.01%	7.84	5.91%	0.09	0.05%
	Clarkway Trib A	132.27	185.55	132.69	185.56	131.79	185.54	140.53	185.65	0.42	0.32%	0.01	0.01%	-0.9	-0.68%	-0.02	-0.01%	7.84	5.91%	0.09	0.05%
	Clarkway Trib A	132.27	185.49	132.69	185.49	131.79	185.48	140.53	185.59	0.42	0.32%	0.00	0.00%	-0.9	-0.68%	-0.01	-0.01%	7.84	5.91%	0.1	0.05%
	Clarkway Trib A	132.27	185.4	132.69	185.4	131.79	185.39	140.53	185.5	0.42	0.32%	0.00	0.00%	-0.9	-0.68%	-0.01	-0.01%	7.84	5.91%	0.1	0.05%
	Clarkway Trib A	132.27	185.32	132.69	185.32	131.79	185.31	140.53	185.42	0.42	0.32%	0.00	0.00%	-0.9	-0.68%	-0.01	-0.01%	7.84	5.91%	0.1	0.05%
	Clarkway Trib A	132.27	185.23	132.69	185.24	131.79	185.22	140.53	185.33	0.42	0.32%	0.01	0.01%	-0.9	-0.68%	-0.02	-0.01%	7.84	5.91%	0.09	0.05%
	Clarkway Trib A	132.27	185.15	132.69	185.16	131.79	185.14	140.53	185.26	0.42	0.32%	0.01	0.01%	-0.9	-0.68%	-0.02	-0.01%	7.84	5.91%	0.1	0.05%
	Clarkway Trib A	132.27	185.17	132.69	185.17	131.79	185.16	140.53	185.27	0.42	0.32%	0.00	0.00%	-0.9	-0.68%	-0.01	-0.01%	7.84	5.91%	0.1	0.05%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
1307	Clarkway Trib A	144.88	184.3	145.45	184.3	144.26	184.29	152.6	184.31	0.57	0.39%	0.00	0.00%	-1.19	-0.82%	-0.01	-0.01%	7.15	4.92%	0.01	0.01%
	Clarkway Trib A	144.88	184.52	145.45	184.53	144.26	184.51	152.6	184.56	0.57	0.39%	0.01	0.01%	-1.19	-0.82%	-0.02	-0.01%	7.15	4.92%	0.03	0.02%
	Clarkway Trib A	144.88	184.53	145.45	184.54	144.26	184.52	152.6	184.57	0.57	0.39%	0.01	0.01%	-1.19	-0.82%	-0.02	-0.01%	7.15	4.92%	0.03	0.02%
	Clarkway Trib A	144.88	184.5	145.45	184.51	144.26	184.49	152.6	184.54	0.57	0.39%	0.01	0.01%	-1.19	-0.82%	-0.02	-0.01%	7.15	4.92%	0.03	0.02%
	Clarkway Trib A	144.88	184.49	145.45	184.49	144.26	184.48	152.6	184.53	0.57	0.39%	0.00	0.00%	-1.19	-0.82%	-0.01	-0.01%	7.15	4.92%	0.04	0.02%
	Clarkway Trib A	144.88	184.48	145.45	184.48	144.26	184.47	152.6	184.51	0.57	0.39%	0.00	0.00%	-1.19	-0.82%	-0.01	-0.01%	7.15	4.92%	0.03	0.02%
	Clarkway Trib A	144.88	184.44	145.45	184.45	144.26	184.43	152.6	184.47	0.57	0.39%	0.01	0.01%	-1.19	-0.82%	-0.02	-0.01%	7.15	4.92%	0.02	0.01%
	Clarkway Trib A	144.88	184.45	145.45	184.46	144.26	184.44	152.6	184.48	0.57	0.39%	0.01	0.01%	-1.19	-0.82%	-0.02	-0.01%	7.15	4.92%	0.02	0.01%
	Clarkway Trib A	144.88	184.45	145.45	184.45	144.26	184.44	152.6	184.48	0.57	0.39%	0.00	0.00%	-1.19	-0.82%	-0.01	-0.01%	7.15	4.92%	0.03	0.02%
	Clarkway Trib A	144.88	184.44	145.45	184.45	144.26	184.43	152.6	184.48	0.57	0.39%	0.01	0.01%	-1.19	-0.82%	-0.02	-0.01%	7.15	4.92%	0.03	0.02%
	Clarkway Trib A	144.88	184.44	145.45	184.45	144.26	184.43	152.6	184.48	0.57	0.39%	0.01	0.01%	-1.19	-0.82%	-0.02	-0.01%	7.15	4.92%	0.03	0.02%

VO Node	River	TRCA Future Model Flows		SCE Modified Future Model Flows		SCE Modified Future Model Controlled Flows		Post Dev Updated TP Future Model Uncontrolled Flows		Comparison (SCE Modified Future & TRCA Future Model Results)				Comparison (Post Dev Controlled & SCE Modified Future Model Results)				Comparison (Post Dev Updated TP Uncontrolled & SCE Modified Future Model Results)			
		A	B	C	D	E	F	G	H	Flows		Water Surface Elevation		Flows		Water Surface Elevation		Flows		Water Surface Elevation	
		Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	[C - A]	[C - A]/ [A]	[D - B]	[D - B]/ [B]	[E - C]	[E - C]/ [C]	[F - D]	[F - D]/ [D]	[G - C]	[G - C]/ [C]	[H - D]	[H - D]/ [D]
		(m3/s)	(m)	(m3/s)	(m)	(m3/s)	(m)	(m3/s)	(m)	m^3/s	%	m	%	m^3/s	%	m	%	m^3/s	%	m	%
	Clarkway Trib A	144.88	184.44	145.45	184.45	144.26	184.43	152.6	184.47	0.57	0.39%	0.01	0.01%	-1.19	-0.82%	-0.02	-0.01%	7.15	4.92%	0.02	0.01%
	Clarkway Trib A	Culvert		0		Culvert		Culvert													
1100	Clarkway Trib A	147.2	179.05	147.84	179.06	146.52	179.04	154.92	179.12	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.02	-0.01%	7.08	4.79%	0.06	0.03%
	Clarkway Trib A	147.2	178.99	147.84	178.99	146.52	178.98	154.92	179.04	0.64	0.43%	0.00	0.00%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.05	0.03%
	Clarkway Trib A	147.2	178.66	147.84	178.67	146.52	178.66	154.92	178.7	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.03	0.02%
	Clarkway Trib A	147.2	178.25	147.84	178.26	146.52	178.25	154.92	178.3	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.04	0.02%
	Clarkway Trib A	147.2	178.03	147.84	178.04	146.52	178.03	154.92	178.06	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.02	0.01%
	Clarkway Trib A	147.2	178.03	147.84	178.04	146.52	178.03	154.92	178.06	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.02	0.01%
	Clarkway Trib A	147.2	178.02	147.84	178.03	146.52	178.02	154.92	178.06	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.03	0.02%
	Clarkway Trib A	Bridge		0		Bridge		Bridge													
	Clarkway Trib A	147.2	178.01	147.84	178.02	146.52	178.01	154.92	178.05	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.03	0.02%
	Clarkway Trib A	147.2	178.01	147.84	178.02	146.52	178.01	154.92	178.04	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.02	0.01%
	Clarkway Trib A	147.2	178	147.84	178	146.52	178	154.92	178.03	0.64	0.43%	0.00	0.00%	-1.32	-0.89%	0	0.00%	7.08	4.79%	0.03	0.02%
	Clarkway Trib A	147.2	177.97	147.84	177.97	146.52	177.96	154.92	177.99	0.64	0.43%	0.00	0.00%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.02	0.01%
	Clarkway Trib A	147.2	177.94	147.84	177.95	146.52	177.94	154.92	177.97	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.02	0.01%
	Clarkway Trib A	147.2	177.94	147.84	177.95	146.52	177.94	154.92	177.97	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.02	0.01%
	Clarkway Trib A	Culvert		0		Culvert		Culvert													
	Clarkway Trib A	147.2	175.92	147.84	175.93	146.52	175.91	154.92	176	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.02	-0.01%	7.08	4.79%	0.07	0.04%
	Clarkway Trib A	147.2	175.28	147.84	175.28	146.52	175.28	154.92	175.32	0.64	0.43%	0.00	0.00%	-1.32	-0.89%	0	0.00%	7.08	4.79%	0.04	0.02%
	Clarkway Trib A	147.2	174.89	147.84	174.9	146.52	174.89	154.92	174.94	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.04	0.02%
	Clarkway Trib A	147.2	174.29	147.84	174.3	146.52	174.29	154.92	174.34	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.04	0.02%
	Clarkway Trib A	147.2	173.8	147.84	173.8	146.52	173.79	154.92	173.85	0.64	0.43%	0.00	0.00%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.05	0.03%
	Clarkway Trib A	147.2	172.71	147.84	172.71	146.52	172.71	154.92	172.74	0.64	0.43%	0.00	0.00%	-1.32	-0.89%	0	0.00%	7.08	4.79%	0.03	0.02%
	Clarkway Trib A	147.2	172.26	147.84	172.28	146.52	172.26	154.92	172.33	0.64	0.43%	0.02	0.01%	-1.32	-0.89%	-0.02	-0.01%	7.08	4.79%	0.05	0.03%
	Clarkway Trib A	147.2	172.16	147.84	172.18	146.52	172.16	154.92	172.23	0.64	0.43%	0.02	0.01%	-1.32	-0.89%	-0.02	-0.01%	7.08	4.79%	0.05	0.03%
	Clarkway Trib A	147.2	171.98	147.84	172	146.52	171.99	154.92	172.04	0.64	0.43%	0.02	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.04	0.02%
	Clarkway Trib A	147.2	171.98	147.84	172	146.52	171.99	154.92	172.05	0.64	0.43%	0.02	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.05	0.03%
	Clarkway Trib A	147.2	171.98	147.84	172	146.52	171.99	154.92	172.04	0.64	0.43%	0.02	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.04	0.02%
	Clarkway Trib A	Culvert		0		Culvert		Culvert													
	Clarkway Trib A	147.2	170.55	147.84	170.56	146.52	170.55	154.92	170.64	0.64	0.43%	0.01	0.01%	-1.32	-0.89%	-0.01	-0.01%	7.08	4.79%	0.08	0.05%
	Clarkway Trib A	147.2	170.25	147.84	170.2	146.52	170.18	154.92	170.21	0.64	0.43%	-0.05	-0.03%	-1.32	-0.89%	-0.02	-0.01%	7.08	4.79%	0.01	0.01%
	Clarkway Trib A	147.2	170.03	147.84	169.93	146.52	169.91	154.92	169.91	0.64	0.43%	-0.10	-0.06%	-1.32	-0.89%	-0.02	-0.01%	7.08	4.79%	-0.02	-0.01%
	Clarkway Trib A	147.2	169.77	147.84	169.6	146.52	169.56	154.92	169.5	0.64	0.43%	-0.17	-0.10%	-1.32	-0.89%	-0.04	-0.02%	7.08	4.79%	-0.1	-0.06%
	Clarkway Trib A	147.2	169.79	147.84	169.62	146.52	169.59	154.92	169.53	0.64	0.43%	-0.17	-0.10%	-1.32	-0.89%	-0.03	-0.02%	7.08	4.79%	-0.09	-0.05%
	Clarkway Trib A	147.2	169.78	147.84	169.62	146.52	169.58	154.92	169.52	0.64	0.43%	-0.16	-0.09%	-1.32	-0.89%	-0.04	-0.02%	7.08	4.79%	-0.1	-0.06%
846	Gore Road Trib	40.85	229.49	40.29	229.48	37.01	229.45	36.39	229.44	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.04	-0.02%
	Gore Road Trib	40.85	229.02	40.29	229.02	37.01	228.99	36.39	228.98	-0.56	-1.37%	0.00	0.00%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.04	-0.02%
	Gore Road Trib	40.85	228.58	40.29	228.58	37.01	228.54	36.39	228.53	-0.56	-1.37%	0.00	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	228.11	40.29	228.1	37.01	228.06	36.39	228.05	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	227.79	40.29	227.78	37.01	227.74	36.39	227.73	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	227.27	40.29	227.26	37.01	227.22	36.39	227.22	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.04	-0.02%
	Gore Road Trib	40.85	226.71	40.29	226.7	37.01	226.67	36.39	226.67	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.03	-0.01%
	Gore Road Trib	40.85	226.08	40.29	226.07	37.01	226.04	36.39	226.03	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.04	-0.02%
	Gore Road Trib	40.85	225.48	40.29	225.47	37.01	225.43	36.39	225.42	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	224.66	40.29	224.66	37.01	224.63	36.39	224.62	-0.56	-1.37%	0.00	0.00%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.04	-0.02%
	Gore Road Trib	40.85	223.55	40.29	223.54	37.01	223.5	36.39	223.49	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	222.91	40.29	222.9	37.01	222.85	36.39	222.84	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.05	-0.02%	-3.9	-9.68%	-0.06	-0.03%
	Gore Road Trib	40.85	222.61	40.29	222.59	37.01	222.56	36.39	222.56	-0.56	-1.37%	-0.02	-0.01%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.03	-0.01%
	Gore Road Trib	40.85	222.61	40.29	222.58	37.01	222.56	36.39	222.55	-0.56	-1.37%	-0.03	-0.01%	-3.28	-8.14%	-0.02	-0.01%	-3.9	-9.68%	-0.03	-0.01%
	Gore Road Trib	40.85	222.6	40.29	222.58	37.01	222.56	36.39	222.55	-0.56	-1.37%	-0.02	-0.01%	-3.28	-8.14%	-0.02	-0.01%	-3.9	-9.68%	-0.03	-0.01%
	Gore Road Trib	Culvert		0		Culvert		Culvert													
846	Gore Road Trib	40.85	221.66	40.29	221.65	37.01	221.6	36.39	221.59	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.05	-0.02%	-3.9	-9.68%	-0.06	-0.03%
	Gore Road Trib	40.85	221.57	40.29	221.56	37.01	221.52	36.39	221.51	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	221.32	40.29	221.32	37.01	221.28	36.39	221.27	-0.56	-1.37%	0.00	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	220.31	40.29	220.3	37.01	220.26	36.39	220.25	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	219.71	40.29	219.71	37.01	219.68	36.39	219.67	-0.56	-1.37%	0.00	0.00%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.04	-0.02%
	Gore Road Trib	40.85	219.23	40.29	219.22	37.01	219.19	36.39	219.19	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.03	-0.01%
	Gore Road Trib	40.85	218.41	40.29	218.41	37.01	218.37	36.39	218.36	-0.56	-1.37%	0.00	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	217.54	40.29	217.53	37.01	217.49	36.39	217.48	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	216.31	40.29	216.31	37.01	216.27	36.39	216.26	-0.56	-1.37%	0.00	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.05	-0.02%
	Gore Road Trib	40.85	215.57	40.29	215.56	37.01	215.51	36.39	215.5	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.05	-0.02%	-3.9	-9.68%	-0.06	-0.03%
	Gore Road Trib	40.85	215.13	40.29	215.12	37.01	215.07	36.39	215.06	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.05	-0.02%	-3.9	-9.68%	-0.06	-0.03%
	Gore Road Trib	40.85	214.65	40.29	214.63	37.01	214.6	36.39	214.61	-0.56	-1.37%	-0.02	-0.01%	-3.28	-8.14%	-0.03	-0.01%	-3.9	-9.68%	-0.02	-0.01%
	Gore Road Trib	40.85	214.63	40.29	214.62	37.01	214.58	36.39	214.59	-0.56	-1.37%	-0.01	0.00%	-3.28	-8.14%	-0.04	-0.02%	-3.9	-9.68%	-0.03	-0.01%
	Gore Road Trib	Culvert		0		Culvert		Culvert													
1393	Gore Road Trib	39.9	214.11	39.35	214.11	37.43	214.08	38.42	214.09	-0.55	-1.38%	0.00	0.00%	-1.92	-4.88%	-0.03	-0.01%	-0.93	-2.36%	-0.02	-0.01%
	Gore Road Trib	39.9	213.74	39.35	213.73	37.43	213.7	38.42	213.71	-0.55	-1.38%	-0.01	0.00%	-1.92	-4.88%	-0.03	-0.01%	-0.93	-2.36%	-0.02	-0.01%
	Gore Road Trib	39.9	213.11	39.35	213.1	37.43	213.08	38.42	213.09	-0.55	-1.38%	-0.01	0.00%	-1.92	-4.88%	-0.02	-0.01%	-0.93	-2.36%	-0.01	0.00%
	Gore Road Trib	39.9	212.2	39.35	212.19	37.43	212.17	38.42	212.18	-0.55	-1.38%	-0.01	0.00%	-1.92	-4.88%	-0.02	-0.01%	-0.93	-2.36%	-0.01	0.00%
	Gore Road Trib	39.9	211.48	39.35	211.47	37.43	211.45	38.42	211.46	-0.55	-1.38%	-0.01	0.00%	-1.92	-4.88%	-0.02	-0.01%	-0.93	-2.36%	-0.01	0.00%
	Gore Road Trib	39.9	210.48	39.35	210.47	37.43	210.45	38.42	210.46	-0.55	-1.38%	-0.01	0.00%	-1.92	-4.88%	-0.02	-0.01%	-0.93	-2.36%	-0.01	0.00%
	Gore Road Trib	39.9	209.55	39.35	209.55	37.43	209.52	38.42	209.54	-0.55	-1.38%	0.00	0.00%	-1.92	-4.88%	-0.03	-0.01%	-0.93	-2.36%	-0.01	0.00%
	Gore Road Trib	39.9	208.61	39.35	208.61	37.43	208.59	38.42	208.59	-0.55	-1.38%	0.00	0.00%	-1.92	-4.88%	-0.02	-0.01%	-0.93	-2.36%	-0.02	-0.01%
	Gore Road Trib	39.9	207.65	39.35	207.64	37.43	207.62	38.42	207.64	-0.55	-1.38%	-0.01	0.00%	-1.92	-4.88%	-0.02	-0.01%	-0.93	-2.36%	0	0.00%
	Gore Road Trib	39.9	206.96	39.35	206.96	37.43	206.91	38.42	206.9	-0.55	-1.38%	0.00	0.00%	-1.92	-4.88%	-0.05	-0.02%	-0.93	-2.36%	-0.06	-0.03%
	Gore Road Trib	39.9	205.77	39.35	205.76	37.43	205.76	38.42	205.8	-0.55	-1.38%	-0.01	0.00%	-1.92	-4.88%	0	0.00%	-0.93	-2.36%	0.04	0.02%
1461	Gore Road Trib	51.03	205.57	50.66	205.57	50.96	205.57	54.37	205.61	-0.37	-0.73%	0.00	0.00%	0.3	0.59%	0	0.00%	3.71	7.32%	0.04	0.02%
	Gore Road Trib	51.03	205.1	50.66	205.1	50.96	205.1	54.37	205.12	-0.37	-0.73%	0.00	0.00%	0.3	0.59%	0	0.00%	3.71	7.32%	0.02	0.01%
	Gore Road Trib	51.03	204.22	50.66	204.21	50.96	204.22	54.37	204.27	-0.37	-0.73%	-0.01	0.00%	0.3	0.59%	0.01	0.00%	3.71	7.32%	0.06	0.03%
	Gore Road Trib	51.03	203.96	50.66	203.96	50.96	203.96	54.37	204.01	-0.37	-0.73%	0.00	0.00%	0.3	0.59%	0	0.00%	3.71	7.32%	0.05	0.02%
	Gore Road Trib	51.03	203.61	50.66	203.6	50.96	203.61	54.37	203.64	-0.37	-0.73%	-0.01	0.00%	0.3	0.59%	0.01	0.00%	3.71	7.32%	0.04	0.02%
	Gore Road Trib	51.03	203.03	50.66	203.02	50.96	203.03	54.37	203.06	-0.37	-0.73%	-0.01	0.00%	0.3	0.59%	0.01	0.00%	3.71	7.32%	0.04	0.02%
	Gore Road Trib	51.03	202.2	50.66	202.2	50.96	202.2	54.37	202.24	-0.37	-0.73%	0.00	0.00%	0.3	0.59%	0	0.00%	3.71	7.32%	0.04	0.02%
	Gore Road Trib	51.03	201.44	50.66	201.44	50.96	201.44	54.37	201.48	-0.37	-0.73%	0.00	0.00%	0.3	0.59%	0	0.00%	3.71	7.32%	0.04	0.02%
	Gore Road Trib	51.03	200.93	50.66	200.94	50.96	200.93	54.37	200.98	-0.37	-0.73%	0.01	0.00%	0.3	0.59%	-0.01	0.00%	3.71	7.32%	0.04	0.02%
	Gore Road Trib	51.03	199.87	50.66	199.86	50.96	199.87	54.37	199.89	-0.37	-0.73%	-0.01	-0.01%	0.3	0.59%	0.01	0.01%	3.71	7.32%	0.03	0.02%
	Gore Road Trib	51.03	199.96	50.66	199.96	50.96	199.96	54.37	199.98	-0.37	-0.73%	0.00	0.00%	0.3	0.59%	0	0.00%	3.71	7.32%	0.02	0.01%
	Gore Road Trib	51.03	199.97	50.66	199.96	50.96	199.96	54.37	199.98	-0.37	-0.73%	-0.01	-0.01%	0.3	0.59%	0	0.00%	3.71	7.32%	0.02	0.01%
	Gore Road Trib	51.03	199.96	50.66	199.96	50.96	199.96	54.37	199.98	-0.37	-0.73%	0.00	0.00%	0.3	0.59%	0	0.00%	3.71	7.32%	0.02	0.01%
	Gore Road Trib	Bridge		0		Bridge		Bridge													
	Gore Road Trib	51.03	198.9	50.66	198.89	50.96	198.89	54.37	198.93	-0.37	-0.73%	-0.01	-0.01%	0.3	0.59%	0	0.00%	3.71	7.32%	0.04	0.02%
	Gore Road Trib	51.03	199.15	50.66	199.14	50.96	199.14	54.37	199.2	-0.37	-0.73%	-0.01	-0.01%	0.3	0.59%	0	0.00%	3.71	7.32%	0.06	0.03%
	Gore Road Trib	51.03	199.13	50.66	199.13	50.96	199.12	54.37	199.18	-0.37	-0.73%	0.00	0.00%	0.3	0.59%	-0.01	-0.01%	3.71	7.32%	0.05	0.03%
	Gore Road Trib	51.03	199.06	50.66	199.05	50.96	199.05	54.37	199.11	-0.37	-0.73%	-0.01	-0.01%	0.3	0.59%	0	0.00%	3.71	7.32%	0.06	0.03%
	Gore Road Trib	51.03	198.79	50.66	198.78	50.96	198.78	54.37	198.82	-0.37	-0.73%	-0.01	-0.01%	0.3	0.59%	0	0.00%	3.71	7.32%	0.04	0.02%
	Gore Road Trib	Culvert		0		Culvert		Culvert													
1819	Gore Road Trib	68.92	198.4	68.62	198.4	67.82	198.39	70.07	198.41	-0.3	-0.44%	0.00	0.00%	-0.8	-1.17%	-0.01	-0.01%	1.45	2.11%	0.01	0.01%
	Gore Road Trib	68.92	198.43	68.62	198.43	67.82	198.42	70.07	198.44	-0.3	-0.44%	0.00	0.00%	-0.8	-1.17%	-0.01	-0.01%	1.45	2.11%	0.01	0.01%
	Gore Road Trib	68.92	197.86	68.62	197.86	67.82	197.85	70.07	197.87	-0.3	-0.44%	0.00	0.00%	-0.8	-1.17%	-0.01	-0.01%	1.45	2.11%	0.01	0.01%
	Gore Road Trib	68.92	196.65	68.62	196.64	67.82	196.64	70.07	196.65	-0.3	-0.44%	-0.01	-0.01%	-0.8	-1.17%	0	0.00%	1.45	2.11%	0.01	0.01%
	Gore Road Trib	68.92	195.95	68.62	195.94	67.82	195.95	70.07	195.96	-0.3	-0.44%	-0.01	-0.01%	-0.8	-1.17%	0.01	0.01%	1.45	2.11%	0.02	0.01%
	Gore Road Trib	68.92	195.85	68.62	195.83	67.82	195.85	70.07	195.85	-0.3	-0.44%	-0.02	-0.01%	-0.8	-1.17%	0.02	0.01%	1.45	2.11%	0.02	0.01%
	Gore Road Trib	68.92	195.84	68.62	195.82	67.82	195.85	70.07	195.85	-0.3	-0.44%	-0.02	-0.01%	-0.8	-1.17%	0.03	0.02%	1.45	2.11%	0.03	0.02%
	Gore Road Trib	Culvert		0		Culvert		Culvert													
	Gore Road Trib	68.92	195.49	68.62	195.49	67.82	195.48	70.07	195.5	-0.3	-0.44%	0.00	0.00%	-0.8	-1.17%	-0.01	-0.01%	1.45	2.11%	0.01	0.01%
	Gore Road Trib	68.92	195.46	68.62	195.46	67.82	195.45	70.07	195.47	-0.3	-0.44%	0.00	0.00%	-0.8	-1.17%	-0.01	-0.01%	1.45	2.11%	0.01	0.01%
	Gore Road Trib	68.92	195.27	68.62	195.27	67.82	195.26	70.07	195.28	-0.3	-0.44%	0.00	0.00%	-0.8	-1.17%	-0.01	-0.01%	1.45	2.11%	0.01	0.01%
	Gore Road Trib	68.92	195.02	68.62	195.02	67.82	195.01	70.07	195.03	-0.3	-0.44%	0.00	0.00%	-0.8	-1.17%	-0.01	-0.01%	1.45	2.11%	0.01	0.01%
	Gore Road Trib	68.92	194.57	68.62	194.57	67.82	194.56	70.07	194.58	-0.3	-0.44%	0.00	0.00%	-0.8	-1.17%	-0.01	-0.01%	1.45	2.11%	0.01	0.01%
1962	Gore Road Trib	77.72	194.35	77.48	194.35	76.82	194.34	78.71	194.36	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.01	-0.01%	1.23	1.59%	0.01	0.01%
	Gore Road Trib	77.72	194.17	77.48	194.16	76.82	194.16	78.71	194.18	-0.24	-0.31%	-0.01	-0.01%	-0.66	-0.85%	0	0.00%	1.23	1.59%	0.02	0.01%
	Gore Road Trib	77.72	193.84	77.48	193.83	76.82	193.83	78.71	193.85	-0.24	-0.31%	-0.01	-0.01%	-0.66	-0.85%	0	0.00%	1.23	1.59%	0.02	0.01%
	Gore Road Trib	77.72	193.8	77.48	193.79	76.82	193.8	78.71	193.81	-0.24	-0.31%	-0.01	-0.01%	-0.66	-0.85%	0.01	0.01%	1.23	1.59%	0.02	0.01%
	Gore Road Trib	Bridge		0		Bridge		Bridge													
	Gore Road Trib	77.72	192.85	77.48	192.85	76.82	192.84	78.71	192.85	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.01	-0.01%	1.23	1.59%	0	0.00%
	Gore Road Trib	77.72	192.85	77.48	192.85	76.82	192.85	78.71	192.86	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	0	0.00%	1.23	1.59%	0.01	0.01%
	Gore Road Trib	77.72	192.77	77.48	192.77	76.82	192.76	78.71	192.77	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.01	-0.01%	1.23	1.59%	0	0.00%
	Gore Road Trib	77.72	192.76	77.48	192.76	76.82	192.76	78.71	192.76	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	0	0.00%	1.23	1.59%	0	0.00%
	Gore Road Trib	Bridge		0		Bridge		Bridge													
	Gore Road Trib	77.72	191.36	77.48	191.36	76.82	191.35	78.71	191.36	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.01	-0.01%	1.23	1.59%	0	0.00%
	Gore Road Trib	77.72	191.42	77.48	191.42	76.82	191.41	78.71	191.43	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.01	-0.01%	1.23	1.59%	0.01	0.01%
	Gore Road Trib	77.72	190.9	77.48	190.9	76.82	190.9	78.71	190.91	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	0	0.00%	1.23	1.59%	0.01	0.01%
	Gore Road Trib	77.72	190.75	77.48	190.74	76.82	190.74	78.71	190.76	-0.24	-0.31%	-0.01	-0.01%	-0.66	-0.85%	0	0.00%	1.23	1.59%	0.02	0.01%
	Gore Road Trib	77.72	190.64	77.48	190.64	76.82	190.63	78.71	190.65	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.01	-0.01%	1.23	1.59%	0.01	0.01%
	Gore Road Trib	Culvert		0		Culvert		Culvert													
	Gore Road Trib	77.72	190.51	77.48	190.5	76.82	190.5	78.71	190.51	-0.24	-0.31%	-0.01	-0.01%	-0.66	-0.85%	0	0.00%	1.23	1.59%	0.01	0.01%
	Gore Road Trib	77.72	190.38	77.48	190.38	76.82	190.37	78.71	190.39	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.01	-0.01%	1.23	1.59%	0.01	0.01%
	Gore Road Trib	77.72	189.7	77.48	189.7	76.82	189.69	78.71	189.72	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.01	-0.01%	1.23	1.59%	0.02	0.01%
	Gore Road Trib	77.72	189.56	77.48	189.56	76.82	189.54	78.71	189.58	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.02	-0.01%	1.23	1.59%	0.02	0.01%
	Gore Road Trib	77.72	189.52	77.48	189.52	76.82	189.5	78.71	189.54	-0.24	-0.31%	0.00	0.00%	-0.66	-0.85%	-0.02	-0.01%	1.23	1.59%	0.02	0.01%
	Gore Road Trib	Bridge		0		Bridge		Bridge													
1853	Gore Road Trib	84.33	188.83	84.09	188.83	83.43	188.82	85.23	188.84	-0.24	-0.28%	0.00	0.00%	-0.66	-0.78%	-0.01	-0.01%	1.14	1.36%	0.01	0.01%
	Gore Road Trib	84.33	188.51	84.09	188.51	83.43	188.5	85.23	188.52	-0.24	-0.28%	0.00	0.00%	-0.66	-0.78%	-0.01	-0.01%	1.14	1.36%	0.01	0.01%
	Gore Road Trib	84.33	187.77	84.09	187.77	83.43	187.76	85.23	187.78	-0.24	-0.28%	0.00	0.00%	-0.66	-0.78%	-0.01	-0.01%	1.14	1.36%	0.01	0.01%
	Gore Road Trib	84.33	187.44	84.09	187.45	83.43	187.43	85.23	187.46	-0.24	-0.28%	0.01	0.01%	-0.66	-0.78%	-0.02	-0.01%	1.14	1.36%	0.01	0.01%
	Gore Road Trib	84.33	187.25	84.09	187.26	83.43	187.24	85.23	187.28	-0.24	-0.28%	0.01	0.01%	-0.66	-0.78%	-0.02	-0.01%	1.14	1.36%	0.02	0.01%

VO Node	River	TRCA Future Model Flows		SCE Modified Future Model Flows		SCE Modified Future Model Controlled Flows		Post Dev Updated TP Future Model Uncontrolled Flows		Comparison (SCE Modified Future & TRCA Future Model Results)				Comparison (Post Dev Controlled & SCE Modified Future Model Results)				Comparison (Post Dev Updated TP Uncontrolled & SCE Modified Future Model Results)			
		A	B	C	D	E	F	G	H	Flows		Water Surface Elevation		Flows		Water Surface Elevation		Flows		Water Surface Elevation	
		Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	Q Total	W.S. Elev	[C - A]	[C - A]/ [A]	[D - B]	[D - B]/ [B]	[E - C]	[E - C]/ [C]	[F - D]	[F - D]/ [D]	[G - C]	[G - C]/ [C]	[H - D]	[H - D]/ [D]
		(m3/s)	(m)	(m3/s)	(m)	(m3/s)	(m)	(m3/s)	(m)	m^3/s	%	m	%	m^3/s	%	m	%	m^3/s	%	m	%
	Gore Road Trib	84.33	187.17	84.09	187.19	83.43	187.17	85.23	187.2	-0.24	-0.28%	0.02	0.01%	-0.66	-0.78%	-0.02	-0.01%	1.14	1.36%	0.01	0.01%
	Gore Road Trib	84.33	186.96	84.09	186.98	83.43	186.96	85.23	186.99	-0.24	-0.28%	0.02	0.01%	-0.66	-0.78%	-0.02	-0.01%	1.14	1.36%	0.01	0.01%
	Gore Road Trib	Bridge		0		Bridge		Bridge													
1696	Gore Road Trib	84.31	185.31	84.04	185.32	83.38	185.31	85.49	185.33	-0.27	-0.32%	0.01	0.01%	-0.66	-0.79%	-0.01	-0.01%	1.45	1.73%	0.01	0.01%
	Gore Road Trib	84.31	185.24	84.04	185.23	83.38	185.23	85.49	185.24	-0.27	-0.32%	-0.01	-0.01%	-0.66	-0.79%	0	0.00%	1.45	1.73%	0.01	0.01%
	Gore Road Trib	84.31	184.87	84.04	184.87	83.38	184.86	85.49	184.89	-0.27	-0.32%	0.00	0.00%	-0.66	-0.79%	-0.01	-0.01%	1.45	1.73%	0.02	0.01%
	Gore Road Trib	84.31	184.58	84.04	184.58	83.38	184.57	85.49	184.59	-0.27	-0.32%	0.00	0.00%	-0.66	-0.79%	-0.01	-0.01%	1.45	1.73%	0.01	0.01%
	Gore Road Trib	84.31	184.45	84.04	184.45	83.38	184.44	85.49	184.46	-0.27	-0.32%	0.00	0.00%	-0.66	-0.79%	-0.01	-0.01%	1.45	1.73%	0.01	0.01%
	Gore Road Trib	84.31	183.95	84.04	183.95	83.38	183.95	85.49	183.96	-0.27	-0.32%	0.00	0.00%	-0.66	-0.79%	0	0.00%	1.45	1.73%	0.01	0.01%
	Gore Road Trib	84.31	183.16	84.04	183.15	83.38	183.14	85.49	183.18	-0.27	-0.32%	-0.01	-0.01%	-0.66	-0.79%	-0.01	-0.01%	1.45	1.73%	0.03	0.02%
	Gore Road Trib	84.31	182.93	84.04	182.92	83.38	182.9	85.49	182.97	-0.27	-0.32%	-0.01	-0.01%	-0.66	-0.79%	-0.02	-0.01%	1.45	1.73%	0.05	0.03%
	Gore Road Trib	84.31	182.72	84.04	182.7	83.38	182.67	85.49	182.77	-0.27	-0.32%	-0.02	-0.01%	-0.66	-0.79%	-0.03	-0.02%	1.45	1.73%	0.07	0.04%
	Gore Road Trib	84.31	182.63	84.04	182.61	83.38	182.58	85.49	182.69	-0.27	-0.32%	-0.02	-0.01%	-0.66	-0.79%	-0.03	-0.02%	1.45	1.73%	0.08	0.04%
	Gore Road Trib	84.31	182.6	84.04	182.58	83.38	182.55	85.49	182.66	-0.27	-0.32%	-0.02	-0.01%	-0.66	-0.79%	-0.03	-0.02%	1.45	1.73%	0.08	0.04%
	Gore Road Trib	84.31	182.6	84.04	182.58	83.38	182.55	85.49	182.66	-0.27	-0.32%	-0.02	-0.01%	-0.66	-0.79%	-0.03	-0.02%	1.45	1.73%	0.08	0.04%
	Gore Road Trib	84.31	182.54	84.04	182.53	83.38	182.49	85.49	182.61	-0.27	-0.32%	-0.01	-0.01%	-0.66	-0.79%	-0.04	-0.02%	1.45	1.73%	0.08	0.04%
	Gore Road Trib	Culvert		0		Culvert		Culvert													
1389	Gore Road Trib	99.22	180.53	98.95	180.52	98.35	180.52	100.6	180.54	-0.27	-0.27%	-0.01	-0.01%	-0.6	-0.61%	0	0.00%	1.65	1.67%	0.02	0.01%
	Gore Road Trib	99.22	180.56	98.95	180.55	98.35	180.54	100.6	180.58	-0.27	-0.27%	-0.01	-0.01%	-0.6	-0.61%	-0.01	-0.01%	1.65	1.67%	0.03	0.02%
	Gore Road Trib	99.22	180.39	98.95	180.38	98.35	180.37	100.6	180.42	-0.27	-0.27%	-0.01	-0.01%	-0.6	-0.61%	-0.01	-0.01%	1.65	1.67%	0.04	0.02%
	Gore Road Trib	99.22	180.24	98.95	180.23	98.35	180.22	100.6	180.27	-0.27	-0.27%	-0.01	-0.01%	-0.6	-0.61%	-0.01	-0.01%	1.65	1.67%	0.04	0.02%
	Gore Road Trib	99.22	180.17	98.95	180.16	98.35	180.15	100.6	180.19	-0.27	-0.27%	-0.01	-0.01%	-0.6	-0.61%	-0.01	-0.01%	1.65	1.67%	0.03	0.02%
	Gore Road Trib	Culvert		0		Culvert		Culvert													
1690	Gore Road Trib	99.29	178.74	99.04	178.74	98.28	178.79	100.41	178.81	-0.25	-0.25%	0.00	0.00%	-0.76	-0.77%	0.05	0.03%	1.37	1.38%	0.07	0.04%
	Gore Road Trib	99.29	178.85	99.04	178.85	98.28	178.84	100.41	178.86	-0.25	-0.25%	0.00	0.00%	-0.76	-0.77%	-0.01	-0.01%	1.37	1.38%	0.01	0.01%
	Gore Road Trib	99.29	178.05	99.04	178.05	98.28	178.05	100.41	178.06	-0.25	-0.25%	0.00	0.00%	-0.76	-0.77%	0	0.00%	1.37	1.38%	0.01	0.01%
	Gore Road Trib	99.29	176.9	99.04	176.9	98.28	176.9	100.41	176.91	-0.25	-0.25%	0.00	0.00%	-0.76	-0.77%	0	0.00%	1.37	1.38%	0.01	0.01%
	Gore Road Trib	99.29	176.28	99.04	176.28	98.28	176.27	100.41	176.29	-0.25	-0.25%	0.00	0.00%	-0.76	-0.77%	-0.01	-0.01%	1.37	1.38%	0.01	0.01%
	Gore Road Trib	99.29	175.56	99.04	175.56	98.28	175.55	100.41	175.58	-0.25	-0.25%	0.00	0.00%	-0.76	-0.77%	-0.01	-0.01%	1.37	1.38%	0.02	0.01%
	Gore Road Trib	99.29	175.04	99.04	175.04	98.28	175.03	100.41	175.05	-0.25	-0.25%	0.00	0.00%	-0.76	-0.77%	-0.01	-0.01%	1.37	1.38%	0.01	0.01%
	Gore Road Trib	99.29	173.95	99.04	173.95	98.28	173.95	100.41	173.96	-0.25	-0.25%	0.00	0.00%	-0.76	-0.77%	0	0.00%	1.37	1.38%	0.01	0.01%
1959	Gore Road Trib	107.85	173.75	107.6	173.75	106.84	173.74	108.65	173.76	-0.25	-0.23%	0.00	0.00%	-0.76	-0.71%	-0.01	-0.01%	1.05	0.98%	0.01	0.01%
	Gore Road Trib	107.85	173.24	107.6	173.24	106.84	173.23	108.65	173.25	-0.25	-0.23%	0.00	0.00%	-0.76	-0.71%	-0.01	-0.01%	1.05	0.98%	0.01	0.01%
	Gore Road Trib	107.85	172.85	107.6	172.85	106.84	172.84	108.65	172.86	-0.25	-0.23%	0.00	0.00%	-0.76	-0.71%	-0.01	-0.01%	1.05	0.98%	0.01	0.01%
	Gore Road Trib	107.85	172.63	107.6	172.62	106.84	172.62	108.65	172.64	-0.25	-0.23%	-0.01	-0.01%	-0.76	-0.71%	0	0.00%	1.05	0.98%	0.02	0.01%
	Gore Road Trib	107.85	172.37	107.6	172.36	106.84	172.35	108.65	172.38	-0.25	-0.23%	-0.01	-0.01%	-0.76	-0.71%	-0.01	-0.01%	1.05	0.98%	0.02	0.01%
	Gore Road Trib	107.85	172.11	107.6	172.1	106.84	172.09	108.65	172.12	-0.25	-0.23%	-0.01	-0.01%	-0.76	-0.71%	-0.01	-0.01%	1.05	0.98%	0.02	0.01%
	Gore Road Trib	107.85	171.98	107.6	171.96	106.84	171.96	108.65	171.98	-0.25	-0.23%	-0.02	-0.01%	-0.76	-0.71%	0	0.00%	1.05	0.98%	0.02	0.01%
	Gore Road Trib	107.85	171.84	107.6	171.83	106.84	171.82	108.65	171.85	-0.25	-0.23%	-0.01	-0.01%	-0.76	-0.71%	-0.01	-0.01%	1.05	0.98%	0.02	0.01%
	Gore Road Trib	107.85	171.77	107.6	171.76	106.84	171.75	108.65	171.78	-0.25	-0.23%	-0.01	-0.01%	-0.76	-0.71%	-0.01	-0.01%	1.05	0.98%	0.02	0.01%
	Gore Road Trib	107.85	171.71	107.6	171.69	106.84	171.69	108.65	171.71	-0.25	-0.23%	-0.02	-0.01%	-0.76	-0.71%	0	0.00%	1.05	0.98%	0.02	0.01%
	Gore Road Trib	Culvert		0		Culvert		Culvert													
	Gore Road Trib	107.85	169.93	107.6	169.83	106.84	169.81	108.65	169.8	-0.25	-0.23%	-0.10	-0.06%	-0.76	-0.71%	-0.02	-0.01%	1.05	0.98%	-0.03	-0.02%
	Gore Road Trib	107.85	170.05	107.6	169.96	106.84	169.94	108.65	169.93	-0.25	-0.23%	-0.09	-0.05%	-0.76	-0.71%	-0.02	-0.01%	1.05	0.98%	-0.03	-0.02%
	Gore Road Trib	107.85	169.85	107.6	169.69	106.84	169.65	108.65	169.6	-0.25	-0.23%	-0.16	-0.09%	-0.76	-0.71%	-0.04	-0.02%	1.05	0.98%	-0.09	-0.05%
	Gore Road Trib	107.85	169.79	107.6	169.62	106.84	169.58	108.65	169.52	-0.25	-0.23%	-0.17	-0.10%	-0.76	-0.71%	-0.04	-0.02%	1.05	0.98%	-0.1	-0.06%
	Gore Road Trib	107.85	169.78	107.6	169.61	106.84	169.58	108.65	169.51	-0.25	-0.23%	-0.17	-0.10%	-0.76	-0.71%	-0.03	-0.02%	1.05	0.98%	-0.1	-0.06%
727	Clarkway Trib	258.89	169.76	259.26	169.59	257.16	169.55	267.21	169.49	0.37	0.14%	-0.17	-0.10%	-2.1	-0.81%	-0.04	-0.02%	7.95	3.07%	-0.1	-0.06%
	Clarkway Trib	258.89	169.72	259.26	169.54	257.16	169.5	267.21	169.43	0.37	0.14%	-0.18	-0.11%	-2.1	-0.81%	-0.04	-0.02%	7.95	3.07%	-0.11	-0.06%
	Clarkway Trib	258.89	169.72	259.26	169.54	257.16	169.51	267.21	169.43	0.37	0.14%	-0.18	-0.11%	-2.1	-0.81%	-0.03	-0.02%	7.95	3.07%	-0.11	-0.06%

PROJECT NO.: 5139
PROJECT NAME: Humber Station Village
LOCATION: Town of Caledon
DATE: Nov-24

SCHAEFFERS
CONSULTING ENGINEERS

Table 1: Watershed Slope Calculations

Catchment	Number of Divisions of Equal Length	Equal Lengths (m)	Upstream Elevation (mAMSL)	Downstream Elevation (mAMSL)	Slope (m/m)	Slope to the power of -0.5 (m/m)	Sum of Length (m)	Sum of Slope to the power of -0.5	Watershed Slope, Sw (%)
41.08 Post Dev West	1	48.7	#############	################	0.026	6.2	243.5	49.81	1.01
	2	48.7	#############	################	0.005	14.0			
	3	48.7	#############	################	0.010	9.9			
	4	48.7	#############	################	0.010	9.9			
	5	48.7	#############	################	0.010	9.9			
41.07 Post Dev West	1	95.2	#############	################	0.008	11.3	476.2	61.40	0.66
	2	95.2	#############	################	0.005	13.8			
	3	95.2	#############	################	0.005	13.8			
	4	95.2	#############	################	0.013	8.7			
	5	95.2	#############	################	0.005	13.8			
43.03 Post Dev External	1	133.3	#############	################	0.009	10.3	666.3	59.16	0.71
	2	133.3	#############	################	0.011	9.4			
	3	133.3	#############	################	0.008	11.5			
	4	133.3	#############	################	0.008	11.5			
	5	133.3	#############	################	0.004	16.3			
43.02 Post Dev External	1	50.5	#############	################	0.005	14.2	252.3	72.16	0.48
	2	50.5	#############	################	0.020	7.1			
	3	50.5	#############	################	0.010	10.0			
	4	50.5	#############	################	0.003	18.3			
	5	50.5	#############	################	0.002	22.5			
43.04 Post Dev External	1	69.9	#############	################	0.039	5.0	349.7	62.15	0.65
	2	69.9	#############	################	0.007	11.8			
	3	69.9	#############	################	0.007	11.8			
	4	69.9	#############	################	0.004	16.7			
	5	69.9	#############	################	0.004	16.7			
43.05 Post Dev External	1	41.4	#############	################	0.012	9.1	207.2	37.47	1.78
	2	41.4	#############	################	0.024	6.4			
	3	41.4	#############	################	0.072	3.7			
	4	41.4	#############	################	0.012	9.1			
	5	41.4	#############	################	0.012	9.1			
43.06 Post Dev External	1	154.6	#############	################	0.019	7.2	773.2	64.94	0.59
	2	154.6	#############	################	0.006	12.4			
	3	154.6	#############	################	0.010	10.2			
	4	154.6	#############	################	0.003	17.6			
	5	154.6	#############	################	0.003	17.6			
41.06 Post Dev External	1	69.4	#############	################	0.001	26.3	346.8	88.05	0.32
	2	69.4	#############	################	0.002	21.5			
	3	69.4	#############	################	0.007	11.8			
	4	69.4	#############	################	0.004	16.7			
	5	69.4	#############	################	0.007	11.8			
Proposed water course	1	302.3	#############	################	0.005	14.2	1511.3	82.85	0.36
	2	302.3	#############	################	0.003	17.4			
	3	302.3	#############	################	0.003	17.4			
	4	302.3	#############	################	0.012	9.3			
	5	302.3	#############	################	0.002	24.6			
41.07 PreDEv North External	1	166.2	#############	################	0.018	7.4	831.0	60.25	0.69
	2	166.2	#############	################	0.005	14.9			
	3	166.2	#############	################	0.008	11.5			
	4	166.2	#############	################	0.015	8.2			
	5	166.2	#############	################	0.003	18.2			
Natural Channel South of Pond	1	33.4	#############	################	-0.269	#NUM!	167.0	#NUM!	0.29
	2	33.4	#############	################	0.022	6.7			
	3	33.4	#############	################	0.037	5.2			
	4	33.4	#############	################	0.075	3.7			
	5	33.4	#############	################	0.015	8.2			

Notes:

1. The watershed slope is calculated using the Equivalent Slope Method using the Ministry of Transportation (MTO, 1997) Drainage Manual guidelines in Chapter 8 (page 27). The Equalivent Slope Method equation is

PROJECT NO.: 5139
PROJECT NAME: Humber Station Village
LOCATION: Town of Caledon
DATE: Nov-24

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Table 2: Pre-development Catchment Area Drainage Characteristics

Catchment	Area	Initial Abstraction *	Watershed Slope, S_w	Overland Flow Length, L	Runoff Coefficient, C	Time of Concentration, t_c (Airport)	Time to Peak, tp = 0.67tc (Airport)	Time to Peak, tp = 0.67tc (Airport)
	(ha)	*(mm)*	*(%)*	*(m)*		minutes	minutes	(hrs)
41.08 Post Dev West	6.54	10.00	1.0	243.5	0.25	43.1	28.9	0.48
41.07 Post Dev West	6.81	10.00	0.66	476.2	0.25	69.2	46.4	0.77
43.03 Post Dev External	16.91	10.00	0.71	666.309	0.25	79.9	53.6	0.89
43.02 Post Dev External		10.00	0.48	252.28	0.25	56.1	37.6	0.63
43.04 Post Dev External	7.27	10.00	0.65	349.683	0.25	59.8	40.1	0.67
43.05 Post Dev External		10.00	1.78	207.211	0.25	33.0	22.1	0.37
43.06 Post Dev External	9.51	10.00	0.59	773.1679	0.25	91.6	61.3	1.02
41.06 Post Dev External	9.43	10.00	0.32	346.815	0.25	75.0	50.2	0.84
Proposed water course	8.81	10.00	0.36	1511.259	0.25	150.3	100.7	1.68
41.07 PreDEv North External	27.77	10.00	0.69	831	0.25	90.3	60.5	1.01
Natural Channel South of Pond	3.44	5.00	0.29	167	0.25	53.9	36.1	**0.60**

*from TRCA Humber River Model

Airport Equation:

Assumptions: Runoff Coefficient, C, is <u>less than or equal to 0.4</u>

$$t_c = 3.26 * (1.1 - C) * L^{0.5} * S_w^{-0.33}$$

Where:
t_c is the time of concentration (minutes);
C is the runoff coefficient;
L is the watershed length (m); and
S_w is the watershed slope (%).

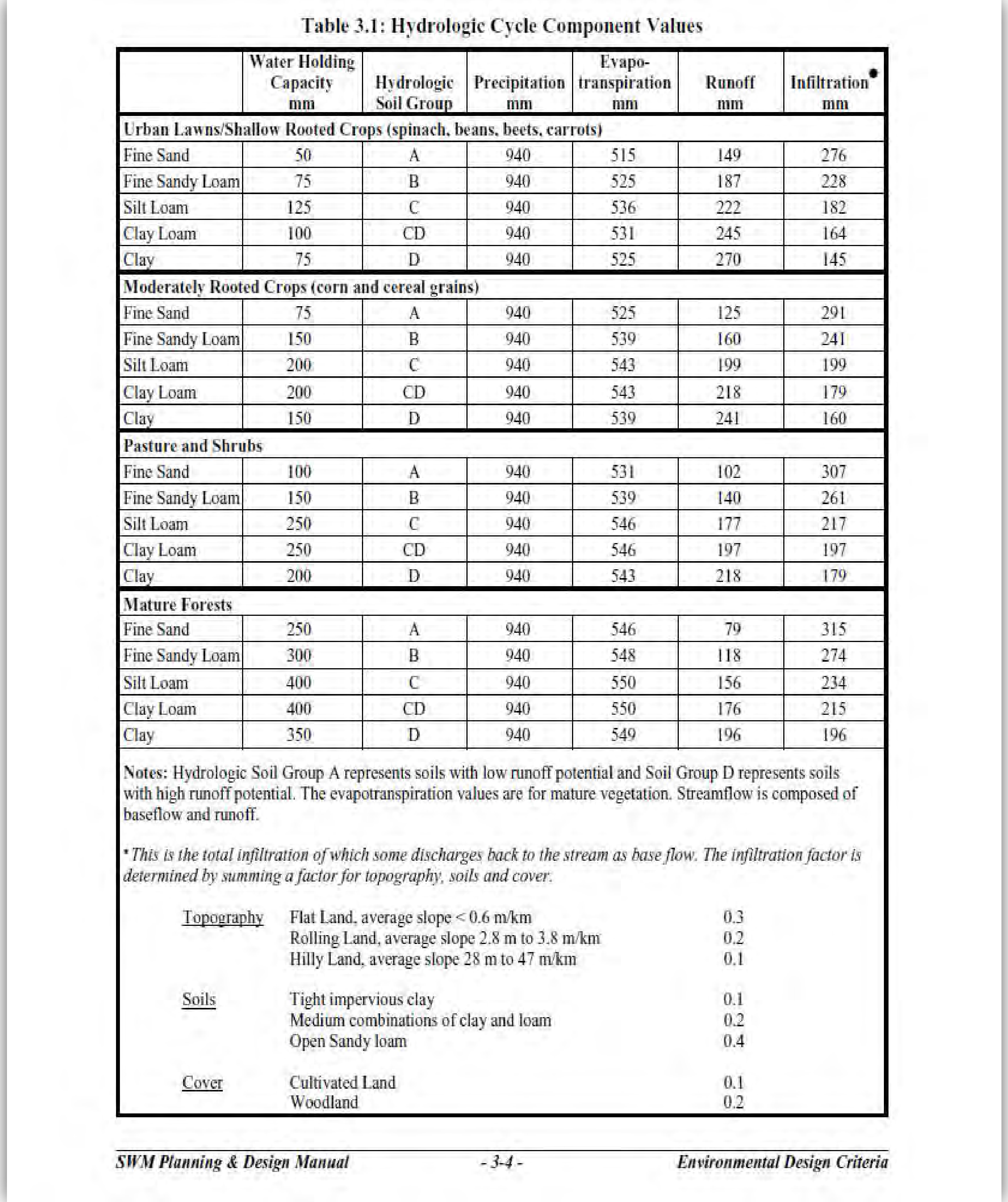


Table 3.1: Hydrologic Cycle Component Values

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

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

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

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

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

	Study Area			
Catchment Designation	Natural Feature Area/ NHS	Buiilding and Driveway Areas	Dirt Yard	Total
Area (m^2)	2025500	27900	76700	2130100
Pervious Area (m^2)	2025500	0	76700	2102200
Impervious Area (m^2)	0	27900	0	27900
Infiltration Factors				
Topography Infiltration Factor (Rolling Land)	0.15	N/A	0.15	
Soil Infiltration Factor (Soil Type D)	0.1	N/A	0.1	
Land Cover Infiltration Factor	0.15	N/A	0.05	
MOE Infiltration Factor	0.4	N/A	0.3	
Inputs (per unit area)				
Precipitation (mm/year	868	868	868	0
Total Inputs (mm/year)	868	868	868	0
Outputs (per unit area)				
Precipitation Surplus (mm/year)	418	781	418	423
Net Surplus (mm/year)	418	781	418	423
Downspout Disconnection Retention*	0	0	0	0
Evapotranpiration (mm/year)	450	87	450	445
Roof Evapotranspiration (mm/year)**	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0
Total Evapotranspiration (mm/yr)	**450**	**87**	**450**	**445**
Infiltration (mm/year)	167	0	125	164
Rooftop Infiltration (mm/year)**	0	0	0	0
Total Infiltration (mm/year)	**167**	**0**	**125**	**164**
Runoff Pervious Area (mm/year)	251	781	293	259
Runoff Impervious Area (mm/year)	0	0	0	0
Total Runoff (mm/year)	**251**	**781**	**293**	**259**
Total Outputs (mm/year)	**868**	**868**	**868**	**868**
Difference (Inputs - Outputs)	0	0	0	0
Input Volumes				
Precipitation (m^3/year)	1758134	24217	66576	1848927
Total Inputs (m^3/year)	**1758134**	**24217**	**66576**	**1848927**
Outputs (Volumes)				
Precipitation Surplus (m^3/year)	846659	21795	32061	900515
Net Surplus (m^3/year)	846659	21795	32061	900515
Downspout Disconnection Retention* (m^3/year)	0	0	0	0
Evapotranpiration (m^3/year)	911475	2422	34515	948412
Roof Evapotranspiration (m^3/year)	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0
Total Evapotranspiration (m^3/year)	**911475**	**2422**	**34515**	**948412**
Infiltration (m^3/year)	338664	0	9618	348282
Rooftop Infiltration (m^3/year)	0	0	0	0
Total Infiltration (m^3/year)	**338664**	**0**	**9618**	**348282**
Runoff Pervious Area (m^3/year)	507995	21795	22442	552233
Runoff Impervious Area (m^3/year)	0	0	0	0
Total Runoff (m^3/year)	**507995**	**21795**	**22442**	**552233**
Total Outputs (m^3/year)	**1758134**	**24217**	**66576**	**1848927**
Difference (Inputs - Outputs)	0	0	0	0

TABLE 2: WATER BUDGET - POST DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

Catchment Designation	Area draining to Pond 1		Area draining to pond 2		
	Natural Feature Area + Pervious Areas	Site Plan Area	ROW Pervious Area	ROW Impervious Area	Total
Area (m^2)	788400	1306400	7060	28240	2130100
Pervious Area (m^2)	788400	0	7060	0	795460
Impervious Area (m^2)	0	1306400	0	28240	1334640
Infiltration Factors					
Topography Infiltration Factor (Rolling Land)	0.15	N/A	0.15	N/A	
Soil Infiltration Factor (Soil Type D)	0.1	N/A	0.1	N/A	
Land Cover Infiltration Factor	0.15	N/A	0.1	N/A	
MOE Infiltration Factor	0.4	N/A	0.35	N/A	
Inputs (per unit area)					
Precipitation (mm/year	868	868	868	868	868
Total Inputs (mm/year)	868	868	868	868	868
Outputs (per unit area)					
Precipitation Surplus (mm/year)	418	781	418	781	646
Net Surplus (mm/year)	418	781	418	781	646
Downspout Disconnection Retention*	0	0	0	0	0
Evapotranpiration (mm/year)	450	87	450	87	222
Roof Evapotranspiration (mm/year)**	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**450**	**87**	**450**	**87**	222
Infiltration (mm/year)	167	0	146	0	62
Rooftop Infiltration (mm/year)**	0	0	0	0	0
Total Infiltration (mm/year)	**167**	**0**	**146**	**0**	62
Runoff Pervious Area (mm/year)	251	0	272	0	94
Runoff Impervious Area (mm/year)	0	781	0	781	489
Total Runoff (mm/year)	**251**	**781**	**272**	**781**	583
Total Outputs (mm/year)	**868**	**868**	**868**	**868**	868
Difference (Inputs - Outputs)	0	0	0	0	0
Input Volumes					
Precipitation (m^3/year)	684331	1133955	6128	24512	1848927
Total Inputs (m^3/year)	**684331**	**1133955**	**6128**	**24512**	**1848927**
Outputs (Volumes)					
Precipitation Surplus (m^3/year)	329551	1020560	2951	22061	1375123
Net Surplus (m^3/year)	329551	1020560	2951	22061	1375123
Downspout Disconnection Retention* (m^3/year)	0	0	0	0	0
Evapotranpiration (m^3/year)	354780	113396	3177	2451	473804
Roof Evapotranspiration (m^3/year)	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**354780**	**113396**	**3177**	**2451**	473804
Infiltration (m^3/year)	131820	0	1033	0	132853
Rooftop Infiltration (m^3/year)	0	0	0	0	0
Total Infiltration (m^3/year)	**131820**	**0**	**1033**	**0**	132853
Runoff Pervious Area (m^3/year)	197731	0	1918	0	199649
Runoff Impervious Area (m^3/year)	0	1020560	0	22061	1042621
Total Runoff (m^3/year)	**197731**	**1020560**	**1918**	**22061**	1242270
Total Outputs (m^3/year)	**684331**	**1133955**	**6128**	**24512**	**1848927**
Difference (Inputs - Outputs)	0	0	0	0	**0**

TABLE 1: WATER BUDGET - PRE DEVELOPMENT
WATER BALANCE/WATER BUDGET ASSESSMENT

	Area draining to Pond 1				
Catchment Designation	Natural Feature Area	ROW Pervious Area	ROW Impervious Area	Site Plan Area	Total
Area (m^2)	788400	7060	28240	1306400	2130100
Pervious Area (m^2)	788400	7060	0	0	795460
Impervious Area (m^2)	0	0	28240	1306400	1334640
Infiltration Factors					
Topography Infiltration Factor (Rolling Land)	0.15	0.15	N/A	N/A	
Soil Infiltration Factor (Soil Type D)	0.1	0.1	N/A	N/A	
Land Cover Infiltration Factor	0.15	0.1	N/A	N/A	
MOE Infiltration Factor	0.4	0.35	N/A	N/A	
Inputs (per unit area)					
Precipitation (mm/year	868	868	868	868	868
Total Inputs (mm/year)	868	868	868	868	868
Outputs (per unit area)					
Precipitation Surplus (mm/year)	418	418	781	781	646
Net Surplus (mm/year)	418	418	781	781	646
Downspout Disconnection Retention*	0	0	0	0	0
Evapotranpiration (mm/year)	450	450	87	87	222
Roof Evapotranspiration (mm/year)**	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (mm/year)	0	0	0	0	0
Total Evapotranspiration (mm/yr)	**450**	**450**	**87**	**87**	222
Infiltration (mm/year)	167	146	0	0	62
Rooftop Infiltration (mm/year)**	0	0	0	0	0
Mitigation Infiltration (Top soil Ammendment)	0	0	0	0	0
Mitigation Site Plan Infiltration	0	0	0	161	99
Total Infiltration (mm/year)	**167**	**146**	**0**	**161**	161
Runoff Pervious Area (mm/year)	251	272	0	0	94
Runoff Impervious Area (mm/year)	0	0	781	620	391
Total Runoff (mm/year)	**251**	**272**	**781**	**620**	484
Total Outputs (mm/year)	**868**	**868**	**868**	**868**	868
Difference (Inputs - Outputs)	0	0	0	0	0
Input Volumes					
Precipitation (m^3/year)	684331	6128	24512	1133955	1848927
Total Inputs (m^3/year)	**684331**	**6128**	**24512**	**1133955**	**1848927**
Outputs (Volumes)					
Precipitation Surplus (m^3/year)	329551	2951	22061	1020560	1375123
Net Surplus (m^3/year)	329551	2951	22061	1020560	1375123
Downspout Disconnection Retention* (m^3/year)	0	0	0	0	0
Evapotranpiration (m^3/year)	354780	3177	2451	113396	473804
Roof Evapotranspiration (m^3/year)	0	0	0	0	0
Rooftop Runoff Lawn Evaporation (m^3/year)	0	0	0	0	0
Total Evapotranspiration (m^3/year)	**354780**	**3177**	**2451**	**113396**	473804
Infiltration (m^3/year)	131820	1033	0	0	132853
Rooftop Infiltration (m^3/year)	0	0	0	0	0
Mitigation Infiltration (Top soil Ammendment)	0	0	0	0	0
Mitigation Site Plan Infiltration	0	0	0	210330	210330
Total Infiltration (m^3/year)	**131820**	**1033**	**0**	**210330**	343184
Runoff Pervious Area (m^3/year)	197731	1918	0	0	199649
Runoff Impervious Area (m^3/year)	0	0	22061	810229	832290
Total Runoff (m^3/year)	**197731**	**1918**	**22061**	**810229**	1031939
Total Outputs (m^3/year)	**684331**	**6128**	**24512**	**1133955**	**1848927**
Difference (Inputs - Outputs)	0	0	0	0	**0**

Water Balance Mitigation Calculations - OPTION 1

Pre Development Infintration = 348,282 m^3/y

Post Development Infiltration = 132,853 m^3/y

Post to Pre Deficit = 215,428 m^3/y

Overall Required mitigation

134.17 ha x Annual Precipitation Depth = 215,428 m^3/year

Required Annual Precpitation Depth to meet deficit = 161 mm/yr

Based on this analysis, it is concluded that precipitation events of depth less than or equal to *4.20 mm* 5635.14 m^3/event
will produce an annual amount of precipitation equal to 161 mm/yr

Mitigation Measures

m^3/y

Topsoil Amendment = 0 m^3/y

On-Site Infiltration= 210,330 m^3/y

Mitgation Voulme Provided = 210,330 m^3/y

Deficit = 5,098 m^3/y

Site Plan Mitigation

130.64 ha x Annual Precipitation Depth = 210,330 m^3/year

Required Annual Precpitation Depth to meet deficit = 161 mm/yr

Based on this analysis, it is concluded that precipitation events of depth less than or equal to *4.20 mm* 5486.88 m^3/event
will produce an annual amount of precipitation equal to 161 mm/yr

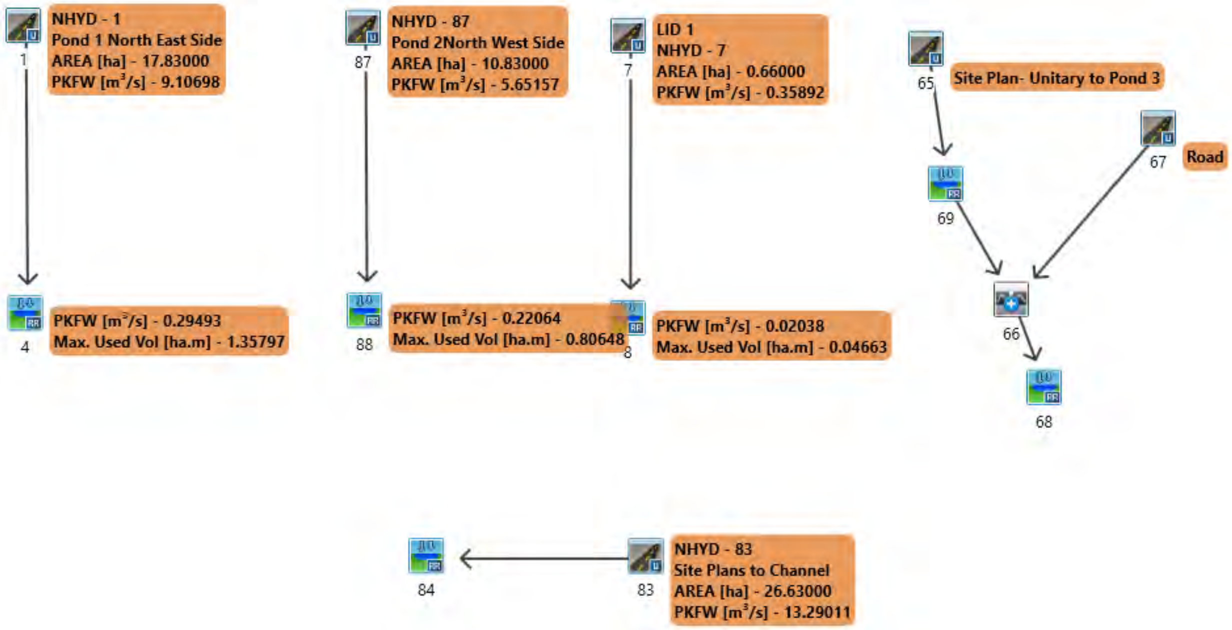
TABLE 6: WATER BUDGET -SUMMARY TABLE

Characteristics	Site				
	Pre-development	Post-development	Percent Change (Pre to Post)	Post-development with mitigation	change (pre to post with mitigation)
Inputs (Volumes)					
Precipitation (m^3/year)	1,848,927	1,848,927	0%	1848927	0%
Total Inputs (m^3/year)	1,848,927	1,848,927	0%	1848927	0%
Outputs (Volumes)					
Precipitation surplus (m^3/year)	900,515	1,375,123	35%	1375123	35%
Net Surplus (m^3/year	900,515	1,375,123	35%	1375123	35%
Total Evapotranspiration (m^3/year)	948,412	473,804	-100%	473804	-100%
Total Infiltration (m^3/year)	348,282	132,853	-162%	343184	-1%
Total Runoff (m^3/year)	552,233	1,242,270	56%	1031939	46%
Total Outputs (m^3/year)	1,848,927	1,848,927	0%	1848927	0%

Infiltration Deficit 215428 m^3/year

APPENDIX B

Visual Otthymo Modeling and Data



SCHAEFFERS
CONSULTING ENGINEERS

6-Hour and 12-Hour AES Storm, 4-Hour Chicago Storm (2-year to 100 year)

Job #: 2021-5139

Date: August 2024

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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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DATE: 11-01-2024                           TIME: 01:43:06

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 100-Year 12-Hour AES          **
  ************************************************



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|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\126ac574
| Ptotal= 88.54 mm |    Comments: 100 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   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 |
```

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 3.167    5.31 | 6.250   11.51 |  9.33    0.89
                 0.167    0.00 | 3.250    5.31 | 6.333    6.20 |  9.42    0.89
                 0.250    0.00 | 3.333   15.05 | 6.417    6.20 |  9.50    0.89
                 0.333    0.89 | 3.417   15.05 | 6.500    6.20 |  9.58    0.89
                 0.417    0.89 | 3.500   15.05 | 6.583    6.20 |  9.67    0.89
                 0.500    0.89 | 3.583   15.05 | 6.667    6.20 |  9.75    0.89
                 0.583    0.89 | 3.667   15.05 | 6.750    6.20 |  9.83    0.89
                 0.667    0.89 | 3.750   15.05 | 6.833    6.20 |  9.92    0.89
                 0.750    0.89 | 3.833   15.05 | 6.917    6.20 | 10.00    0.89
                 0.833    0.89 | 3.917   15.05 | 7.000    6.20 | 10.08    0.89
                 0.917    0.89 | 4.000   15.05 | 7.083    6.20 | 10.17    0.89
                 1.000    0.89 | 4.083   15.05 | 7.167    6.20 | 10.25    0.89
                 1.083    0.89 | 4.167   15.05 | 7.250    6.20 | 10.33    0.89
                 1.167    0.89 | 4.250   15.05 | 7.333    3.54 | 10.42    0.89
                 1.250    0.89 | 4.333   40.71 | 7.417    3.54 | 10.50    0.89
                 1.333    0.89 | 4.417   40.71 | 7.500    3.54 | 10.58    0.89
                 1.417    0.89 | 4.500   40.71 | 7.583    3.54 | 10.67    0.89
                 1.500    0.89 | 4.583   40.71 | 7.667    3.54 | 10.75    0.89
                 1.583    0.89 | 4.667   40.71 | 7.750    3.54 | 10.83    0.89
                 1.667    0.89 | 4.750   40.71 | 7.833    3.54 | 10.92    0.89
                 1.750    0.89 | 4.833   40.71 | 7.917    3.54 | 11.00    0.89
                 1.833    0.89 | 4.917   40.71 | 8.000    3.54 | 11.08    0.89
                 1.917    0.89 | 5.000   40.71 | 8.083    3.54 | 11.17    0.89
                 2.000    0.89 | 5.083   40.71 | 8.167    3.54 | 11.25    0.89
                 2.083    0.89 | 5.167   40.71 | 8.250    3.54 | 11.33    0.89
                 2.167    0.89 | 5.250   40.71 | 8.333    1.77 | 11.42    0.89
                 2.250    0.89 | 5.333   11.51 | 8.417    1.77 | 11.50    0.89
                 2.333    5.31 | 5.417   11.51 | 8.500    1.77 | 11.58    0.89
                 2.417    5.31 | 5.500   11.51 | 8.583    1.77 | 11.67    0.89
                 2.500    5.31 | 5.583   11.51 | 8.667    1.77 | 11.75    0.89
                 2.583    5.31 | 5.667   11.51 | 8.750    1.77 | 11.83    0.89
                 2.667    5.31 | 5.750   11.51 | 8.833    1.77 | 11.92    0.89
                 2.750    5.31 | 5.833   11.51 | 8.917    1.77 | 12.00    0.89
                 2.833    5.31 | 5.917   11.51 | 9.000    1.77 | 12.08    0.89
                 2.917    5.31 | 6.000   11.51 | 9.083    1.77 | 12.17    0.89
                 3.000    5.31 | 6.083   11.51 | 9.167    1.77 | 12.25    0.89
                 3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=      40.71        32.96
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       7.69 (ii)    9.30 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.13         0.12
                                                           *TOTALS*
     PEAK FLOW       (cms)=       2.00         0.02          2.011 (iii)
```

```
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        57.45          87.24
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.65           0.99


       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830     2.011      5.25      87.24
   OUTFLOW: ID= 1 (  0004)     17.830     0.253      7.42      86.94

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.59
                  TIME SHIFT OF PEAK FLOW         (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.1821

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    5.31 | 6.250   11.51 |  9.33    0.89
                0.167    0.00 | 3.250    5.31 | 6.333    6.20 |  9.42    0.89
                0.250    0.00 | 3.333   15.05 | 6.417    6.20 |  9.50    0.89
                0.333    0.89 | 3.417   15.05 | 6.500    6.20 |  9.58    0.89
                0.417    0.89 | 3.500   15.05 | 6.583    6.20 |  9.67    0.89
                0.500    0.89 | 3.583   15.05 | 6.667    6.20 |  9.75    0.89
                0.583    0.89 | 3.667   15.05 | 6.750    6.20 |  9.83    0.89
                0.667    0.89 | 3.750   15.05 | 6.833    6.20 |  9.92    0.89
                0.750    0.89 | 3.833   15.05 | 6.917    6.20 | 10.00    0.89
                0.833    0.89 | 3.917   15.05 | 7.000    6.20 | 10.08    0.89
                0.917    0.89 | 4.000   15.05 | 7.083    6.20 | 10.17    0.89
                1.000    0.89 | 4.083   15.05 | 7.167    6.20 | 10.25    0.89
                1.083    0.89 | 4.167   15.05 | 7.250    6.20 | 10.33    0.89
                1.167    0.89 | 4.250   15.05 | 7.333    3.54 | 10.42    0.89
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                1.250    0.89 | 4.333   40.71 | 7.417    3.54 | 10.50    0.89
                1.333    0.89 | 4.417   40.71 | 7.500    3.54 | 10.58    0.89
                1.417    0.89 | 4.500   40.71 | 7.583    3.54 | 10.67    0.89
                1.500    0.89 | 4.583   40.71 | 7.667    3.54 | 10.75    0.89
                1.583    0.89 | 4.667   40.71 | 7.750    3.54 | 10.83    0.89
                1.667    0.89 | 4.750   40.71 | 7.833    3.54 | 10.92    0.89
                1.750    0.89 | 4.833   40.71 | 7.917    3.54 | 11.00    0.89
                1.833    0.89 | 4.917   40.71 | 8.000    3.54 | 11.08    0.89
                1.917    0.89 | 5.000   40.71 | 8.083    3.54 | 11.17    0.89
                2.000    0.89 | 5.083   40.71 | 8.167    3.54 | 11.25    0.89
                2.083    0.89 | 5.167   40.71 | 8.250    3.54 | 11.33    0.89
                2.167    0.89 | 5.250   40.71 | 8.333    1.77 | 11.42    0.89
                2.250    0.89 | 5.333   11.51 | 8.417    1.77 | 11.50    0.89
                2.333    5.31 | 5.417   11.51 | 8.500    1.77 | 11.58    0.89
                2.417    5.31 | 5.500   11.51 | 8.583    1.77 | 11.67    0.89
                2.500    5.31 | 5.583   11.51 | 8.667    1.77 | 11.75    0.89
                2.583    5.31 | 5.667   11.51 | 8.750    1.77 | 11.83    0.89
                2.667    5.31 | 5.750   11.51 | 8.833    1.77 | 11.92    0.89
                2.750    5.31 | 5.833   11.51 | 8.917    1.77 | 12.00    0.89
                2.833    5.31 | 5.917   11.51 | 9.000    1.77 | 12.08    0.89
                2.917    5.31 | 6.000   11.51 | 9.083    1.77 | 12.17    0.89
                3.000    5.31 | 6.083   11.51 | 9.167    1.77 | 12.25    0.89
                3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=      40.71        32.96
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.86 (ii)    4.47 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.28         0.23
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.00          0.074 (iii)
     TIME TO PEAK    (hrs)=       5.08         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        57.45          87.24
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.65           0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0008)|     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   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660     0.074      5.25      87.24
   OUTFLOW: ID= 1 (  0008)      0.660     0.016      6.33      82.83

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.03
                  TIME SHIFT OF PEAK FLOW         (min)= 65.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0386

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| CALIB             |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.167    5.31 | 6.250   11.51 |  9.33    0.89
               0.167    0.00 | 3.250    5.31 | 6.333    6.20 |  9.42    0.89
               0.250    0.00 | 3.333   15.05 | 6.417    6.20 |  9.50    0.89
               0.333    0.89 | 3.417   15.05 | 6.500    6.20 |  9.58    0.89
               0.417    0.89 | 3.500   15.05 | 6.583    6.20 |  9.67    0.89
               0.500    0.89 | 3.583   15.05 | 6.667    6.20 |  9.75    0.89
               0.583    0.89 | 3.667   15.05 | 6.750    6.20 |  9.83    0.89
               0.667    0.89 | 3.750   15.05 | 6.833    6.20 |  9.92    0.89
               0.750    0.89 | 3.833   15.05 | 6.917    6.20 | 10.00    0.89
               0.833    0.89 | 3.917   15.05 | 7.000    6.20 | 10.08    0.89
               0.917    0.89 | 4.000   15.05 | 7.083    6.20 | 10.17    0.89
               1.000    0.89 | 4.083   15.05 | 7.167    6.20 | 10.25    0.89
               1.083    0.89 | 4.167   15.05 | 7.250    6.20 | 10.33    0.89
               1.167    0.89 | 4.250   15.05 | 7.333    3.54 | 10.42    0.89
               1.250    0.89 | 4.333   40.71 | 7.417    3.54 | 10.50    0.89
               1.333    0.89 | 4.417   40.71 | 7.500    3.54 | 10.58    0.89
               1.417    0.89 | 4.500   40.71 | 7.583    3.54 | 10.67    0.89
               1.500    0.89 | 4.583   40.71 | 7.667    3.54 | 10.75    0.89
               1.583    0.89 | 4.667   40.71 | 7.750    3.54 | 10.83    0.89
               1.667    0.89 | 4.750   40.71 | 7.833    3.54 | 10.92    0.89
               1.750    0.89 | 4.833   40.71 | 7.917    3.54 | 11.00    0.89
               1.833    0.89 | 4.917   40.71 | 8.000    3.54 | 11.08    0.89
               1.917    0.89 | 5.000   40.71 | 8.083    3.54 | 11.17    0.89
               2.000    0.89 | 5.083   40.71 | 8.167    3.54 | 11.25    0.89
               2.083    0.89 | 5.167   40.71 | 8.250    3.54 | 11.33    0.89
               2.167    0.89 | 5.250   40.71 | 8.333    1.77 | 11.42    0.89
               2.250    0.89 | 5.333   11.51 | 8.417    1.77 | 11.50    0.89
               2.333    5.31 | 5.417   11.51 | 8.500    1.77 | 11.58    0.89
               2.417    5.31 | 5.500   11.51 | 8.583    1.77 | 11.67    0.89
               2.500    5.31 | 5.583   11.51 | 8.667    1.77 | 11.75    0.89
               2.583    5.31 | 5.667   11.51 | 8.750    1.77 | 11.83    0.89
               2.667    5.31 | 5.750   11.51 | 8.833    1.77 | 11.92    0.89
               2.750    5.31 | 5.833   11.51 | 8.917    1.77 | 12.00    0.89
               2.833    5.31 | 5.917   11.51 | 9.000    1.77 | 12.08    0.89
               2.917    5.31 | 6.000   11.51 | 9.083    1.77 | 12.17    0.89
               3.000    5.31 | 6.083   11.51 | 9.167    1.77 | 12.25    0.89
               3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=      40.71        32.96
                over (min)      10.00        15.00
     Storage Coeff.  (min)=      11.85 (ii)   13.46 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       8.40         0.06         8.461 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25          5.25
     RUNOFF VOLUME    (mm)=      87.54        57.45         87.24
     TOTAL RAINFALL   (mm)=      88.54        88.54         88.54
     RUNOFF COEFFICIENT   =       0.99         0.65          0.99
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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(  0069)|     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   |  1.1394      4.4340
                          0.4823     2.3068   |  1.3243      4.9942
                          0.7344     3.0305   |  1.5003      5.6083
                          0.9063     3.6110   |  5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390      8.461      5.25      87.24
   OUTFLOW: ID= 1 (  0069)     75.390      1.247      7.33      87.22

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.74
                  TIME SHIFT OF PEAK FLOW         (min)=125.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  4.7599

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--------------------
| CALIB             |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.167    5.31 | 6.250   11.51 |  9.33    0.89
               0.167    0.00 | 3.250    5.31 | 6.333    6.20 |  9.42    0.89
               0.250    0.00 | 3.333   15.05 | 6.417    6.20 |  9.50    0.89
               0.333    0.89 | 3.417   15.05 | 6.500    6.20 |  9.58    0.89
               0.417    0.89 | 3.500   15.05 | 6.583    6.20 |  9.67    0.89
               0.500    0.89 | 3.583   15.05 | 6.667    6.20 |  9.75    0.89
               0.583    0.89 | 3.667   15.05 | 6.750    6.20 |  9.83    0.89
               0.667    0.89 | 3.750   15.05 | 6.833    6.20 |  9.92    0.89
               0.750    0.89 | 3.833   15.05 | 6.917    6.20 | 10.00    0.89
               0.833    0.89 | 3.917   15.05 | 7.000    6.20 | 10.08    0.89
               0.917    0.89 | 4.000   15.05 | 7.083    6.20 | 10.17    0.89
               1.000    0.89 | 4.083   15.05 | 7.167    6.20 | 10.25    0.89
               1.083    0.89 | 4.167   15.05 | 7.250    6.20 | 10.33    0.89
               1.167    0.89 | 4.250   15.05 | 7.333    3.54 | 10.42    0.89
               1.250    0.89 | 4.333   40.71 | 7.417    3.54 | 10.50    0.89
               1.333    0.89 | 4.417   40.71 | 7.500    3.54 | 10.58    0.89
               1.417    0.89 | 4.500   40.71 | 7.583    3.54 | 10.67    0.89
               1.500    0.89 | 4.583   40.71 | 7.667    3.54 | 10.75    0.89
               1.583    0.89 | 4.667   40.71 | 7.750    3.54 | 10.83    0.89
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                1.667    0.89 | 4.750   40.71 | 7.833    3.54 | 10.92    0.89
                1.750    0.89 | 4.833   40.71 | 7.917    3.54 | 11.00    0.89
                1.833    0.89 | 4.917   40.71 | 8.000    3.54 | 11.08    0.89
                1.917    0.89 | 5.000   40.71 | 8.083    3.54 | 11.17    0.89
                2.000    0.89 | 5.083   40.71 | 8.167    3.54 | 11.25    0.89
                2.083    0.89 | 5.167   40.71 | 8.250    3.54 | 11.33    0.89
                2.167    0.89 | 5.250   40.71 | 8.333    1.77 | 11.42    0.89
                2.250    0.89 | 5.333   11.51 | 8.417    1.77 | 11.50    0.89
                2.333    5.31 | 5.417   11.51 | 8.500    1.77 | 11.58    0.89
                2.417    5.31 | 5.500   11.51 | 8.583    1.77 | 11.67    0.89
                2.500    5.31 | 5.583   11.51 | 8.667    1.77 | 11.75    0.89
                2.583    5.31 | 5.667   11.51 | 8.750    1.77 | 11.83    0.89
                2.667    5.31 | 5.750   11.51 | 8.833    1.77 | 11.92    0.89
                2.750    5.31 | 5.833   11.51 | 8.917    1.77 | 12.00    0.89
                2.833    5.31 | 5.917   11.51 | 9.000    1.77 | 12.08    0.89
                2.917    5.31 | 6.000   11.51 | 9.083    1.77 | 12.17    0.89
                3.000    5.31 | 6.083   11.51 | 9.167    1.77 | 12.25    0.89
                3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=      40.71        32.69
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.45 (ii)   15.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.23         0.07
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.26         0.05          0.307 (iii)
     TIME TO PEAK    (hrs)=       5.17         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        57.45          81.52
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.65           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.307     5.25    81.52
      + ID2= 2 (  0069):    75.39   1.247     7.33    87.22
        ====================================================
        ID = 3 (  0066):    78.26   1.296     6.25    87.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.296      6.25      87.01
   OUTFLOW: ID= 1 (  0068)     78.260      1.176      8.83      86.93
```

```
                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 90.72
                  TIME SHIFT OF PEAK FLOW         (min)=155.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7992

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 3.167    5.31 | 6.250   11.51 |  9.33    0.89
                 0.167    0.00 | 3.250    5.31 | 6.333    6.20 |  9.42    0.89
                 0.250    0.00 | 3.333   15.05 | 6.417    6.20 |  9.50    0.89
                 0.333    0.89 | 3.417   15.05 | 6.500    6.20 |  9.58    0.89
                 0.417    0.89 | 3.500   15.05 | 6.583    6.20 |  9.67    0.89
                 0.500    0.89 | 3.583   15.05 | 6.667    6.20 |  9.75    0.89
                 0.583    0.89 | 3.667   15.05 | 6.750    6.20 |  9.83    0.89
                 0.667    0.89 | 3.750   15.05 | 6.833    6.20 |  9.92    0.89
                 0.750    0.89 | 3.833   15.05 | 6.917    6.20 | 10.00    0.89
                 0.833    0.89 | 3.917   15.05 | 7.000    6.20 | 10.08    0.89
                 0.917    0.89 | 4.000   15.05 | 7.083    6.20 | 10.17    0.89
                 1.000    0.89 | 4.083   15.05 | 7.167    6.20 | 10.25    0.89
                 1.083    0.89 | 4.167   15.05 | 7.250    6.20 | 10.33    0.89
                 1.167    0.89 | 4.250   15.05 | 7.333    3.54 | 10.42    0.89
                 1.250    0.89 | 4.333   40.71 | 7.417    3.54 | 10.50    0.89
                 1.333    0.89 | 4.417   40.71 | 7.500    3.54 | 10.58    0.89
                 1.417    0.89 | 4.500   40.71 | 7.583    3.54 | 10.67    0.89
                 1.500    0.89 | 4.583   40.71 | 7.667    3.54 | 10.75    0.89
                 1.583    0.89 | 4.667   40.71 | 7.750    3.54 | 10.83    0.89
                 1.667    0.89 | 4.750   40.71 | 7.833    3.54 | 10.92    0.89
                 1.750    0.89 | 4.833   40.71 | 7.917    3.54 | 11.00    0.89
                 1.833    0.89 | 4.917   40.71 | 8.000    3.54 | 11.08    0.89
                 1.917    0.89 | 5.000   40.71 | 8.083    3.54 | 11.17    0.89
                 2.000    0.89 | 5.083   40.71 | 8.167    3.54 | 11.25    0.89
                 2.083    0.89 | 5.167   40.71 | 8.250    3.54 | 11.33    0.89
                 2.167    0.89 | 5.250   40.71 | 8.333    1.77 | 11.42    0.89
                 2.250    0.89 | 5.333   11.51 | 8.417    1.77 | 11.50    0.89
                 2.333    5.31 | 5.417   11.51 | 8.500    1.77 | 11.58    0.89
                 2.417    5.31 | 5.500   11.51 | 8.583    1.77 | 11.67    0.89
                 2.500    5.31 | 5.583   11.51 | 8.667    1.77 | 11.75    0.89
                 2.583    5.31 | 5.667   11.51 | 8.750    1.77 | 11.83    0.89
                 2.667    5.31 | 5.750   11.51 | 8.833    1.77 | 11.92    0.89
                 2.750    5.31 | 5.833   11.51 | 8.917    1.77 | 12.00    0.89
                 2.833    5.31 | 5.917   11.51 | 9.000    1.77 | 12.08    0.89
                 2.917    5.31 | 6.000   11.51 | 9.083    1.77 | 12.17    0.89
                 3.000    5.31 | 6.083   11.51 | 9.167    1.77 | 12.25    0.89
                 3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=      40.71        32.96
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       8.67 (ii)   10.28 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
```

```
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       2.98         0.02          3.002 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        57.45          87.24
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.65           0.99


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      3.002      5.25      87.24
   OUTFLOW: ID= 1 (  0084)     26.630      0.487      6.67      87.20

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.21
                   TIME SHIFT OF PEAK FLOW         (min)= 85.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.6384

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.167    5.31 | 6.250   11.51 |  9.33    0.89
               0.167    0.00 | 3.250    5.31 | 6.333    6.20 |  9.42    0.89
               0.250    0.00 | 3.333   15.05 | 6.417    6.20 |  9.50    0.89
               0.333    0.89 | 3.417   15.05 | 6.500    6.20 |  9.58    0.89
               0.417    0.89 | 3.500   15.05 | 6.583    6.20 |  9.67    0.89
               0.500    0.89 | 3.583   15.05 | 6.667    6.20 |  9.75    0.89
               0.583    0.89 | 3.667   15.05 | 6.750    6.20 |  9.83    0.89
               0.667    0.89 | 3.750   15.05 | 6.833    6.20 |  9.92    0.89
               0.750    0.89 | 3.833   15.05 | 6.917    6.20 | 10.00    0.89
               0.833    0.89 | 3.917   15.05 | 7.000    6.20 | 10.08    0.89
               0.917    0.89 | 4.000   15.05 | 7.083    6.20 | 10.17    0.89
               1.000    0.89 | 4.083   15.05 | 7.167    6.20 | 10.25    0.89
               1.083    0.89 | 4.167   15.05 | 7.250    6.20 | 10.33    0.89
               1.167    0.89 | 4.250   15.05 | 7.333    3.54 | 10.42    0.89
               1.250    0.89 | 4.333   40.71 | 7.417    3.54 | 10.50    0.89
               1.333    0.89 | 4.417   40.71 | 7.500    3.54 | 10.58    0.89
               1.417    0.89 | 4.500   40.71 | 7.583    3.54 | 10.67    0.89
               1.500    0.89 | 4.583   40.71 | 7.667    3.54 | 10.75    0.89
               1.583    0.89 | 4.667   40.71 | 7.750    3.54 | 10.83    0.89
               1.667    0.89 | 4.750   40.71 | 7.833    3.54 | 10.92    0.89
               1.750    0.89 | 4.833   40.71 | 7.917    3.54 | 11.00    0.89
               1.833    0.89 | 4.917   40.71 | 8.000    3.54 | 11.08    0.89
               1.917    0.89 | 5.000   40.71 | 8.083    3.54 | 11.17    0.89
               2.000    0.89 | 5.083   40.71 | 8.167    3.54 | 11.25    0.89
               2.083    0.89 | 5.167   40.71 | 8.250    3.54 | 11.33    0.89
               2.167    0.89 | 5.250   40.71 | 8.333    1.77 | 11.42    0.89
               2.250    0.89 | 5.333   11.51 | 8.417    1.77 | 11.50    0.89
               2.333    5.31 | 5.417   11.51 | 8.500    1.77 | 11.58    0.89
               2.417    5.31 | 5.500   11.51 | 8.583    1.77 | 11.67    0.89
               2.500    5.31 | 5.583   11.51 | 8.667    1.77 | 11.75    0.89
               2.583    5.31 | 5.667   11.51 | 8.750    1.77 | 11.83    0.89
               2.667    5.31 | 5.750   11.51 | 8.833    1.77 | 11.92    0.89
               2.750    5.31 | 5.833   11.51 | 8.917    1.77 | 12.00    0.89
               2.833    5.31 | 5.917   11.51 | 9.000    1.77 | 12.08    0.89
               2.917    5.31 | 6.000   11.51 | 9.083    1.77 | 12.17    0.89
               3.000    5.31 | 6.083   11.51 | 9.167    1.77 | 12.25    0.89
               3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

     Max.Eff.Inten.(mm/hr)=      40.71        32.96
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       6.62 (ii)    8.23 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.18         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.21         0.01          1.222 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        57.45          87.24
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.65           0.99


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      1.222      5.25      87.24
   OUTFLOW: ID= 1 (  0088)     10.830      0.185      7.25      86.97

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.14
                   TIME SHIFT OF PEAK FLOW         (min)=120.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6884

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\4ba0e476-050f-4040-9e19-7a530cf3ef93\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\4ba0e476-050f-4040-9e19-7a530cf3ef93\sc


DATE: 11-01-2024                           TIME: 01:43:05

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 100-Year 4-Hour Chicago Caled **
  ************************************************

--------------------
| 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    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   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


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| CALIB            |
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```
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.89 | 1.083   62.12 | 2.083   12.48 |  3.08    3.91
               0.167    2.89 | 1.167   62.12 | 2.167   12.48 |  3.17    3.91
               0.250    3.67 | 1.250  196.54 | 2.250    9.60 |  3.25    3.44
               0.333    3.67 | 1.333  196.54 | 2.333    9.60 |  3.33    3.44
               0.417    4.88 | 1.417   83.09 | 2.417    7.66 |  3.42    3.05
               0.500    4.88 | 1.500   83.09 | 2.500    7.66 |  3.50    3.05
               0.583    6.96 | 1.583   41.25 | 2.583    6.29 |  3.58    2.73
               0.667    6.96 | 1.667   41.25 | 2.667    6.29 |  3.67    2.73
               0.750   11.02 | 1.750   25.07 | 2.750    5.28 |  3.75    2.47
               0.833   11.02 | 1.833   25.07 | 2.833    5.28 |  3.83    2.47
               0.917   21.03 | 1.917   17.06 | 2.917    4.51 |  3.92    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       129.47
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       4.10 (ii)    4.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.24         0.22
                                                          *TOTALS*
     PEAK FLOW       (cms)=       9.05         0.06          9.107 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      88.87        58.63          88.57
     TOTAL RAINFALL   (mm)=      89.87        89.87          89.87
     RUNOFF COEFFICIENT   =       0.99         0.65           0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830     9.107      1.33      88.57
   OUTFLOW: ID= 1 (  0004)     17.830     0.295      2.75      88.30
```

```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.24
                   TIME SHIFT OF PEAK FLOW         (min)= 85.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.3580

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.89 | 1.083   62.12 | 2.083   12.48 |  3.08    3.91
                0.167    2.89 | 1.167   62.12 | 2.167   12.48 |  3.17    3.91
                0.250    3.67 | 1.250  196.54 | 2.250    9.60 |  3.25    3.44
                0.333    3.67 | 1.333  196.54 | 2.333    9.60 |  3.33    3.44
                0.417    4.88 | 1.417   83.09 | 2.417    7.66 |  3.42    3.05
                0.500    4.88 | 1.500   83.09 | 2.500    7.66 |  3.50    3.05
                0.583    6.96 | 1.583   41.25 | 2.583    6.29 |  3.58    2.73
                0.667    6.96 | 1.667   41.25 | 2.667    6.29 |  3.67    2.73
                0.750   11.02 | 1.750   25.07 | 2.750    5.28 |  3.75    2.47
                0.833   11.02 | 1.833   25.07 | 2.833    5.28 |  3.83    2.47
                0.917   21.03 | 1.917   17.06 | 2.917    4.51 |  3.92    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       129.47
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.52 (ii)    2.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.30
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.36         0.00         0.359 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33          1.33
     RUNOFF VOLUME    (mm)=      88.87        58.63         88.57
     TOTAL RAINFALL   (mm)=      89.87        89.87         89.87
     RUNOFF COEFFICIENT   =       0.99         0.65          0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466
```

```
                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.359      1.33      88.57
   OUTFLOW: ID= 1 (  0008)      0.660      0.020      2.17      84.16

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.68
                   TIME SHIFT OF PEAK FLOW         (min)= 50.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0466

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.89 | 1.083   62.12 | 2.083   12.48 |  3.08    3.91
                0.167    2.89 | 1.167   62.12 | 2.167   12.48 |  3.17    3.91
                0.250    3.67 | 1.250  196.54 | 2.250    9.60 |  3.25    3.44
                0.333    3.67 | 1.333  196.54 | 2.333    9.60 |  3.33    3.44
                0.417    4.88 | 1.417   83.09 | 2.417    7.66 |  3.42    3.05
                0.500    4.88 | 1.500   83.09 | 2.500    7.66 |  3.50    3.05
                0.583    6.96 | 1.583   41.25 | 2.583    6.29 |  3.58    2.73
                0.667    6.96 | 1.667   41.25 | 2.667    6.29 |  3.67    2.73
                0.750   11.02 | 1.750   25.07 | 2.750    5.28 |  3.75    2.47
                0.833   11.02 | 1.833   25.07 | 2.833    5.28 |  3.83    2.47
                0.917   21.03 | 1.917   17.06 | 2.917    4.51 |  3.92    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       129.47
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.31 (ii)    7.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.19         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=      34.65         0.20        34.823 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      88.87        58.63         88.57
     TOTAL RAINFALL   (mm)=      89.87        89.87         89.87
     RUNOFF COEFFICIENT   =       0.99         0.65          0.99


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390     34.823      1.33      88.57
   OUTFLOW: ID= 1 (  0069)     75.390      1.500      2.58      88.55

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.31
                   TIME SHIFT OF PEAK FLOW         (min)= 75.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  5.6083

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.89 | 1.083   62.12 | 2.083   12.48 |  3.08    3.91
                0.167    2.89 | 1.167   62.12 | 2.167   12.48 |  3.17    3.91
                0.250    3.67 | 1.250  196.54 | 2.250    9.60 |  3.25    3.44
                0.333    3.67 | 1.333  196.54 | 2.333    9.60 |  3.33    3.44
                0.417    4.88 | 1.417   83.09 | 2.417    7.66 |  3.42    3.05
                0.500    4.88 | 1.500   83.09 | 2.500    7.66 |  3.50    3.05
                0.583    6.96 | 1.583   41.25 | 2.583    6.29 |  3.58    2.73
                0.667    6.96 | 1.667   41.25 | 2.667    6.29 |  3.67    2.73
                0.750   11.02 | 1.750   25.07 | 2.750    5.28 |  3.75    2.47
                0.833   11.02 | 1.833   25.07 | 2.833    5.28 |  3.83    2.47
                0.917   21.03 | 1.917   17.06 | 2.917    4.51 |  3.92    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       129.47
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.37 (ii)    5.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.16
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.24         0.17       1.389 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42        1.33
     RUNOFF VOLUME    (mm)=      88.87        58.63       82.82
     TOTAL RAINFALL   (mm)=      89.87        89.87       89.87
     RUNOFF COEFFICIENT   =       0.99         0.65        0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   1.389     1.33    82.82
      + ID2= 2 (  0069):    75.39   1.500     2.58    88.55
        ==================================================
        ID = 3 (  0066):    78.26   1.891     1.33    88.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.891      1.33      88.34
   OUTFLOW: ID= 1 (  0068)     78.260      1.302      4.75      88.27

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 68.84
                   TIME SHIFT OF PEAK FLOW         (min)=205.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.8658

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.89 | 1.083   62.12 | 2.083   12.48 |  3.08    3.91
                0.167    2.89 | 1.167   62.12 | 2.167   12.48 |  3.17    3.91
                0.250    3.67 | 1.250  196.54 | 2.250    9.60 |  3.25    3.44
                0.333    3.67 | 1.333  196.54 | 2.333    9.60 |  3.33    3.44
                0.417    4.88 | 1.417   83.09 | 2.417    7.66 |  3.42    3.05
                0.500    4.88 | 1.500   83.09 | 2.500    7.66 |  3.50    3.05
                0.583    6.96 | 1.583   41.25 | 2.583    6.29 |  3.58    2.73
                0.667    6.96 | 1.667   41.25 | 2.667    6.29 |  3.67    2.73
                0.750   11.02 | 1.750   25.07 | 2.750    5.28 |  3.75    2.47
                0.833   11.02 | 1.833   25.07 | 2.833    5.28 |  3.83    2.47
                0.917   21.03 | 1.917   17.06 | 2.917    4.51 |  3.92    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       129.47
```

```
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.62 (ii)    5.48 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.22         0.16
                                                       *TOTALS*
     PEAK FLOW       (cms)=      13.22         0.08         13.290 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      88.87        58.63          88.57
     TOTAL RAINFALL   (mm)=      89.87        89.87          89.87
     RUNOFF COEFFICIENT   =       0.99         0.65           0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630     13.290      1.33      88.57
   OUTFLOW: ID= 1 (  0084)     26.630      0.594      2.50      88.53

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.47
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.9538

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.89 | 1.083   62.12 | 2.083   12.48 |  3.08    3.91
               0.167    2.89 | 1.167   62.12 | 2.167   12.48 |  3.17    3.91
               0.250    3.67 | 1.250  196.54 | 2.250    9.60 |  3.25    3.44
               0.333    3.67 | 1.333  196.54 | 2.333    9.60 |  3.33    3.44
               0.417    4.88 | 1.417   83.09 | 2.417    7.66 |  3.42    3.05
               0.500    4.88 | 1.500   83.09 | 2.500    7.66 |  3.50    3.05
               0.583    6.96 | 1.583   41.25 | 2.583    6.29 |  3.58    2.73
               0.667    6.96 | 1.667   41.25 | 2.667    6.29 |  3.67    2.73
```

```
               0.750   11.02 | 1.750   25.07 | 2.750    5.28 |  3.75    2.47
               0.833   11.02 | 1.833   25.07 | 2.833    5.28 |  3.83    2.47
               0.917   21.03 | 1.917   17.06 | 2.917    4.51 |  3.92    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       129.47
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       3.53 (ii)    4.39 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.26         0.23
                                                       *TOTALS*
     PEAK FLOW       (cms)=       5.61         0.04          5.652 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      88.87        58.63          88.57
     TOTAL RAINFALL   (mm)=      89.87        89.87          89.87
     RUNOFF COEFFICIENT   =       0.99         0.65           0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      5.652      1.33      88.57
   OUTFLOW: ID= 1 (  0088)     10.830      0.221      2.50      88.30

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.90
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.8065

--------------------------------------------------------------------------------
================================================================================
==========================

       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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\9c3aa0f1-3940-4c0d-a651-34e48a85bada\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\9c3aa0f1-3940-4c0d-a651-34e48a85bada\sc


DATE: 11-01-2024                           TIME: 01:43:06

USER:


COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
---------------------------
  ************************************************
  ** SIMULATION : 100-Year 6-Hour AES           **
  ************************************************



--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\6a1e02c4
| 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 |

-------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
```

```
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.06 (ii)    7.33 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.19         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.61         0.03          3.633 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24          79.02
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.99         0.63           0.98


       (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(  0004)|     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   |   0.2240     1.0750
                          0.0369     0.4255   |   0.2610     1.2100
                          0.0940     0.5850   |   0.2950     1.3580
                          0.1450     0.7390   |   1.6700     2.1200
                          0.1780     0.8770   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      3.633      2.75      79.02
   OUTFLOW: ID= 1 (  0004)     17.830      0.254      4.33      78.75

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.98
                   TIME SHIFT OF PEAK FLOW         (min)= 95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.1831

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250
```

```
         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.25 (ii)    3.52 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.30         0.26
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.13         0.00       0.135 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75        2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24       79.02
     TOTAL RAINFALL   (mm)=      80.31        80.31       80.31
     RUNOFF COEFFICIENT   =       0.99         0.63        0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.135      2.75      79.02
   OUTFLOW: ID= 1 (  0008)      0.660      0.017      3.75      74.60

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.64
                  TIME SHIFT OF PEAK FLOW         (min)= 60.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0398
```

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--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       9.34 (ii)   10.61 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=      14.76         0.10      14.858 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75        2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24       79.02
     TOTAL RAINFALL   (mm)=      80.31        80.31       80.31
     RUNOFF COEFFICIENT   =       0.99         0.63        0.98


       (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(  0069)|     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   |   1.1394      4.4340
```

```
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390     14.858      2.75      79.02
   OUTFLOW: ID= 1 (  0069)     75.390      1.273      4.33      79.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.57
                  TIME SHIFT OF PEAK FLOW         (min)= 95.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  4.8387

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.50 (ii)    8.08 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.26         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.47         0.08         0.555 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24         73.49
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.99         0.63          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
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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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--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.555     2.75    73.49
      + ID2= 2 (  0069):    75.39   1.273     4.33    79.00
        ==================================================
        ID = 3 (  0066):    78.26   1.328     3.75    78.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.328      3.75      78.80
   OUTFLOW: ID= 1 (  0068)     78.260      1.127      6.25      78.73

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 84.83
                  TIME SHIFT OF PEAK FLOW         (min)=150.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7762

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--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
```

```
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.83 (ii)    8.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.18         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=       5.37         0.04          5.407 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24          79.02
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.99         0.63           0.98


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      5.407      2.75      79.02
   OUTFLOW: ID= 1 (  0084)     26.630      0.502      4.08      78.98

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.28
                  TIME SHIFT OF PEAK FLOW         (min)= 80.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.6776

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.22 (ii)    6.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.21         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       2.20         0.02          2.212 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24          79.02
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.99         0.63           0.98


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      2.212      2.75      79.02
   OUTFLOW: ID= 1 (  0088)     10.830      0.188      4.25      78.75

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.51
                  TIME SHIFT OF PEAK FLOW         (min)= 90.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6978

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\8c5560da-101d-49e7-b8bc-887c98ec53a4\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\8c5560da-101d-49e7-b8bc-887c98ec53a4\sc


DATE: 11-01-2024                           TIME: 01:43:05

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 10-Year 12-Hour AES           **
  ************************************************



--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\bcf45888
| Ptotal= 62.71 mm |    Comments: 10 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   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 |

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| CALIB             |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
                0.167    0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
                0.250    0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
                0.333    0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
                0.417    0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
                0.500    0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
                0.583    0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
                0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
                0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
                0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
                0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
                1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
                1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
                1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
                1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
                1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
                1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
                1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
                1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
                1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
                1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
                1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
                1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
                2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
                2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
                2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
                2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
                2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
                2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
                2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
                2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
                2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
                2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
                2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
                2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
                3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
                3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

     Max.Eff.Inten.(mm/hr)=      28.84        20.90
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       8.83 (ii)   10.67 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.41         0.01          1.422 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      61.71        35.33          61.45
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.56           0.98
```

```
       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      1.422      5.25      61.45
   OUTFLOW: ID= 1 (  0004)     17.830      0.170      7.42      61.18

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.97
                   TIME SHIFT OF PEAK FLOW         (min)=130.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.8448

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
                0.167    0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
                0.250    0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
                0.333    0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
                0.417    0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
                0.500    0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
                0.583    0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
                0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
                0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
                0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
                0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
                1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
                1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
                1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
                1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
                1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
                1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
                1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
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                1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
                1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
                1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
                1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
                1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
                2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
                2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
                2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
                2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
                2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
                2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
                2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
                2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
                2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
                2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
                2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
                2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
                3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
                3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

     Max.Eff.Inten.(mm/hr)=      28.84        20.90
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.28 (ii)    5.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.27         0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00          0.053 (iii)
     TIME TO PEAK    (hrs)=       5.08         5.25           5.25
     RUNOFF VOLUME    (mm)=      61.71        35.33          61.44
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.56           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.053      5.25      61.44
   OUTFLOW: ID= 1 (  0008)      0.660      0.011      6.33      57.03

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.19
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0278

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--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
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                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
                0.167    0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
                0.250    0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
                0.333    0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
                0.417    0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
                0.500    0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
                0.583    0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
                0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
                0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
                0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
                0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
                1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
                1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
                1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
                1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
                1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
                1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
                1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
                1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
                1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
                1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
                1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
                1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
                2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
                2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
                2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
                2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
                2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
                2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
                2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
                2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
                2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
                2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
                2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
                2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
                3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
                3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

     Max.Eff.Inten.(mm/hr)=      28.84        20.90
                over (min)       15.00        20.00
     Storage Coeff.  (min)=      13.61 (ii)   15.45 (ii)
     Unit Hyd. Tpeak (min)=      15.00        20.00
     Unit Hyd. peak  (cms)=       0.08         0.07
                                                           *TOTALS*
     PEAK FLOW       (cms)=       5.91         0.04          5.944 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      61.71        35.33          61.45
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.56           0.98


       (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(  0069)|     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   |   1.1394     4.4340
                          0.4823     2.3068   |   1.3243     4.9942
                          0.7344     3.0305   |   1.5003     5.6083
                          0.9063     3.6110   |   5.8130     9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390      5.944      5.25      61.45
   OUTFLOW: ID= 1 (  0069)     75.390      0.842      7.42      61.43

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.16
                   TIME SHIFT OF PEAK FLOW         (min)=130.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  3.3926

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
                0.167    0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
                0.250    0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
                0.333    0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
                0.417    0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
                0.500    0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
                0.583    0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
                0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
                0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
                0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
                0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
                1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
                1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
                1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
                1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
                1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
                1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
                1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
                1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
                1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
                1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
                1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
                1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
```

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                2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
                2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
                2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
                2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
                2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
                2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
                2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
                2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
                2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
                2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
                2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
                2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
                3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
                3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

     Max.Eff.Inten.(mm/hr)=      28.84        20.66
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       5.10 (ii)   18.37 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.21         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.18         0.03          0.212 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.33           5.25
     RUNOFF VOLUME    (mm)=      61.71        35.33          56.43
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.56           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.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.212     5.25    56.43
      + ID2= 2 (  0069):    75.39   0.842     7.42    61.43
        ====================================================
        ID = 3 (  0066):    78.26   0.875     7.25    61.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|      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   |   0.7862      0.6217
                           0.0059     0.0677   |   0.9885      0.7196
                           0.4183     0.4587   |   1.1496      0.7854
                           0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      0.875      7.25      61.25
   OUTFLOW: ID= 1 (  0068)     78.260      0.786      9.17      61.17

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 89.89
                   TIME SHIFT OF PEAK FLOW        (min)=115.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6217
```

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-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
                0.167    0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
                0.250    0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
                0.333    0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
                0.417    0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
                0.500    0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
                0.583    0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
                0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
                0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
                0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
                0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
                1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
                1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
                1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
                1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
                1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
                1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
                1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
                1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
                1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
                1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
                1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
                1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
                2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
                2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
                2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
                2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
                2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
                2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
                2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
                2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
                2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
                2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
                2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
                2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
                3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
                3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

     Max.Eff.Inten.(mm/hr)=      28.84        20.90
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       9.96 (ii)   11.80 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.11         0.01          2.122 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      61.71        35.33          61.45
```

```
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.56           0.98


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      2.122      5.25      61.45
   OUTFLOW: ID= 1 (  0084)     26.630      0.328      7.00      61.41

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.47
                   TIME SHIFT OF PEAK FLOW         (min)=105.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.1667

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.167    3.76 | 6.250    8.15 |  9.33    0.63
               0.167    0.00 | 3.250    3.76 | 6.333    4.39 |  9.42    0.63
               0.250    0.00 | 3.333   10.66 | 6.417    4.39 |  9.50    0.63
               0.333    0.63 | 3.417   10.66 | 6.500    4.39 |  9.58    0.63
               0.417    0.63 | 3.500   10.66 | 6.583    4.39 |  9.67    0.63
               0.500    0.63 | 3.583   10.66 | 6.667    4.39 |  9.75    0.63
               0.583    0.63 | 3.667   10.66 | 6.750    4.39 |  9.83    0.63
               0.667    0.63 | 3.750   10.66 | 6.833    4.39 |  9.92    0.63
               0.750    0.63 | 3.833   10.66 | 6.917    4.39 | 10.00    0.63
               0.833    0.63 | 3.917   10.66 | 7.000    4.39 | 10.08    0.63
               0.917    0.63 | 4.000   10.66 | 7.083    4.39 | 10.17    0.63
               1.000    0.63 | 4.083   10.66 | 7.167    4.39 | 10.25    0.63
               1.083    0.63 | 4.167   10.66 | 7.250    4.39 | 10.33    0.63
               1.167    0.63 | 4.250   10.66 | 7.333    2.51 | 10.42    0.63
               1.250    0.63 | 4.333   28.84 | 7.417    2.51 | 10.50    0.63
               1.333    0.63 | 4.417   28.84 | 7.500    2.51 | 10.58    0.63
               1.417    0.63 | 4.500   28.84 | 7.583    2.51 | 10.67    0.63
               1.500    0.63 | 4.583   28.84 | 7.667    2.51 | 10.75    0.63
               1.583    0.63 | 4.667   28.84 | 7.750    2.51 | 10.83    0.63
               1.667    0.63 | 4.750   28.84 | 7.833    2.51 | 10.92    0.63
               1.750    0.63 | 4.833   28.84 | 7.917    2.51 | 11.00    0.63
               1.833    0.63 | 4.917   28.84 | 8.000    2.51 | 11.08    0.63
               1.917    0.63 | 5.000   28.84 | 8.083    2.51 | 11.17    0.63
               2.000    0.63 | 5.083   28.84 | 8.167    2.51 | 11.25    0.63
               2.083    0.63 | 5.167   28.84 | 8.250    2.51 | 11.33    0.63
               2.167    0.63 | 5.250   28.84 | 8.333    1.25 | 11.42    0.63
               2.250    0.63 | 5.333    8.15 | 8.417    1.25 | 11.50    0.63
               2.333    3.76 | 5.417    8.15 | 8.500    1.25 | 11.58    0.63
               2.417    3.76 | 5.500    8.15 | 8.583    1.25 | 11.67    0.63
               2.500    3.76 | 5.583    8.15 | 8.667    1.25 | 11.75    0.63
               2.583    3.76 | 5.667    8.15 | 8.750    1.25 | 11.83    0.63
               2.667    3.76 | 5.750    8.15 | 8.833    1.25 | 11.92    0.63
               2.750    3.76 | 5.833    8.15 | 8.917    1.25 | 12.00    0.63
               2.833    3.76 | 5.917    8.15 | 9.000    1.25 | 12.08    0.63
               2.917    3.76 | 6.000    8.15 | 9.083    1.25 | 12.17    0.63
               3.000    3.76 | 6.083    8.15 | 9.167    1.25 | 12.25    0.63
               3.083    3.76 | 6.167    8.15 | 9.250    1.25 |

     Max.Eff.Inten.(mm/hr)=      28.84        20.90
                over (min)      10.00        10.00
     Storage Coeff.  (min)=       7.60 (ii)    9.45 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.13         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.86         0.01          0.865 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      61.71        35.33          61.45
     TOTAL RAINFALL   (mm)=      62.71        62.71          62.71
     RUNOFF COEFFICIENT   =       0.98         0.56           0.98


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      0.865      5.25      61.45
   OUTFLOW: ID= 1 (  0088)     10.830      0.125      7.33      61.18

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.44
                   TIME SHIFT OF PEAK FLOW         (min)=125.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.4943

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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
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```
        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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\2f8ff4f1-ae39-441c-b695-9fbae92752c1\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\2f8ff4f1-ae39-441c-b695-9fbae92752c1\sc


DATE: 11-01-2024                           TIME: 01:43:05

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 10-Year 4-Hour Chicago Caledo **
  ************************************************

--------------------
| 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    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   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


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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
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     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.39 | 1.083   37.17 | 2.083    8.06 |  3.08    3.05
                0.167    2.39 | 1.167   37.17 | 2.167    8.06 |  3.17    3.05
                0.250    2.89 | 1.250  134.16 | 2.250    6.42 |  3.25    2.75
                0.333    2.89 | 1.333  134.16 | 2.333    6.42 |  3.33    2.75
                0.417    3.65 | 1.417   50.03 | 2.417    5.30 |  3.42    2.50
                0.500    3.65 | 1.500   50.03 | 2.500    5.30 |  3.50    2.50
                0.583    4.89 | 1.583   24.37 | 2.583    4.50 |  3.58    2.29
                0.667    4.89 | 1.667   24.37 | 2.667    4.50 |  3.67    2.29
                0.750    7.23 | 1.750   15.14 | 2.750    3.89 |  3.75    2.11
                0.833    7.23 | 1.833   15.14 | 2.833    3.89 |  3.83    2.11
                0.917   12.87 | 1.917   10.64 | 2.917    3.42 |  3.92    1.96
                1.000   12.87 | 2.000   10.64 | 3.000    3.42 |  4.00    1.96

     Max.Eff.Inten.(mm/hr)=     134.16        71.15
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.77 (ii)    5.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.22         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       5.97         0.03          5.998 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      57.62        32.00          57.36
     TOTAL RAINFALL   (mm)=      58.62        58.62          58.62
     RUNOFF COEFFICIENT   =       0.98         0.55           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      5.998      1.33      57.36
   OUTFLOW: ID= 1 (  0004)     17.830      0.178      2.92      57.14

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.97
                TIME SHIFT OF PEAK FLOW         (min)= 95.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.8769

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.39 | 1.083   37.17 | 2.083    8.06 |  3.08    3.05
               0.167    2.39 | 1.167   37.17 | 2.167    8.06 |  3.17    3.05
               0.250    2.89 | 1.250  134.16 | 2.250    6.42 |  3.25    2.75
               0.333    2.89 | 1.333  134.16 | 2.333    6.42 |  3.33    2.75
               0.417    3.65 | 1.417   50.03 | 2.417    5.30 |  3.42    2.50
               0.500    3.65 | 1.500   50.03 | 2.500    5.30 |  3.50    2.50
               0.583    4.89 | 1.583   24.37 | 2.583    4.50 |  3.58    2.29
               0.667    4.89 | 1.667   24.37 | 2.667    4.50 |  3.67    2.29
               0.750    7.23 | 1.750   15.14 | 2.750    3.89 |  3.75    2.11
               0.833    7.23 | 1.833   15.14 | 2.833    3.89 |  3.83    2.11
               0.917   12.87 | 1.917   10.64 | 2.917    3.42 |  3.92    1.96
               1.000   12.87 | 2.000   10.64 | 3.000    3.42 |  4.00    1.96

     Max.Eff.Inten.(mm/hr)=     134.16        71.15
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.78 (ii)    2.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.28
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.00          0.244 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      57.62        32.00          57.36
     TOTAL RAINFALL   (mm)=      58.62        58.62          58.62
     RUNOFF COEFFICIENT   =       0.98         0.55           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.244      1.33      57.36
   OUTFLOW: ID= 1 (  0008)      0.660      0.012      2.25      52.94
```

```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.00
                   TIME SHIFT OF PEAK FLOW         (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0301

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--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.39 | 1.083   37.17 | 2.083    8.06 |  3.08    3.05
               0.167    2.39 | 1.167   37.17 | 2.167    8.06 |  3.17    3.05
               0.250    2.89 | 1.250  134.16 | 2.250    6.42 |  3.25    2.75
               0.333    2.89 | 1.333  134.16 | 2.333    6.42 |  3.33    2.75
               0.417    3.65 | 1.417   50.03 | 2.417    5.30 |  3.42    2.50
               0.500    3.65 | 1.500   50.03 | 2.500    5.30 |  3.50    2.50
               0.583    4.89 | 1.583   24.37 | 2.583    4.50 |  3.58    2.29
               0.667    4.89 | 1.667   24.37 | 2.667    4.50 |  3.67    2.29
               0.750    7.23 | 1.750   15.14 | 2.750    3.89 |  3.75    2.11
               0.833    7.23 | 1.833   15.14 | 2.833    3.89 |  3.83    2.11
               0.917   12.87 | 1.917   10.64 | 2.917    3.42 |  3.92    1.96
               1.000   12.87 | 2.000   10.64 | 3.000    3.42 |  4.00    1.96

     Max.Eff.Inten.(mm/hr)=     134.16        71.15
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       7.36 (ii)    8.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                           *TOTALS*
     PEAK FLOW       (cms)=      22.30         0.11         22.381 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      57.62        32.00          57.36
     TOTAL RAINFALL   (mm)=      58.62        58.62          58.62
     RUNOFF COEFFICIENT   =       0.98         0.55           0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020
```

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                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390     22.381      1.33      57.36
   OUTFLOW: ID= 1 (  0069)     75.390      0.906      2.75      57.34

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.05
                   TIME SHIFT OF PEAK FLOW         (min)= 85.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  3.6110

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--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    2.39 | 1.083   37.17 | 2.083    8.06 |  3.08    3.05
                 0.167    2.39 | 1.167   37.17 | 2.167    8.06 |  3.17    3.05
                 0.250    2.89 | 1.250  134.16 | 2.250    6.42 |  3.25    2.75
                 0.333    2.89 | 1.333  134.16 | 2.333    6.42 |  3.33    2.75
                 0.417    3.65 | 1.417   50.03 | 2.417    5.30 |  3.42    2.50
                 0.500    3.65 | 1.500   50.03 | 2.500    5.30 |  3.50    2.50
                 0.583    4.89 | 1.583   24.37 | 2.583    4.50 |  3.58    2.29
                 0.667    4.89 | 1.667   24.37 | 2.667    4.50 |  3.67    2.29
                 0.750    7.23 | 1.750   15.14 | 2.750    3.89 |  3.75    2.11
                 0.833    7.23 | 1.833   15.14 | 2.833    3.89 |  3.83    2.11
                 0.917   12.87 | 1.917   10.64 | 2.917    3.42 |  3.92    1.96
                 1.000   12.87 | 2.000   10.64 | 3.000    3.42 |  4.00    1.96

     Max.Eff.Inten.(mm/hr)=     134.16        71.15
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.76 (ii)    6.36 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.15
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.84         0.09          0.913 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      57.62        32.00          52.49
     TOTAL RAINFALL   (mm)=      58.62        58.62          58.62
     RUNOFF COEFFICIENT   =       0.98         0.55           0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------
| ADD HYD  (  0066)|
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|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.913     1.33    52.49
      + ID2= 2 (  0069):    75.39   0.906     2.75    57.34
        ===================================================
        ID = 3 (  0066):    78.26   1.214     1.33    57.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.214      1.33      57.17
   OUTFLOW: ID= 1 (  0068)     78.260      0.782      5.08      57.10

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 64.41
                   TIME SHIFT OF PEAK FLOW         (min)=225.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6202

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--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    2.39 | 1.083   37.17 | 2.083    8.06 |  3.08    3.05
                 0.167    2.39 | 1.167   37.17 | 2.167    8.06 |  3.17    3.05
                 0.250    2.89 | 1.250  134.16 | 2.250    6.42 |  3.25    2.75
                 0.333    2.89 | 1.333  134.16 | 2.333    6.42 |  3.33    2.75
                 0.417    3.65 | 1.417   50.03 | 2.417    5.30 |  3.42    2.50
                 0.500    3.65 | 1.500   50.03 | 2.500    5.30 |  3.50    2.50
                 0.583    4.89 | 1.583   24.37 | 2.583    4.50 |  3.58    2.29
                 0.667    4.89 | 1.667   24.37 | 2.667    4.50 |  3.67    2.29
                 0.750    7.23 | 1.750   15.14 | 2.750    3.89 |  3.75    2.11
                 0.833    7.23 | 1.833   15.14 | 2.833    3.89 |  3.83    2.11
                 0.917   12.87 | 1.917   10.64 | 2.917    3.42 |  3.92    1.96
                 1.000   12.87 | 2.000   10.64 | 3.000    3.42 |  4.00    1.96

     Max.Eff.Inten.(mm/hr)=     134.16        71.15
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.38 (ii)    6.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.21         0.15
                                                           *TOTALS*
```

```
     PEAK FLOW       (cms)=       8.67         0.04          8.706 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      57.62        32.00          57.36
     TOTAL RAINFALL   (mm)=      58.62        58.62          58.62
     RUNOFF COEFFICIENT   =       0.98         0.55           0.98


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      8.706      1.33      57.36
   OUTFLOW: ID= 1 (  0084)     26.630      0.358      2.58      57.32

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.11
                   TIME SHIFT OF PEAK FLOW         (min)= 75.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.2572

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.39 | 1.083   37.17 | 2.083    8.06 |  3.08    3.05
                0.167    2.39 | 1.167   37.17 | 2.167    8.06 |  3.17    3.05
                0.250    2.89 | 1.250  134.16 | 2.250    6.42 |  3.25    2.75
                0.333    2.89 | 1.333  134.16 | 2.333    6.42 |  3.33    2.75
                0.417    3.65 | 1.417   50.03 | 2.417    5.30 |  3.42    2.50
                0.500    3.65 | 1.500   50.03 | 2.500    5.30 |  3.50    2.50
                0.583    4.89 | 1.583   24.37 | 2.583    4.50 |  3.58    2.29
                0.667    4.89 | 1.667   24.37 | 2.667    4.50 |  3.67    2.29
                0.750    7.23 | 1.750   15.14 | 2.750    3.89 |  3.75    2.11
                0.833    7.23 | 1.833   15.14 | 2.833    3.89 |  3.83    2.11
                0.917   12.87 | 1.917   10.64 | 2.917    3.42 |  3.92    1.96
                1.000   12.87 | 2.000   10.64 | 3.000    3.42 |  4.00    1.96

     Max.Eff.Inten.(mm/hr)=     134.16        71.15
```

```
                 over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.11 (ii)    5.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.16
                                                              *TOTALS*
     PEAK FLOW       (cms)=       3.74         0.02          3.752 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      57.62        32.00          57.36
     TOTAL RAINFALL   (mm)=      58.62        58.62          58.62
     RUNOFF COEFFICIENT   =       0.98         0.55           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      3.752      1.33      57.36
   OUTFLOW: ID= 1 (  0088)     10.830      0.133      2.67      57.09

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.53
                   TIME SHIFT OF PEAK FLOW         (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.5204

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\f138f647-096f-4b31-9edb-d68a58052bc3\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\f138f647-096f-4b31-9edb-d68a58052bc3\sc
```

```
DATE: 11-01-2024                         TIME: 01:43:06

USER:


COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
---------------------------
  ************************************************
  ** SIMULATION : 10-Year 6-Hour AES            **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\214a92d3
| Ptotal= 55.69 mm |    Comments: 10 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   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 |

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
                0.167    0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
                0.250    0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
                0.333    1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
                0.417    1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
                0.500    1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
                0.583    1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
                0.667    1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
                0.750    1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
                0.833    1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
                0.917    1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
                1.000    1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
                1.083    1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
                1.167    1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
                1.250    1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
                1.333    6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
                1.417    6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
                1.500    6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
                1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

     Max.Eff.Inten.(mm/hr)=      51.24        34.52
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       7.01 (ii)    8.48 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.49         0.02          2.506 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      54.69        29.66          54.44
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.98         0.53           0.98


       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      2.506      2.75      54.44
   OUTFLOW: ID= 1 (  0004)     17.830      0.165      4.33      54.21

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.60
                   TIME SHIFT OF PEAK FLOW        (min)= 95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.8238

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083   0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
                0.167   0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
                0.250   0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
                0.333   1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
                0.417   1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
                0.500   1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
                0.583   1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
                0.667   1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
                0.750   1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
                0.833   1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
                0.917   1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
                1.000   1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
                1.083   1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
                1.167   1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
                1.250   1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
                1.333   6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
                1.417   6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
                1.500   6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
                1.583   6.68 | 3.167   14.48 | 4.750    2.23 |

     Max.Eff.Inten.(mm/hr)=      51.24        34.52
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.61 (ii)    4.08 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.29         0.24
                                                       *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.00      0.094 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75        2.75
     RUNOFF VOLUME    (mm)=      54.69        29.66       54.44
     TOTAL RAINFALL   (mm)=      55.69        55.69       55.69
     RUNOFF COEFFICIENT   =       0.98         0.53        0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.094      2.75      54.44
   OUTFLOW: ID= 1 (  0008)      0.660      0.011      3.83      50.03

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.96
                   TIME SHIFT OF PEAK FLOW        (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0279

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
```

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--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
                 0.167    0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
                 0.250    0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
                 0.333    1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
                 0.417    1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
                 0.500    1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
                 0.583    1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
                 0.667    1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
                 0.750    1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
                 0.833    1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
                 0.917    1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
                 1.000    1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
                 1.083    1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
                 1.167    1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
                 1.250    1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
                 1.333    6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
                 1.417    6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
                 1.500    6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
                 1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

     Max.Eff.Inten.(mm/hr)=      51.24        34.52
                over (min)       10.00        15.00
     Storage Coeff.  (min)=      10.81 (ii)   12.28 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.09
                                                       *TOTALS*
     PEAK FLOW       (cms)=      10.05         0.06     10.106 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83        2.75
     RUNOFF VOLUME    (mm)=      54.69        29.66       54.44
     TOTAL RAINFALL   (mm)=      55.69        55.69       55.69
     RUNOFF COEFFICIENT   =       0.98         0.53        0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
```

```
   INFLOW : ID= 2 (  0065)     75.390     10.106      2.75      54.44
   OUTFLOW: ID= 1 (  0069)     75.390      0.833      4.33      54.42

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.24
                   TIME SHIFT OF PEAK FLOW         (min)= 95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  3.3643

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
                0.167    0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
                0.250    0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
                0.333    1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
                0.417    1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
                0.500    1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
                0.583    1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
                0.667    1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
                0.750    1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
                0.833    1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
                0.917    1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
                1.000    1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
                1.083    1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
                1.167    1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
                1.250    1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
                1.333    6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
                1.417    6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
                1.500    6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
                1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

     Max.Eff.Inten.(mm/hr)=      51.24        33.51
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.06 (ii)   14.99 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.24         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.33         0.04         0.366 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83          2.75
     RUNOFF VOLUME    (mm)=      54.69        29.66         49.68
     TOTAL RAINFALL   (mm)=      55.69        55.69         55.69
     RUNOFF COEFFICIENT   =       0.98         0.53          0.89

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):      2.87   0.366     2.75    49.68
      + ID2= 2 (  0069):     75.39   0.833     4.33    54.42
        ==================================================
        ID = 3 (  0066):     78.26   0.869     3.75    54.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |  0.7862      0.6217
                          0.0059     0.0677   |  0.9885      0.7196
                          0.4183     0.4587   |  1.1496      0.7854
                          0.6373     0.5653   |  1.3019      0.8658

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)        78.260      0.869      3.75      54.25
   OUTFLOW: ID= 1 (  0068)        78.260      0.720      6.58      54.19

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 82.85
                   TIME SHIFT OF PEAK FLOW         (min)=170.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.5965

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
                0.167    0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
                0.250    0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
                0.333    1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
                0.417    1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
                0.500    1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
                0.583    1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
                0.667    1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
                0.750    1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
                0.833    1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
                0.917    1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
                1.000    1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
                1.083    1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
                1.167    1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
                1.250    1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
```

```
                1.333    6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
                1.417    6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
                1.500    6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
                1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

     Max.Eff.Inten.(mm/hr)=      51.24        34.52
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       7.91 (ii)    9.38 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.13         0.12
                                                        *TOTALS*
     PEAK FLOW       (cms)=       3.67         0.02          3.693 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      54.69        29.66          54.44
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.98         0.53           0.98


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      3.693      2.75      54.44
   OUTFLOW: ID= 1 (  0084)     26.630      0.328      4.25      54.40

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.89
                   TIME SHIFT OF PEAK FLOW         (min)= 90.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.1669

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    6.68 | 3.250   14.48 |  4.83    1.11
                0.167    0.00 | 1.750    6.68 | 3.333    7.80 |  4.92    1.11
                0.250    0.00 | 1.833   18.94 | 3.417    7.80 |  5.00    1.11
```

```
                0.333    1.11 | 1.917   18.94 | 3.500    7.80 |  5.08    1.11
                0.417    1.11 | 2.000   18.94 | 3.583    7.80 |  5.17    1.11
                0.500    1.11 | 2.083   18.94 | 3.667    7.80 |  5.25    1.11
                0.583    1.11 | 2.167   18.94 | 3.750    7.80 |  5.33    1.11
                0.667    1.11 | 2.250   18.94 | 3.833    4.46 |  5.42    1.11
                0.750    1.11 | 2.333   51.24 | 3.917    4.46 |  5.50    1.11
                0.833    1.11 | 2.417   51.24 | 4.000    4.46 |  5.58    1.11
                0.917    1.11 | 2.500   51.24 | 4.083    4.46 |  5.67    1.11
                1.000    1.11 | 2.583   51.24 | 4.167    4.46 |  5.75    1.11
                1.083    1.11 | 2.667   51.24 | 4.250    4.46 |  5.83    1.11
                1.167    1.11 | 2.750   51.24 | 4.333    2.23 |  5.92    1.11
                1.250    1.11 | 2.833   14.48 | 4.417    2.23 |  6.00    1.11
                1.333    6.68 | 2.917   14.48 | 4.500    2.23 |  6.08    1.11
                1.417    6.68 | 3.000   14.48 | 4.583    2.23 |  6.17    1.11
                1.500    6.68 | 3.083   14.48 | 4.667    2.23 |  6.25    1.11
                1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

     Max.Eff.Inten.(mm/hr)=      51.24        34.52
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.04 (ii)    7.51 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.19         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.52         0.01          1.529 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      54.69        29.66          54.44
     TOTAL RAINFALL   (mm)=      55.69        55.69          55.69
     RUNOFF COEFFICIENT   =       0.98         0.53           0.98


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      1.529      2.75      54.44
   OUTFLOW: ID= 1 (  0088)     10.830      0.123      4.25      54.17

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.03
                   TIME SHIFT OF PEAK FLOW         (min)= 90.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.4876

--------------------------------------------------------------------------------
================================================================================
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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\b12b60af-028f-44a9-ba7e-6dc362cfdb47\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\b12b60af-028f-44a9-ba7e-6dc362cfdb47\sc


DATE: 11-01-2024                           TIME: 01:43:06

USER:



COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 25-Year 12-Hour AES           **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\bacea332
| Ptotal= 73.10 mm |    Comments: 25 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   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 (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
```

```
Dep. Storage     (mm)=       1.00         1.50
Average Slope     (%)=       1.00         2.00
Length            (m)=     344.77        40.00
Mannings n          =      0.013        0.250

    NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
          0.083    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
          0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
          0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
          0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
          0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
          0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
          0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
          0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
          0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
          0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
          0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
          1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
          1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
          1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
          1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
          1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
          1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
          1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
          1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
          1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
          1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
          1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
          1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
          2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
          2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
          2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
          2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
          2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
          2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
          2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
          2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
          2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
          2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
          2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
          2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
          3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
          3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

Max.Eff.Inten.(mm/hr)=      33.63        25.71
           over (min)      10.00        15.00
Storage Coeff.  (min)=       8.30 (ii)   10.04 (ii)
Unit Hyd. Tpeak (min)=      10.00        15.00
Unit Hyd. peak  (cms)=       0.13         0.10
                                                     *TOTALS*
PEAK FLOW       (cms)=       1.65         0.01         1.660 (iii)
TIME TO PEAK    (hrs)=       5.25         5.25          5.25
RUNOFF VOLUME    (mm)=      72.10        44.03         71.82
TOTAL RAINFALL   (mm)=      73.10        73.10         73.10
RUNOFF COEFFICIENT   =       0.99         0.60          0.98


  (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830     1.660      5.25      71.82
   OUTFLOW: ID= 1 (  0004)     17.830     0.202      7.42      71.54

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.18
                   TIME SHIFT OF PEAK FLOW         (min)=130.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.9811

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
                0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
                0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
                0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
                0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
                0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
                0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
                0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
                0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
                0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
                0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
                1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
                1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
                1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
                1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
                1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
                1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
                1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
                1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
                1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
                1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
                1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
                1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
                2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
                2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
                2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
                2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
                2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
                2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
                2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
                2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
                2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
                2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
                2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
                2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
                3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
                3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      33.63        25.71
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       3.09 (ii)    4.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.27         0.22
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.00          0.062 (iii)
     TIME TO PEAK    (hrs)=       5.08         5.25           5.25
     RUNOFF VOLUME    (mm)=      72.10        44.03          71.82
     TOTAL RAINFALL   (mm)=      73.10        73.10          73.10
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660     0.062      5.25      71.82
   OUTFLOW: ID= 1 (  0008)      0.660     0.013      6.33      67.41

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.45
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0322

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| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n           =      0.013        0.250
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         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
                0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
                0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
                0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
                0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
                0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
                0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
                0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
                0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
                0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
                0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
                1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
                1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
                1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
                1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
                1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
                1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
                1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
                1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
                1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
                1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
                1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
                1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
                2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
                2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
                2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
                2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
                2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
                2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
                2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
                2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
                2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
                2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
                2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
                2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
                3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
                3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      33.63        25.71
                over (min)       15.00        15.00
     Storage Coeff.  (min)=      12.79 (ii)   14.53 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.08         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       6.91         0.05         6.955 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25          5.25
     RUNOFF VOLUME    (mm)=      72.10        44.03         71.82
     TOTAL RAINFALL   (mm)=      73.10        73.10         73.10
     RUNOFF COEFFICIENT   =       0.99         0.60          0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390      6.955      5.25      71.82
   OUTFLOW: ID= 1 (  0069)     75.390      1.001      7.42      71.80

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.39
                  TIME SHIFT OF PEAK FLOW         (min)=130.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  3.9445

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--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
                0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
                0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
                0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
                0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
                0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
                0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
                0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
                0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
                0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
                0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
                1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
                1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
                1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
                1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
                1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
                1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
                1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
                1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
                1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
                1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
                1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
                1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
                2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
                2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
                2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
                2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
                2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
                2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
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                2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
                2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
                2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
                2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
                2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
                2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
                3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
                3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      33.63        25.46
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.80 (ii)   17.00 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.22         0.06
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.21         0.04          0.250 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      72.10        44.03          66.48
     TOTAL RAINFALL   (mm)=      73.10        73.10          73.10
     RUNOFF COEFFICIENT   =       0.99         0.60           0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.250     5.25    66.48
      + ID2= 2 (  0069):    75.39   1.001     7.42    71.80
        ===================================================
        ID = 3 (  0066):    78.26   1.040     7.25    71.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.040      7.25      71.61
   OUTFLOW: ID= 1 (  0068)     78.260      0.937      9.17      71.53

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 90.10
                   TIME SHIFT OF PEAK FLOW        (min)=115.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6946

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--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
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                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
               0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
               0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
               0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
               0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
               0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
               0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
               0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
               0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
               0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
               0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
               1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
               1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
               1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
               1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
               1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
               1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
               1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
               1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
               1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
               1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
               1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
               1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
               2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
               2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
               2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
               2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
               2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
               2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
               2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
               2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
               2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
               2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
               2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
               2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
               3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
               3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      33.63        25.71
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       9.36 (ii)   11.10 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.46         0.02          2.477 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      72.10        44.03          71.82
     TOTAL RAINFALL   (mm)=      73.10        73.10          73.10
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98


       (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(  0084)|     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   |   0.4507     1.5442
                          0.1903     0.7953   |   0.5255     1.7396
                          0.2909     1.0533   |   0.5941     1.9538
                          0.3582     1.2571   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      2.477      5.25      71.82
   OUTFLOW: ID= 1 (  0084)     26.630      0.390      6.83      71.78

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.76
                TIME SHIFT OF PEAK FLOW         (min)= 95.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.3569

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--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
                0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
                0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
                0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
                0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
                0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
                0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
                0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
                0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
                0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
                0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
                1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
                1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
                1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
                1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
                1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
                1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
                1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
                1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
                1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
                1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
                1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
```

```
                1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
                2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
                2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
                2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
                2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
                2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
                2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
                2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
                2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
                2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
                2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
                2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
                2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
                3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
                3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      33.63        25.71
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       7.15 (ii)    8.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                          *TOTALS*
     PEAK FLOW      (cms)=       1.00         0.01          1.009 (iii)
     TIME TO PEAK   (hrs)=       5.25         5.25          5.25
     RUNOFF VOLUME    (mm)=      72.10        44.03         71.82
     TOTAL RAINFALL   (mm)=      73.10        73.10         73.10
     RUNOFF COEFFICIENT   =       0.99         0.60          0.98


       (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(  0088)|     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   |   0.1328     0.5210
                          0.0223     0.2570   |   0.1673     0.6380
                          0.0705     0.3460   |   0.1955     0.7180
                          0.1081     0.4380   |   0.2207     0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      1.009      5.25      71.82
   OUTFLOW: ID= 1 (  0088)     10.830      0.148      7.25      71.55

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.68
                TIME SHIFT OF PEAK FLOW         (min)=120.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.5730

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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
```

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       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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\21612e8a-ad16-4751-9720-793974f24ed2\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\21612e8a-ad16-4751-9720-793974f24ed2\sc


DATE: 11-01-2024                           TIME: 01:43:04

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 25-Year 4-Hour Chicago Caledo **
  ************************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3158.000
| Ptotal= 71.59 mm |                          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    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   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


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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250
```

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         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                  0.083    2.68 | 1.083   47.76 | 2.083   10.11 |  3.08    3.51
                  0.167    2.68 | 1.167   47.76 | 2.167   10.11 |  3.17    3.51
                  0.250    3.31 | 1.250  156.47 | 2.250    7.92 |  3.25    3.13
                  0.333    3.31 | 1.333  156.47 | 2.333    7.92 |  3.33    3.13
                  0.417    4.28 | 1.417   63.86 | 2.417    6.44 |  3.42    2.81
                  0.500    4.28 | 1.500   63.86 | 2.500    6.44 |  3.50    2.81
                  0.583    5.90 | 1.583   31.72 | 2.583    5.38 |  3.58    2.55
                  0.667    5.90 | 1.667   31.72 | 2.667    5.38 |  3.67    2.55
                  0.750    9.00 | 1.750   19.56 | 2.750    4.59 |  3.75    2.33
                  0.833    9.00 | 1.833   19.56 | 2.833    4.59 |  3.83    2.33
                  0.917   16.53 | 1.917   13.56 | 2.917    3.99 |  3.92    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        92.44
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.49 (ii)    5.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.23         0.16
                                                           *TOTALS*
     PEAK FLOW       (cms)=       7.08         0.04          7.112 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      70.59        42.75          70.31
     TOTAL RAINFALL   (mm)=      71.59        71.59          71.59
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      7.112      1.33      70.31
   OUTFLOW: ID= 1 (  0004)     17.830      0.224      2.83      70.07

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.15
                   TIME SHIFT OF PEAK FLOW        (min)= 90.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0752

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
```

```
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.65         0.01
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.68 | 1.083   47.76 | 2.083   10.11 |  3.08    3.51
               0.167    2.68 | 1.167   47.76 | 2.167   10.11 |  3.17    3.51
               0.250    3.31 | 1.250  156.47 | 2.250    7.92 |  3.25    3.13
               0.333    3.31 | 1.333  156.47 | 2.333    7.92 |  3.33    3.13
               0.417    4.28 | 1.417   63.86 | 2.417    6.44 |  3.42    2.81
               0.500    4.28 | 1.500   63.86 | 2.500    6.44 |  3.50    2.81
               0.583    5.90 | 1.583   31.72 | 2.583    5.38 |  3.58    2.55
               0.667    5.90 | 1.667   31.72 | 2.667    5.38 |  3.67    2.55
               0.750    9.00 | 1.750   19.56 | 2.750    4.59 |  3.75    2.33
               0.833    9.00 | 1.833   19.56 | 2.833    4.59 |  3.83    2.33
               0.917   16.53 | 1.917   13.56 | 2.917    3.99 |  3.92    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        92.44
                over (min)       5.00         5.00
     Storage Coeff.  (min)=       1.67 (ii)    2.61 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.29
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.28         0.00       0.285 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33        1.33
     RUNOFF VOLUME    (mm)=      70.59        42.75       70.31
     TOTAL RAINFALL   (mm)=      71.59        71.59       71.59
     RUNOFF COEFFICIENT   =       0.99         0.60        0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.285      1.33      70.31
   OUTFLOW: ID= 1 (  0008)      0.660      0.015      2.25      65.90

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.40
                   TIME SHIFT OF PEAK FLOW        (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0369
```

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--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     74.64         0.75
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.68 | 1.083   47.76 | 2.083   10.11 |  3.08    3.51
               0.167    2.68 | 1.167   47.76 | 2.167   10.11 |  3.17    3.51
               0.250    3.31 | 1.250  156.47 | 2.250    7.92 |  3.25    3.13
               0.333    3.31 | 1.333  156.47 | 2.333    7.92 |  3.33    3.13
               0.417    4.28 | 1.417   63.86 | 2.417    6.44 |  3.42    2.81
               0.500    4.28 | 1.500   63.86 | 2.500    6.44 |  3.50    2.81
               0.583    5.90 | 1.583   31.72 | 2.583    5.38 |  3.58    2.55
               0.667    5.90 | 1.667   31.72 | 2.667    5.38 |  3.67    2.55
               0.750    9.00 | 1.750   19.56 | 2.750    4.59 |  3.75    2.33
               0.833    9.00 | 1.833   19.56 | 2.833    4.59 |  3.83    2.33
               0.917   16.53 | 1.917   13.56 | 2.917    3.99 |  3.92    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        92.44
                over (min)       5.00        10.00
     Storage Coeff.  (min)=       6.92 (ii)    7.86 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=      26.75         0.14      26.865 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42        1.33
     RUNOFF VOLUME    (mm)=      70.59        42.75       70.31
     TOTAL RAINFALL   (mm)=      71.59        71.59       71.59
     RUNOFF COEFFICIENT   =       0.99         0.60        0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390     26.865      1.33      70.31
   OUTFLOW: ID= 1 (  0069)     75.390      1.139      2.75      70.29
```

```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.24
                   TIME SHIFT OF PEAK FLOW         (min)= 85.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  4.4340

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.68 | 1.083   47.76 | 2.083   10.11 |  3.08    3.51
               0.167    2.68 | 1.167   47.76 | 2.167   10.11 |  3.17    3.51
               0.250    3.31 | 1.250  156.47 | 2.250    7.92 |  3.25    3.13
               0.333    3.31 | 1.333  156.47 | 2.333    7.92 |  3.33    3.13
               0.417    4.28 | 1.417   63.86 | 2.417    6.44 |  3.42    2.81
               0.500    4.28 | 1.500   63.86 | 2.500    6.44 |  3.50    2.81
               0.583    5.90 | 1.583   31.72 | 2.583    5.38 |  3.58    2.55
               0.667    5.90 | 1.667   31.72 | 2.667    5.38 |  3.67    2.55
               0.750    9.00 | 1.750   19.56 | 2.750    4.59 |  3.75    2.33
               0.833    9.00 | 1.833   19.56 | 2.833    4.59 |  3.83    2.33
               0.917   16.53 | 1.917   13.56 | 2.917    3.99 |  3.92    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        92.44
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.59 (ii)    5.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.29         0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.98         0.12       1.084 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42        1.33
     RUNOFF VOLUME    (mm)=      70.59        42.75       65.02
     TOTAL RAINFALL   (mm)=      71.59        71.59       71.59
     RUNOFF COEFFICIENT   =       0.99         0.60        0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   1.084     1.33    65.02
      + ID2= 2 (  0069):    75.39   1.139     2.75    70.29
        ====================================================
        ID = 3 (  0066):    78.26   1.461     1.33    70.10

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.461      1.33      70.10
   OUTFLOW: ID= 1 (  0068)     78.260      0.988      5.00      70.03

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 67.64
                   TIME SHIFT OF PEAK FLOW         (min)=220.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7196

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.68 | 1.083   47.76 | 2.083   10.11 |  3.08    3.51
               0.167    2.68 | 1.167   47.76 | 2.167   10.11 |  3.17    3.51
               0.250    3.31 | 1.250  156.47 | 2.250    7.92 |  3.25    3.13
               0.333    3.31 | 1.333  156.47 | 2.333    7.92 |  3.33    3.13
               0.417    4.28 | 1.417   63.86 | 2.417    6.44 |  3.42    2.81
               0.500    4.28 | 1.500   63.86 | 2.500    6.44 |  3.50    2.81
               0.583    5.90 | 1.583   31.72 | 2.583    5.38 |  3.58    2.55
               0.667    5.90 | 1.667   31.72 | 2.667    5.38 |  3.67    2.55
               0.750    9.00 | 1.750   19.56 | 2.750    4.59 |  3.75    2.33
               0.833    9.00 | 1.833   19.56 | 2.833    4.59 |  3.83    2.33
               0.917   16.53 | 1.917   13.56 | 2.917    3.99 |  3.92    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        92.44
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.06 (ii)    6.00 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.21         0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=      10.31         0.05      10.356 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42        1.33
     RUNOFF VOLUME    (mm)=      70.59        42.75       70.31
     TOTAL RAINFALL   (mm)=      71.59        71.59       71.59
     RUNOFF COEFFICIENT   =       0.99         0.60        0.98
```

```
      (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630     10.356      1.33      70.31
   OUTFLOW: ID= 1 (  0084)     26.630      0.451      2.58      70.27

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.35
                   TIME SHIFT OF PEAK FLOW         (min)= 75.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.5442

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--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.68 | 1.083   47.76 | 2.083   10.11 |  3.08    3.51
               0.167    2.68 | 1.167   47.76 | 2.167   10.11 |  3.17    3.51
               0.250    3.31 | 1.250  156.47 | 2.250    7.92 |  3.25    3.13
               0.333    3.31 | 1.333  156.47 | 2.333    7.92 |  3.33    3.13
               0.417    4.28 | 1.417   63.86 | 2.417    6.44 |  3.42    2.81
               0.500    4.28 | 1.500   63.86 | 2.500    6.44 |  3.50    2.81
               0.583    5.90 | 1.583   31.72 | 2.583    5.38 |  3.58    2.55
               0.667    5.90 | 1.667   31.72 | 2.667    5.38 |  3.67    2.55
               0.750    9.00 | 1.750   19.56 | 2.750    4.59 |  3.75    2.33
               0.833    9.00 | 1.833   19.56 | 2.833    4.59 |  3.83    2.33
               0.917   16.53 | 1.917   13.56 | 2.917    3.99 |  3.92    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        92.44
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       3.86 (ii)    4.80 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.25         0.22
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.41         0.03          4.438 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      70.59        42.75          70.31
     TOTAL RAINFALL   (mm)=      71.59        71.59          71.59
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      4.438      1.33      70.31
   OUTFLOW: ID= 1 (  0088)     10.830      0.167      2.67      70.04

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.77
                   TIME SHIFT OF PEAK FLOW         (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6380

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\1bc38bf5-e76a-4782-817b-c1651aabe43a\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\1bc38bf5-e76a-4782-817b-c1651aabe43a\sc


DATE: 11-01-2024                           TIME: 01:43:04

USER:
```

```
COMMENTS: ____________________________________________________________

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  ************************************************
  ** SIMULATION : 25-Year 6-Hour AES            **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\d9bcda0b
| Ptotal= 65.59 mm |    Comments: 25 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   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)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    7.87 | 3.250   17.06 |  4.83    1.31
                0.167    0.00 | 1.750    7.87 | 3.333    9.18 |  4.92    1.31
                0.250    0.00 | 1.833   22.30 | 3.417    9.18 |  5.00    1.31
                0.333    1.31 | 1.917   22.30 | 3.500    9.18 |  5.08    1.31
                0.417    1.31 | 2.000   22.30 | 3.583    9.18 |  5.17    1.31
                0.500    1.31 | 2.083   22.30 | 3.667    9.18 |  5.25    1.31
                0.583    1.31 | 2.167   22.30 | 3.750    9.18 |  5.33    1.31
                0.667    1.31 | 2.250   22.30 | 3.833    5.25 |  5.42    1.31
                0.750    1.31 | 2.333   60.35 | 3.917    5.25 |  5.50    1.31
                0.833    1.31 | 2.417   60.35 | 4.000    5.25 |  5.58    1.31
                0.917    1.31 | 2.500   60.35 | 4.083    5.25 |  5.67    1.31
                1.000    1.31 | 2.583   60.35 | 4.167    5.25 |  5.75    1.31
                1.083    1.31 | 2.667   60.35 | 4.250    5.25 |  5.83    1.31
                1.167    1.31 | 2.750   60.35 | 4.333    2.62 |  5.92    1.31
                1.250    1.31 | 2.833   17.06 | 4.417    2.62 |  6.00    1.31
                1.333    7.87 | 2.917   17.06 | 4.500    2.62 |  6.08    1.31
                1.417    7.87 | 3.000   17.06 | 4.583    2.62 |  6.17    1.31
                1.500    7.87 | 3.083   17.06 | 4.667    2.62 |  6.25    1.31
                1.583    7.87 | 3.167   17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=      60.35        43.45
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.57 (ii)    7.94 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.18         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.94         0.02          2.959 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      64.59        37.71          64.32
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.98         0.57           0.98


       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      2.959      2.75      64.32
   OUTFLOW: ID= 1 (  0004)     17.830      0.199      4.33      64.08

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.73
                TIME SHIFT OF PEAK FLOW         (min)= 95.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.9683

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    7.87 | 3.250   17.06 |  4.83    1.31
                0.167    0.00 | 1.750    7.87 | 3.333    9.18 |  4.92    1.31
                0.250    0.00 | 1.833   22.30 | 3.417    9.18 |  5.00    1.31
                0.333    1.31 | 1.917   22.30 | 3.500    9.18 |  5.08    1.31
```

```
                0.417    1.31 | 2.000   22.30 | 3.583    9.18 |  5.17    1.31
                0.500    1.31 | 2.083   22.30 | 3.667    9.18 |  5.25    1.31
                0.583    1.31 | 2.167   22.30 | 3.750    9.18 |  5.33    1.31
                0.667    1.31 | 2.250   22.30 | 3.833    5.25 |  5.42    1.31
                0.750    1.31 | 2.333   60.35 | 3.917    5.25 |  5.50    1.31
                0.833    1.31 | 2.417   60.35 | 4.000    5.25 |  5.58    1.31
                0.917    1.31 | 2.500   60.35 | 4.083    5.25 |  5.67    1.31
                1.000    1.31 | 2.583   60.35 | 4.167    5.25 |  5.75    1.31
                1.083    1.31 | 2.667   60.35 | 4.250    5.25 |  5.83    1.31
                1.167    1.31 | 2.750   60.35 | 4.333    2.62 |  5.92    1.31
                1.250    1.31 | 2.833   17.06 | 4.417    2.62 |  6.00    1.31
                1.333    7.87 | 2.917   17.06 | 4.500    2.62 |  6.08    1.31
                1.417    7.87 | 3.000   17.06 | 4.583    2.62 |  6.17    1.31
                1.500    7.87 | 3.083   17.06 | 4.667    2.62 |  6.25    1.31
                1.583    7.87 | 3.167   17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=      60.35        43.45
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.44 (ii)    3.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.30         0.25
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.00          0.110 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      64.59        37.71         64.32
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.98         0.57          0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.110      2.75      64.32
   OUTFLOW: ID= 1 (  0008)      0.660      0.013      3.83      59.91

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.17
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0327

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
```

```
     Length           (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 1.667    7.87 | 3.250   17.06 |  4.83    1.31
                 0.167    0.00 | 1.750    7.87 | 3.333    9.18 |  4.92    1.31
                 0.250    0.00 | 1.833   22.30 | 3.417    9.18 |  5.00    1.31
                 0.333    1.31 | 1.917   22.30 | 3.500    9.18 |  5.08    1.31
                 0.417    1.31 | 2.000   22.30 | 3.583    9.18 |  5.17    1.31
                 0.500    1.31 | 2.083   22.30 | 3.667    9.18 |  5.25    1.31
                 0.583    1.31 | 2.167   22.30 | 3.750    9.18 |  5.33    1.31
                 0.667    1.31 | 2.250   22.30 | 3.833    5.25 |  5.42    1.31
                 0.750    1.31 | 2.333   60.35 | 3.917    5.25 |  5.50    1.31
                 0.833    1.31 | 2.417   60.35 | 4.000    5.25 |  5.58    1.31
                 0.917    1.31 | 2.500   60.35 | 4.083    5.25 |  5.67    1.31
                 1.000    1.31 | 2.583   60.35 | 4.167    5.25 |  5.75    1.31
                 1.083    1.31 | 2.667   60.35 | 4.250    5.25 |  5.83    1.31
                 1.167    1.31 | 2.750   60.35 | 4.333    2.62 |  5.92    1.31
                 1.250    1.31 | 2.833   17.06 | 4.417    2.62 |  6.00    1.31
                 1.333    7.87 | 2.917   17.06 | 4.500    2.62 |  6.08    1.31
                 1.417    7.87 | 3.000   17.06 | 4.583    2.62 |  6.17    1.31
                 1.500    7.87 | 3.083   17.06 | 4.667    2.62 |  6.25    1.31
                 1.583    7.87 | 3.167   17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=      60.35        43.45
                over (min)       10.00        15.00
     Storage Coeff.  (min)=      10.13 (ii)   11.50 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=      11.94         0.07         12.014 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83          2.75
     RUNOFF VOLUME    (mm)=      64.59        37.71         64.32
     TOTAL RAINFALL   (mm)=      65.59        65.59         65.59
     RUNOFF COEFFICIENT   =       0.98         0.57          0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390     12.014      2.75      64.32
   OUTFLOW: ID= 1 (  0069)     75.390      1.004      4.33      64.31

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.36
                   TIME SHIFT OF PEAK FLOW         (min)= 95.00
```

```
                   MAXIMUM  STORAGE   USED       (ha.m.)=  3.9580

 -------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    7.87 | 3.250   17.06 |  4.83    1.31
                0.167    0.00 | 1.750    7.87 | 3.333    9.18 |  4.92    1.31
                0.250    0.00 | 1.833   22.30 | 3.417    9.18 |  5.00    1.31
                0.333    1.31 | 1.917   22.30 | 3.500    9.18 |  5.08    1.31
                0.417    1.31 | 2.000   22.30 | 3.583    9.18 |  5.17    1.31
                0.500    1.31 | 2.083   22.30 | 3.667    9.18 |  5.25    1.31
                0.583    1.31 | 2.167   22.30 | 3.750    9.18 |  5.33    1.31
                0.667    1.31 | 2.250   22.30 | 3.833    5.25 |  5.42    1.31
                0.750    1.31 | 2.333   60.35 | 3.917    5.25 |  5.50    1.31
                0.833    1.31 | 2.417   60.35 | 4.000    5.25 |  5.58    1.31
                0.917    1.31 | 2.500   60.35 | 4.083    5.25 |  5.67    1.31
                1.000    1.31 | 2.583   60.35 | 4.167    5.25 |  5.75    1.31
                1.083    1.31 | 2.667   60.35 | 4.250    5.25 |  5.83    1.31
                1.167    1.31 | 2.750   60.35 | 4.333    2.62 |  5.92    1.31
                1.250    1.31 | 2.833   17.06 | 4.417    2.62 |  6.00    1.31
                1.333    7.87 | 2.917   17.06 | 4.500    2.62 |  6.08    1.31
                1.417    7.87 | 3.000   17.06 | 4.583    2.62 |  6.17    1.31
                1.500    7.87 | 3.083   17.06 | 4.667    2.62 |  6.25    1.31
                1.583    7.87 | 3.167   17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=      60.35        43.45
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.80 (ii)    8.76 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.12
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.38         0.06          0.447 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      64.59        37.71          59.21
     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.98         0.57           0.90

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.447     2.75    59.21
      + ID2= 2 (  0069):    75.39   1.004     4.33    64.31
        ====================================================
        ID = 3 (  0066):    78.26   1.049     3.75    64.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 -------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.049      3.75      64.12
   OUTFLOW: ID= 1 (  0068)     78.260      0.882      6.50      64.05

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 84.07
                  TIME SHIFT OF PEAK FLOW         (min)=165.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6681

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--------------------
| CALIB             |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    7.87 | 3.250   17.06 |  4.83    1.31
                0.167    0.00 | 1.750    7.87 | 3.333    9.18 |  4.92    1.31
                0.250    0.00 | 1.833   22.30 | 3.417    9.18 |  5.00    1.31
                0.333    1.31 | 1.917   22.30 | 3.500    9.18 |  5.08    1.31
                0.417    1.31 | 2.000   22.30 | 3.583    9.18 |  5.17    1.31
                0.500    1.31 | 2.083   22.30 | 3.667    9.18 |  5.25    1.31
                0.583    1.31 | 2.167   22.30 | 3.750    9.18 |  5.33    1.31
                0.667    1.31 | 2.250   22.30 | 3.833    5.25 |  5.42    1.31
                0.750    1.31 | 2.333   60.35 | 3.917    5.25 |  5.50    1.31
                0.833    1.31 | 2.417   60.35 | 4.000    5.25 |  5.58    1.31
                0.917    1.31 | 2.500   60.35 | 4.083    5.25 |  5.67    1.31
                1.000    1.31 | 2.583   60.35 | 4.167    5.25 |  5.75    1.31
                1.083    1.31 | 2.667   60.35 | 4.250    5.25 |  5.83    1.31
                1.167    1.31 | 2.750   60.35 | 4.333    2.62 |  5.92    1.31
                1.250    1.31 | 2.833   17.06 | 4.417    2.62 |  6.00    1.31
                1.333    7.87 | 2.917   17.06 | 4.500    2.62 |  6.08    1.31
                1.417    7.87 | 3.000   17.06 | 4.583    2.62 |  6.17    1.31
                1.500    7.87 | 3.083   17.06 | 4.667    2.62 |  6.25    1.31
                1.583    7.87 | 3.167   17.06 | 4.750    2.62 |
```

```
     Max.Eff.Inten.(mm/hr)=      60.35        43.45
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       7.41 (ii)    8.79 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                        *TOTALS*
     PEAK FLOW       (cms)=       4.37         0.03       4.400 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75        2.75
     RUNOFF VOLUME    (mm)=      64.59        37.71       64.32
     TOTAL RAINFALL   (mm)=      65.59        65.59       65.59
     RUNOFF COEFFICIENT   =       0.98         0.57        0.98


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      4.400      2.75      64.32
   OUTFLOW: ID= 1 (  0084)     26.630      0.395      4.25      64.28

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.99
                 TIME SHIFT OF PEAK FLOW         (min)= 90.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  1.3725

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                  0.083    0.00 | 1.667    7.87 | 3.250   17.06 |  4.83    1.31
                  0.167    0.00 | 1.750    7.87 | 3.333    9.18 |  4.92    1.31
                  0.250    0.00 | 1.833   22.30 | 3.417    9.18 |  5.00    1.31
                  0.333    1.31 | 1.917   22.30 | 3.500    9.18 |  5.08    1.31
                  0.417    1.31 | 2.000   22.30 | 3.583    9.18 |  5.17    1.31
                  0.500    1.31 | 2.083   22.30 | 3.667    9.18 |  5.25    1.31
                  0.583    1.31 | 2.167   22.30 | 3.750    9.18 |  5.33    1.31
                  0.667    1.31 | 2.250   22.30 | 3.833    5.25 |  5.42    1.31
                  0.750    1.31 | 2.333   60.35 | 3.917    5.25 |  5.50    1.31
                  0.833    1.31 | 2.417   60.35 | 4.000    5.25 |  5.58    1.31
                  0.917    1.31 | 2.500   60.35 | 4.083    5.25 |  5.67    1.31
                  1.000    1.31 | 2.583   60.35 | 4.167    5.25 |  5.75    1.31
                  1.083    1.31 | 2.667   60.35 | 4.250    5.25 |  5.83    1.31
                  1.167    1.31 | 2.750   60.35 | 4.333    2.62 |  5.92    1.31
                  1.250    1.31 | 2.833   17.06 | 4.417    2.62 |  6.00    1.31
                  1.333    7.87 | 2.917   17.06 | 4.500    2.62 |  6.08    1.31
                  1.417    7.87 | 3.000   17.06 | 4.583    2.62 |  6.17    1.31
                  1.500    7.87 | 3.083   17.06 | 4.667    2.62 |  6.25    1.31
                  1.583    7.87 | 3.167   17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=      60.35        43.45
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.66 (ii)    7.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.20         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.79         0.01       1.804 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75        2.75
     RUNOFF VOLUME    (mm)=      64.59        37.71       64.32
     TOTAL RAINFALL   (mm)=      65.59        65.59       65.59
     RUNOFF COEFFICIENT   =       0.98         0.57        0.98


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      1.804      2.75      64.32
   OUTFLOW: ID= 1 (  0088)     10.830      0.148      4.25      64.05

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.20
                 TIME SHIFT OF PEAK FLOW         (min)= 90.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.5724

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\40ad9a44-4114-4486-8dd0-8b828a2c6890\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\40ad9a44-4114-4486-8dd0-8b828a2c6890\sc


DATE: 11-01-2024                            TIME: 01:43:05

USER:



COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 2-Year 12-Hour AES            **
  ************************************************



--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\df6836ac
| Ptotal= 42.00 mm |    Comments: 2 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    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 |

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250
```

```
       NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
         0.083    0.00 | 3.167    2.52 | 6.250    5.46 |  9.33    0.42
         0.167    0.00 | 3.250    2.52 | 6.333    2.94 |  9.42    0.42
         0.250    0.00 | 3.333    7.14 | 6.417    2.94 |  9.50    0.42
         0.333    0.42 | 3.417    7.14 | 6.500    2.94 |  9.58    0.42
         0.417    0.42 | 3.500    7.14 | 6.583    2.94 |  9.67    0.42
         0.500    0.42 | 3.583    7.14 | 6.667    2.94 |  9.75    0.42
         0.583    0.42 | 3.667    7.14 | 6.750    2.94 |  9.83    0.42
         0.667    0.42 | 3.750    7.14 | 6.833    2.94 |  9.92    0.42
         0.750    0.42 | 3.833    7.14 | 6.917    2.94 | 10.00    0.42
         0.833    0.42 | 3.917    7.14 | 7.000    2.94 | 10.08    0.42
         0.917    0.42 | 4.000    7.14 | 7.083    2.94 | 10.17    0.42
         1.000    0.42 | 4.083    7.14 | 7.167    2.94 | 10.25    0.42
         1.083    0.42 | 4.167    7.14 | 7.250    2.94 | 10.33    0.42
         1.167    0.42 | 4.250    7.14 | 7.333    1.68 | 10.42    0.42
         1.250    0.42 | 4.333   19.32 | 7.417    1.68 | 10.50    0.42
         1.333    0.42 | 4.417   19.32 | 7.500    1.68 | 10.58    0.42
         1.417    0.42 | 4.500   19.32 | 7.583    1.68 | 10.67    0.42
         1.500    0.42 | 4.583   19.32 | 7.667    1.68 | 10.75    0.42
         1.583    0.42 | 4.667   19.32 | 7.750    1.68 | 10.83    0.42
         1.667    0.42 | 4.750   19.32 | 7.833    1.68 | 10.92    0.42
         1.750    0.42 | 4.833   19.32 | 7.917    1.68 | 11.00    0.42
         1.833    0.42 | 4.917   19.32 | 8.000    1.68 | 11.08    0.42
         1.917    0.42 | 5.000   19.32 | 8.083    1.68 | 11.17    0.42
         2.000    0.42 | 5.083   19.32 | 8.167    1.68 | 11.25    0.42
         2.083    0.42 | 5.167   19.32 | 8.250    1.68 | 11.33    0.42
         2.167    0.42 | 5.250   19.32 | 8.333    0.84 | 11.42    0.42
         2.250    0.42 | 5.333    5.46 | 8.417    0.84 | 11.50    0.42
         2.333    2.52 | 5.417    5.46 | 8.500    0.84 | 11.58    0.42
         2.417    2.52 | 5.500    5.46 | 8.583    0.84 | 11.67    0.42
         2.500    2.52 | 5.583    5.46 | 8.667    0.84 | 11.75    0.42
         2.583    2.52 | 5.667    5.46 | 8.750    0.84 | 11.83    0.42
         2.667    2.52 | 5.750    5.46 | 8.833    0.84 | 11.92    0.42
         2.750    2.52 | 5.833    5.46 | 8.917    0.84 | 12.00    0.42
         2.833    2.52 | 5.917    5.46 | 9.000    0.84 | 12.08    0.42
         2.917    2.52 | 6.000    5.46 | 9.083    0.84 | 12.17    0.42
         3.000    2.52 | 6.083    5.46 | 9.167    0.84 | 12.25    0.42
         3.083    2.52 | 6.167    5.46 | 9.250    0.84 |

     Max.Eff.Inten.(mm/hr)=      19.32        11.73
                over (min)=      10.00        15.00
     Storage Coeff.  (min)=      10.36 (ii)   12.53 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.94         0.01         0.950 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25          5.25
     RUNOFF VOLUME    (mm)=      41.00        19.22         40.78
     TOTAL RAINFALL   (mm)=      42.00        42.00         42.00
     RUNOFF COEFFICIENT   =       0.98         0.46          0.97


       (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(  0004)|     OVERFLOW IS OFF
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| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      0.950      5.25      40.78
   OUTFLOW: ID= 1 (  0004)     17.830      0.094      7.58      40.56

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.88
                   TIME SHIFT OF PEAK FLOW         (min)=140.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.5846

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.167    2.52 | 6.250    5.46 |  9.33    0.42
               0.167    0.00 | 3.250    2.52 | 6.333    2.94 |  9.42    0.42
               0.250    0.00 | 3.333    7.14 | 6.417    2.94 |  9.50    0.42
               0.333    0.42 | 3.417    7.14 | 6.500    2.94 |  9.58    0.42
               0.417    0.42 | 3.500    7.14 | 6.583    2.94 |  9.67    0.42
               0.500    0.42 | 3.583    7.14 | 6.667    2.94 |  9.75    0.42
               0.583    0.42 | 3.667    7.14 | 6.750    2.94 |  9.83    0.42
               0.667    0.42 | 3.750    7.14 | 6.833    2.94 |  9.92    0.42
               0.750    0.42 | 3.833    7.14 | 6.917    2.94 | 10.00    0.42
               0.833    0.42 | 3.917    7.14 | 7.000    2.94 | 10.08    0.42
               0.917    0.42 | 4.000    7.14 | 7.083    2.94 | 10.17    0.42
               1.000    0.42 | 4.083    7.14 | 7.167    2.94 | 10.25    0.42
               1.083    0.42 | 4.167    7.14 | 7.250    2.94 | 10.33    0.42
               1.167    0.42 | 4.250    7.14 | 7.333    1.68 | 10.42    0.42
               1.250    0.42 | 4.333   19.32 | 7.417    1.68 | 10.50    0.42
               1.333    0.42 | 4.417   19.32 | 7.500    1.68 | 10.58    0.42
               1.417    0.42 | 4.500   19.32 | 7.583    1.68 | 10.67    0.42
               1.500    0.42 | 4.583   19.32 | 7.667    1.68 | 10.75    0.42
               1.583    0.42 | 4.667   19.32 | 7.750    1.68 | 10.83    0.42
               1.667    0.42 | 4.750   19.32 | 7.833    1.68 | 10.92    0.42
               1.750    0.42 | 4.833   19.32 | 7.917    1.68 | 11.00    0.42
               1.833    0.42 | 4.917   19.32 | 8.000    1.68 | 11.08    0.42
               1.917    0.42 | 5.000   19.32 | 8.083    1.68 | 11.17    0.42
               2.000    0.42 | 5.083   19.32 | 8.167    1.68 | 11.25    0.42
               2.083    0.42 | 5.167   19.32 | 8.250    1.68 | 11.33    0.42
               2.167    0.42 | 5.250   19.32 | 8.333    0.84 | 11.42    0.42
               2.250    0.42 | 5.333    5.46 | 8.417    0.84 | 11.50    0.42
               2.333    2.52 | 5.417    5.46 | 8.500    0.84 | 11.58    0.42
               2.417    2.52 | 5.500    5.46 | 8.583    0.84 | 11.67    0.42
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               2.500    2.52 | 5.583    5.46 | 8.667    0.84 | 11.75    0.42
               2.583    2.52 | 5.667    5.46 | 8.750    0.84 | 11.83    0.42
               2.667    2.52 | 5.750    5.46 | 8.833    0.84 | 11.92    0.42
               2.750    2.52 | 5.833    5.46 | 8.917    0.84 | 12.00    0.42
               2.833    2.52 | 5.917    5.46 | 9.000    0.84 | 12.08    0.42
               2.917    2.52 | 6.000    5.46 | 9.083    0.84 | 12.17    0.42
               3.000    2.52 | 6.083    5.46 | 9.167    0.84 | 12.25    0.42
               3.083    2.52 | 6.167    5.46 | 9.250    0.84 |

     Max.Eff.Inten.(mm/hr)=      19.32        11.73
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.85 (ii)    6.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00          0.035 (iii)
     TIME TO PEAK    (hrs)=       5.08         5.25           5.25
     RUNOFF VOLUME    (mm)=      41.00        19.22          40.78
     TOTAL RAINFALL   (mm)=      42.00        42.00          42.00
     RUNOFF COEFFICIENT   =       0.98         0.46           0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.035      5.25      40.78
   OUTFLOW: ID= 1 (  0008)      0.660      0.006      6.33      36.37

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 18.28
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0195

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
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```
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.52 | 6.250    5.46 |  9.33    0.42
                0.167    0.00 | 3.250    2.52 | 6.333    2.94 |  9.42    0.42
                0.250    0.00 | 3.333    7.14 | 6.417    2.94 |  9.50    0.42
                0.333    0.42 | 3.417    7.14 | 6.500    2.94 |  9.58    0.42
                0.417    0.42 | 3.500    7.14 | 6.583    2.94 |  9.67    0.42
                0.500    0.42 | 3.583    7.14 | 6.667    2.94 |  9.75    0.42
                0.583    0.42 | 3.667    7.14 | 6.750    2.94 |  9.83    0.42
                0.667    0.42 | 3.750    7.14 | 6.833    2.94 |  9.92    0.42
                0.750    0.42 | 3.833    7.14 | 6.917    2.94 | 10.00    0.42
                0.833    0.42 | 3.917    7.14 | 7.000    2.94 | 10.08    0.42
                0.917    0.42 | 4.000    7.14 | 7.083    2.94 | 10.17    0.42
                1.000    0.42 | 4.083    7.14 | 7.167    2.94 | 10.25    0.42
                1.083    0.42 | 4.167    7.14 | 7.250    2.94 | 10.33    0.42
                1.167    0.42 | 4.250    7.14 | 7.333    1.68 | 10.42    0.42
                1.250    0.42 | 4.333   19.32 | 7.417    1.68 | 10.50    0.42
                1.333    0.42 | 4.417   19.32 | 7.500    1.68 | 10.58    0.42
                1.417    0.42 | 4.500   19.32 | 7.583    1.68 | 10.67    0.42
                1.500    0.42 | 4.583   19.32 | 7.667    1.68 | 10.75    0.42
                1.583    0.42 | 4.667   19.32 | 7.750    1.68 | 10.83    0.42
                1.667    0.42 | 4.750   19.32 | 7.833    1.68 | 10.92    0.42
                1.750    0.42 | 4.833   19.32 | 7.917    1.68 | 11.00    0.42
                1.833    0.42 | 4.917   19.32 | 8.000    1.68 | 11.08    0.42
                1.917    0.42 | 5.000   19.32 | 8.083    1.68 | 11.17    0.42
                2.000    0.42 | 5.083   19.32 | 8.167    1.68 | 11.25    0.42
                2.083    0.42 | 5.167   19.32 | 8.250    1.68 | 11.33    0.42
                2.167    0.42 | 5.250   19.32 | 8.333    0.84 | 11.42    0.42
                2.250    0.42 | 5.333    5.46 | 8.417    0.84 | 11.50    0.42
                2.333    2.52 | 5.417    5.46 | 8.500    0.84 | 11.58    0.42
                2.417    2.52 | 5.500    5.46 | 8.583    0.84 | 11.67    0.42
                2.500    2.52 | 5.583    5.46 | 8.667    0.84 | 11.75    0.42
                2.583    2.52 | 5.667    5.46 | 8.750    0.84 | 11.83    0.42
                2.667    2.52 | 5.750    5.46 | 8.833    0.84 | 11.92    0.42
                2.750    2.52 | 5.833    5.46 | 8.917    0.84 | 12.00    0.42
                2.833    2.52 | 5.917    5.46 | 9.000    0.84 | 12.08    0.42
                2.917    2.52 | 6.000    5.46 | 9.083    0.84 | 12.17    0.42
                3.000    2.52 | 6.083    5.46 | 9.167    0.84 | 12.25    0.42
                3.083    2.52 | 6.167    5.46 | 9.250    0.84 |

     Max.Eff.Inten.(mm/hr)=      19.32        11.73
                over (min)       15.00        20.00
     Storage Coeff.  (min)=      15.97 (ii)   18.14 (ii)
     Unit Hyd. Tpeak (min)=      15.00        20.00
     Unit Hyd. peak  (cms)=       0.07         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.92         0.02         3.938 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.33          5.25
     RUNOFF VOLUME    (mm)=      41.00        19.22         40.78
     TOTAL RAINFALL   (mm)=      42.00        42.00         42.00
     RUNOFF COEFFICIENT   =       0.98         0.46          0.97


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390      3.938      5.25      40.78
   OUTFLOW: ID= 1 (  0069)     75.390      0.482      7.58      40.77

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.25
                 TIME SHIFT OF PEAK FLOW         (min)=140.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  2.3068

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--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    2.52 | 6.250    5.46 |  9.33    0.42
                0.167    0.00 | 3.250    2.52 | 6.333    2.94 |  9.42    0.42
                0.250    0.00 | 3.333    7.14 | 6.417    2.94 |  9.50    0.42
                0.333    0.42 | 3.417    7.14 | 6.500    2.94 |  9.58    0.42
                0.417    0.42 | 3.500    7.14 | 6.583    2.94 |  9.67    0.42
                0.500    0.42 | 3.583    7.14 | 6.667    2.94 |  9.75    0.42
                0.583    0.42 | 3.667    7.14 | 6.750    2.94 |  9.83    0.42
                0.667    0.42 | 3.750    7.14 | 6.833    2.94 |  9.92    0.42
                0.750    0.42 | 3.833    7.14 | 6.917    2.94 | 10.00    0.42
                0.833    0.42 | 3.917    7.14 | 7.000    2.94 | 10.08    0.42
                0.917    0.42 | 4.000    7.14 | 7.083    2.94 | 10.17    0.42
                1.000    0.42 | 4.083    7.14 | 7.167    2.94 | 10.25    0.42
                1.083    0.42 | 4.167    7.14 | 7.250    2.94 | 10.33    0.42
                1.167    0.42 | 4.250    7.14 | 7.333    1.68 | 10.42    0.42
                1.250    0.42 | 4.333   19.32 | 7.417    1.68 | 10.50    0.42
                1.333    0.42 | 4.417   19.32 | 7.500    1.68 | 10.58    0.42
                1.417    0.42 | 4.500   19.32 | 7.583    1.68 | 10.67    0.42
                1.500    0.42 | 4.583   19.32 | 7.667    1.68 | 10.75    0.42
                1.583    0.42 | 4.667   19.32 | 7.750    1.68 | 10.83    0.42
                1.667    0.42 | 4.750   19.32 | 7.833    1.68 | 10.92    0.42
                1.750    0.42 | 4.833   19.32 | 7.917    1.68 | 11.00    0.42
                1.833    0.42 | 4.917   19.32 | 8.000    1.68 | 11.08    0.42
                1.917    0.42 | 5.000   19.32 | 8.083    1.68 | 11.17    0.42
                2.000    0.42 | 5.083   19.32 | 8.167    1.68 | 11.25    0.42
                2.083    0.42 | 5.167   19.32 | 8.250    1.68 | 11.33    0.42
                2.167    0.42 | 5.250   19.32 | 8.333    0.84 | 11.42    0.42
                2.250    0.42 | 5.333    5.46 | 8.417    0.84 | 11.50    0.42
                2.333    2.52 | 5.417    5.46 | 8.500    0.84 | 11.58    0.42
                2.417    2.52 | 5.500    5.46 | 8.583    0.84 | 11.67    0.42
                2.500    2.52 | 5.583    5.46 | 8.667    0.84 | 11.75    0.42
                2.583    2.52 | 5.667    5.46 | 8.750    0.84 | 11.83    0.42
                2.667    2.52 | 5.750    5.46 | 8.833    0.84 | 11.92    0.42
                2.750    2.52 | 5.833    5.46 | 8.917    0.84 | 12.00    0.42
                2.833    2.52 | 5.917    5.46 | 9.000    0.84 | 12.08    0.42
```

```
                2.917    2.52 | 6.000    5.46 | 9.083    0.84 | 12.17    0.42
                3.000    2.52 | 6.083    5.46 | 9.167    0.84 | 12.25    0.42
                3.083    2.52 | 6.167    5.46 | 9.250    0.84 |

     Max.Eff.Inten.(mm/hr)=      19.32        11.36
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       5.99 (ii)   22.83 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=       0.19         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.01          0.137 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.33           5.25
     RUNOFF VOLUME    (mm)=      41.00        19.22          36.64
     TOTAL RAINFALL   (mm)=      42.00        42.00          42.00
     RUNOFF COEFFICIENT   =       0.98         0.46           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.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.137     5.25    36.64
      + ID2= 2 (  0069):    75.39   0.482     7.58    40.77
        ====================================================
        ID = 3 (  0066):    78.26   0.503     7.25    40.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      0.503      7.25      40.61
   OUTFLOW: ID= 1 (  0068)     78.260      0.418     11.08      40.55

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 83.21
                   TIME SHIFT OF PEAK FLOW         (min)=230.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.4587

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
```

```
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 3.167    2.52 | 6.250    5.46 |  9.33    0.42
                 0.167    0.00 | 3.250    2.52 | 6.333    2.94 |  9.42    0.42
                 0.250    0.00 | 3.333    7.14 | 6.417    2.94 |  9.50    0.42
                 0.333    0.42 | 3.417    7.14 | 6.500    2.94 |  9.58    0.42
                 0.417    0.42 | 3.500    7.14 | 6.583    2.94 |  9.67    0.42
                 0.500    0.42 | 3.583    7.14 | 6.667    2.94 |  9.75    0.42
                 0.583    0.42 | 3.667    7.14 | 6.750    2.94 |  9.83    0.42
                 0.667    0.42 | 3.750    7.14 | 6.833    2.94 |  9.92    0.42
                 0.750    0.42 | 3.833    7.14 | 6.917    2.94 | 10.00    0.42
                 0.833    0.42 | 3.917    7.14 | 7.000    2.94 | 10.08    0.42
                 0.917    0.42 | 4.000    7.14 | 7.083    2.94 | 10.17    0.42
                 1.000    0.42 | 4.083    7.14 | 7.167    2.94 | 10.25    0.42
                 1.083    0.42 | 4.167    7.14 | 7.250    2.94 | 10.33    0.42
                 1.167    0.42 | 4.250    7.14 | 7.333    1.68 | 10.42    0.42
                 1.250    0.42 | 4.333   19.32 | 7.417    1.68 | 10.50    0.42
                 1.333    0.42 | 4.417   19.32 | 7.500    1.68 | 10.58    0.42
                 1.417    0.42 | 4.500   19.32 | 7.583    1.68 | 10.67    0.42
                 1.500    0.42 | 4.583   19.32 | 7.667    1.68 | 10.75    0.42
                 1.583    0.42 | 4.667   19.32 | 7.750    1.68 | 10.83    0.42
                 1.667    0.42 | 4.750   19.32 | 7.833    1.68 | 10.92    0.42
                 1.750    0.42 | 4.833   19.32 | 7.917    1.68 | 11.00    0.42
                 1.833    0.42 | 4.917   19.32 | 8.000    1.68 | 11.08    0.42
                 1.917    0.42 | 5.000   19.32 | 8.083    1.68 | 11.17    0.42
                 2.000    0.42 | 5.083   19.32 | 8.167    1.68 | 11.25    0.42
                 2.083    0.42 | 5.167   19.32 | 8.250    1.68 | 11.33    0.42
                 2.167    0.42 | 5.250   19.32 | 8.333    0.84 | 11.42    0.42
                 2.250    0.42 | 5.333    5.46 | 8.417    0.84 | 11.50    0.42
                 2.333    2.52 | 5.417    5.46 | 8.500    0.84 | 11.58    0.42
                 2.417    2.52 | 5.500    5.46 | 8.583    0.84 | 11.67    0.42
                 2.500    2.52 | 5.583    5.46 | 8.667    0.84 | 11.75    0.42
                 2.583    2.52 | 5.667    5.46 | 8.750    0.84 | 11.83    0.42
                 2.667    2.52 | 5.750    5.46 | 8.833    0.84 | 11.92    0.42
                 2.750    2.52 | 5.833    5.46 | 8.917    0.84 | 12.00    0.42
                 2.833    2.52 | 5.917    5.46 | 9.000    0.84 | 12.08    0.42
                 2.917    2.52 | 6.000    5.46 | 9.083    0.84 | 12.17    0.42
                 3.000    2.52 | 6.083    5.46 | 9.167    0.84 | 12.25    0.42
                 3.083    2.52 | 6.167    5.46 | 9.250    0.84 |

     Max.Eff.Inten.(mm/hr)=      19.32        11.73
                over (min)       10.00        15.00
     Storage Coeff.  (min)=      11.69 (ii)   13.86 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.41         0.01          1.416 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      41.00        19.22          40.78
     TOTAL RAINFALL   (mm)=      42.00        42.00          42.00
     RUNOFF COEFFICIENT   =       0.98         0.46           0.97


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      1.416      5.25      40.78
   OUTFLOW: ID= 1 (  0084)     26.630      0.190      7.33      40.74

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.44
                TIME SHIFT OF PEAK FLOW         (min)=125.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.7953

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 3.167    2.52 | 6.250    5.46 |  9.33    0.42
                 0.167    0.00 | 3.250    2.52 | 6.333    2.94 |  9.42    0.42
                 0.250    0.00 | 3.333    7.14 | 6.417    2.94 |  9.50    0.42
                 0.333    0.42 | 3.417    7.14 | 6.500    2.94 |  9.58    0.42
                 0.417    0.42 | 3.500    7.14 | 6.583    2.94 |  9.67    0.42
                 0.500    0.42 | 3.583    7.14 | 6.667    2.94 |  9.75    0.42
                 0.583    0.42 | 3.667    7.14 | 6.750    2.94 |  9.83    0.42
                 0.667    0.42 | 3.750    7.14 | 6.833    2.94 |  9.92    0.42
                 0.750    0.42 | 3.833    7.14 | 6.917    2.94 | 10.00    0.42
                 0.833    0.42 | 3.917    7.14 | 7.000    2.94 | 10.08    0.42
                 0.917    0.42 | 4.000    7.14 | 7.083    2.94 | 10.17    0.42
                 1.000    0.42 | 4.083    7.14 | 7.167    2.94 | 10.25    0.42
                 1.083    0.42 | 4.167    7.14 | 7.250    2.94 | 10.33    0.42
                 1.167    0.42 | 4.250    7.14 | 7.333    1.68 | 10.42    0.42
                 1.250    0.42 | 4.333   19.32 | 7.417    1.68 | 10.50    0.42
                 1.333    0.42 | 4.417   19.32 | 7.500    1.68 | 10.58    0.42
                 1.417    0.42 | 4.500   19.32 | 7.583    1.68 | 10.67    0.42
                 1.500    0.42 | 4.583   19.32 | 7.667    1.68 | 10.75    0.42
                 1.583    0.42 | 4.667   19.32 | 7.750    1.68 | 10.83    0.42
                 1.667    0.42 | 4.750   19.32 | 7.833    1.68 | 10.92    0.42
                 1.750    0.42 | 4.833   19.32 | 7.917    1.68 | 11.00    0.42
                 1.833    0.42 | 4.917   19.32 | 8.000    1.68 | 11.08    0.42
                 1.917    0.42 | 5.000   19.32 | 8.083    1.68 | 11.17    0.42
                 2.000    0.42 | 5.083   19.32 | 8.167    1.68 | 11.25    0.42
                 2.083    0.42 | 5.167   19.32 | 8.250    1.68 | 11.33    0.42
                 2.167    0.42 | 5.250   19.32 | 8.333    0.84 | 11.42    0.42
                 2.250    0.42 | 5.333    5.46 | 8.417    0.84 | 11.50    0.42
                 2.333    2.52 | 5.417    5.46 | 8.500    0.84 | 11.58    0.42
                 2.417    2.52 | 5.500    5.46 | 8.583    0.84 | 11.67    0.42
                 2.500    2.52 | 5.583    5.46 | 8.667    0.84 | 11.75    0.42
                 2.583    2.52 | 5.667    5.46 | 8.750    0.84 | 11.83    0.42
                 2.667    2.52 | 5.750    5.46 | 8.833    0.84 | 11.92    0.42
                 2.750    2.52 | 5.833    5.46 | 8.917    0.84 | 12.00    0.42
                 2.833    2.52 | 5.917    5.46 | 9.000    0.84 | 12.08    0.42
                 2.917    2.52 | 6.000    5.46 | 9.083    0.84 | 12.17    0.42
                 3.000    2.52 | 6.083    5.46 | 9.167    0.84 | 12.25    0.42
                 3.083    2.52 | 6.167    5.46 | 9.250    0.84 |

     Max.Eff.Inten.(mm/hr)=      19.32        11.73
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       8.92 (ii)   11.09 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.57         0.00          0.578 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      41.00        19.22          40.78
     TOTAL RAINFALL   (mm)=      42.00        42.00          42.00
     RUNOFF COEFFICIENT   =       0.98         0.46           0.97


      (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      0.578      5.25      40.78
   OUTFLOW: ID= 1 (  0088)     10.830      0.070      7.42      40.51

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.17
                TIME SHIFT OF PEAK FLOW         (min)=130.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.3458

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\b5c43a9f-d366-43ab-a572-f61d5781cb36\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\b5c43a9f-d366-43ab-a572-f61d5781cb36\sc


DATE: 11-01-2024                           TIME: 01:43:06

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 2-Year 4-Hour Chicago Caledon **
  ************************************************

--------------------
| 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


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
```

```
                0.083    1.53 | 1.083   19.60 | 2.083    4.48 |  3.08    1.89
                0.167    1.53 | 1.167   19.60 | 2.167    4.48 |  3.17    1.89
                0.250    1.81 | 1.250   85.72 | 2.250    3.65 |  3.25    1.73
                0.333    1.81 | 1.333   85.72 | 2.333    3.65 |  3.33    1.73
                0.417    2.22 | 1.417   26.59 | 2.417    3.08 |  3.42    1.59
                0.500    2.22 | 1.500   26.59 | 2.500    3.08 |  3.50    1.59
                0.583    2.87 | 1.583   12.64 | 2.583    2.66 |  3.58    1.47
                0.667    2.87 | 1.667   12.64 | 2.667    2.66 |  3.67    1.47
                0.750    4.06 | 1.750    7.99 | 2.750    2.34 |  3.75    1.37
                0.833    4.06 | 1.833    7.99 | 2.833    2.34 |  3.83    1.37
                0.917    6.86 | 1.917    5.76 | 2.917    2.10 |  3.92    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        31.78
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.71 (ii)    6.90 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.20         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.62         0.01          3.630 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      33.22        13.81          33.02
     TOTAL RAINFALL   (mm)=      34.22        34.22          34.22
     RUNOFF COEFFICIENT   =       0.97         0.40           0.97


       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)    17.830     3.630      1.33      33.02
   OUTFLOW: ID= 1 (  0004)    17.830     0.073      3.67      32.85

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.01
                   TIME SHIFT OF PEAK FLOW        (min)=140.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.5260

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250
```

```
         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    1.53 | 1.083   19.60 | 2.083    4.48 |  3.08    1.89
                 0.167    1.53 | 1.167   19.60 | 2.167    4.48 |  3.17    1.89
                 0.250    1.81 | 1.250   85.72 | 2.250    3.65 |  3.25    1.73
                 0.333    1.81 | 1.333   85.72 | 2.333    3.65 |  3.33    1.73
                 0.417    2.22 | 1.417   26.59 | 2.417    3.08 |  3.42    1.59
                 0.500    2.22 | 1.500   26.59 | 2.500    3.08 |  3.50    1.59
                 0.583    2.87 | 1.583   12.64 | 2.583    2.66 |  3.58    1.47
                 0.667    2.87 | 1.667   12.64 | 2.667    2.66 |  3.67    1.47
                 0.750    4.06 | 1.750    7.99 | 2.750    2.34 |  3.75    1.37
                 0.833    4.06 | 1.833    7.99 | 2.833    2.34 |  3.83    1.37
                 0.917    6.86 | 1.917    5.76 | 2.917    2.10 |  3.92    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        31.78
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.12 (ii)    3.32 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.31         0.26
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.15         0.00          0.155 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      33.22        13.81          33.02
     TOTAL RAINFALL   (mm)=      34.22        34.22          34.22
     RUNOFF COEFFICIENT   =       0.97         0.40           0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660     0.155      1.33      33.02
   OUTFLOW: ID= 1 (  0008)      0.660     0.005      2.50      28.61

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.43
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0180

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--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    1.53 | 1.083   19.60 | 2.083    4.48 |  3.08    1.89
                 0.167    1.53 | 1.167   19.60 | 2.167    4.48 |  3.17    1.89
                 0.250    1.81 | 1.250   85.72 | 2.250    3.65 |  3.25    1.73
                 0.333    1.81 | 1.333   85.72 | 2.333    3.65 |  3.33    1.73
                 0.417    2.22 | 1.417   26.59 | 2.417    3.08 |  3.42    1.59
                 0.500    2.22 | 1.500   26.59 | 2.500    3.08 |  3.50    1.59
                 0.583    2.87 | 1.583   12.64 | 2.583    2.66 |  3.58    1.47
                 0.667    2.87 | 1.667   12.64 | 2.667    2.66 |  3.67    1.47
                 0.750    4.06 | 1.750    7.99 | 2.750    2.34 |  3.75    1.37
                 0.833    4.06 | 1.833    7.99 | 2.833    2.34 |  3.83    1.37
                 0.917    6.86 | 1.917    5.76 | 2.917    2.10 |  3.92    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        31.78
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       8.80 (ii)    9.99 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.12         0.11
                                                        *TOTALS*
     PEAK FLOW       (cms)=      11.73         0.04         11.771 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.42           1.42
     RUNOFF VOLUME    (mm)=      33.22        13.81          33.02
     TOTAL RAINFALL   (mm)=      34.22        34.22          34.22
     RUNOFF COEFFICIENT   =       0.97         0.40           0.97


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390    11.771      1.42      33.02
   OUTFLOW: ID= 1 (  0069)     75.390     0.440      3.17      33.01

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.74
                   TIME SHIFT OF PEAK FLOW         (min)=105.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  2.1037

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| CALIB              |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    1.53 | 1.083   19.60 | 2.083    4.48 |  3.08    1.89
                0.167    1.53 | 1.167   19.60 | 2.167    4.48 |  3.17    1.89
                0.250    1.81 | 1.250   85.72 | 2.250    3.65 |  3.25    1.73
                0.333    1.81 | 1.333   85.72 | 2.333    3.65 |  3.33    1.73
                0.417    2.22 | 1.417   26.59 | 2.417    3.08 |  3.42    1.59
                0.500    2.22 | 1.500   26.59 | 2.500    3.08 |  3.50    1.59
                0.583    2.87 | 1.583   12.64 | 2.583    2.66 |  3.58    1.47
                0.667    2.87 | 1.667   12.64 | 2.667    2.66 |  3.67    1.47
                0.750    4.06 | 1.750    7.99 | 2.750    2.34 |  3.75    1.37
                0.833    4.06 | 1.833    7.99 | 2.833    2.34 |  3.83    1.37
                0.917    6.86 | 1.917    5.76 | 2.917    2.10 |  3.92    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        31.78
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.30 (ii)    7.61 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.27         0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.53         0.04          0.555 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      33.22        13.81          29.33
     TOTAL RAINFALL   (mm)=      34.22        34.22          34.22
     RUNOFF COEFFICIENT   =       0.97         0.40           0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.555     1.33    29.33
      + ID2= 2 (  0069):    75.39   0.440     3.17    33.01
        ==================================================
        ID = 3 (  0066):    78.26   0.672     1.33    32.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260     0.672      1.33      32.87
   OUTFLOW: ID= 1 (  0068)     78.260     0.351      6.92      32.82

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.18
                   TIME SHIFT OF PEAK FLOW        (min)=335.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3948

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--------------------
| CALIB              |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    1.53 | 1.083   19.60 | 2.083    4.48 |  3.08    1.89
                0.167    1.53 | 1.167   19.60 | 2.167    4.48 |  3.17    1.89
                0.250    1.81 | 1.250   85.72 | 2.250    3.65 |  3.25    1.73
                0.333    1.81 | 1.333   85.72 | 2.333    3.65 |  3.33    1.73
                0.417    2.22 | 1.417   26.59 | 2.417    3.08 |  3.42    1.59
                0.500    2.22 | 1.500   26.59 | 2.500    3.08 |  3.50    1.59
                0.583    2.87 | 1.583   12.64 | 2.583    2.66 |  3.58    1.47
                0.667    2.87 | 1.667   12.64 | 2.667    2.66 |  3.67    1.47
                0.750    4.06 | 1.750    7.99 | 2.750    2.34 |  3.75    1.37
                0.833    4.06 | 1.833    7.99 | 2.833    2.34 |  3.83    1.37
                0.917    6.86 | 1.917    5.76 | 2.917    2.10 |  3.92    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        31.78
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.44 (ii)    7.63 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.18         0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=       5.21         0.02          5.222 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      33.22        13.81          33.02
     TOTAL RAINFALL   (mm)=      34.22        34.22          34.22
     RUNOFF COEFFICIENT   =       0.97         0.40           0.97


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630     5.222      1.33      33.02
   OUTFLOW: ID= 1 (  0084)     26.630     0.175      2.83      32.98

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.35
                   TIME SHIFT OF PEAK FLOW         (min)= 90.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7319

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--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    1.53 | 1.083   19.60 | 2.083    4.48 |  3.08    1.89
                0.167    1.53 | 1.167   19.60 | 2.167    4.48 |  3.17    1.89
                0.250    1.81 | 1.250   85.72 | 2.250    3.65 |  3.25    1.73
                0.333    1.81 | 1.333   85.72 | 2.333    3.65 |  3.33    1.73
                0.417    2.22 | 1.417   26.59 | 2.417    3.08 |  3.42    1.59
                0.500    2.22 | 1.500   26.59 | 2.500    3.08 |  3.50    1.59
                0.583    2.87 | 1.583   12.64 | 2.583    2.66 |  3.58    1.47
                0.667    2.87 | 1.667   12.64 | 2.667    2.66 |  3.67    1.47
                0.750    4.06 | 1.750    7.99 | 2.750    2.34 |  3.75    1.37
                0.833    4.06 | 1.833    7.99 | 2.833    2.34 |  3.83    1.37
                0.917    6.86 | 1.917    5.76 | 2.917    2.10 |  3.92    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        31.78
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.92 (ii)    6.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.22         0.15
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.29         0.01        2.295 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=      33.22        13.81        33.02
     TOTAL RAINFALL   (mm)=      34.22        34.22        34.22
     RUNOFF COEFFICIENT   =       0.97         0.40         0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
```

```
       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830     2.295      1.33      33.02
   OUTFLOW: ID= 1 (  0088)     10.830     0.053      3.33      32.75

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.32
                   TIME SHIFT OF PEAK FLOW         (min)=120.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3141

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\8fefe974-52c2-49ad-bd3e-f512275221fd\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\8fefe974-52c2-49ad-bd3e-f512275221fd\sc


DATE: 11-01-2024                           TIME: 01:43:06

USER:



COMMENTS: ____________________________________________________________
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  ***********************************************
  ** SIMULATION : 2-Year 6-Hour AES            **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\751f1711
| 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)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
                0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
                0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
                0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
                0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
                0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
                0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
                0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
                0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
                0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
                0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
                1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
                1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
                1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
                1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
                1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
                1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
                1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
                1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12        17.87
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       8.35 (ii)   10.10 (ii)
```

```
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.58         0.01         1.589 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83          2.75
     RUNOFF VOLUME    (mm)=      35.00        15.01         34.80
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.97         0.42          0.97


       (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(  0004)|     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   |   0.2240     1.0750
                          0.0369     0.4255   |   0.2610     1.2100
                          0.0940     0.5850   |   0.2950     1.3580
                          0.1450     0.7390   |   1.6700     2.1200
                          0.1780     0.8770   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      1.589      2.75      34.80
   OUTFLOW: ID= 1 (  0004)     17.830      0.080      4.58      34.61

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.03
                    TIME SHIFT OF PEAK FLOW         (min)=110.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.5458

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--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
                0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
                0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
                0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
                0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
                0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
                0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
                0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
                0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
                0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
```

```
                0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
                1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
                1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
                1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
                1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
                1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
                1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
                1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
                1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12        17.87
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       3.11 (ii)    4.85 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.27         0.22
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.00          0.060 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      35.00        15.01          34.80
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.97         0.42           0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660     0.060      2.75      34.80
   OUTFLOW: ID= 1 (  0008)      0.660     0.006      3.83      30.39

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.69
                   TIME SHIFT OF PEAK FLOW        (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0187

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--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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```
                     ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
          0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
          0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
          0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
          0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
          0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
          0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
          0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
          0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
          0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
          0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
          1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
          1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
          1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
          1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
          1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
          1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
          1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
          1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12        17.87
                over (min)       15.00        15.00
     Storage Coeff.  (min)=      12.87 (ii)   14.62 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.08         0.08
                                                           *TOTALS*
     PEAK FLOW       (cms)=       6.15         0.03          6.173 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83           2.75
     RUNOFF VOLUME    (mm)=      35.00        15.01          34.80
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.97         0.42           0.97


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390     6.173      2.75      34.80
   OUTFLOW: ID= 1 (  0069)     75.390     0.456      4.50      34.78

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.40
                   TIME SHIFT OF PEAK FLOW        (min)=105.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  2.1836

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--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
```

```
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
               0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
               0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
               0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
               0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
               0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
               0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
               0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
               0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
               0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
               0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
               1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
               1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
               1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
               1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
               1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
               1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
               1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
               1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12        17.18
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.83 (ii)   19.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.22         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.21         0.02         0.227 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.92          2.75
     RUNOFF VOLUME    (mm)=      35.00        15.00         31.00
     TOTAL RAINFALL   (mm)=      36.00        36.00         36.00
     RUNOFF COEFFICIENT   =       0.97         0.42          0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):      2.87   0.227     2.75    31.00
      + ID2= 2 (  0069):     75.39   0.456     4.50    34.78
        ====================================================
        ID = 3 (  0066):     78.26   0.476     4.25    34.64
```

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     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      0.476      4.25      34.64
   OUTFLOW: ID= 1 (  0068)     78.260      0.369      8.33      34.59

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 77.42
                  TIME SHIFT OF PEAK FLOW         (min)=245.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4118

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--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
               0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
               0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
               0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
               0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
               0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
               0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
               0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
               0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
               0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
               0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
               1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
               1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
               1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
               1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
               1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
               1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
               1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
               1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12        17.87
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       9.42 (ii)   11.17 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                          *TOTALS*
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     PEAK FLOW       (cms)=      2.33         0.01          2.345 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.83           2.75
     RUNOFF VOLUME    (mm)=     35.00        15.01          34.80
     TOTAL RAINFALL   (mm)=     36.00        36.00          36.00
     RUNOFF COEFFICIENT   =      0.97         0.42           0.97


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      2.345      2.75      34.80
   OUTFLOW: ID= 1 (  0084)     26.630      0.182      4.33      34.76

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.75
                   TIME SHIFT OF PEAK FLOW         (min)= 95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7594

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     10.72         0.11
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    268.70        40.00
     Mannings n           =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 1.667    4.32 | 3.250    9.36 |  4.83    0.72
                 0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
                 0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
                 0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
                 0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
                 0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
                 0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
                 0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
                 0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
                 0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
                 0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
                 1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
                 1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
                 1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
```

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                 1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
                 1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
                 1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
                 1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
                 1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12        17.87
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       7.19 (ii)    8.94 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.98         0.00          0.981 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      35.00        15.01          34.80
     TOTAL RAINFALL   (mm)=      36.00        36.00          36.00
     RUNOFF COEFFICIENT   =       0.97         0.42           0.97


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      0.981      2.75      34.80
   OUTFLOW: ID= 1 (  0088)     10.830      0.060      4.33      34.53

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.11
                   TIME SHIFT OF PEAK FLOW         (min)= 95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3267

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\686df366-3c65-4734-9509-9139594692b5\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\686df366-3c65-4734-9509-9139594692b5\sc


DATE: 11-01-2024                           TIME: 01:43:05

USER:



COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 50-Year 12-Hour AES           **
  ************************************************



--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\c99d343d
| Ptotal= 80.82 mm |    Comments: 50 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   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 |

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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
```

```
                0.083    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
                0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
                0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
                0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
                0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
                0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
                0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
                0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
                0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
                0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
                0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
                1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
                1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
                1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
                1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
                1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
                1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
                1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
                1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
                1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
                1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
                1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
                1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
                2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
                2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
                2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
                2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
                2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
                2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
                2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
                2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
                2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
                2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
                2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
                2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
                3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
                3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17        29.32
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       7.98 (ii)    9.64 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.13         0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.82         0.01          1.836 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      79.82        50.68          79.53
     TOTAL RAINFALL   (mm)=      80.82        80.82          80.82
     RUNOFF COEFFICIENT   =       0.99         0.63           0.98


       (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(  0004)|     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   |   0.2240     1.0750
                          0.0369     0.4255   |   0.2610     1.2100
                          0.0940     0.5850   |   0.2950     1.3580
```

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                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      1.836      5.25      79.53
   OUTFLOW: ID= 1 (  0004)     17.830      0.226      7.42      79.24

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.31
                   TIME SHIFT OF PEAK FLOW         (min)=130.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.0823

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--------------------
| CALIB              |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
                0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
                0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
                0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
                0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
                0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
                0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
                0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
                0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
                0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
                0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
                1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
                1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
                1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
                1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
                1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
                1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
                1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
                1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
                1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
                1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
                1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
                1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
                2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
                2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
                2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
                2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
                2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
                2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
                2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
                2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
                2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
                2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
                2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
                2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
```

```
                3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
                3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17        29.32
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.97 (ii)    4.64 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.28         0.22
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.00          0.068 (iii)
     TIME TO PEAK    (hrs)=       5.08         5.25           5.25
     RUNOFF VOLUME    (mm)=      79.82        50.68          79.53
     TOTAL RAINFALL   (mm)=      80.82        80.82          80.82
     RUNOFF COEFFICIENT   =       0.99         0.63           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.068      5.25      79.53
   OUTFLOW: ID= 1 (  0008)      0.660      0.015      6.33      75.11

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.63
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0354

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
                0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
                0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
                0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
```

```
               0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
               0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
               0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
               0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
               0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
               0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
               0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
               1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
               1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
               1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
               1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
               1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
               1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
               1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
               1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
               1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
               1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
               1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
               1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
               2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
               2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
               2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
               2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
               2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
               2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
               2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
               2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
               2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
               2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
               2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
               2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
               3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
               3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17        29.32
               over (min)       10.00        15.00
     Storage Coeff.  (min)=      12.29 (ii)   13.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                           *TOTALS*
     PEAK FLOW       (cms)=       7.66         0.06          7.715 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25          5.25
     RUNOFF VOLUME    (mm)=      79.82        50.68         79.53
     TOTAL RAINFALL   (mm)=      80.82        80.82         80.82
     RUNOFF COEFFICIENT   =       0.99         0.63          0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
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   INFLOW : ID= 2 (  0065)     75.390      7.715      5.25      79.53
   OUTFLOW: ID= 1 (  0069)     75.390      1.117      7.33      79.51

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.48
                   TIME SHIFT OF PEAK FLOW         (min)=125.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  4.3547

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--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =      0.013        0.250

          NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
                 0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
                 0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
                 0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
                 0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
                 0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
                 0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
                 0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
                 0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
                 0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
                 0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
                 1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
                 1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
                 1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
                 1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
                 1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
                 1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
                 1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
                 1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
                 1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
                 1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
                 1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
                 1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
                 2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
                 2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
                 2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
                 2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
                 2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
                 2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
                 2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
                 2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
                 2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
                 2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
                 2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
                 2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
                 3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
                 3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17        29.06
                over (min)        5.00        20.00
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     Storage Coeff.  (min)=       4.61 (ii)   16.18 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.22         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.24         0.04       0.279 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25        5.25
     RUNOFF VOLUME    (mm)=      79.82        50.68       73.99
     TOTAL RAINFALL   (mm)=      80.82        80.82       80.82
     RUNOFF COEFFICIENT   =       0.99         0.63        0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.279     5.25    73.99
      + ID2= 2 (  0069):    75.39   1.117     7.33    79.51
        ===================================================
        ID = 3 (  0066):    78.26   1.164     6.25    79.31

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.164      6.25      79.31
   OUTFLOW: ID= 1 (  0068)     78.260      1.055      9.00      79.23

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 90.67
                   TIME SHIFT OF PEAK FLOW         (min)=165.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7468

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--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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                       ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
                 0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
                 0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
                 0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
                 0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
                 0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
                 0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
                 0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
                 0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
                 0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
                 0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
                 1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
                 1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
                 1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
                 1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
                 1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
                 1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
                 1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
                 1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
                 1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
                 1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
                 1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
                 1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
                 2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
                 2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
                 2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
                 2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
                 2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
                 2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
                 2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
                 2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
                 2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
                 2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
                 2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
                 2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
                 3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
                 3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17        29.32
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       9.00 (ii)   10.66 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       2.72         0.02       2.739 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25        5.25
     RUNOFF VOLUME    (mm)=      79.82        50.68       79.53
     TOTAL RAINFALL   (mm)=      80.82        80.82       80.82
     RUNOFF COEFFICIENT   =       0.99         0.63        0.98


       (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(  0084)|     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   |   0.4507      1.5442
                              0.1903     0.7953   |   0.5255      1.7396
                              0.2909     1.0533   |   0.5941      1.9538
                              0.3582     1.2571   |   0.0000      0.0000

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)        26.630      2.739      5.25      79.53
   OUTFLOW: ID= 1 (  0084)        26.630      0.436      6.75      79.49

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.91
                   TIME SHIFT OF PEAK FLOW         (min)= 90.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.4981

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--------------------
| CALIB             |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
                 0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
                 0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
                 0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
                 0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
                 0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
                 0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
                 0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
                 0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
                 0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
                 0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
                 1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
                 1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
                 1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
                 1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
                 1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
                 1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
                 1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
                 1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
                 1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
                 1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
                 1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
                 1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
                 2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
                 2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
                 2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
                 2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
                 2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
                 2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
                 2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
                 2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
                 2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
                 2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
                 2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
                 2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
                 3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
                 3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17        29.32
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.87 (ii)    8.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.18         0.12
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.11         0.01         1.115 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25          5.25
     RUNOFF VOLUME    (mm)=      79.82        50.68         79.53
     TOTAL RAINFALL   (mm)=      80.82        80.82         80.82
     RUNOFF COEFFICIENT   =       0.99         0.63          0.98


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      1.115      5.25      79.53
   OUTFLOW: ID= 1 (  0088)     10.830      0.165      7.25      79.26

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.82
                   TIME SHIFT OF PEAK FLOW         (min)=120.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6313

-------------------------------------------------------------------------------
================================================================================
==========================


       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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\1b611422-db7c-46a3-8662-a82e415faff4\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\1b611422-db7c-46a3-8662-a82e415faff4\sc


DATE: 11-01-2024                           TIME: 01:43:04

USER:



COMMENTS: ____________________________________________________________

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  ************************************************
  ** SIMULATION : 50-Year 4-Hour Chicago Caledo **
  ************************************************

--------------------
| 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


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.76 | 1.083   54.62 | 2.083   11.20 |  3.08    3.68
                0.167    2.76 | 1.167   54.62 | 2.167   11.20 |  3.17    3.68
                0.250    3.46 | 1.250  176.19 | 2.250    8.68 |  3.25    3.25
                0.333    3.46 | 1.333  176.19 | 2.333    8.68 |  3.33    3.25
                0.417    4.54 | 1.417   73.10 | 2.417    6.99 |  3.42    2.91
                0.500    4.54 | 1.500   73.10 | 2.500    6.99 |  3.50    2.91
                0.583    6.37 | 1.583   36.22 | 2.583    5.78 |  3.58    2.62
                0.667    6.37 | 1.667   36.22 | 2.667    5.78 |  3.67    2.62
                0.750    9.92 | 1.750   22.14 | 2.750    4.89 |  3.75    2.38
                0.833    9.92 | 1.833   22.14 | 2.833    4.89 |  3.83    2.38
                0.917   18.63 | 1.917   15.18 | 2.917    4.21 |  3.92    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       110.25
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.28 (ii)    5.18 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.23         0.16
                                                            *TOTALS*
     PEAK FLOW       (cms)=       8.05         0.05          8.086 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      79.32        50.25          79.03
     TOTAL RAINFALL   (mm)=      80.32        80.32          80.32
     RUNOFF COEFFICIENT   =       0.99         0.63           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      8.086      1.33      79.03
   OUTFLOW: ID= 1 (  0004)     17.830      0.261      2.75      78.77

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.23
                   TIME SHIFT OF PEAK FLOW        (min)= 85.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.2097

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    2.76 | 1.083   54.62 | 2.083   11.20 |  3.08    3.68
                 0.167    2.76 | 1.167   54.62 | 2.167   11.20 |  3.17    3.68
                 0.250    3.46 | 1.250  176.19 | 2.250    8.68 |  3.25    3.25
                 0.333    3.46 | 1.333  176.19 | 2.333    8.68 |  3.33    3.25
                 0.417    4.54 | 1.417   73.10 | 2.417    6.99 |  3.42    2.91
                 0.500    4.54 | 1.500   73.10 | 2.500    6.99 |  3.50    2.91
                 0.583    6.37 | 1.583   36.22 | 2.583    5.78 |  3.58    2.62
                 0.667    6.37 | 1.667   36.22 | 2.667    5.78 |  3.67    2.62
                 0.750    9.92 | 1.750   22.14 | 2.750    4.89 |  3.75    2.38
                 0.833    9.92 | 1.833   22.14 | 2.833    4.89 |  3.83    2.38
                 0.917   18.63 | 1.917   15.18 | 2.917    4.21 |  3.92    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       110.25
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.59 (ii)    2.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.33         0.29
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.32         0.00        0.322 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33         1.33
     RUNOFF VOLUME    (mm)=      79.32        50.25        79.03
     TOTAL RAINFALL   (mm)=      80.32        80.32        80.32
     RUNOFF COEFFICIENT   =       0.99         0.63         0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660     0.322      1.33      79.03
   OUTFLOW: ID= 1 (  0008)      0.660     0.018      2.25      74.61

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.63
                   TIME SHIFT OF PEAK FLOW         (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0415

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
```

```
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    2.76 | 1.083   54.62 | 2.083   11.20 |  3.08    3.68
                 0.167    2.76 | 1.167   54.62 | 2.167   11.20 |  3.17    3.68
                 0.250    3.46 | 1.250  176.19 | 2.250    8.68 |  3.25    3.25
                 0.333    3.46 | 1.333  176.19 | 2.333    8.68 |  3.33    3.25
                 0.417    4.54 | 1.417   73.10 | 2.417    6.99 |  3.42    2.91
                 0.500    4.54 | 1.500   73.10 | 2.500    6.99 |  3.50    2.91
                 0.583    6.37 | 1.583   36.22 | 2.583    5.78 |  3.58    2.62
                 0.667    6.37 | 1.667   36.22 | 2.667    5.78 |  3.67    2.62
                 0.750    9.92 | 1.750   22.14 | 2.750    4.89 |  3.75    2.38
                 0.833    9.92 | 1.833   22.14 | 2.833    4.89 |  3.83    2.38
                 0.917   18.63 | 1.917   15.18 | 2.917    4.21 |  3.92    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       110.25
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.60 (ii)    7.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.18         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=      30.61         0.17       30.757 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42         1.33
     RUNOFF VOLUME    (mm)=      79.32        50.25        79.03
     TOTAL RAINFALL   (mm)=      80.32        80.32        80.32
     RUNOFF COEFFICIENT   =       0.99         0.63         0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390    30.757      1.33      79.03
   OUTFLOW: ID= 1 (  0069)     75.390     1.324      2.67      79.01

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.31
                   TIME SHIFT OF PEAK FLOW         (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  4.9942

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
```

```
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.76 | 1.083   54.62 | 2.083   11.20 |  3.08    3.68
               0.167    2.76 | 1.167   54.62 | 2.167   11.20 |  3.17    3.68
               0.250    3.46 | 1.250  176.19 | 2.250    8.68 |  3.25    3.25
               0.333    3.46 | 1.333  176.19 | 2.333    8.68 |  3.33    3.25
               0.417    4.54 | 1.417   73.10 | 2.417    6.99 |  3.42    2.91
               0.500    4.54 | 1.500   73.10 | 2.500    6.99 |  3.50    2.91
               0.583    6.37 | 1.583   36.22 | 2.583    5.78 |  3.58    2.62
               0.667    6.37 | 1.667   36.22 | 2.667    5.78 |  3.67    2.62
               0.750    9.92 | 1.750   22.14 | 2.750    4.89 |  3.75    2.38
               0.833    9.92 | 1.833   22.14 | 2.833    4.89 |  3.83    2.38
               0.917   18.63 | 1.917   15.18 | 2.917    4.21 |  3.92    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       110.25
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.47 (ii)    5.71 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.29         0.15
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.11         0.14          1.233 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      79.32        50.25          73.50
     TOTAL RAINFALL   (mm)=      80.32        80.32          80.32
     RUNOFF COEFFICIENT   =       0.99         0.63           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   1.233     1.33    73.50
      + ID2= 2 (  0069):    75.39   1.324     2.67    79.01
        ====================================================
        ID = 3 (  0066):    78.26   1.666     1.33    78.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
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                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.666      1.33      78.81
   OUTFLOW: ID= 1 (  0068)     78.260      1.149      4.67      78.74

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 68.98
                    TIME SHIFT OF PEAK FLOW        (min)=200.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.7854

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.76 | 1.083   54.62 | 2.083   11.20 |  3.08    3.68
               0.167    2.76 | 1.167   54.62 | 2.167   11.20 |  3.17    3.68
               0.250    3.46 | 1.250  176.19 | 2.250    8.68 |  3.25    3.25
               0.333    3.46 | 1.333  176.19 | 2.333    8.68 |  3.33    3.25
               0.417    4.54 | 1.417   73.10 | 2.417    6.99 |  3.42    2.91
               0.500    4.54 | 1.500   73.10 | 2.500    6.99 |  3.50    2.91
               0.583    6.37 | 1.583   36.22 | 2.583    5.78 |  3.58    2.62
               0.667    6.37 | 1.667   36.22 | 2.667    5.78 |  3.67    2.62
               0.750    9.92 | 1.750   22.14 | 2.750    4.89 |  3.75    2.38
               0.833    9.92 | 1.833   22.14 | 2.833    4.89 |  3.83    2.38
               0.917   18.63 | 1.917   15.18 | 2.917    4.21 |  3.92    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       110.25
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.83 (ii)    5.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.22         0.15
                                                            *TOTALS*
     PEAK FLOW       (cms)=      11.74         0.07         11.795 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      79.32        50.25          79.03
     TOTAL RAINFALL   (mm)=      80.32        80.32          80.32
     RUNOFF COEFFICIENT   =       0.99         0.63           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630    11.795      1.33      79.03
   OUTFLOW: ID= 1 (  0084)     26.630     0.525      2.50      78.99

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.45
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.7396

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.76 | 1.083   54.62 | 2.083   11.20 |  3.08    3.68
               0.167    2.76 | 1.167   54.62 | 2.167   11.20 |  3.17    3.68
               0.250    3.46 | 1.250  176.19 | 2.250    8.68 |  3.25    3.25
               0.333    3.46 | 1.333  176.19 | 2.333    8.68 |  3.33    3.25
               0.417    4.54 | 1.417   73.10 | 2.417    6.99 |  3.42    2.91
               0.500    4.54 | 1.500   73.10 | 2.500    6.99 |  3.50    2.91
               0.583    6.37 | 1.583   36.22 | 2.583    5.78 |  3.58    2.62
               0.667    6.37 | 1.667   36.22 | 2.667    5.78 |  3.67    2.62
               0.750    9.92 | 1.750   22.14 | 2.750    4.89 |  3.75    2.38
               0.833    9.92 | 1.833   22.14 | 2.833    4.89 |  3.83    2.38
               0.917   18.63 | 1.917   15.18 | 2.917    4.21 |  3.92    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       110.25
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       3.69 (ii)    4.58 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.25         0.23
                                                            *TOTALS*
     PEAK FLOW       (cms)=       5.00         0.03          5.034 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      79.32        50.25          79.03
     TOTAL RAINFALL   (mm)=      80.32        80.32          80.32
     RUNOFF COEFFICIENT   =       0.99         0.63           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830     5.034      1.33      79.03
   OUTFLOW: ID= 1 (  0088)     10.830     0.195      2.58      78.76

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.88
                   TIME SHIFT OF PEAK FLOW         (min)= 75.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7182

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\9529bbe7-7c71-47fe-bbd9-160c301a1db0\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\9529bbe7-7c71-47fe-bbd9-160c301a1db0\sc


DATE: 11-01-2024                           TIME: 01:43:06

USER:



COMMENTS: ____________________________________________________________

------------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 50-Year 6-Hour AES            **
```

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  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\70469be7
| Ptotal= 73.00 mm |    Comments: 50 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   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)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
                0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
                0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
                0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
                0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
                0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
                0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
                0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
                0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
                0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
                0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
                1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
                1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
                1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
                1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
                1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
                1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
                1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
                1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        50.27
                over (min)       5.00        10.00
     Storage Coeff.  (min)=       6.30 (ii)    7.61 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.19         0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=       3.28         0.02          3.298 (iii)
```

```
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      72.00        43.95          71.72
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98


       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      3.298      2.75      71.72
   OUTFLOW: ID= 1 (  0004)     17.830      0.224      4.33      71.46

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.81
                    TIME SHIFT OF PEAK FLOW        (min)= 95.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  1.0769

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
                0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
                0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
                0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
                0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
                0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
                0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
                0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
                0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
                0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
                0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
                1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
                1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
                1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
```

```
                1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
                1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
                1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
                1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
                1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        50.27
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.34 (ii)    3.66 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.30         0.25
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.00          0.123 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      72.00        43.95          71.72
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.123      2.75      71.72
   OUTFLOW: ID= 1 (  0008)      0.660      0.015      3.83      67.30

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.31
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0363

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
                0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
                0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
                0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
                0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
                0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
                0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
                0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
                0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
                0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
                0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
                1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
                1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
                1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
                1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
                1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
                1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
                1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
                1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        50.27
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       9.70 (ii)   11.02 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=      13.36         0.09         13.444 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83           2.75
     RUNOFF VOLUME    (mm)=      72.00        43.95          71.72
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390     13.444      2.75      71.72
   OUTFLOW: ID= 1 (  0069)     75.390      1.131      4.33      71.70

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.41
                   TIME SHIFT OF PEAK FLOW         (min)= 95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  4.4039

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
```

```
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
                 0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
                 0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
                 0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
                 0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
                 0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
                 0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
                 0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
                 0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
                 0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
                 0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
                 1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
                 1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
                 1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
                 1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
                 1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
                 1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
                 1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
                 1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        50.27
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.64 (ii)    8.39 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.12
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.43         0.07          0.501 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      72.00        43.95          66.39
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.60           0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.501     2.75    66.39
      + ID2= 2 (  0069):    75.39   1.131     4.33    71.70
        ==================================================
        ID = 3 (  0066):    78.26   1.183     3.75    71.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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    |   0.7862     0.6217
                         0.0059     0.0677    |   0.9885     0.7196
                         0.4183     0.4587    |   1.1496     0.7854
                         0.6373     0.5653    |   1.3019     0.8658

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      1.183      3.75      71.51
   OUTFLOW: ID= 1 (  0068)     78.260      0.999      6.42      71.44

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 84.49
                   TIME SHIFT OF PEAK FLOW         (min)=160.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7240

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
                 0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
                 0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
                 0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
                 0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
                 0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
                 0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
                 0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
                 0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
                 0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
                 0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
                 1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
                 1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
                 1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
                 1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
                 1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
                 1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
                 1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
                 1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        50.27
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       7.10 (ii)    8.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                           *TOTALS*
     PEAK FLOW       (cms)=       4.87         0.03          4.907 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      72.00        43.95          71.72
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
```

```
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      4.907      2.75      71.72
   OUTFLOW: ID= 1 (  0084)     26.630      0.445      4.17      71.68

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.07
                   TIME SHIFT OF PEAK FLOW         (min)= 85.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.5269

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--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    8.76 | 3.250   18.98 |  4.83    1.46
                0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
                0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
                0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
                0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
                0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
                0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
                0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
                0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
                0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
                0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
                1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
                1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
                1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
                1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
                1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
                1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
                1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
                1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        50.27
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.42 (ii)    6.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.20         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.00         0.01         2.009 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      72.00        43.95          71.72
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.60           0.98


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      2.009      2.75      71.72
   OUTFLOW: ID= 1 (  0088)     10.830      0.167      4.25      71.45

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.29
                   TIME SHIFT OF PEAK FLOW         (min)= 90.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.6360

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\54c3fa15-166e-49fc-8db2-36dba84f71ef\sc
```

```
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\54c3fa15-166e-49fc-8db2-36dba84f71ef\sc


DATE: 11-01-2024                           TIME: 01:43:05

USER:



COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
---------------------------
  ************************************************
  ** SIMULATION : 5-Year 12-Hour AES            **
  ************************************************



--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\1933271e
| 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 (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =       0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
                0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
                0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
                0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
```

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                0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
                0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
                0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
                0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
                0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
                0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
                0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
                1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
                1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
                1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
                1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
                1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
                1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
                1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
                1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
                1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
                1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
                1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
                1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
                2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
                2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
                2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
                2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
                2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
                2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
                2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
                2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
                2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
                2.750    3.26 | 5.833    7.07 | 8.917    1.09 | 12.00    0.54
                2.833    3.26 | 5.917    7.07 | 9.000    1.09 | 12.08    0.54
                2.917    3.26 | 6.000    7.07 | 9.083    1.09 | 12.17    0.54
                3.000    3.26 | 6.083    7.07 | 9.167    1.09 | 12.25    0.54
                3.083    3.26 | 6.167    7.07 | 9.250    1.09 |

     Max.Eff.Inten.(mm/hr)=      25.02        17.13
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       9.34 (ii)   11.30 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.23         0.01         1.233 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25          5.25
     RUNOFF VOLUME    (mm)=      53.38        28.62         53.13
     TOTAL RAINFALL   (mm)=      54.38        54.38         54.38
     RUNOFF COEFFICIENT   =       0.98         0.53          0.98


       (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(  0004)|     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   |   0.2240     1.0750
                          0.0369     0.4255   |   0.2610     1.2100
                          0.0940     0.5850   |   0.2950     1.3580
                          0.1450     0.7390   |   1.6700     2.1200
                          0.1780     0.8770   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
```

```
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      1.233      5.25      53.13
   OUTFLOW: ID= 1 (  0004)     17.830      0.145      7.42      52.89

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.73
                   TIME SHIFT OF PEAK FLOW         (min)=130.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7379

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
                0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
                0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
                0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
                0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
                0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
                0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
                0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
                0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
                0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
                0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
                1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
                1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
                1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
                1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
                1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
                1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
                1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
                1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
                1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
                1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
                1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
                1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
                2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
                2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
                2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
                2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
                2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
                2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
                2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
                2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
                2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
                2.750    3.26 | 5.833    7.07 | 8.917    1.09 | 12.00    0.54
                2.833    3.26 | 5.917    7.07 | 9.000    1.09 | 12.08    0.54
                2.917    3.26 | 6.000    7.07 | 9.083    1.09 | 12.17    0.54
                3.000    3.26 | 6.083    7.07 | 9.167    1.09 | 12.25    0.54
                3.083    3.26 | 6.167    7.07 | 9.250    1.09 |

     Max.Eff.Inten.(mm/hr)=      25.02        17.13
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                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.48 (ii)    5.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.26         0.16
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00          0.046 (iii)
     TIME TO PEAK    (hrs)=       5.08         5.25           5.25
     RUNOFF VOLUME    (mm)=      53.38        28.62          53.13
     TOTAL RAINFALL   (mm)=      54.38        54.38          54.38
     RUNOFF COEFFICIENT   =       0.98         0.53           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.046      5.25      53.13
   OUTFLOW: ID= 1 (  0008)      0.660      0.009      6.33      48.72

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.74
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0244

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
                0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
                0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
                0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
                0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
                0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
                0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
                0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
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                0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
                0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
                0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
                1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
                1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
                1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
                1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
                1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
                1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
                1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
                1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
                1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
                1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
                1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
                1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
                2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
                2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
                2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
                2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
                2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
                2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
                2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
                2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
                2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
                2.750    3.26 | 5.833    7.07 | 8.917    1.09 | 12.00    0.54
                2.833    3.26 | 5.917    7.07 | 9.000    1.09 | 12.08    0.54
                2.917    3.26 | 6.000    7.07 | 9.083    1.09 | 12.17    0.54
                3.000    3.26 | 6.083    7.07 | 9.167    1.09 | 12.25    0.54
                3.083    3.26 | 6.167    7.07 | 9.250    1.09 |

     Max.Eff.Inten.(mm/hr)=      25.02        17.13
                over (min)       15.00        20.00
     Storage Coeff.  (min)=      14.40 (ii)   16.36 (ii)
     Unit Hyd. Tpeak (min)=      15.00        20.00
     Unit Hyd. peak  (cms)=       0.08         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       5.11         0.03         5.139 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.33          5.25
     RUNOFF VOLUME    (mm)=      53.38        28.62         53.13
     TOTAL RAINFALL   (mm)=      54.38        54.38         54.38
     RUNOFF COEFFICIENT   =       0.98         0.53          0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390      5.139      5.25      53.13
   OUTFLOW: ID= 1 (  0069)     75.390      0.709      7.42      53.12

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.79
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                TIME SHIFT OF PEAK FLOW        (min)=130.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  2.9573

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
               0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
               0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
               0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
               0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
               0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
               0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
               0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
               0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
               0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
               0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
               1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
               1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
               1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
               1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
               1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
               1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
               1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
               1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
               1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
               1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
               1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
               1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
               2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
               2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
               2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
               2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
               2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
               2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
               2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
               2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
               2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
               2.750    3.26 | 5.833    7.07 | 8.917    1.09 | 12.00    0.54
               2.833    3.26 | 5.917    7.07 | 9.000    1.09 | 12.08    0.54
               2.917    3.26 | 6.000    7.07 | 9.083    1.09 | 12.17    0.54
               3.000    3.26 | 6.083    7.07 | 9.167    1.09 | 12.25    0.54
               3.083    3.26 | 6.167    7.07 | 9.250    1.09 |

     Max.Eff.Inten.(mm/hr)=      25.02        16.91
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       5.40 (ii)   19.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.21         0.06
                                                          *TOTALS*
```

```
     PEAK FLOW       (cms)=       0.16         0.02          0.182 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.33           5.25
     RUNOFF VOLUME    (mm)=      53.38        28.62          48.42
     TOTAL RAINFALL   (mm)=      54.38        54.38          54.38
     RUNOFF COEFFICIENT   =       0.98         0.53           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.

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--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.182     5.25    48.42
      + ID2= 2 (  0069):    75.39   0.709     7.42    53.12
        ==================================================
        ID = 3 (  0066):    78.26   0.737     7.25    52.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                             AREA     QPEAK     TPEAK       R.V.
                             (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      0.737      7.25      52.94
   OUTFLOW: ID= 1 (  0068)     78.260      0.637      9.50      52.88

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 86.52
                  TIME SHIFT OF PEAK FLOW        (min)=135.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5653

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
              0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
              0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
              0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
              0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
              0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
              0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
              0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
              0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
              0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
              0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
              0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
              1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
              1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
              1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
              1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
              1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
              1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
              1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
              1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
              1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
              1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
              1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
              1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
              2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
              2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
              2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
              2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
              2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
              2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
              2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
              2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
              2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
              2.750    3.26 | 5.833    7.07 | 8.917    1.09 | 12.00    0.54
              2.833    3.26 | 5.917    7.07 | 9.000    1.09 | 12.08    0.54
              2.917    3.26 | 6.000    7.07 | 9.083    1.09 | 12.17    0.54
              3.000    3.26 | 6.083    7.07 | 9.167    1.09 | 12.25    0.54
              3.083    3.26 | 6.167    7.07 | 9.250    1.09 |

     Max.Eff.Inten.(mm/hr)=      25.02        17.13
                over (min)       10.00        15.00
     Storage Coeff.  (min)=      10.54 (ii)   12.49 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.83         0.01          1.839 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      53.38        28.62          53.13
     TOTAL RAINFALL   (mm)=      54.38        54.38          54.38
     RUNOFF COEFFICIENT   =       0.98         0.53           0.98


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000
```

```
                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      1.839      5.25      53.13
   OUTFLOW: ID= 1 (  0084)     26.630      0.277      7.25      53.09

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.06
                TIME SHIFT OF PEAK FLOW         (min)=120.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.0174

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
                0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
                0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
                0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
                0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
                0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
                0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
                0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
                0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
                0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
                0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
                1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
                1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
                1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
                1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
                1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
                1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
                1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
                1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
                1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
                1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
                1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
                1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
                2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
                2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
                2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
                2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
                2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
                2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
                2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
                2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
                2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
                2.750    3.26 | 5.833    7.07 | 8.917    1.09 | 12.00    0.54
                2.833    3.26 | 5.917    7.07 | 9.000    1.09 | 12.08    0.54
                2.917    3.26 | 6.000    7.07 | 9.083    1.09 | 12.17    0.54
                3.000    3.26 | 6.083    7.07 | 9.167    1.09 | 12.25    0.54
                3.083    3.26 | 6.167    7.07 | 9.250    1.09 |
```

```
     Max.Eff.Inten.(mm/hr)=      25.02        17.13
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       8.05 (ii)   10.00 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.13         0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.74         0.00          0.750 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      53.38        28.62          53.13
     TOTAL RAINFALL   (mm)=      54.38        54.38          54.38
     RUNOFF COEFFICIENT   =       0.98         0.53           0.98


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      0.750      5.25      53.13
   OUTFLOW: ID= 1 (  0088)     10.830      0.106      7.33      52.86

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.13
                TIME SHIFT OF PEAK FLOW         (min)=125.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.4327

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\4312677d-fd5f-41d4-923c-5c981e7aead7\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\4312677d-fd5f-41d4-923c-5c981e7aead7\sc
```

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DATE: 11-01-2024                           TIME: 01:43:05

USER:



COMMENTS: ____________________________________________________________


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  ************************************************
  ** SIMULATION : 5-Year 4-Hour Chicago Caledon **
  ************************************************

--------------------
| 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    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   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


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--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.35 | 1.083   30.47 | 2.083    7.17 |  3.08    2.93
                0.167    2.35 | 1.167   30.47 | 2.167    7.17 |  3.17    2.93
                0.250    2.80 | 1.250  109.68 | 2.250    5.81 |  3.25    2.67
                0.333    2.80 | 1.333  109.68 | 2.333    5.81 |  3.33    2.67
                0.417    3.46 | 1.417   40.71 | 2.417    4.87 |  3.42    2.45
                0.500    3.46 | 1.500   40.71 | 2.500    4.87 |  3.50    2.45
                0.583    4.52 | 1.583   20.28 | 2.583    4.19 |  3.58    2.26
                0.667    4.52 | 1.667   20.28 | 2.667    4.19 |  3.67    2.26
                0.750    6.48 | 1.750   12.91 | 2.750    3.67 |  3.75    2.10
                0.833    6.48 | 1.833   12.91 | 2.833    3.67 |  3.83    2.10
```

```
                0.917   11.07 | 1.917    9.28 | 2.917    3.26 |  3.92    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        52.32
                over (min)       5.00        10.00
     Storage Coeff.  (min)=      5.17 (ii)    6.26 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.21         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=      4.80         0.02          4.812 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=     48.55        24.86          48.32
     TOTAL RAINFALL   (mm)=     49.55        49.55          49.55
     RUNOFF COEFFICIENT   =      0.98         0.50           0.98


       (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(  0004)|     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   |   0.2240     1.0750
                          0.0369     0.4255   |   0.2610     1.2100
                          0.0940     0.5850   |   0.2950     1.3580
                          0.1450     0.7390   |   1.6700     2.1200
                          0.1780     0.8770   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      4.812      1.33      48.32
   OUTFLOW: ID= 1 (  0004)     17.830      0.145      3.17      48.11

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.01
                   TIME SHIFT OF PEAK FLOW         (min)=110.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7392

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.35 | 1.083   30.47 | 2.083    7.17 |  3.08    2.93
                0.167    2.35 | 1.167   30.47 | 2.167    7.17 |  3.17    2.93
                0.250    2.80 | 1.250  109.68 | 2.250    5.81 |  3.25    2.67
                0.333    2.80 | 1.333  109.68 | 2.333    5.81 |  3.33    2.67
```

```
                0.417    3.46 | 1.417   40.71 | 2.417    4.87 |  3.42    2.45
                0.500    3.46 | 1.500   40.71 | 2.500    4.87 |  3.50    2.45
                0.583    4.52 | 1.583   20.28 | 2.583    4.19 |  3.58    2.26
                0.667    4.52 | 1.667   20.28 | 2.667    4.19 |  3.67    2.26
                0.750    6.48 | 1.750   12.91 | 2.750    3.67 |  3.75    2.10
                0.833    6.48 | 1.833   12.91 | 2.833    3.67 |  3.83    2.10
                0.917   11.07 | 1.917    9.28 | 2.917    3.26 |  3.92    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        52.32
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.92 (ii)    3.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.31         0.28
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.00          0.199 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      48.55        24.86          48.32
     TOTAL RAINFALL   (mm)=      49.55        49.55          49.55
     RUNOFF COEFFICIENT   =       0.98         0.50           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.199      1.33      48.32
   OUTFLOW: ID= 1 (  0008)      0.660      0.010      2.33      43.90

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.00
                   TIME SHIFT OF PEAK FLOW         (min)= 60.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0252

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    2.35 | 1.083   30.47 | 2.083    7.17 |  3.08    2.93
               0.167    2.35 | 1.167   30.47 | 2.167    7.17 |  3.17    2.93
               0.250    2.80 | 1.250  109.68 | 2.250    5.81 |  3.25    2.67
               0.333    2.80 | 1.333  109.68 | 2.333    5.81 |  3.33    2.67
               0.417    3.46 | 1.417   40.71 | 2.417    4.87 |  3.42    2.45
               0.500    3.46 | 1.500   40.71 | 2.500    4.87 |  3.50    2.45
               0.583    4.52 | 1.583   20.28 | 2.583    4.19 |  3.58    2.26
               0.667    4.52 | 1.667   20.28 | 2.667    4.19 |  3.67    2.26
               0.750    6.48 | 1.750   12.91 | 2.750    3.67 |  3.75    2.10
               0.833    6.48 | 1.833   12.91 | 2.833    3.67 |  3.83    2.10
               0.917   11.07 | 1.917    9.28 | 2.917    3.26 |  3.92    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        52.32
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       7.97 (ii)    9.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.13         0.12
                                                           *TOTALS*
     PEAK FLOW       (cms)=      15.95         0.08         16.026 (iii)
     TIME TO PEAK    (hrs)=       1.42         1.42           1.42
     RUNOFF VOLUME    (mm)=      48.55        24.86          48.32
     TOTAL RAINFALL   (mm)=      49.55        49.55          49.55
     RUNOFF COEFFICIENT   =       0.98         0.50           0.98


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390     16.026      1.42      48.32
   OUTFLOW: ID= 1 (  0069)     75.390      0.734      3.00      48.30

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.58
                   TIME SHIFT OF PEAK FLOW         (min)= 95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  3.0305

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250
```

```
         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.35 | 1.083   30.47 | 2.083    7.17 |  3.08    2.93
                0.167    2.35 | 1.167   30.47 | 2.167    7.17 |  3.17    2.93
                0.250    2.80 | 1.250  109.68 | 2.250    5.81 |  3.25    2.67
                0.333    2.80 | 1.333  109.68 | 2.333    5.81 |  3.33    2.67
                0.417    3.46 | 1.417   40.71 | 2.417    4.87 |  3.42    2.45
                0.500    3.46 | 1.500   40.71 | 2.500    4.87 |  3.50    2.45
                0.583    4.52 | 1.583   20.28 | 2.583    4.19 |  3.58    2.26
                0.667    4.52 | 1.667   20.28 | 2.667    4.19 |  3.67    2.26
                0.750    6.48 | 1.750   12.91 | 2.750    3.67 |  3.75    2.10
                0.833    6.48 | 1.833   12.91 | 2.833    3.67 |  3.83    2.10
                0.917   11.07 | 1.917    9.28 | 2.917    3.26 |  3.92    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        52.32
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.99 (ii)    6.90 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.28         0.14
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.68         0.06          0.734 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      48.55        24.86          43.81
     TOTAL RAINFALL   (mm)=      49.55        49.55          49.55
     RUNOFF COEFFICIENT   =       0.98         0.50           0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.734     1.33    43.81
      + ID2= 2 (  0069):    75.39   0.734     3.00    48.30
        ==================================================
        ID = 3 (  0066):    78.26   0.919     1.33    48.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      0.919      1.33      48.14
   OUTFLOW: ID= 1 (  0068)     78.260      0.604      5.42      48.08

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 65.66
                  TIME SHIFT OF PEAK FLOW         (min)=245.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.5490

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.35 | 1.083   30.47 | 2.083    7.17 |  3.08    2.93
                0.167    2.35 | 1.167   30.47 | 2.167    7.17 |  3.17    2.93
                0.250    2.80 | 1.250  109.68 | 2.250    5.81 |  3.25    2.67
                0.333    2.80 | 1.333  109.68 | 2.333    5.81 |  3.33    2.67
                0.417    3.46 | 1.417   40.71 | 2.417    4.87 |  3.42    2.45
                0.500    3.46 | 1.500   40.71 | 2.500    4.87 |  3.50    2.45
                0.583    4.52 | 1.583   20.28 | 2.583    4.19 |  3.58    2.26
                0.667    4.52 | 1.667   20.28 | 2.667    4.19 |  3.67    2.26
                0.750    6.48 | 1.750   12.91 | 2.750    3.67 |  3.75    2.10
                0.833    6.48 | 1.833   12.91 | 2.833    3.67 |  3.83    2.10
                0.917   11.07 | 1.917    9.28 | 2.917    3.26 |  3.92    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        52.32
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.84 (ii)    6.92 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.20         0.14
                                                           *TOTALS*
     PEAK FLOW       (cms)=       6.94         0.03          6.963 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      48.55        24.86          48.32
     TOTAL RAINFALL   (mm)=      49.55        49.55          49.55
     RUNOFF COEFFICIENT   =       0.98         0.50           0.98


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
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                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      6.963      1.33      48.32
   OUTFLOW: ID= 1 (  0084)     26.630      0.291      2.75      48.28

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.18
                  TIME SHIFT OF PEAK FLOW        (min)= 85.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.0532

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.35 | 1.083   30.47 | 2.083    7.17 |  3.08    2.93
                0.167    2.35 | 1.167   30.47 | 2.167    7.17 |  3.17    2.93
                0.250    2.80 | 1.250  109.68 | 2.250    5.81 |  3.25    2.67
                0.333    2.80 | 1.333  109.68 | 2.333    5.81 |  3.33    2.67
                0.417    3.46 | 1.417   40.71 | 2.417    4.87 |  3.42    2.45
                0.500    3.46 | 1.500   40.71 | 2.500    4.87 |  3.50    2.45
                0.583    4.52 | 1.583   20.28 | 2.583    4.19 |  3.58    2.26
                0.667    4.52 | 1.667   20.28 | 2.667    4.19 |  3.67    2.26
                0.750    6.48 | 1.750   12.91 | 2.750    3.67 |  3.75    2.10
                0.833    6.48 | 1.833   12.91 | 2.833    3.67 |  3.83    2.10
                0.917   11.07 | 1.917    9.28 | 2.917    3.26 |  3.92    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        52.32
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.46 (ii)    5.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.23         0.16
                                                        *TOTALS*
     PEAK FLOW      (cms)=       3.01         0.01         3.021 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      48.55        24.86         48.32
     TOTAL RAINFALL   (mm)=      49.55        49.55         49.55
     RUNOFF COEFFICIENT   =       0.98         0.50          0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      3.021      1.33      48.32
   OUTFLOW: ID= 1 (  0088)     10.830      0.108      2.83      48.05

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.57
                  TIME SHIFT OF PEAK FLOW        (min)= 90.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4378

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\32652aed-57c2-4205-9562-8c209c55da17\sc
  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\32652aed-57c2-4205-9562-8c209c55da17\sc


DATE: 11-01-2024                           TIME: 01:43:05

USER:



COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
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  **************************************************
  ** SIMULATION : 5-Year 6-Hour AES              **
  **************************************************



--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\96e1c98c
```

```
| Ptotal= 47.81 mm |    Comments: 5 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   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)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        27.63
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       7.46 (ii)    9.02 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.13         0.01         2.144 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      46.81        23.53         46.58
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.98         0.49          0.97

       (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(  0004)|     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   |   0.2240     1.0750
                          0.0369     0.4255   |   0.2610     1.2100
                          0.0940     0.5850   |   0.2950     1.3580
                          0.1450     0.7390   |   1.6700     2.1200
                          0.1780     0.8770   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      2.144      2.75      46.58
   OUTFLOW: ID= 1 (  0004)     17.830      0.136      4.33      46.36

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.33
                   TIME SHIFT OF PEAK FLOW        (min)= 95.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.7110

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        27.63
```

```
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.77 (ii)    4.33 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.28         0.23
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.00         0.080 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      46.81        23.53         46.57
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.98         0.49          0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.080      2.75      46.57
   OUTFLOW: ID= 1 (  0008)      0.660      0.009      3.83      42.16

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.60
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0241

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
```

```
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        27.63
                over (min)      10.00        15.00
     Storage Coeff.  (min)=      11.49 (ii)   13.05 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.10         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=       8.55         0.04         8.590 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83          2.75
     RUNOFF VOLUME    (mm)=      46.81        23.53         46.58
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.98         0.49          0.97


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390      8.590      2.75      46.58
   OUTFLOW: ID= 1 (  0069)     75.390      0.687      4.42      46.56

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.00
                   TIME SHIFT OF PEAK FLOW         (min)=100.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  2.8956

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
         0.083    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
         0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
         0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
         0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
         0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
         0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
         0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
         0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
         0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
         0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
         0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
         1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
         1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
         1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
         1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
         1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
         1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
         1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
         1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        26.72
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.31 (ii)   16.28 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.23         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.28         0.03         0.308 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.92          2.75
     RUNOFF VOLUME    (mm)=      46.81        23.53         42.15
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.98         0.49          0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.308     2.75    42.15
      + ID2= 2 (  0069):    75.39   0.687     4.42    46.56
        ==================================================
        ID = 3 (  0066):    78.26   0.716     4.25    46.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658
```

```
                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260     0.716      4.25      46.40
   OUTFLOW: ID= 1 (  0068)     78.260     0.563      6.92      46.34

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 78.72
                TIME SHIFT OF PEAK FLOW         (min)=160.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.5293

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
         0.083    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
         0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
         0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
         0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
         0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
         0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
         0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
         0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
         0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
         0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
         0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
         1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
         1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
         1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
         1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
         1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
         1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
         1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
         1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        27.63
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       8.41 (ii)    9.97 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.12         0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.13         0.02          3.153 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      46.81        23.53          46.58
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.98         0.49           0.97


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      3.153      2.75      46.58
   OUTFLOW: ID= 1 (  0084)     26.630      0.272      4.33      46.54

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.63
                TIME SHIFT OF PEAK FLOW         (min)= 95.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  1.0048

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        27.63
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.42 (ii)    7.98 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.18         0.13
```

```
                                                                *TOTALS*
     PEAK FLOW       (cms)=       1.30         0.01           1.310 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75            2.75
     RUNOFF VOLUME    (mm)=      46.81        23.53           46.58
     TOTAL RAINFALL   (mm)=      47.81        47.81           47.81
     RUNOFF COEFFICIENT   =       0.98         0.49            0.97


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      1.310      2.75      46.58
   OUTFLOW: ID= 1 (  0088)     10.830      0.101      4.25      46.31

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.74
                TIME SHIFT OF PEAK FLOW         (min)= 90.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.4216

-------------------------------------------------------------------------------
================================================================================
==========================

       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: 11-01-2024                            TIME: 01:43:06

USER:
```

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COMMENTS: ____________________________________________________________

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  **********************************************
  ** SIMULATION : Erosion Event                **
  **********************************************


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|                  |              ata\Local\Temp\
|                  |              d2defbb2-f1a2-40af-8868-8a16a628f8eb\51653827
| Ptotal= 25.02 mm |    Comments:
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    2.17 |  1.00    6.20 |  2.00    5.62 |  3.00    2.95
                 0.17    2.38 |  1.17   12.18 |  2.17    4.80 |  3.17    2.76
                 0.33    2.66 |  1.33   41.67 |  2.33    4.21 |  3.33    2.62
                 0.50    3.03 |  1.50   15.28 |  2.50    3.78 |  3.50    2.47
                 0.67    3.58 |  1.67    9.22 |  2.67    3.45 |  3.67    2.35
                 0.83    4.47 |  1.83    6.88 |  2.83    3.18 |  3.83    2.23

-------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     344.77        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.17 | 1.083    6.20 | 2.083    5.62 |  3.08    2.95
                0.167    2.17 | 1.167    6.20 | 2.167    5.62 |  3.17    2.95
                0.250    2.38 | 1.250   12.18 | 2.250    4.80 |  3.25    2.76
                0.333    2.38 | 1.333   12.18 | 2.333    4.80 |  3.33    2.76
                0.417    2.66 | 1.417   41.67 | 2.417    4.21 |  3.42    2.62
                0.500    2.66 | 1.500   41.67 | 2.500    4.21 |  3.50    2.62
                0.583    3.03 | 1.583   15.28 | 2.583    3.78 |  3.58    2.47
                0.667    3.03 | 1.667   15.28 | 2.667    3.78 |  3.67    2.47
                0.750    3.58 | 1.750    9.22 | 2.750    3.45 |  3.75    2.35
                0.833    3.58 | 1.833    9.22 | 2.833    3.45 |  3.83    2.35
                0.917    4.47 | 1.917    6.88 | 2.917    3.18 |  3.92    2.23
                1.000    4.47 | 2.000    6.88 | 3.000    3.18 |  4.00    2.23

     Max.Eff.Inten.(mm/hr)=      41.67        11.63
                over (min)       10.00        10.00
     Storage Coeff.  (min)=       7.62 (ii)    9.21 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.13         0.12
```

```
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.46         0.00          1.464 (iii)
     TIME TO PEAK    (hrs)=       1.58         1.58           1.58
     RUNOFF VOLUME    (mm)=      24.02         8.10          23.86
     TOTAL RAINFALL   (mm)=      25.02        25.02          25.02
     RUNOFF COEFFICIENT   =       0.96         0.32           0.95


       (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      1.464      1.58      23.86
   OUTFLOW: ID= 1 (  0004)     17.830      0.034      4.25      23.70

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.34
                    TIME SHIFT OF PEAK FLOW         (min)=160.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.3954

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0007)|   Area    (ha)=   0.66
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.65         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      66.33        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.17 | 1.083    6.20 | 2.083    5.62 |  3.08    2.95
                0.167    2.17 | 1.167    6.20 | 2.167    5.62 |  3.17    2.95
                0.250    2.38 | 1.250   12.18 | 2.250    4.80 |  3.25    2.76
                0.333    2.38 | 1.333   12.18 | 2.333    4.80 |  3.33    2.76
                0.417    2.66 | 1.417   41.67 | 2.417    4.21 |  3.42    2.62
                0.500    2.66 | 1.500   41.67 | 2.500    4.21 |  3.50    2.62
                0.583    3.03 | 1.583   15.28 | 2.583    3.78 |  3.58    2.47
                0.667    3.03 | 1.667   15.28 | 2.667    3.78 |  3.67    2.47
                0.750    3.58 | 1.750    9.22 | 2.750    3.45 |  3.75    2.35
                0.833    3.58 | 1.833    9.22 | 2.833    3.45 |  3.83    2.35
                0.917    4.47 | 1.917    6.88 | 2.917    3.18 |  3.92    2.23
                1.000    4.47 | 2.000    6.88 | 3.000    3.18 |  4.00    2.23
```

```
     Max.Eff.Inten.(mm/hr)=      41.67        11.63
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.83 (ii)    4.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.28         0.23
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.00          0.074 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.50           1.50
     RUNOFF VOLUME    (mm)=      24.02         8.10          23.86
     TOTAL RAINFALL   (mm)=      25.02        25.02          25.02
     RUNOFF COEFFICIENT   =       0.96         0.32           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0122      0.0301
                          0.0011     0.0126   |   0.0154      0.0369
                          0.0065     0.0195   |   0.0181      0.0415
                          0.0100     0.0252   |   0.0204      0.0466

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)      0.660      0.074      1.50      23.86
   OUTFLOW: ID= 1 (  0008)      0.660      0.002      4.00      19.45

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.25
                   TIME SHIFT OF PEAK FLOW         (min)=150.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0143

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.17 | 1.083    6.20 | 2.083    5.62 |  3.08    2.95
                0.167    2.17 | 1.167    6.20 | 2.167    5.62 |  3.17    2.95
                0.250    2.38 | 1.250   12.18 | 2.250    4.80 |  3.25    2.76
                0.333    2.38 | 1.333   12.18 | 2.333    4.80 |  3.33    2.76
                0.417    2.66 | 1.417   41.67 | 2.417    4.21 |  3.42    2.62
                0.500    2.66 | 1.500   41.67 | 2.500    4.21 |  3.50    2.62
```

```
                0.583    3.03 | 1.583   15.28 | 2.583    3.78 |  3.58    2.47
                0.667    3.03 | 1.667   15.28 | 2.667    3.78 |  3.67    2.47
                0.750    3.58 | 1.750    9.22 | 2.750    3.45 |  3.75    2.35
                0.833    3.58 | 1.833    9.22 | 2.833    3.45 |  3.83    2.35
                0.917    4.47 | 1.917    6.88 | 2.917    3.18 |  3.92    2.23
                1.000    4.47 | 2.000    6.88 | 3.000    3.18 |  4.00    2.23

     Max.Eff.Inten.(mm/hr)=      32.87        11.63
                over (min)       15.00        15.00
     Storage Coeff.  (min)=      12.91 (ii)   14.51 (ii)
     Unit Hyd. Tpeak (min)=      15.00        15.00
     Unit Hyd. peak  (cms)=       0.08         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=       4.94         0.01          4.952 (iii)
     TIME TO PEAK    (hrs)=       1.67         1.67           1.67
     RUNOFF VOLUME    (mm)=      24.02         8.10          23.86
     TOTAL RAINFALL   (mm)=      25.02        25.02          25.02
     RUNOFF COEFFICIENT   =       0.96         0.32           0.95


       (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(  0069)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4020

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0065)     75.390      4.952      1.67      23.86
   OUTFLOW: ID= 1 (  0069)     75.390      0.317      4.17      23.85

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  6.39
                   TIME SHIFT OF PEAK FLOW         (min)=150.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  1.5150

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.17 | 1.083    6.20 | 2.083    5.62 |  3.08    2.95
```

```
                0.167    2.17 | 1.167    6.20 | 2.167    5.62 |  3.17    2.95
                0.250    2.38 | 1.250   12.18 | 2.250    4.80 |  3.25    2.76
                0.333    2.38 | 1.333   12.18 | 2.333    4.80 |  3.33    2.76
                0.417    2.66 | 1.417   41.67 | 2.417    4.21 |  3.42    2.62
                0.500    2.66 | 1.500   41.67 | 2.500    4.21 |  3.50    2.62
                0.583    3.03 | 1.583   15.28 | 2.583    3.78 |  3.58    2.47
                0.667    3.03 | 1.667   15.28 | 2.667    3.78 |  3.67    2.47
                0.750    3.58 | 1.750    9.22 | 2.750    3.45 |  3.75    2.35
                0.833    3.58 | 1.833    9.22 | 2.833    3.45 |  3.83    2.35
                0.917    4.47 | 1.917    6.88 | 2.917    3.18 |  3.92    2.23
                1.000    4.47 | 2.000    6.88 | 3.000    3.18 |  4.00    2.23

     Max.Eff.Inten.(mm/hr)=      41.67         8.84
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       4.40 (ii)   23.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=       0.23         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.01         0.248 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83          1.50
     RUNOFF VOLUME    (mm)=      24.02         8.10         20.83
     TOTAL RAINFALL   (mm)=      25.02        25.02         25.02
     RUNOFF COEFFICIENT   =       0.96         0.32          0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0067):     2.87   0.248     1.50    20.83
      + ID2= 2 (  0069):    75.39   0.317     4.17    23.85
        ===================================================
        ID = 3 (  0066):    78.26   0.332     4.00    23.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0068)|     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   |   0.7862      0.6217
                          0.0059     0.0677   |   0.9885      0.7196
                          0.4183     0.4587   |   1.1496      0.7854
                          0.6373     0.5653   |   1.3019      0.8658

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0066)     78.260      0.332      4.00      23.74
   OUTFLOW: ID= 1 (  0068)     78.260      0.251      7.50      23.69

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 75.60
                   TIME SHIFT OF PEAK FLOW         (min)=210.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.2998

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| CALIB            |
| STANDHYD (  0083)|   Area    (ha)=  26.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      26.36         0.27
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     421.35        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                 0.083    2.17 | 1.083    6.20 | 2.083    5.62 |  3.08    2.95
                 0.167    2.17 | 1.167    6.20 | 2.167    5.62 |  3.17    2.95
                 0.250    2.38 | 1.250   12.18 | 2.250    4.80 |  3.25    2.76
                 0.333    2.38 | 1.333   12.18 | 2.333    4.80 |  3.33    2.76
                 0.417    2.66 | 1.417   41.67 | 2.417    4.21 |  3.42    2.62
                 0.500    2.66 | 1.500   41.67 | 2.500    4.21 |  3.50    2.62
                 0.583    3.03 | 1.583   15.28 | 2.583    3.78 |  3.58    2.47
                 0.667    3.03 | 1.667   15.28 | 2.667    3.78 |  3.67    2.47
                 0.750    3.58 | 1.750    9.22 | 2.750    3.45 |  3.75    2.35
                 0.833    3.58 | 1.833    9.22 | 2.833    3.45 |  3.83    2.35
                 0.917    4.47 | 1.917    6.88 | 2.917    3.18 |  3.92    2.23
                 1.000    4.47 | 2.000    6.88 | 3.000    3.18 |  4.00    2.23

     Max.Eff.Inten.(mm/hr)=      41.67        11.63
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       8.59 (ii)   10.19 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.11         0.01         2.116 (iii)
     TIME TO PEAK    (hrs)=       1.58         1.67          1.58
     RUNOFF VOLUME    (mm)=      24.02         8.10         23.86
     TOTAL RAINFALL   (mm)=      25.02        25.02         25.02
     RUNOFF COEFFICIENT   =       0.96         0.32          0.95


       (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(  0084)|     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   |   0.4507      1.5442
                          0.1903     0.7953   |   0.5255      1.7396
                          0.2909     1.0533   |   0.5941      1.9538
                          0.3582     1.2571   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0083)     26.630      2.116      1.58      23.86
   OUTFLOW: ID= 1 (  0084)     26.630      0.125      4.08      23.82

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.93
```

```
                   TIME SHIFT OF PEAK FLOW         (min)=150.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.5246

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0087)|   Area    (ha)=  10.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.72         0.11
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     268.70        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    2.17 | 1.083    6.20 | 2.083    5.62 |  3.08    2.95
                0.167    2.17 | 1.167    6.20 | 2.167    5.62 |  3.17    2.95
                0.250    2.38 | 1.250   12.18 | 2.250    4.80 |  3.25    2.76
                0.333    2.38 | 1.333   12.18 | 2.333    4.80 |  3.33    2.76
                0.417    2.66 | 1.417   41.67 | 2.417    4.21 |  3.42    2.62
                0.500    2.66 | 1.500   41.67 | 2.500    4.21 |  3.50    2.62
                0.583    3.03 | 1.583   15.28 | 2.583    3.78 |  3.58    2.47
                0.667    3.03 | 1.667   15.28 | 2.667    3.78 |  3.67    2.47
                0.750    3.58 | 1.750    9.22 | 2.750    3.45 |  3.75    2.35
                0.833    3.58 | 1.833    9.22 | 2.833    3.45 |  3.83    2.35
                0.917    4.47 | 1.917    6.88 | 2.917    3.18 |  3.92    2.23
                1.000    4.47 | 2.000    6.88 | 3.000    3.18 |  4.00    2.23

     Max.Eff.Inten.(mm/hr)=      41.67        11.63
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       6.56 (ii)    8.15 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.18         0.13
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.04         0.00          1.043 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.58           1.50
     RUNOFF VOLUME    (mm)=      24.02         8.10          23.86
     TOTAL RAINFALL   (mm)=      25.02        25.02          25.02
     RUNOFF COEFFICIENT   =       0.96         0.32           0.95


       (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(  0088)|     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   |   0.1328      0.5210
                          0.0223     0.2570   |   0.1673      0.6380
                          0.0705     0.3460   |   0.1955      0.7180
                          0.1081     0.4380   |   0.2207      0.8065

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0087)     10.830      1.043      1.50      23.86
   OUTFLOW: ID= 1 (  0088)     10.830      0.021      4.17      23.59

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.00
                   TIME SHIFT OF PEAK FLOW         (min)=160.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.2404

-------------------------------------------------------------------------------

 FINISH
================================================================================
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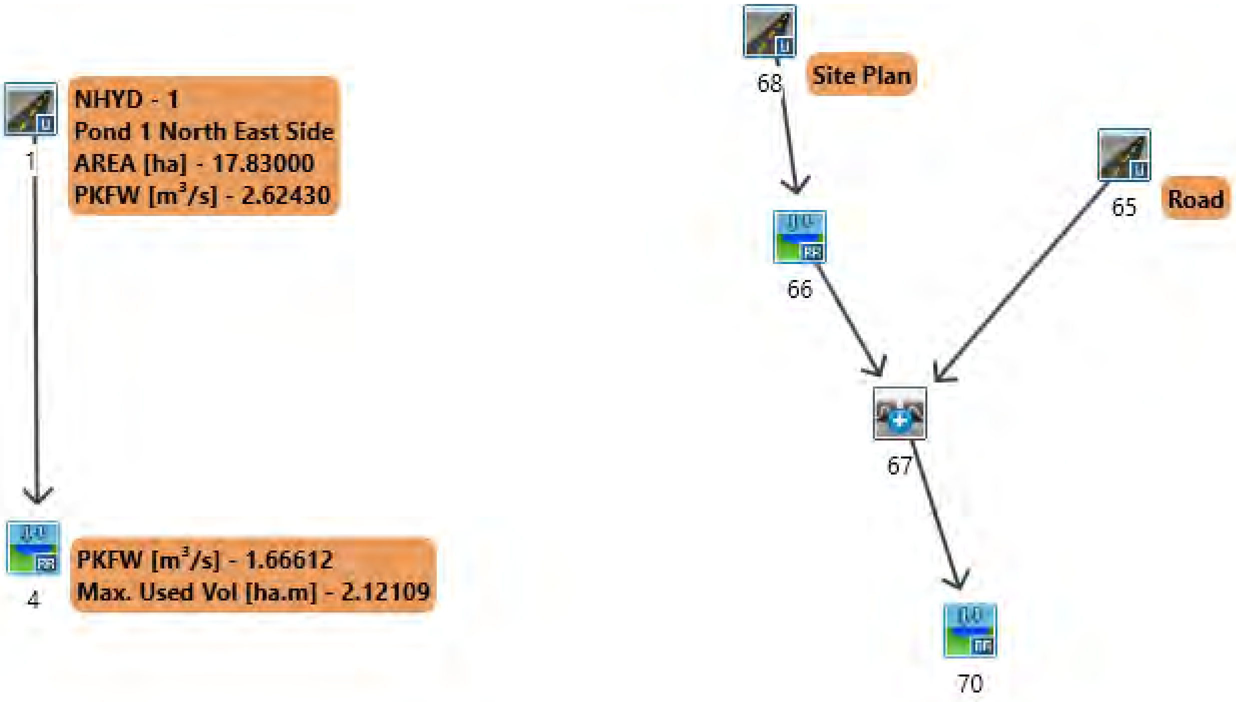
```



SCHAEFFERS
CONSULTING ENGINEERS

Hurricane Hazael – Regional Storm

Job #: 2021-5139	**Date: August 2024**

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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\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
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  Summary filename: C:\Users\jghobrial\AppData\Local\Civica\VH5\32f1e992-4378-
474e-9f5a-d48743e0808e\c0f88979-a1fa-4e88-a507-8ca414446dbe\sc


DATE: 11-01-2024                           TIME: 01:44:04

USER:


COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
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  **************************************************
  ** SIMULATION : Run 19                          **
  **************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jghobrial\AppD
|                  |              ata\Local\Temp\
|                  |              84efed6b-938a-4c6c-9847-adc193290215\fd1bd08e
| 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 (  0001)|   Area    (ha)=  17.83
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      17.65         0.18
     Dep. Storage     (mm)=       1.00         1.50
```

```
Average Slope     (%)=       1.00         2.00
Length            (m)=     344.77        40.00
Mannings n          =      0.013        0.250

    NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
           0.083    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        52.36
           over (min)        5.00        10.00
Storage Coeff.  (min)=       6.92 (ii)    8.37 (ii)
Unit Hyd. Tpeak (min)=       5.00        10.00
Unit Hyd. peak  (cms)=       0.17         0.12
                                                        *TOTALS*
PEAK FLOW       (cms)=       2.60         0.03          2.624 (iii)
TIME TO PEAK    (hrs)=      10.00        10.00          10.00
RUNOFF VOLUME    (mm)=     211.00       192.97         210.82
TOTAL RAINFALL   (mm)=     212.00       212.00         212.00
RUNOFF COEFFICIENT   =       1.00         0.91           0.99


  (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(  0004)|     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   |   0.2240      1.0750
                          0.0369     0.4255   |   0.2610      1.2100
                          0.0940     0.5850   |   0.2950      1.3580
                          0.1450     0.7390   |   1.6700      2.1200
                          0.1780     0.8770   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)     17.830      2.624     10.00     210.82
   OUTFLOW: ID= 1 (  0004)     17.830      1.666     11.00     210.45

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 63.49
                   TIME SHIFT OF PEAK FLOW         (min)= 60.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  2.1211

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--------------------
| CALIB            |
| STANDHYD (  0065)|   Area    (ha)=   2.87
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  80.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.30         0.57
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     138.32        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    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
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               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        52.36
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.00 (ii)   13.14 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.24         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.08          0.420 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=     211.00       192.97         207.39
     TOTAL RAINFALL   (mm)=     212.00       212.00         212.00
     RUNOFF COEFFICIENT   =       1.00         0.91           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (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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--------------------
| CALIB            |
| STANDHYD (  0068)|   Area    (ha)=  75.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      74.64         0.75
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     708.94        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    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
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                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        52.36
                over (min)       10.00        15.00
     Storage Coeff.  (min)=      10.67 (ii)   12.11 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.11         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=      10.95         0.11         11.056 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.00          10.00
     RUNOFF VOLUME    (mm)=     211.00       192.97         210.82
     TOTAL RAINFALL   (mm)=     212.00       212.00         212.00
     RUNOFF COEFFICIENT   =       1.00         0.91           0.99


       (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(  0066)|     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   |   1.1394      4.4340
                          0.4823     2.3068   |   1.3243      4.9942
                          0.7344     3.0305   |   1.5003      5.6083
                          0.9063     3.6110   |   5.8130      9.4097

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0068)     75.390     11.056     10.00     210.82
   OUTFLOW: ID= 1 (  0066)     75.390      5.808     11.17     210.80

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.53
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  9.4097

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--------------------
| ADD HYD  (  0067)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0065):     2.87   0.420    10.00   207.39
      + ID2= 2 (  0066):    75.39   5.808    11.17   210.80
        ====================================================
        ID = 3 (  0067):    78.26   6.031    11.00   210.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0070)|     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   |   0.9885      0.7196
                          0.0059     0.0677   |   1.1496      0.7854
                          0.4183     0.4587   |   1.3019      0.8658
                          0.6373     0.5653   |   4.9530      2.5470
                          0.7862     0.6217   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0067)     78.260      6.031     11.00     210.68
   OUTFLOW: ID= 1 (  0070)     78.260      4.952     12.17     210.58

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 82.09
                   TIME SHIFT OF PEAK FLOW         (min)= 70.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  2.5470

-------------------------------------------------------------------------------

 FINISH
================================================================================
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```

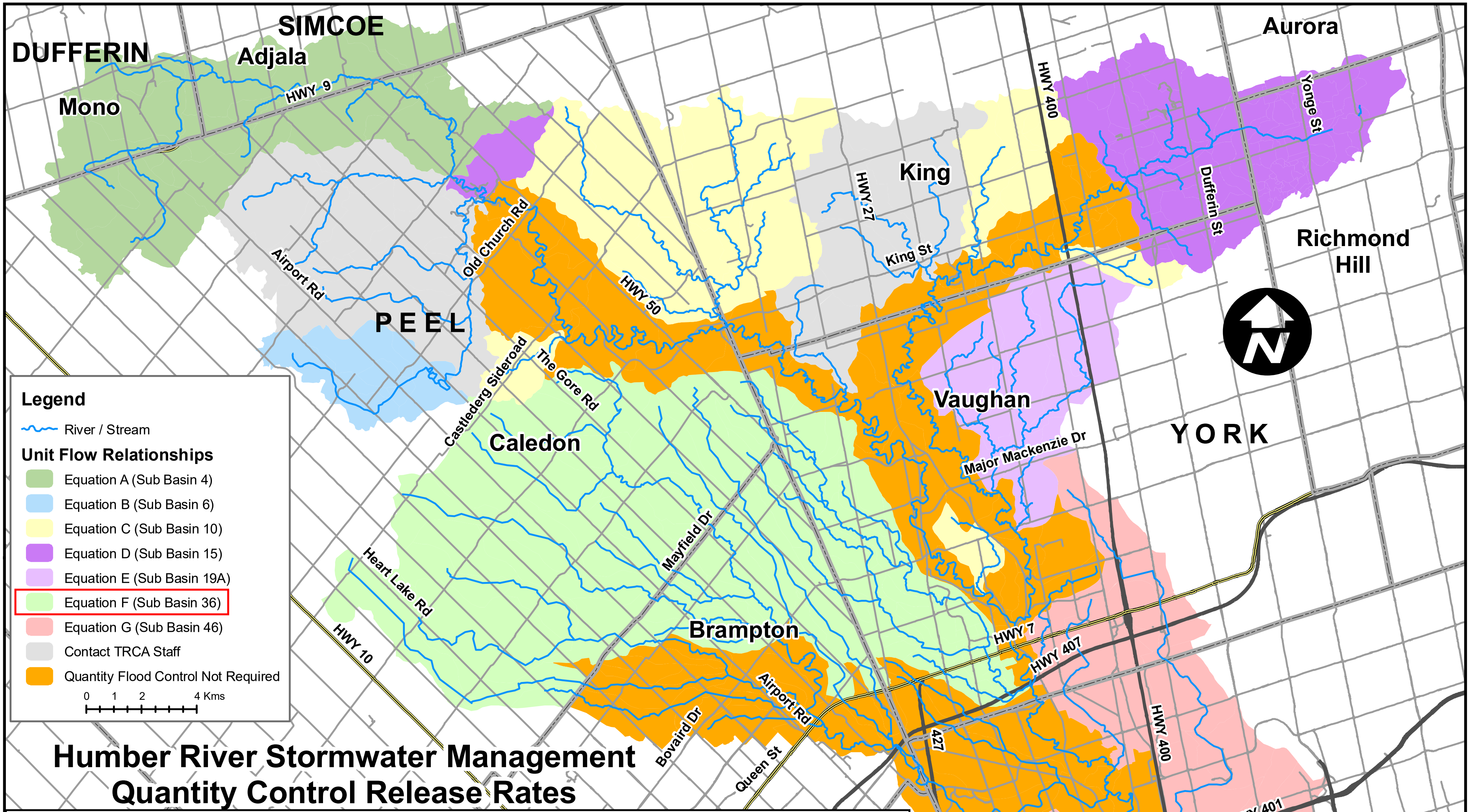
APPENDIX C

Floodplain Analysis

Refer to the CEISMP Phase 2 Report, Humber Station Villages

APPENDIX D

Background Infromation



Humber River Stormwater Management Quantity Control Release Rates

TORONTO AND REGION Conservation for The Living City

TABLE E.1: SUMMARY OF UNIT FLOW RELATIONSHIPS HUMBER RIVER WATERSHED

Return Period	Equation A Sub-Basin 4	Equation B Sub-Basin 6	Equation C Sub-Basin 10	Equation D Sub-Basin 15	Equation E Sub-Basin 19A	Equation F Sub-Basin 36	Equation G Sub-Basin 46
100-Year	Q=6.086-0.445*In(A)	Q=15.199-0.751* In(A)	Q=14.140-1.096* In(A)	Q=20.388-1.899 *In(A)	Q=15.911-1.785 *In(A))	Q=29.912-2.316 *In(A)	Q=22.973-2.256 *In(A)
50-Year	Q=5.147-0.376 *In(A)	Q=12.692-0.623 *In(A)	Q=11.920-0.921*In(A)	Q= 17.051-1.577 *In(A)	Q=13.700-1.531 *In(A)	Q=26.566-2.082 *In(A)	Q=20.164-1.973 *In(A)
25-Year	Q=4.272-0.312 *In(A)	Q= I0.488-0.522 *In(A)	Q=9.838-0.757 *In(A)	Q=14.037-1.293 *In(A)	Q=11.653-1.297 *In(A)	Q=22.639-1.741 *In(A)	Q=17.381-1.690 *In(A)
10-Year	Q=3.192-0.233 *In(A)	Q=7.707-0.382 *In(A)	Q=7.443-0.578 *In(A)	Q=10.400-0.953 *In(A)	Q=9.213-1.031 *In(A)	Q=17.957-1.373 *In(A)	Q=13.877-1.342 *In(A)
5-Year	Q=2.410-0.175 *In(A)	Q=5.755-0.283 *In(A)	Q=5.557-0.427 *In(A)	Q=7.930-0.73I *In(A)	Q=7.358-0.829 *In(A)	Q=14.652-1.136 *In(A)	Q=II.468-1.123 *In(A)
2-Year	Q=1.439-0.106 *In(A)	Q=3.288-0.159 *In(A)	Q=3.142-0.233 *In(A)	Q=4.722-0.454 *In(A)	Q=4.567-0.503 *In(A)	Q=9.506-0.719 *In(A)	Q=7.745-0.762 *In(A)

Note:

1. Q - Unit flow (Lls/ha - litres per second per hectare).
2. A - Area in hectares (ha).

GEORGE BOLTON PARKWAY EXTENSION STORMWATER MANAGEMENT AND FUNCTIONAL SERVICING REPORT

FOR

BOLTCOL HOLDINGS NORTH INC.
0 & 12300 COLERAINE DRIVE

TRIOVEST

TOWN OF CALEDON

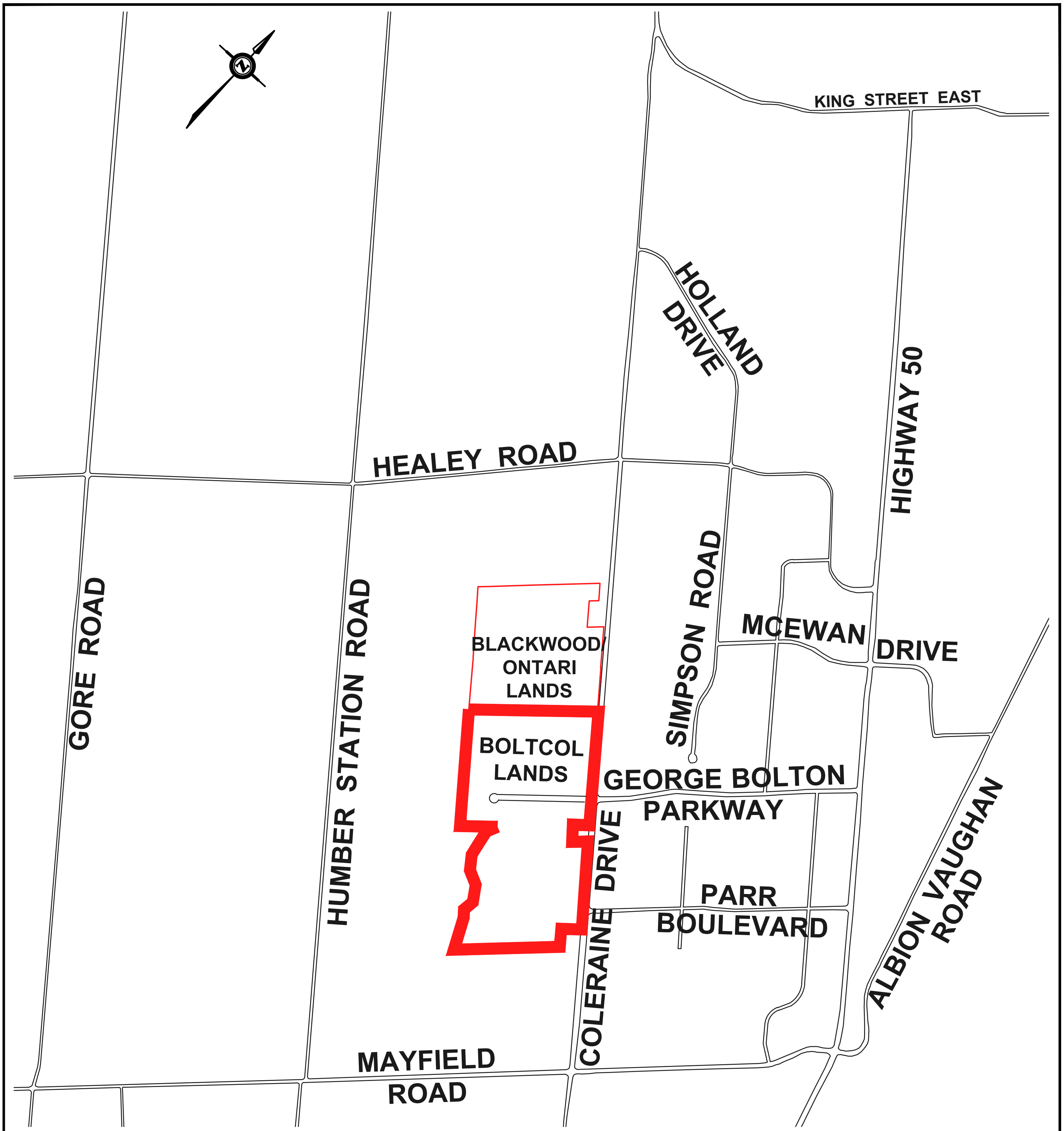
SPA 18-0004

April 2, 2019

a.m. candaras associates inc.
8551 Weston Rd, Suite 203
Woodbridge, Ontario
L4L 9R4

Project No. 1409

a.m. candaras associates inc.
consulting engineers



LOCATION PLAN

FIGURE 1

a.m.candaras associates inc.
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PROJECT:
BOLTCOL NORTH HOLDING
GEORGE BOLTON PKWY EXT.
TOWN OF CALEDON

SCALE : NTS

DATE: MAR 2018

PROJECT No. 1409

2.0 EXISTING AREA STORM DRAINAGE

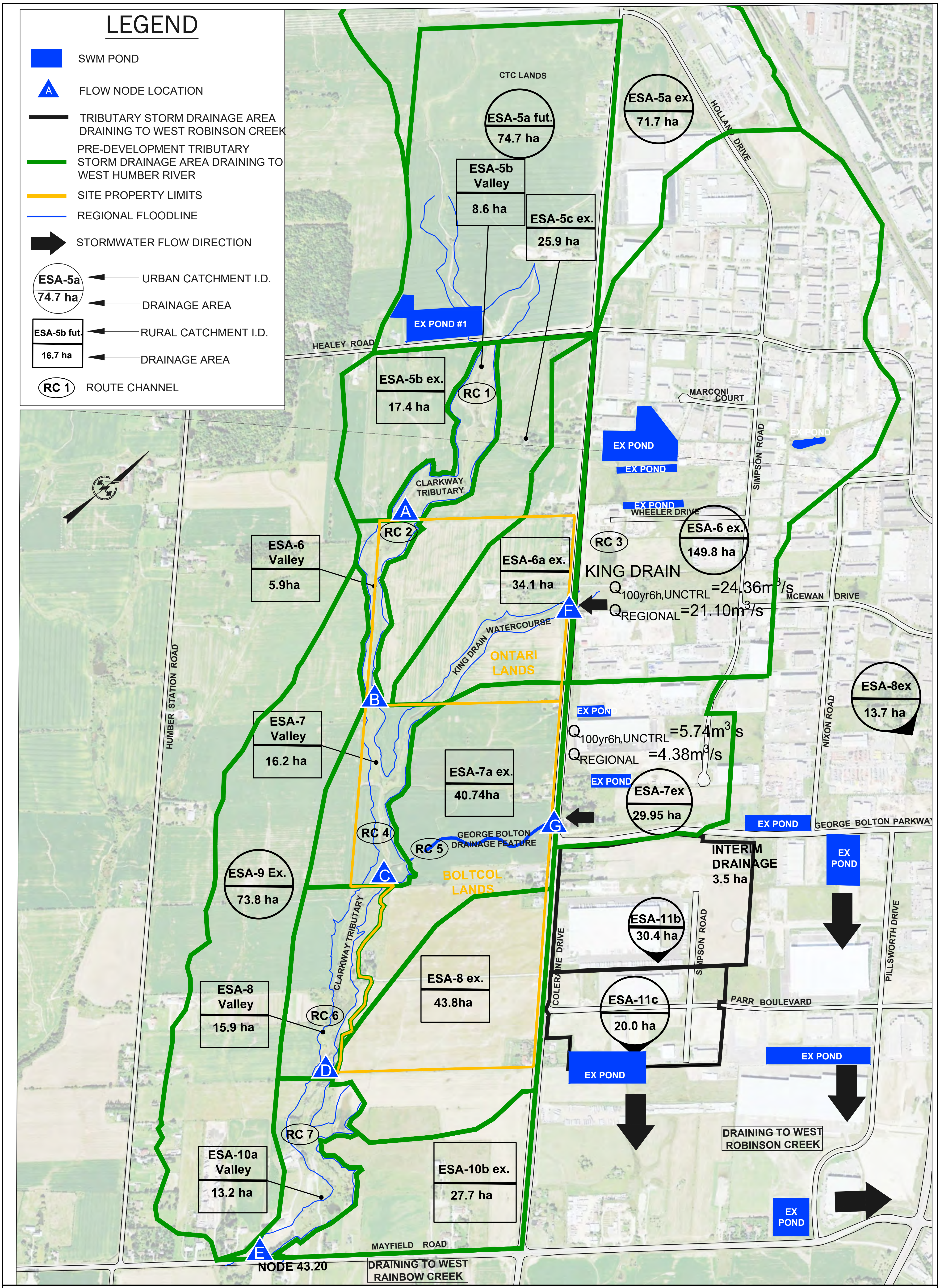
2.1 Existing Site Storm Drainage

The Clarkway Tributary reach, of the Humber River watershed, traverses the subject property along the west property limits, draining in a southerly direction, as shown in Figure 2. The pre-development Boltcol land use is agricultural. Drainage from the east side of Coleraine Drive enters the adjacent Ontari lands through the King Drain culvert, with the watercourse flowing in a southwest direction, entering the Boltcol lands at the northwest limit of the site and discharging to the main channel. A smaller drainage feature traverses the Boltcol lands, conveying the controlled storm flows from the existing stormwater management (SWM) facility northeast of the Coleraine Drive and George Bolton Parkway intersection, as well as some local ditch drainage from Coleraine Drive. Previously completed studies identified the existing regional flood elevations for the main channel and King Drainage watercourse, completed as part of the *Technical Memo: Surface Water Resources: Hydrology and Hydraulics*, prepared by Aquafor Beech Ltd (AQB), February 29, 2012, and further updated by a.m Candaras & Associates in the *Watercourse Realignment Report*. Background documentation from the previous studies is provided in Appendix A, including details of the hydrologic model catchment areas. Drawing F1 shows the existing condition floodplain mapping.

2.2 Existing Models

2.2.1 Existing Hydrologic Model

The SWMHYMO model for the Humber River Hydrology Update Study, originally prepared by TRCA, updated by AQB, and further updated by AMCAI, was the basis for the current hydrologic analysis presented in this report. A schematic of the existing SWMHYMO model used is shown in Appendix B, Figures 4a and 4b. The existing hydrologic simulations were undertaken based on the 6-hour and 12-hour AES design storms, and Regional Storm event, as per TRCA. Model parameters, for the drainage sub-catchments, used in the existing SWMHYMO model are provided in Appendix B. The existing flows presented in this report are based on the model completed in the *Watercourse Realignment Report*. The existing subwatershed with flow node locations are shown in Figure 2, with the existing storm flows at various nodes summarized in Table 1.



PRE-DEVELOPMENT STORMWATER MANAGEMENT AND DRAINAGE AREAS

SOURCE: CEISMP

FIGURE 2

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PROJECT:
ONTARI/BOLTCOL
INDUSTRIAL DEVELOPMENTS
TOWN OF CALEDON

SCALE : 1:12000
DATE: FEB 2018
PROJECT No. 1409

Table 1 – Existing Flow Rates at Reference Points

		Reference Nodes Existing Flow Rates (m^3/s)						
Storm Event	Parameter	A-Pre : 172.4ha	B-Pre : 388.1ha	C-Pre : 423.25ha	D-Pre : 534.69ha	E-Pre : 649.39ha	F-Pre : 149.8ha	G-Pre : 29.95ha
	HEC-RAS SECT.	12487	11848	11455	10565	9684	0976	-
LOCATION DESCRIPTION		U/S LIMIT SUBJECT SITE	D/S ESA-6 FUT	-	D/S ESA-7+8 FUT	MAYFIELD RD	ESA-6ex	ESA-7ex
6-hour AES	2-year	4.00	10.45	10.67	10.39	9.69	6.80	0.33
	5-year	6.22	15.83	16.27	16.71	16.16	11.26	0.48
	10-year	8.19	20.26	20.47	20.70	20.23	15.39	0.59
	25-year	10.19	26.46	26.79	26.62	25.90	19.10	0.70
	50-year	11.74	30.84	31.32	31.60	30.71	21.69	0.83
	100-year	13.36	35.40	35.95	36.20	35.38	24.28	0.98
	100-year NO SWM	25.39	47.79	52.67	52.26	51.23	24.36	5.74
12-hour AES	2-year	3.35	9.08	9.36	9.75	9.50	5.52	0.28
	5-year	4.85	13.27	13.72	14.88	14.81	7.74	0.39
	10-year	6.10	16.10	16.64	18.10	18.30	9.19	0.47
	25-year	7.71	20.28	20.91	22.41	22.70	12.17	0.61
	50-year	8.81	23.63	24.47	26.02	26.26	13.74	0.74
	100-year	9.75	26.56	27.69	29.90	30.11	15.22	0.89
	100-year NO SWM	16.86	33.94	38.02	40.23	40.99	15.27	3.29
25mm CHIC	25mm	2.80	6.57	6.57	5.87	5.32	4.75	0.34
REGIONAL	WITH SWM	16.20	42.56	48.96	57.21	63.88	21.10	4.38
REGIONAL	WITHOUT SWM	23.94	50.24	56.60	64.69	71.02	21.10	4.38

3.0 POST-DEVELOPMENT STORM DRAINAGE

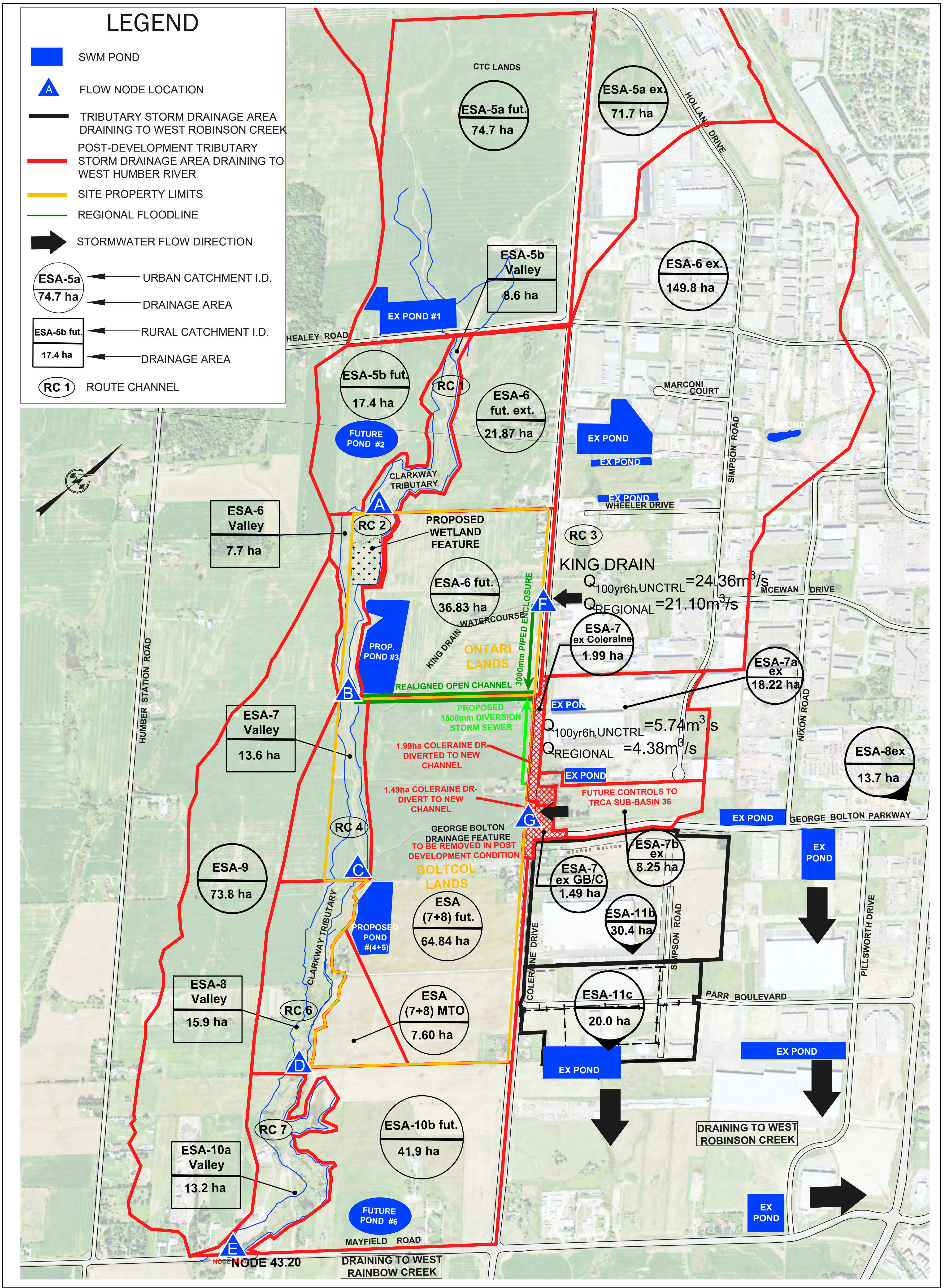
The pre-development condition of the site included two watercourses traversing the site. The King Drain crossed the site at the north west limit of the property; a smaller drainage feature crossed the site from an existing 1050mm culvert at Coleraine Dr draining in a westerly direction across the site to the Clarkway Tributary. The King Drain watercourse was replaced with a new channel and 3000mm pipe, constructed in March 2018, based on the design completed as part of *Ontari/Boltcol Watercourse Realignment and Stormwater Management Master Plan*. Furthermore, the diversion of the existing drainage feature on the Boltcol North lands to the new channel was proposed in the *Storm Sewer Diversion Design Brief for Boltcol Holdings*, dated February 9, 2018. The diversion of the Boltcol watercourse has been submitted to the Town of Caledon as part of the Pre-Servicing/Pre-Grading works for the Boltcol site and is anticipated to be completed prior to the construction of the George Bolton Extension, as detailed in the current report. The proposed storm drainage works of the current submission includes storm drainage for George Bolton parkway Extension, SWM Facility 4+5 and floodplain modification of Clarkway Tributary (main channel) in the form of a cut and fill operation. These three main items will be further detailed in the following sections. Refer to the engineering drawings for the George Bolton Parkway Extension for details of the proposed works.

3.1 Model Background Information

3.1.1 Post-Development Hydrologic Model

The post-development SWMHYMO model updated by a.m. Candaras & associates in the *Ontari/Boltcol Watercourse Realignment and Stormwater Management Master Plan* was used as the base model of the current stormwater management calculations, further updated to reflect the proposed drainage scheme and SWM pond 4+5 design. The post-development drainage areas are shown in Figure 3. The updated schematics based on the proposed development are provided in Appendix B, Figures 4c–4d.

The hydrologic models are consistent with the previous studies and TRCA requirements. The models computed flows base on the 6-hour and 12-hour AES design storms, and the Regional



POST–DEVELOPMENT STORMWATER MANAGEMENT AND DRAINAGE AREAS

SOURCE: CEISMP

FIGURE 3

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PROJECT:
ONTARI/BOLTCOL
INDUSTRIAL DEVELOPMENTS
TOWN OF CALEDON

SCALE : 1:12000
DATE: FEB 2018
PROJECT No. 1409

4.0 STORMWATER MANAGEMENT

Stormwater management for the Boltcol lands has been undertaken in accordance with the criteria presented in the CEISMP, MOE SWMPD Manual (March 2003), the TRCA (2012), and the Town of Caledon (2009). The stormwater management strategy for these lands addresses stormwater quality and quantity controls, including the Regional Storm event. Quality and quantity controls will be provided and in accordance with the CEIMP, the SWM Facilities will satisfy the requirements of the TRCA and MOE as well as providing quantity control of the Regional Storm event. The proposed SWM facility locations are schematically shown on Figure 3. Refer to Drawing G1-G4 for additional detail.

4.1 Stormwater Quantity and Quality Controls

In order to provide the required stormwater quantity and quality controls for the proposed industrial developments, stormwater management ponds (SWMP) will be provided. The stormwater quantity and quality controls being proposed are based on the criteria provided in the following documents:

- Comprehensive Environmental Impact Study and Management Plan Phase 3 Report: June 21, 2012
- M.O.E.E. – Stormwater Management Practices Planning and Design Manual March 2003;
- Toronto Research and Conservation Authority (TRCA) – Stormwater Management Criteria, August 2012 Version 1.0;
- Town of Caledon – Development Standards, Policies & Guidelines, January 2009;

4.1.1 Stormwater Objectives

From documents listed previously in Section 4.1, the stormwater objectives are summarized as follows:

- Water quality – Enhanced Level 1 protection – 80% TSS removal;
- Erosion control – Capture and release the 25mm storm over 48hrs
- Water quantity – Control 2 to 100-year post-development peak flows to: The Unit Flow Relationships for the Employment Lands (Clarkway Tributary)
- Regional Storm release rate to 55l/s/ha.

Based on the TRCA's Unit Flow Relationship for these lands located in the Humber River Watershed in sub-basin 36, the allowable existing target flow rates were established for the subject lands and summarized in Table 3.

Table 3 – Target Flow Rates

Storm	TRCA Unit Flow Equation$^{(1)}$	Boltcol Tributary Area – 64.8ha (m^3/s)
25mm	1.2 l/s/ha$^{(2)}$	0.078
2-year	Q=9.506-0.719*ln(A)	0.422
5-year	Q=14.652-1.136*ln(A)	0.643
10-year	Q=17.957-1.373*ln(A)	0.793
25-year	Q=22.639-1.741*ln(A)	0.997
50-year	Q=26.566-2.082*ln(A)	1.159
100-year	Q=29.912-2.316*ln(A)	1.313
Regional	55 l/s/ha$^{(2)}$	3.566

In order to meet the above stormwater target flow rates, a wet pond will be provided for each of the Boltcol proposed developments, as indicated on Drawings G3.

4.2 Boltcol Stormwater Management Facility - SWMP #(4+5)

For the tributary area of 64.8ha, a 3.62ha stormwater management pond has been provided. The design layout of SWMP #(4+5) is shown on Drawing S7, with details provided on Plan C5. The location of SWMP#4+5 has been adjusted to accommodate the lands located within the designated MTO Highway Study Area #413, to ensure there is no future conflict with the proposed pond and future MTO road works. The proposed stage-storage relationship for this facility is shown in Table 6.

A permanent pool volume of 20,650m^3 will be provided between the 229.50m and 230.50m, elevations. An erosion control volume of 19,242m^3 will be provided between the 230.50m

11.0 CONCLUSIONS

1. The proposed George Bolton Parkway will be constructed with storm and sanitary drainage and water servicing to service the future proposed industrial development.

2. The proposed diversion pipe will convey the existing flows from the George Bolton SWM Facility towards the new open channel.

3. The proposed floodplain modifications in the form of cut/fill will not adversely affect the existing floodplain elevations in the Clarkway Tributary.

4. The proposed development area will be serviced by a stormwater management facility, providing quality and quantity controls for all storm events up to the Regional Storm event.

5. The sanitary and water components for proposed development area will be serviced by existing/future infrastructure under Coleraine Drive.

Prepared by,

a.m. candaras associates inc.

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Consulting Engineer

LICENSED PROFESSIONAL ENGINEER
A. M. CANDARAS
PROVINCE OF ONTARIO

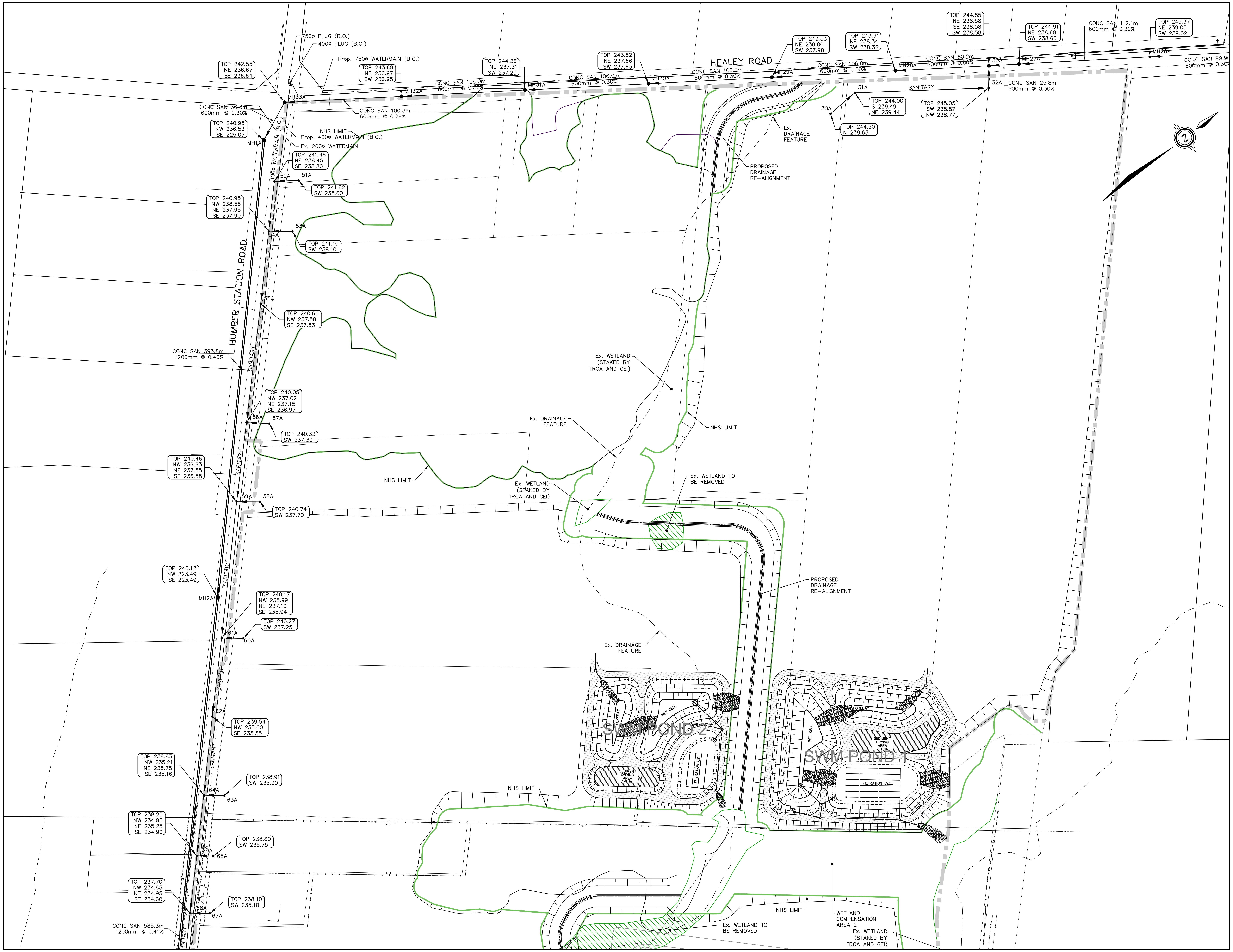
Fanche Petkovski, P. Eng
Associate

April 2, 2019

X:\Secretary\2014\1409\SWM\George Bolton FSR\1409-GeorgeBolton FSR SWM Report.003.docx

APPENDIX E

Engineering Drawings



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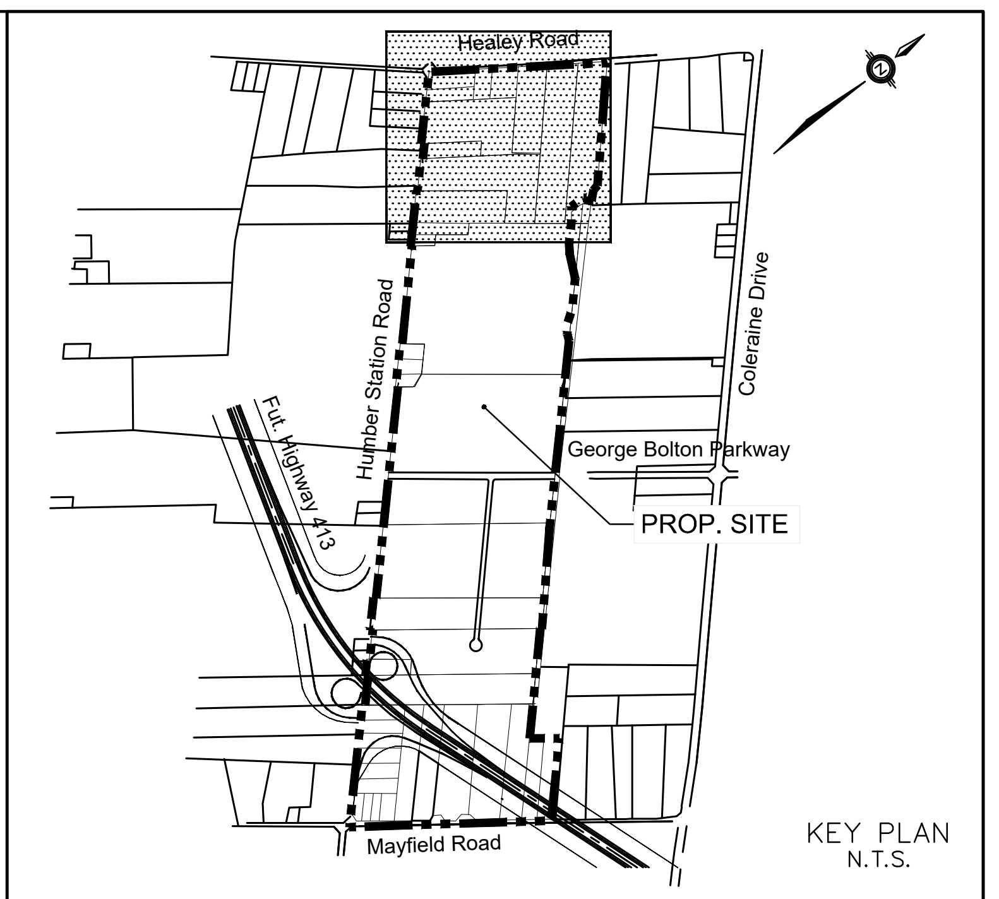

KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
——	DENOTES SANITARY SEWER
TOP 236.02 SW 232.65 NE 232.63	DENOTES TOP ELEVATION DENOTES STORM IN OBVERT ELEVATION DENOTES STORM OUT OBVERT ELEVATION
TOP 195.45 N 192.15 S 192.10	DENOTES TOP ELEVATION DENOTES SANITARY IN OBVERT ELEVATION DENOTES SANITARY OUT OBVERT ELEVATION
▬ ▪ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
▨	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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design@schaeffers.com

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TOWN OF CALEDON

GENERAL PLAN
PART 1

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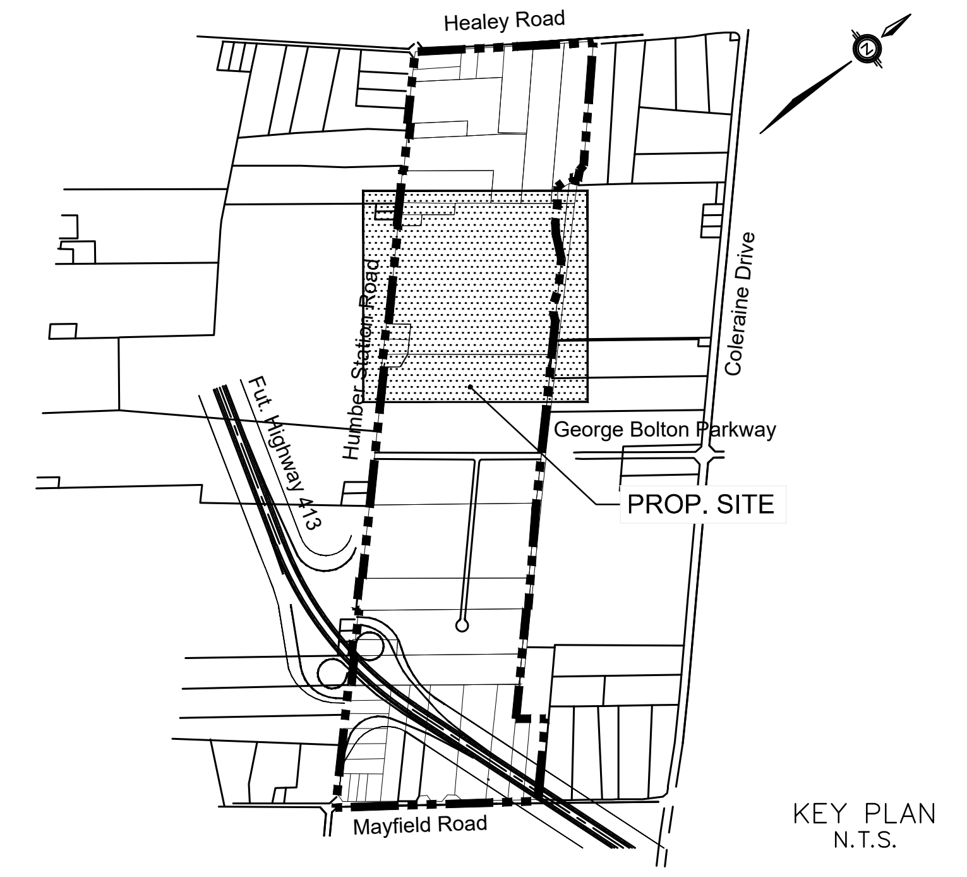
CHECKED BY: P.S.	DATE: AUGUST 2024	DRAWING No. GP-1



KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
—	DENOTES SANITARY SEWER
TOP 236.02 SW 232.65 NE 232.63	DENOTES TOP ELEVATION DENOTES STORM IN OBVERT ELEVATION DENOTES STORM OUT OBVERT ELEVATION
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🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

HUMBER STATION VILLAGES

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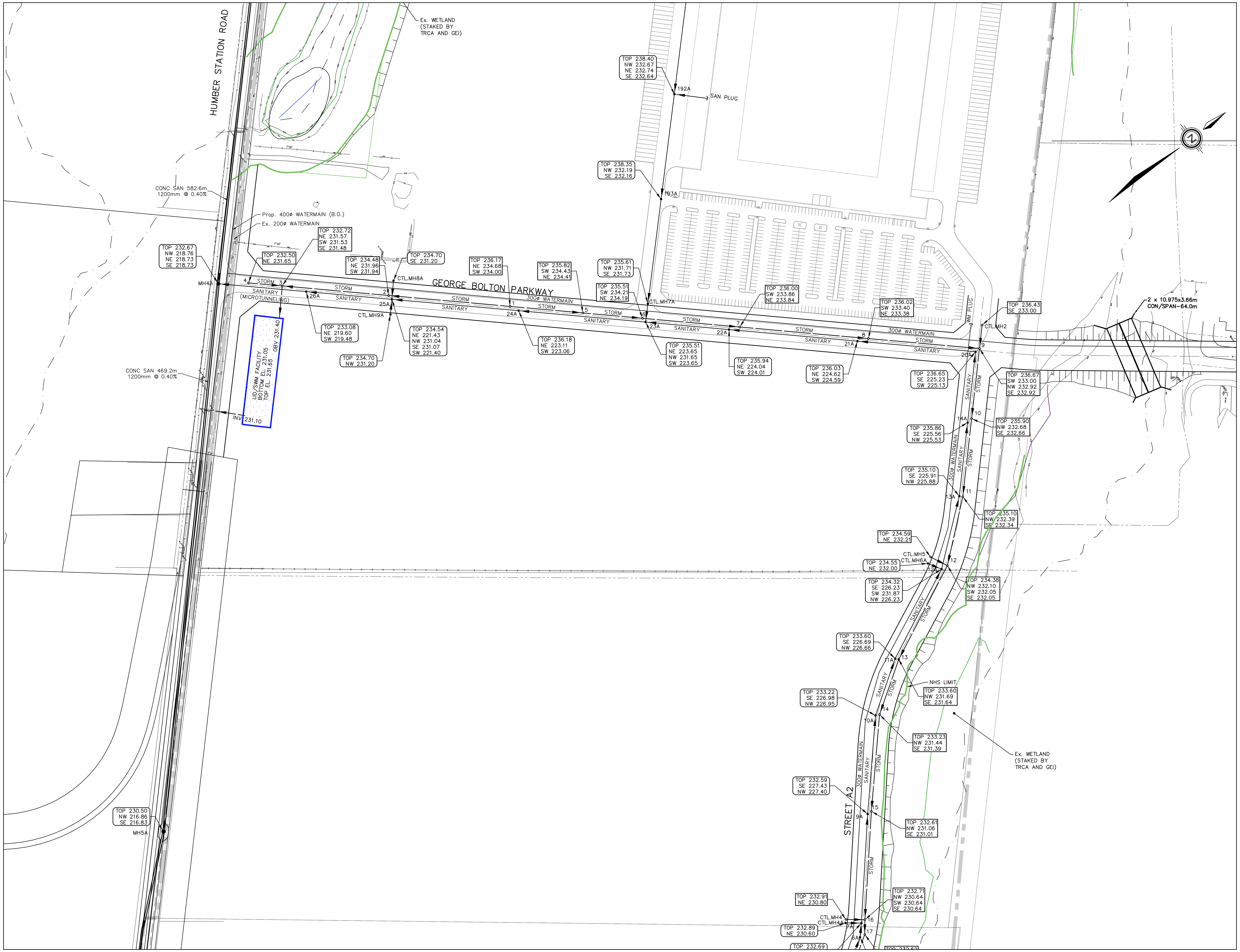
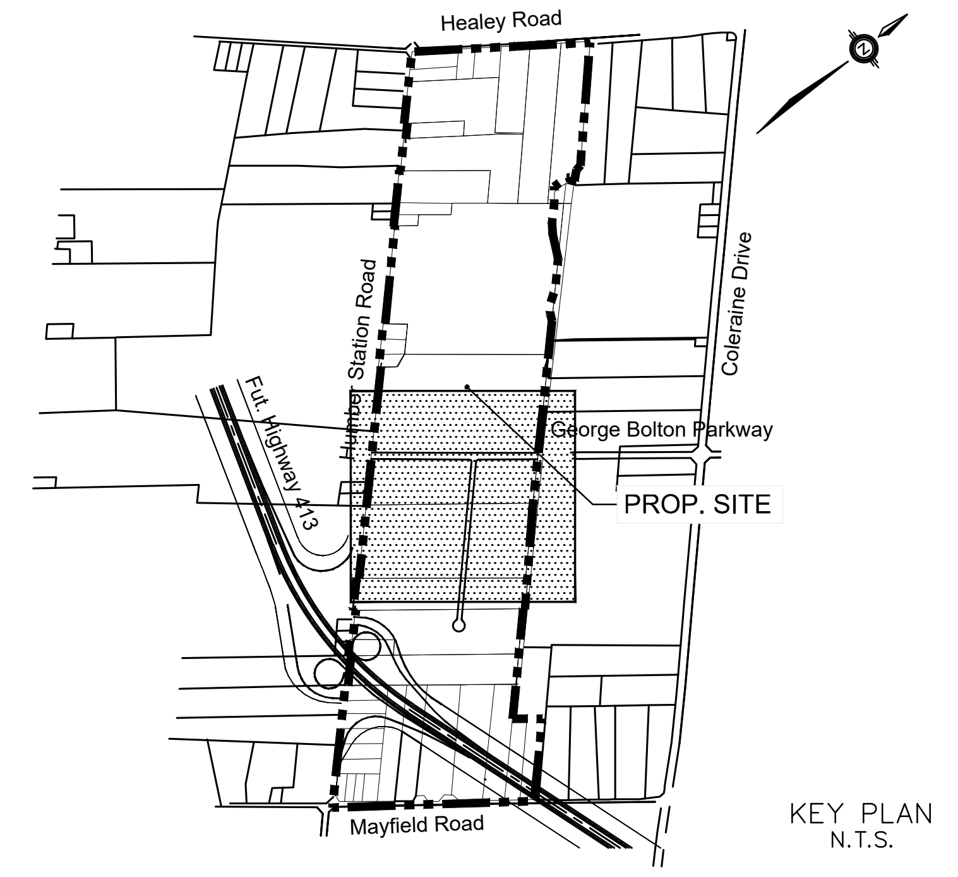


REFER TO DWG. GP-4

REFER TO DWG. GP-5



KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
—	DENOTES SANITARY SEWER
TOP 236.02 SW 232.65 NE 232.63	DENOTES TOP ELEVATION DENOTES STORM IN OBVERT ELEVATION DENOTES STORM OUT OBVERT ELEVATION
TOP 195.45 N 192.15 S 192.10	DENOTES TOP ELEVATION DENOTES SANITARY IN OBVERT ELEVATION DENOTES SANITARY OUT OBVERT ELEVATION
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H.SARKISSIAN
NOV. 1, 2024

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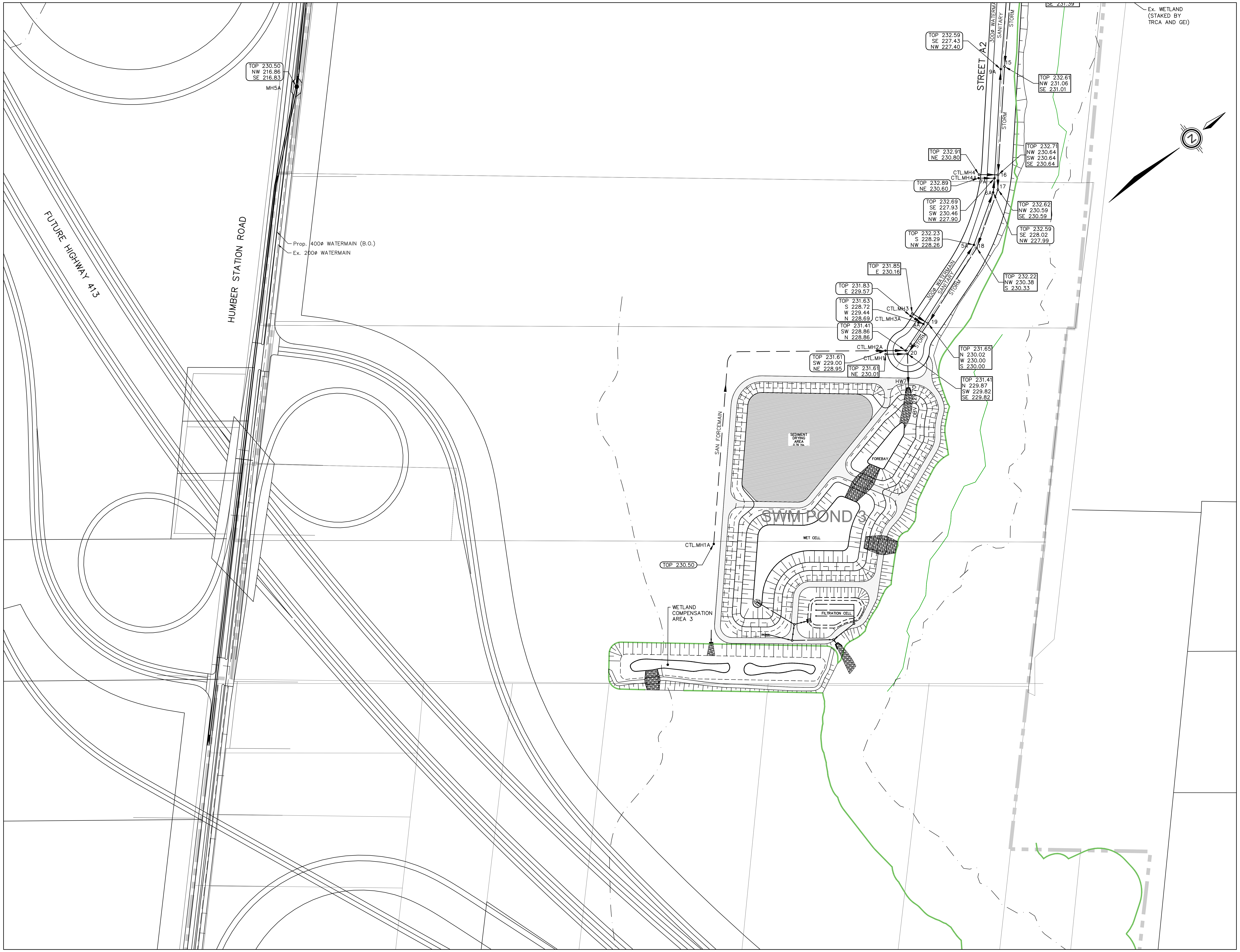
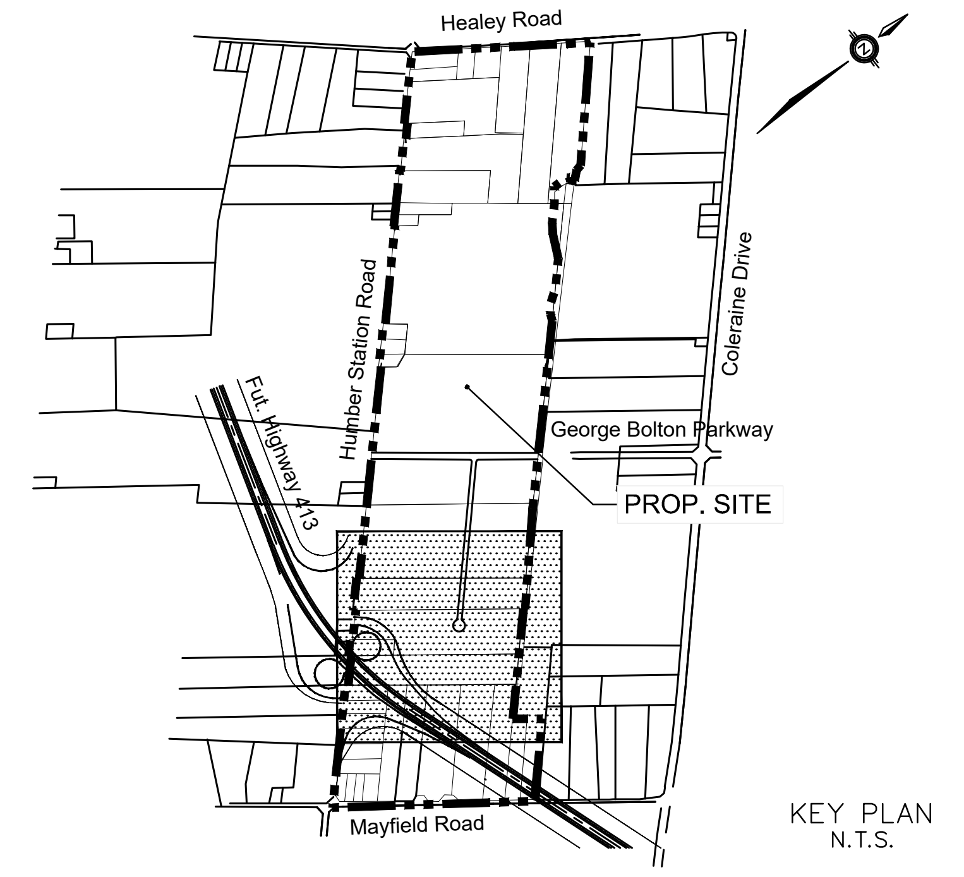
CHECKED BY: P.S.	DATE: AUGUST 2024	

REFER TO DWG. GP-3





KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
—	DENOTES SANITARY SEWER
TOP 236.02 SW 232.65 NE 232.63	DENOTES TOP ELEVATION DENOTES STORM IN OBVERT ELEVATION DENOTES STORM OUT OBVERT ELEVATION
TOP 195.45 N 192.15 S 192.10	DENOTES TOP ELEVATION DENOTES SANITARY IN OBVERT ELEVATION DENOTES SANITARY OUT OBVERT ELEVATION
▬ ▪ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
🟦	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

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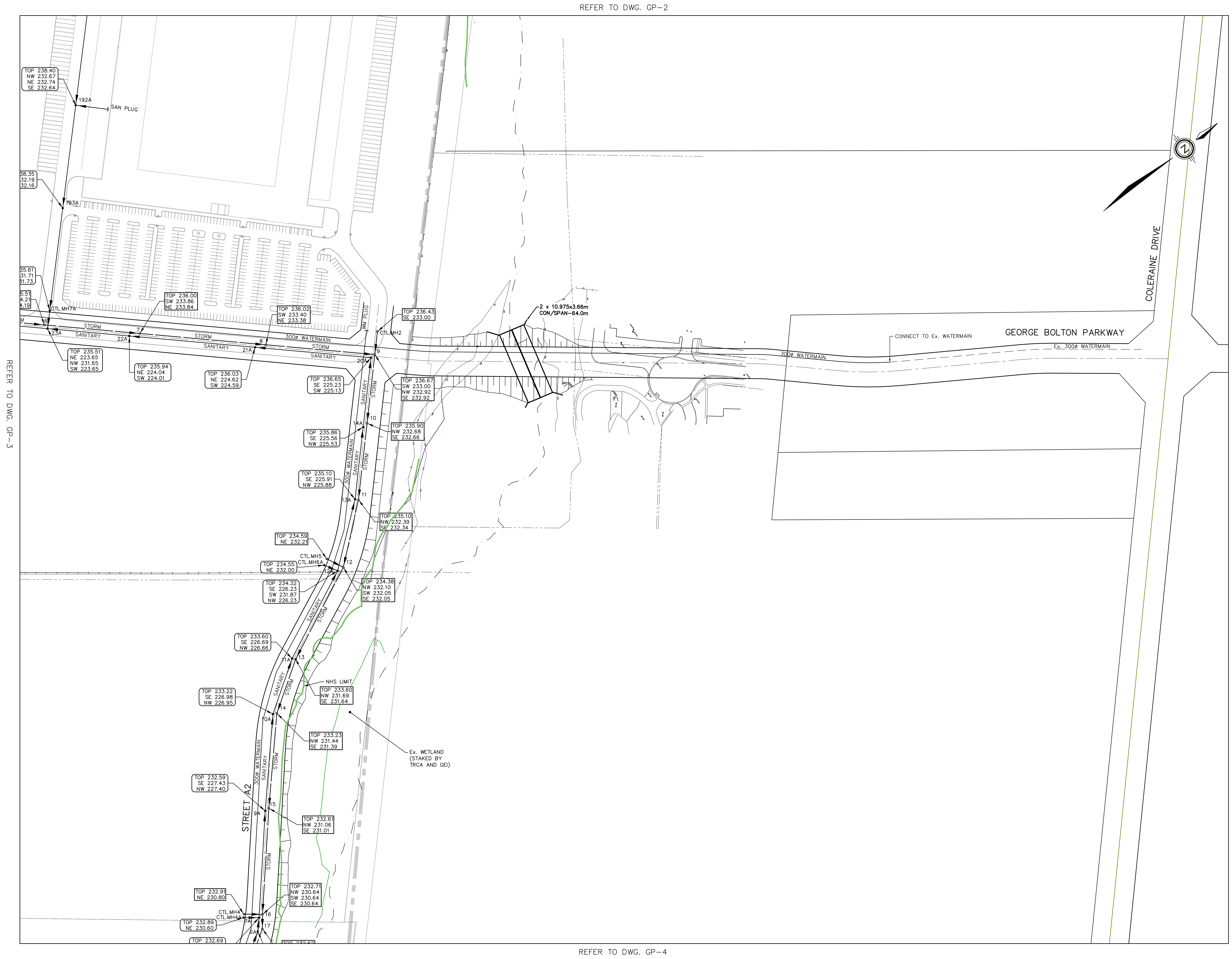
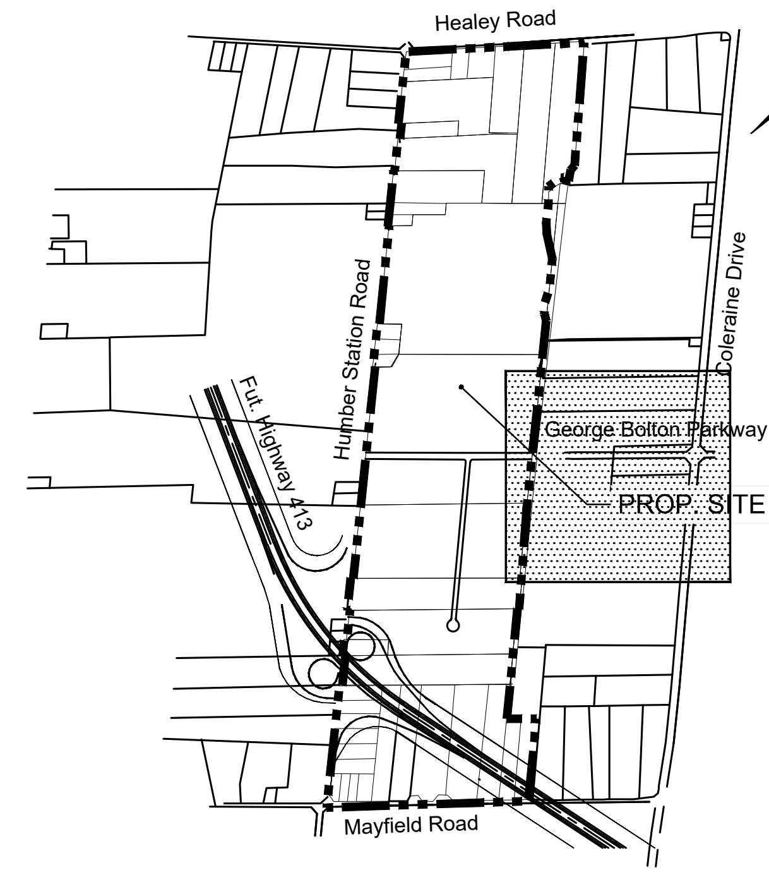
PART 4

SCALE: 1:2000		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. GP-4
CHECKED BY: P.S.	DATE: AUGUST 2024	





KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
—	DENOTES SANITARY SEWER
TOP 236.02 SW 232.65 NE 232.63	DENOTES TOP ELEVATION DENOTES STORM IN OBVERT ELEVATION DENOTES STORM OUT OBVERT ELEVATION
TOP 195.45 N 192.15 S 192.10	DENOTES TOP ELEVATION DENOTES SANITARY IN OBVERT ELEVATION DENOTES SANITARY OUT OBVERT ELEVATION
▬ ▪▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
▨	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

SCHAEFFERS
CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

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E-mail:
design@schaeffers.com

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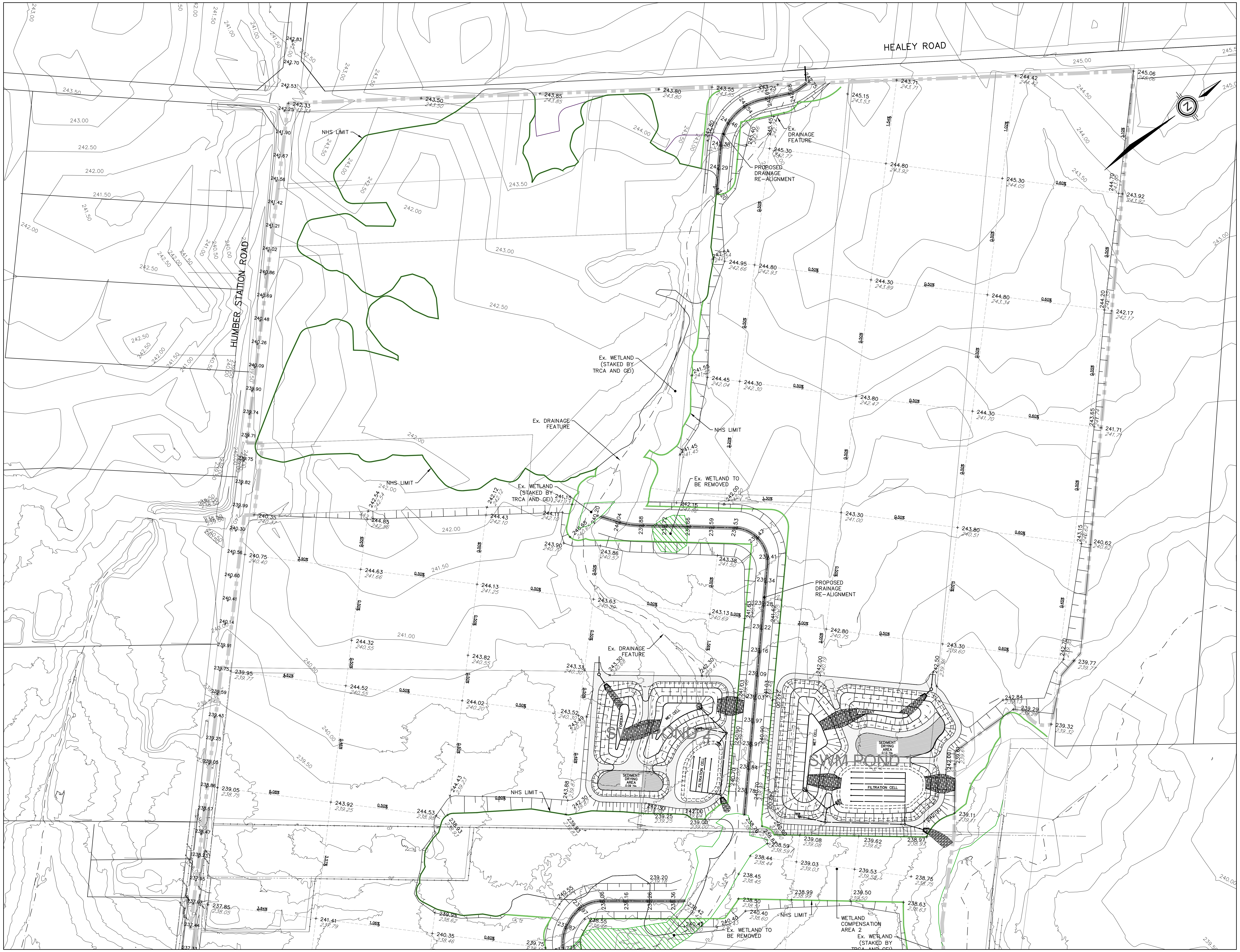
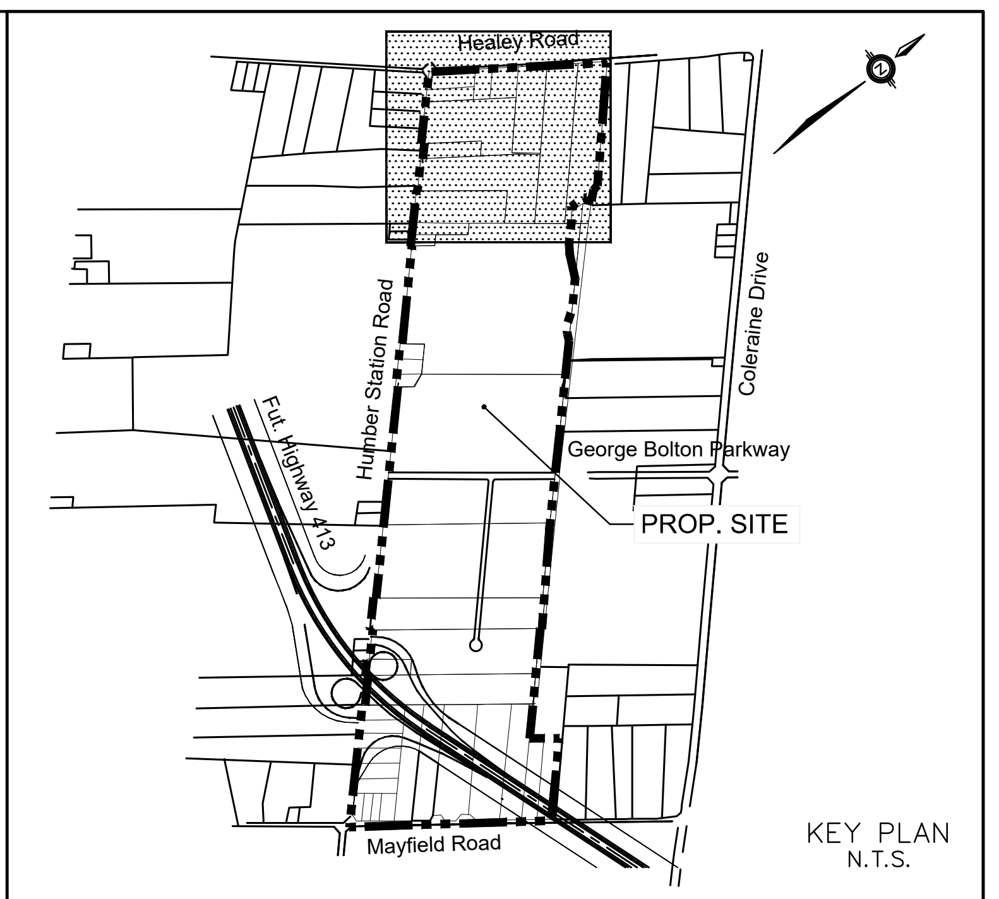
TOWN OF CALEDON

GENERAL PLAN
PART 5

SCALE: 1:2000		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. GP-5
CHECKED BY: P.S.	DATE: AUGUST 2024	



REFER TO DWG. GR-2



KEY PLAN
N.T.S.

LEGEND

223.80	DENOTES PROPOSED ELEVATION
190.14	DENOTES EXISTING ELEVATION
188.50	DENOTES EXISTING CONTOUR
▬ ▪ ▪ ▬	DENOTES LIMIT OF PROPERTY
▨	DENOTES PROPOSED LID/SWM FACILITY
▬	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

HUMBER STATION VILLAGES

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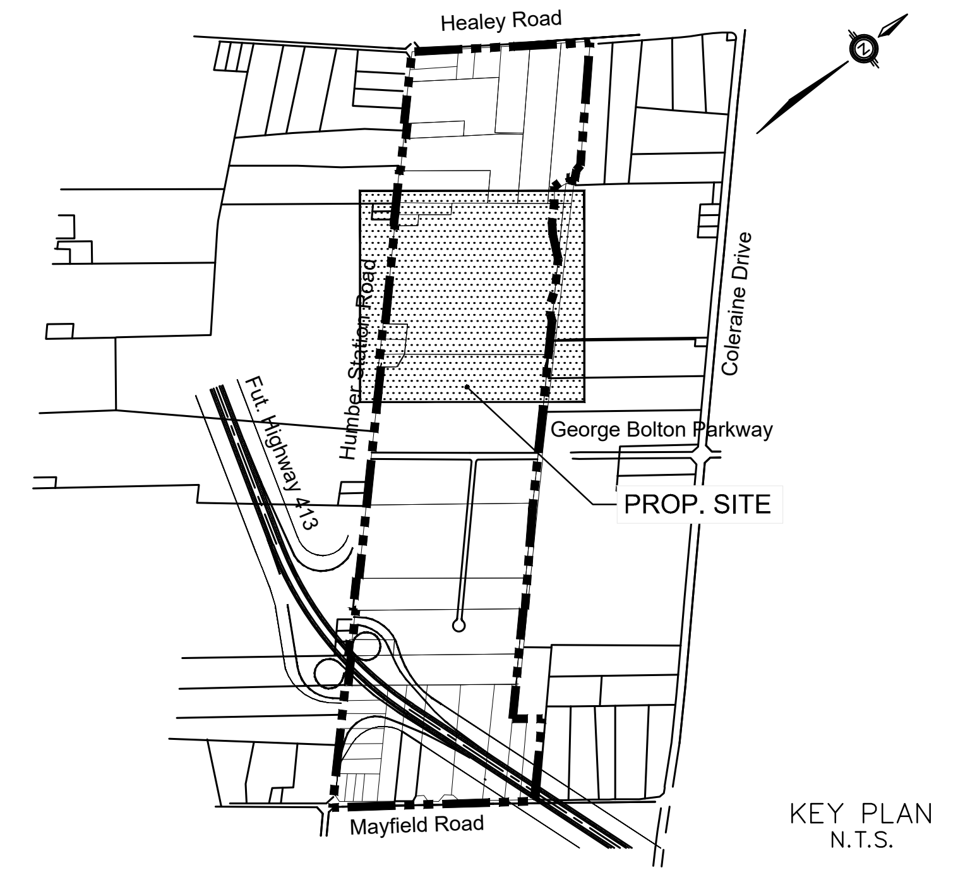
TOWN OF CALEDON

GRADING PLAN
PART 1

SCALE: 1:1500
DESIGNED BY: M.Z.
DRAWN BY: M.Z.
CHECKED BY: F.T.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. GR-1

REFER TO DWG. GR-1

REFER TO DWG. GR-3



KEY PLAN
N.T.S.

LEGEND

223.80	DENOTES PROPOSED ELEVATION
190.14	DENOTES EXISTING ELEVATION
188.50	DENOTES EXISTING CONTOUR
▬ ▮ ▮ ▬	DENOTES LIMIT OF PROPERTY
🟦	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

HUMBER STATION VILLAGES

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TOWN OF CALEDON

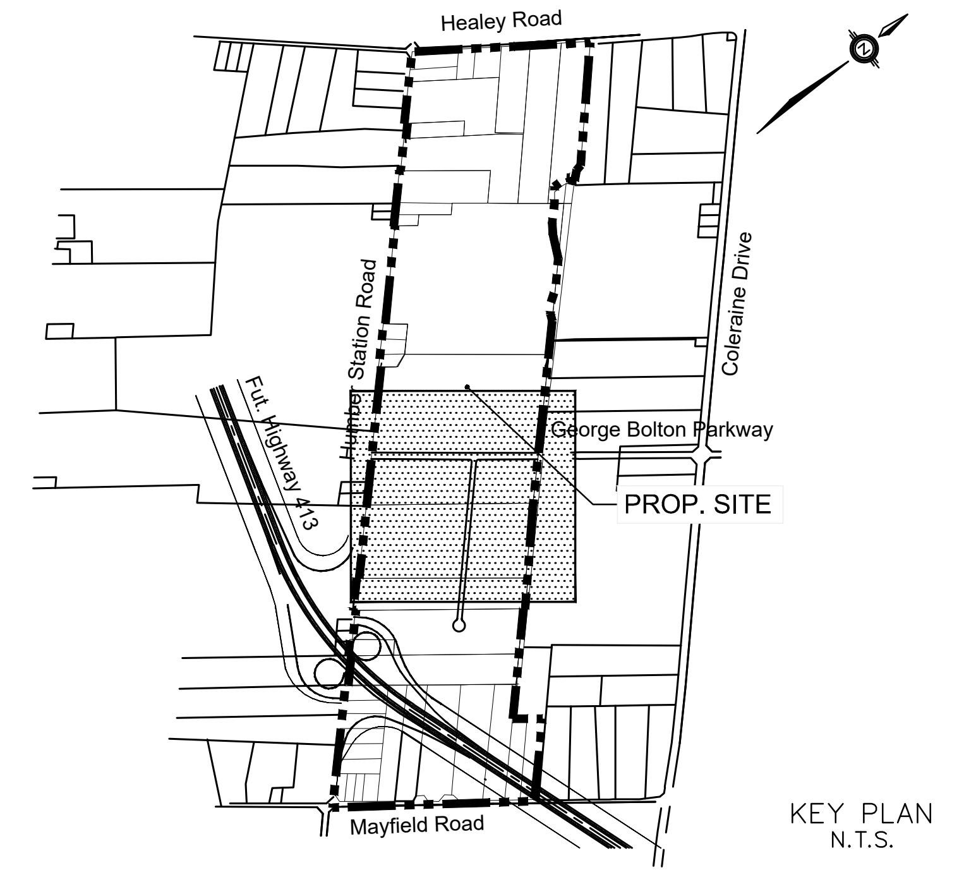
GRADING PLAN
PART 2

SCALE: 1:1500		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. GR-2
CHECKED BY: F.T.	DATE: AUGUST 2024	

REFER TO DWG. GR-2

REFER TO DWG. GR-4

REFER TO DWG. GR-5



KEY PLAN
N.T.S.

LEGEND

223.80	DENOTES PROPOSED ELEVATION
190.14	DENOTES EXISTING ELEVATION
188.50	DENOTES EXISTING CONTOUR
▬ ▪ ▪ ▬	DENOTES LIMIT OF PROPERTY
▨	DENOTES PROPOSED LID/SWM FACILITY
▬	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

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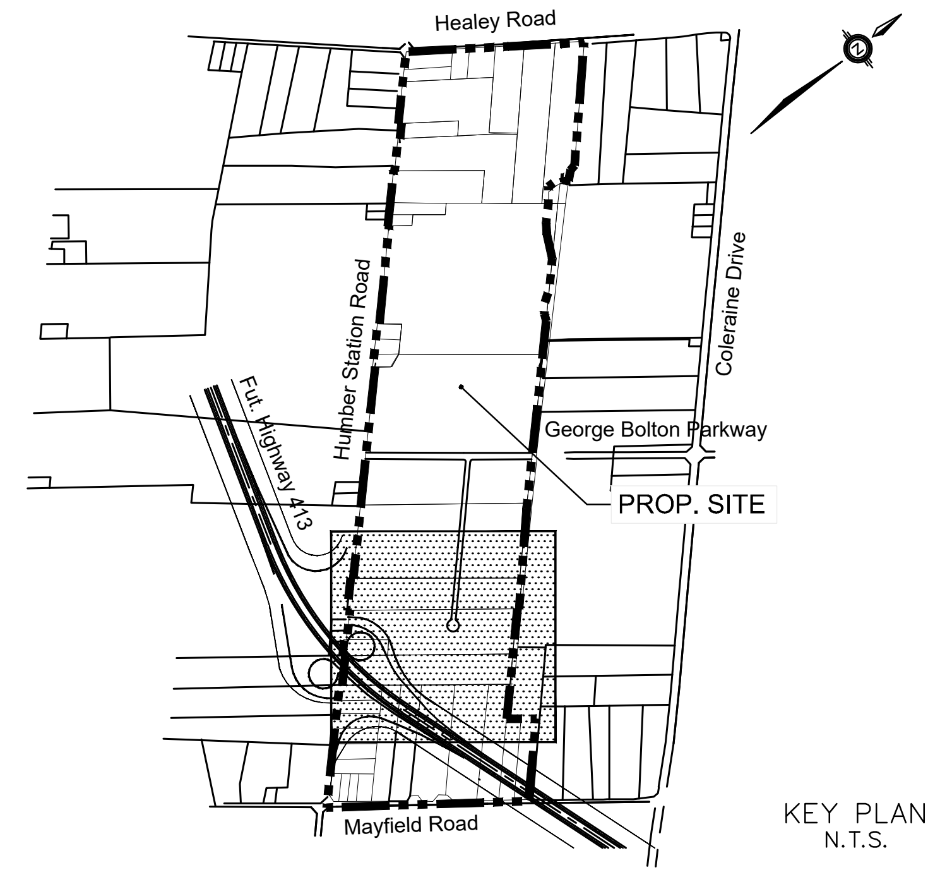
TOWN OF CALEDON

GRADING PLAN
PART 3

SCALE: 1:1500		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	
CHECKED BY: F.T.	DATE: AUGUST 2024	DRAWING No. GR-3

REFER TO DWG. GR-3



KEY PLAN
N.T.S.

LEGEND

223.80	DENOTES PROPOSED ELEVATION
190.14	DENOTES EXISTING ELEVATION
188.50	DENOTES EXISTING CONTOUR
▬ ▪ ▪ ▬	DENOTES LIMIT OF PROPERTY
▨	DENOTES PROPOSED LID/SWM FACILITY
▬	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

HUMBER STATION VILLAGES

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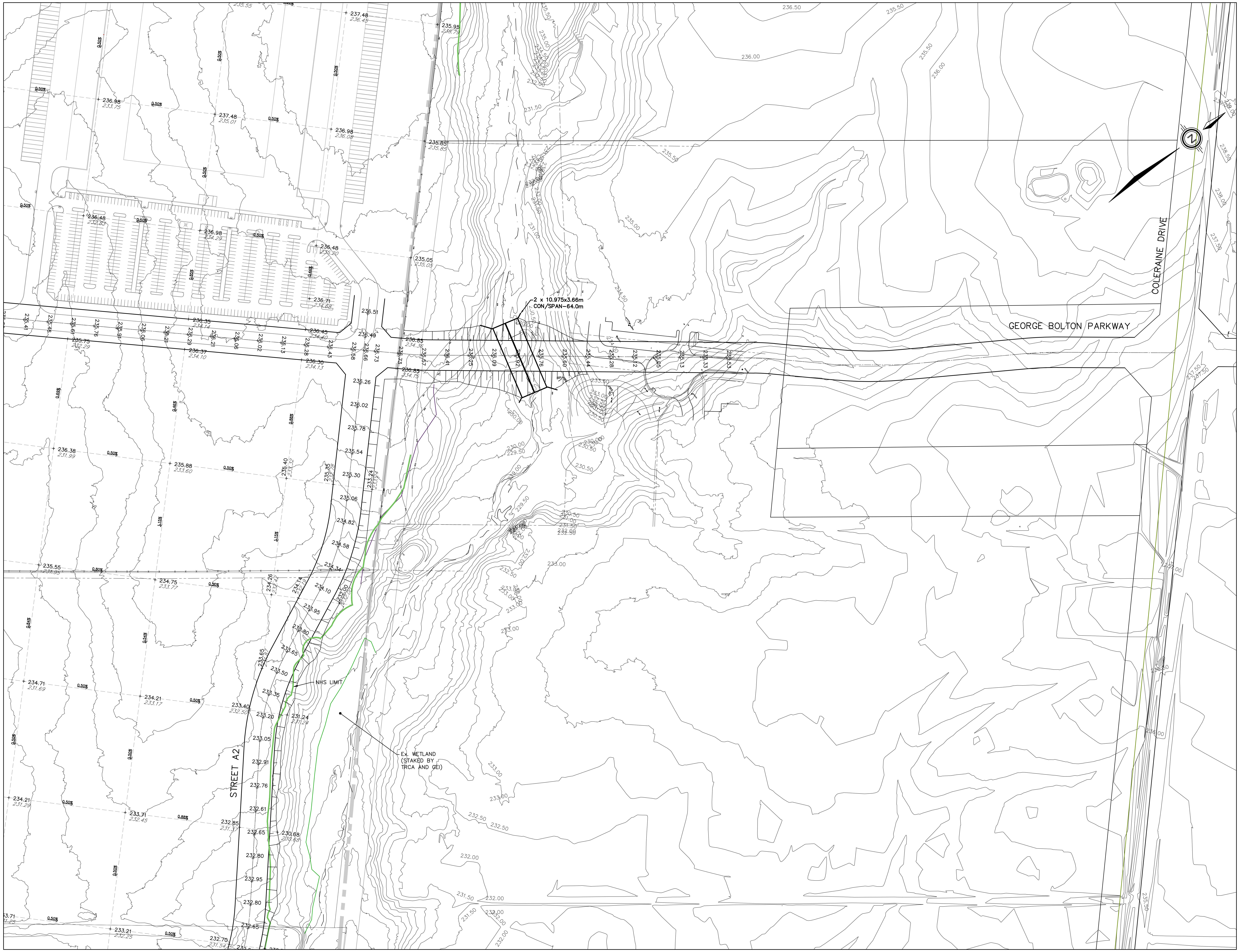
GRADING PLAN
PART 4

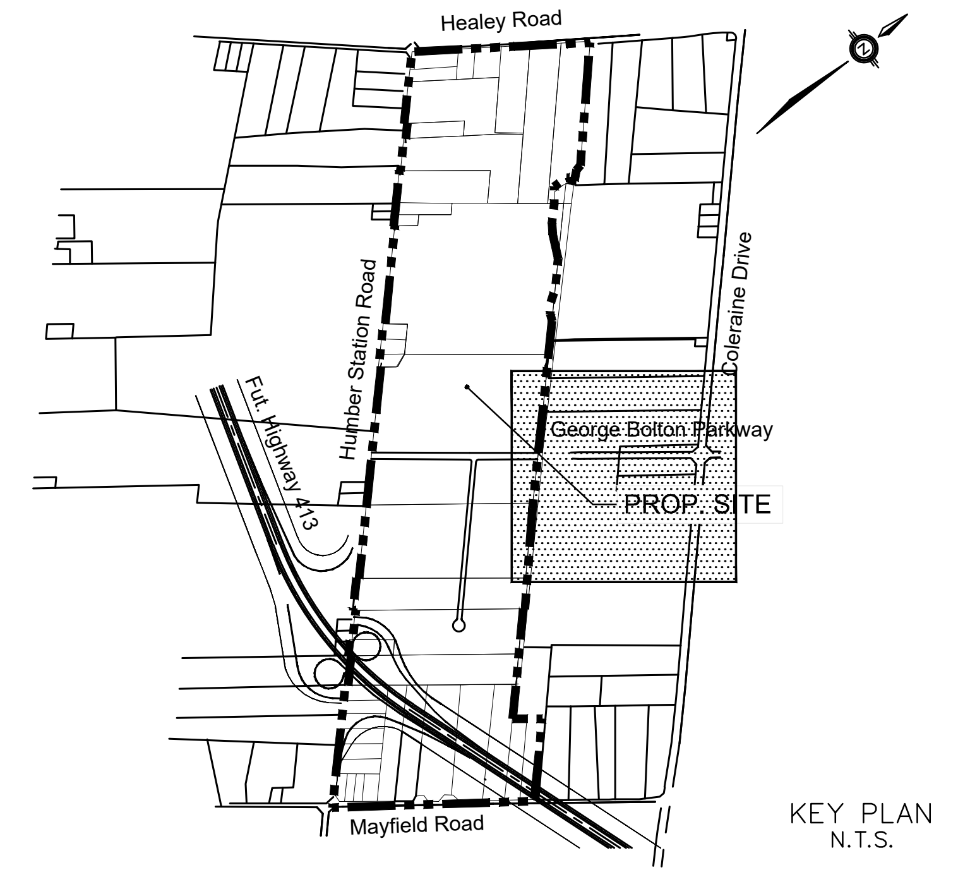
SCALE: 1:1500		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. GR-4
CHECKED BY: F.T.	DATE: AUGUST 2024	

REFER TO DWG. GR-2

REFER TO DWG. GR-3



REFER TO DWG. GR-4



KEY PLAN
N.T.S.

LEGEND

223.80	DENOTES PROPOSED ELEVATION
190.14	DENOTES EXISTING ELEVATION
188.50	DENOTES EXISTING CONTOUR
▬ ▮ ▮ ▬	DENOTES LIMIT OF PROPERTY
▨	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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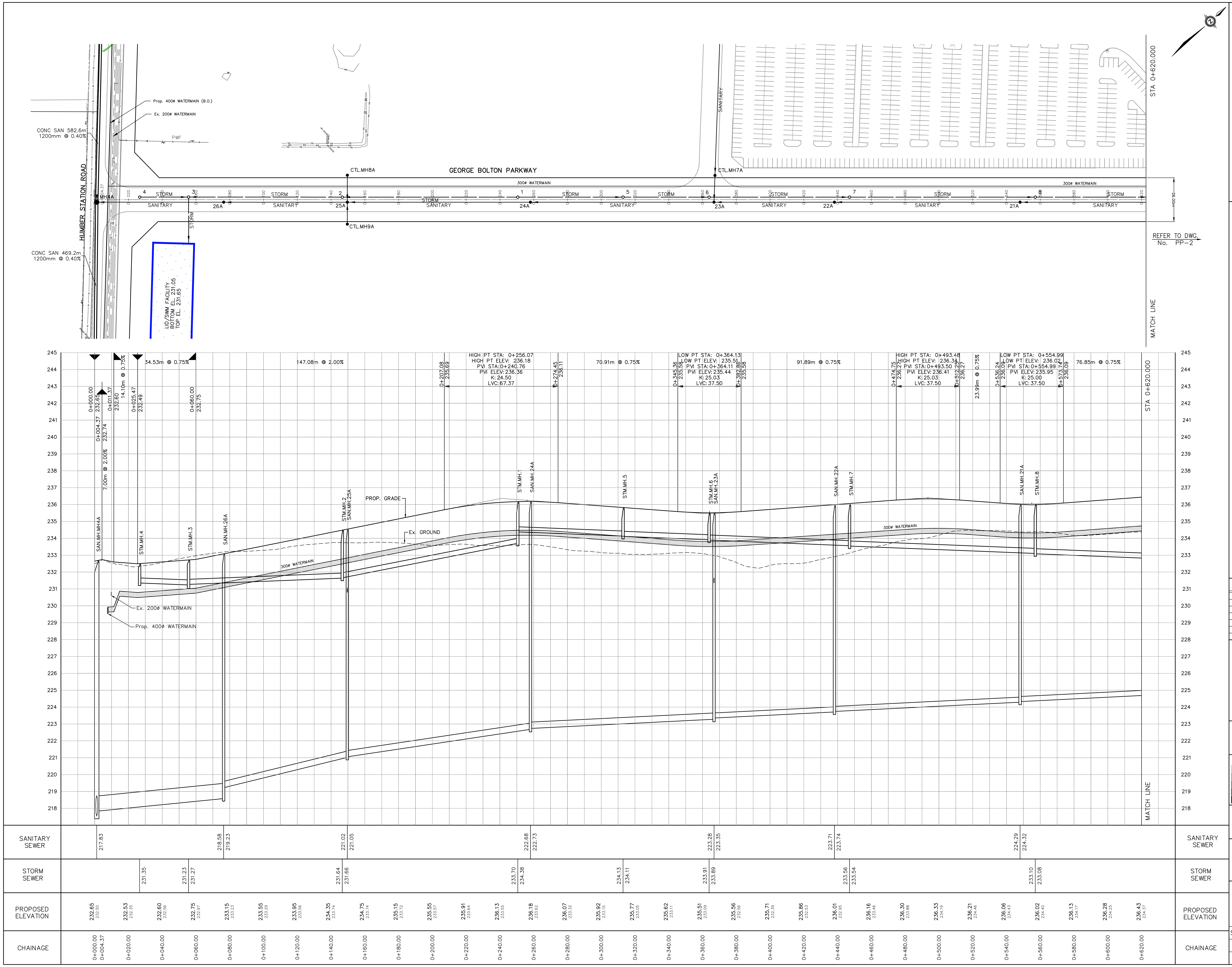
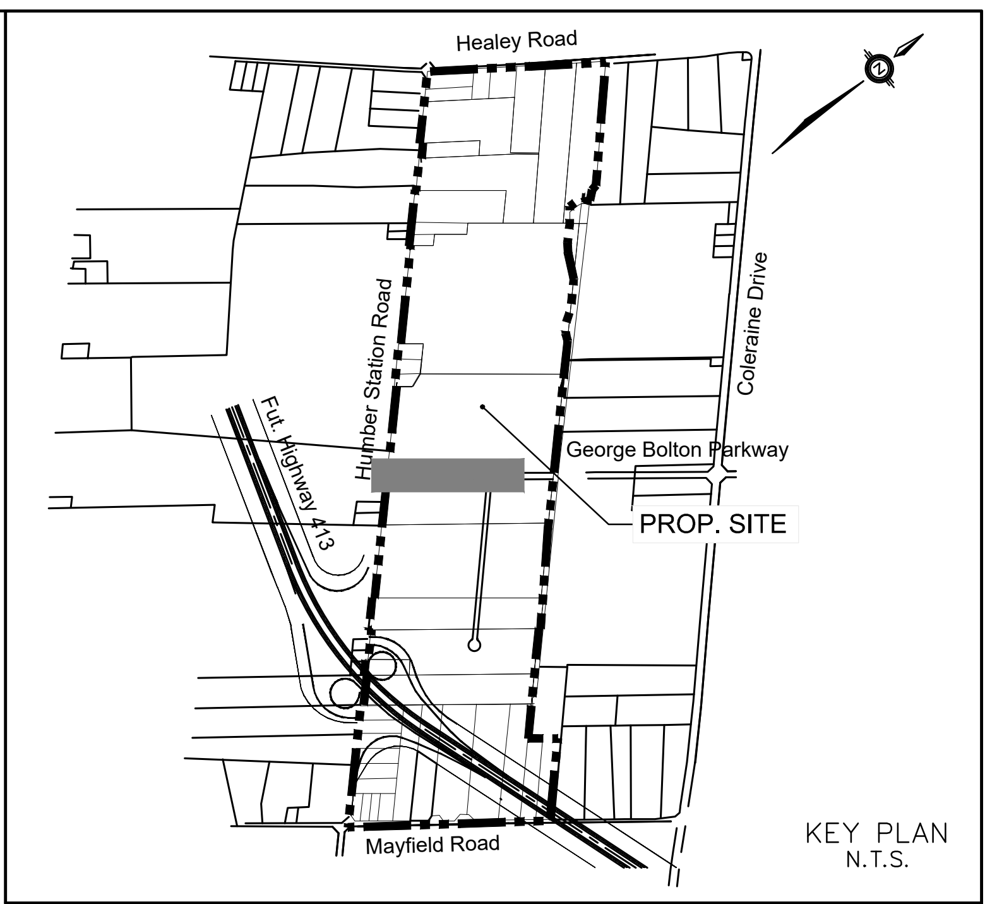
GRADING PLAN
PART 5

SCALE: 1:1500
DESIGNED BY: M.Z.
DRAWN BY: M.Z.
CHECKED BY: F.T.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. GR-5





KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
—·—	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
——	DENOTES SANITARY SEWER
▬ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
▨	DENOTES PROPOSED LID/SWM FACILITY
——	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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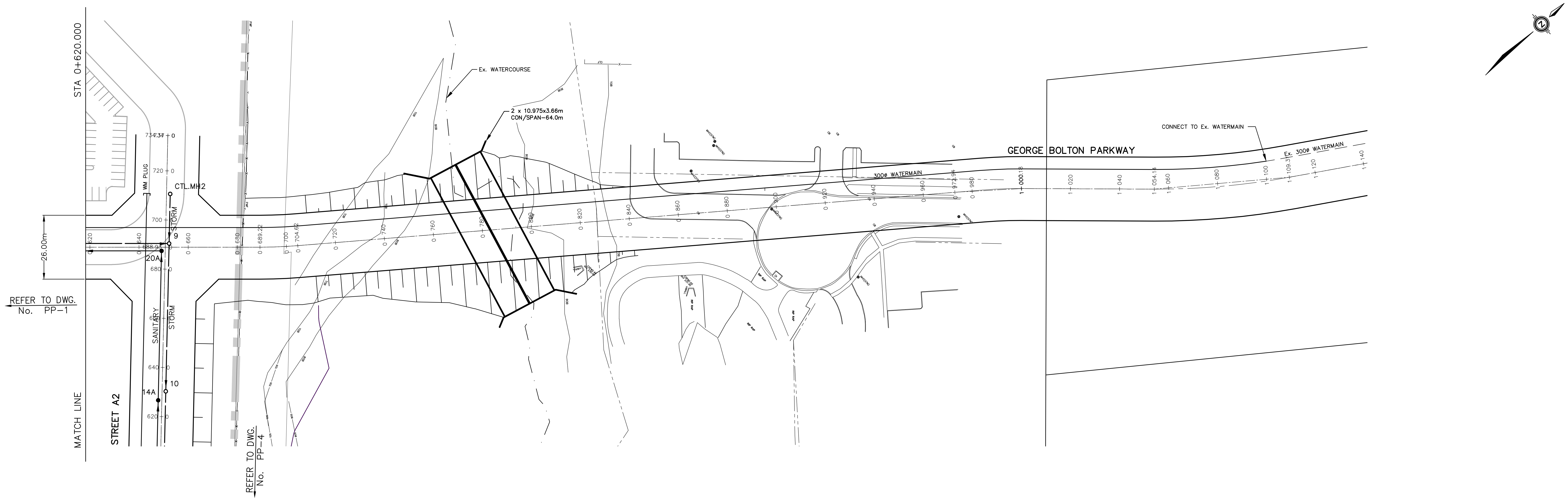
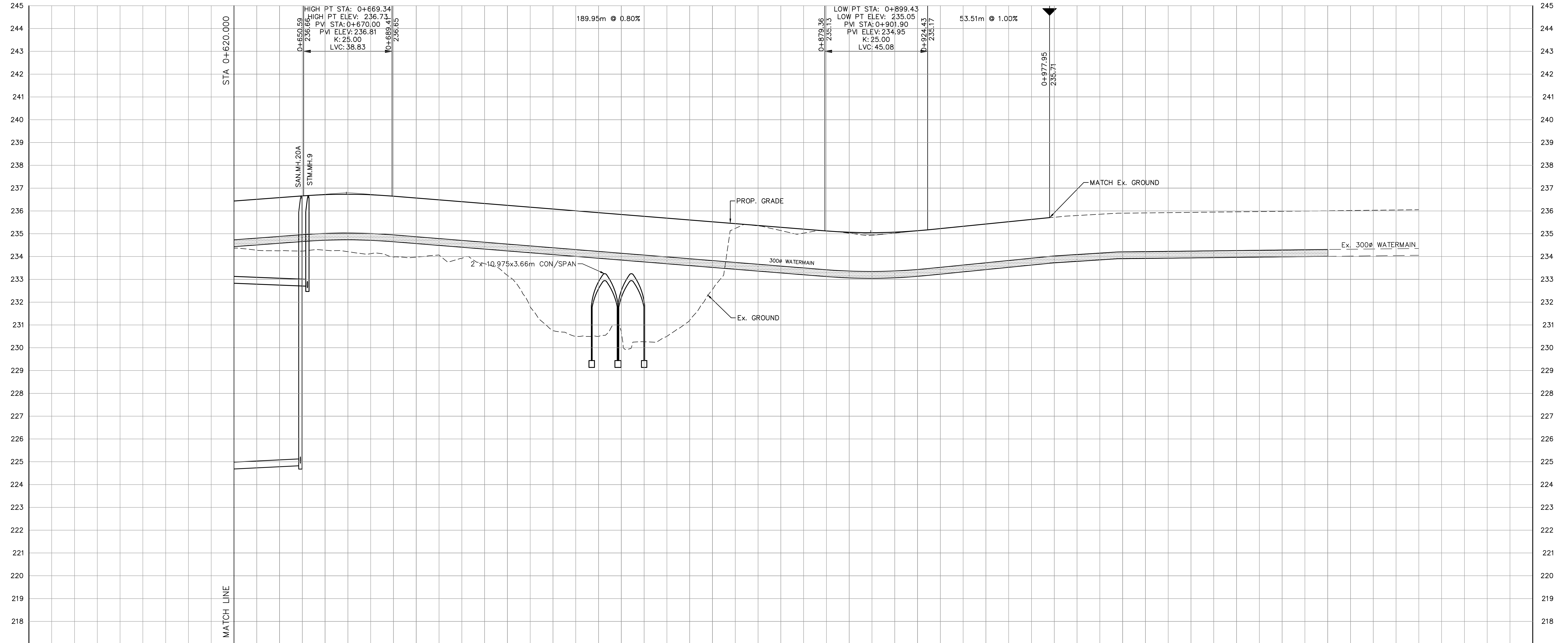
TOWN OF CALEDON

PLAN AND PROFILE OF

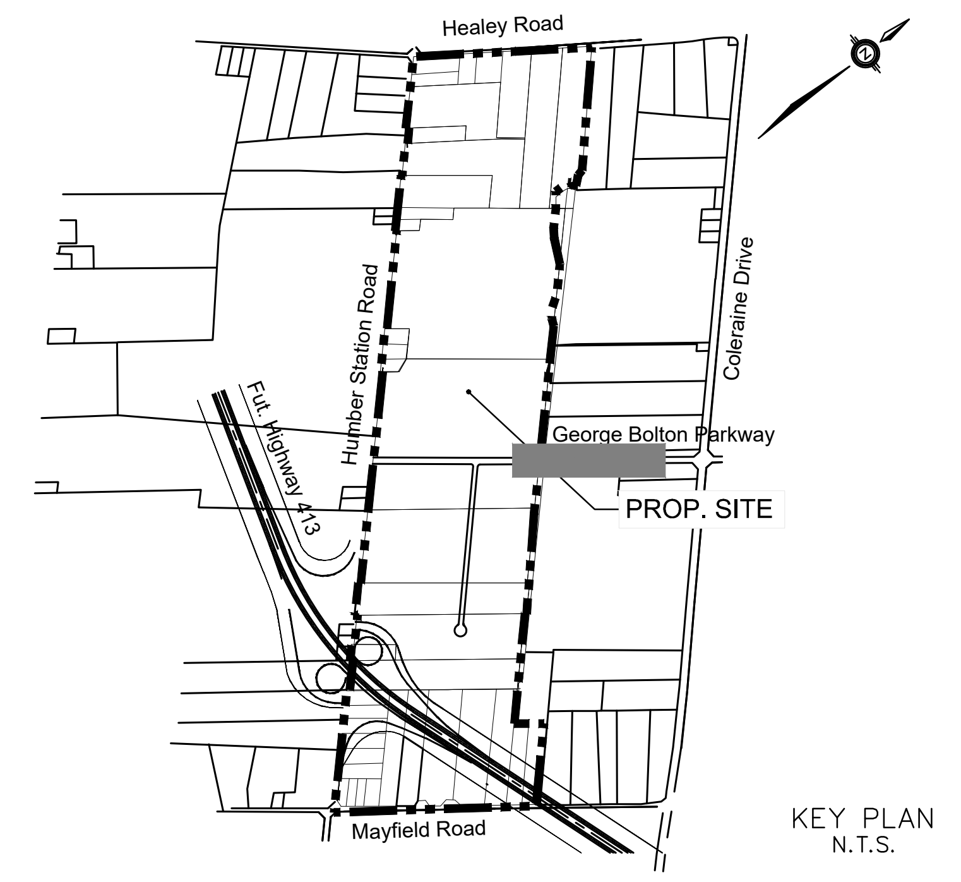
GEORGE BOLTON PARKWAY
FROM STA. 0+000.000 TO STA. 0+620.000

SCALE H 1:1000
V 1:100
DESIGNED BY: M.Z.
DRAWN BY: M.Z.
CHECKED BY: F.T.
DATE: AUGUST 2021
PROJECT No. 2021-5139
DRAWING No. PP-1





CHAINAGE	PROPOSED ELEVATION	SANITARY SEWER	STORM SEWER
0+620.00	236.43 234.37		
0+640.00	236.58 234.25		
		224.83	232.70
0+660.00	236.72 234.28		
0+680.00	236.71 234.13		
0+689.22			
0+696.92			
0+700.00	236.57 233.97		
0+704.62			
0+720.00	236.41 233.92		
0+740.00	236.25 233.17		
0+760.00	236.09 230.75		
0+780.00	235.92 230.50		
0+800.00	235.76 230.26		
0+820.00	235.60 231.21		
0+840.00	235.44 235.23		
0+860.00	235.28 235.14		
0+880.00	235.12 235.12		
0+900.00	235.05 234.93		
0+920.00	235.13 235.13		
0+940.00	235.33 235.33		
0+960.00	235.53 235.53		
0+972.94			
0+980.00	235.72		
1+000.00	235.86		
1+020.00	235.91		
1+040.00	235.94		
1+054.14			
1+060.00	235.96		
1+080.00	235.98		
1+100.00	236.01		
1+109.31			
1+120.00	236.03		
1+140.00	236.05		



KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
—	DENOTES SANITARY SEWER
▬ ▪ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
▨	DENOTES PROPOSED LID/SWM FACILITY
—	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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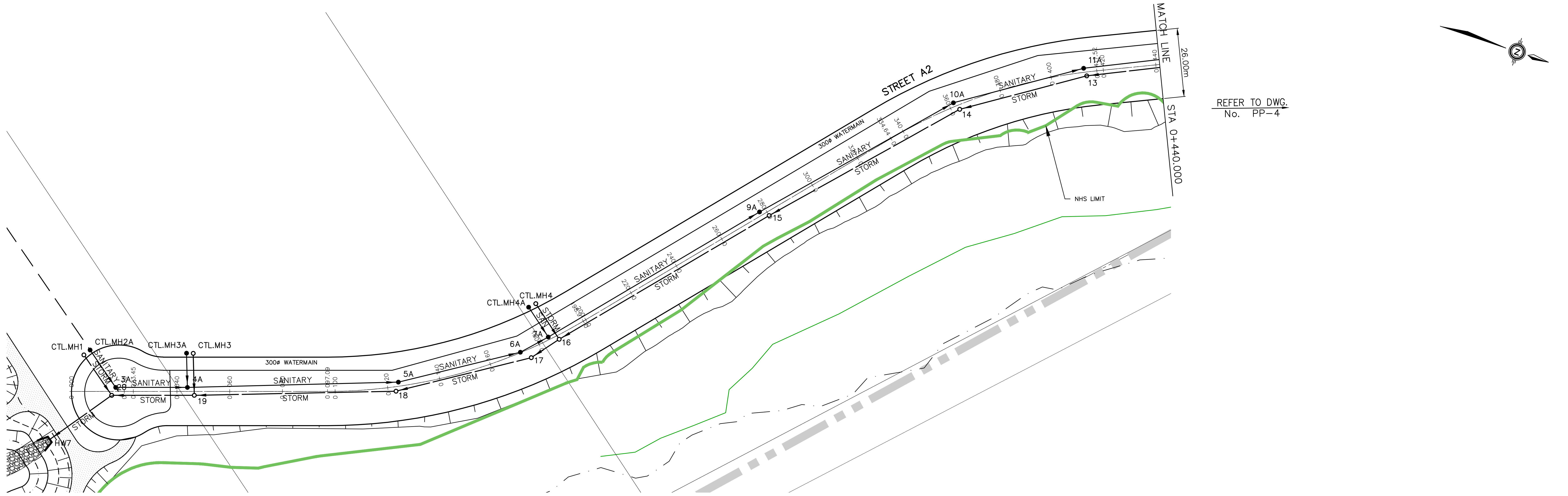
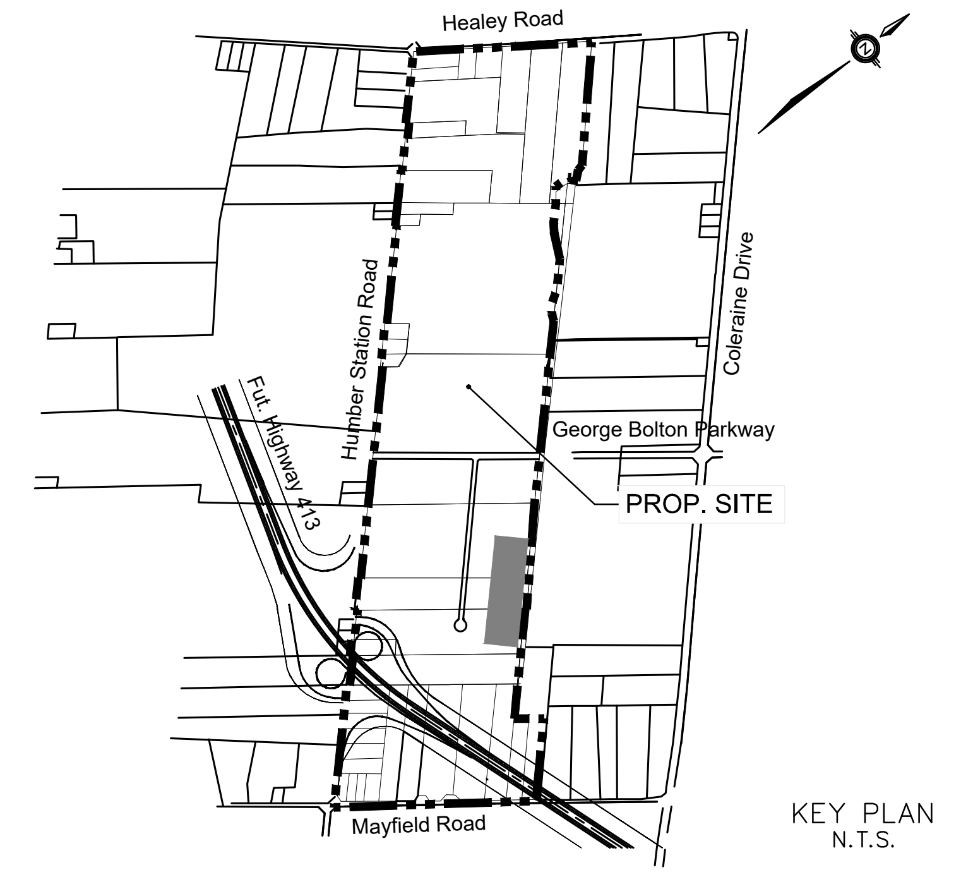
PLAN AND PROFILE OF
GEORGE BOLTON PARKWAY
FROM STA. 0+620.000 TO STA. 1+140.000

SCALE H 1:1000
V 1:100
DESIGNED BY: M.Z.
DRAWN BY: M.Z.
CHECKED BY: F.T.
DATE: AUGUST 2021
PROJECT No. 2021-5139
DRAWING No. PP-2

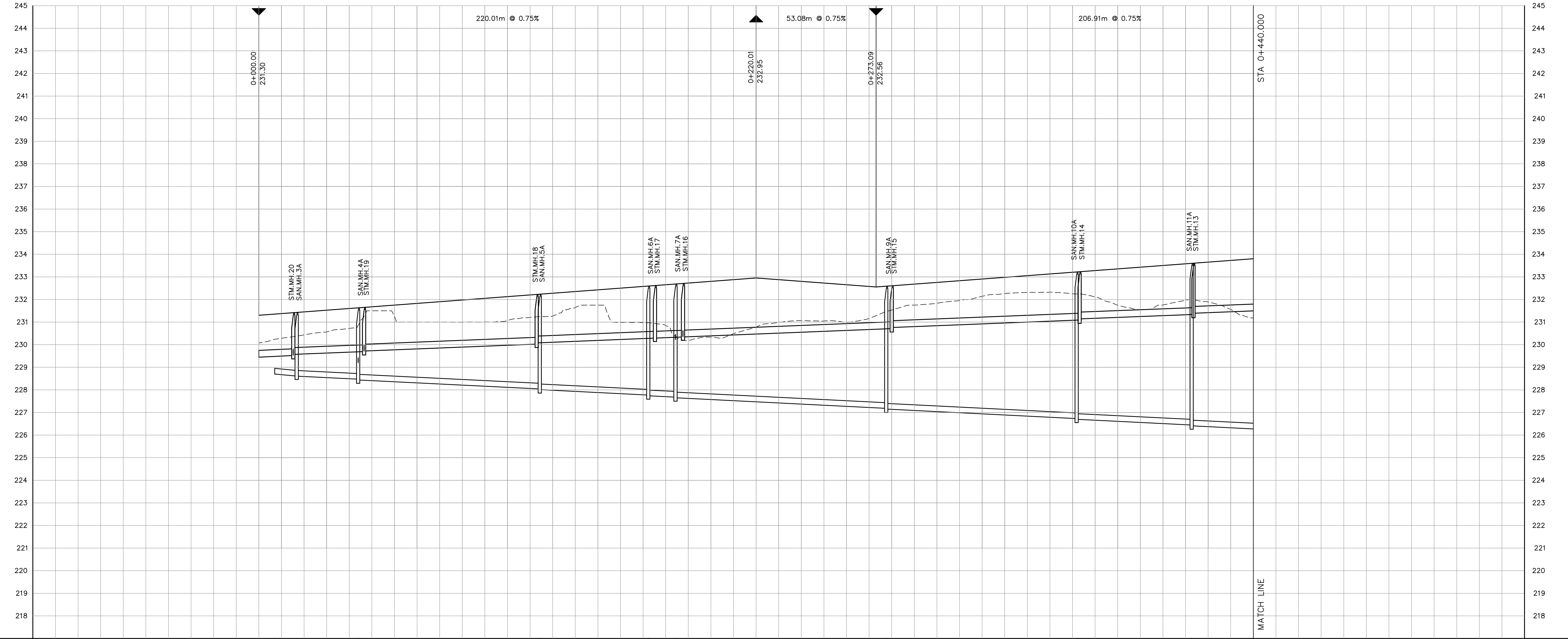




KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
—	DENOTES SANITARY SEWER
▬ ▪ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
▨	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM



SANITARY SEWER	228.70 228.61 228.61 · 228.47 228.44 · 228.04 228.01 · 227.77 227.74 · 227.68 227.65 · 227.18 227.15 · 226.73 226.70 · 226.44 226.41
STORM SEWER	229.40 · 229.52 229.57 · 229.70 229.72 · 230.03 230.08 · 230.29 230.29 · 230.34 230.34 · 230.71 230.76 · 231.09 231.14 · 231.34 231.39
PROPOSED ELEVATION	231.30 230.07 · 231.45 230.43 · 231.60 230.72 · 231.75 231.26 · 231.90 231.00 · 232.05 231.00 · 232.20 231.20 · 232.35 231.64 · 232.50 230.99 · 232.65 230.85 · 232.80 230.34 · 232.95 230.78 · 232.80 231.07 · 232.65 230.99 · 232.61 231.53 · 232.76 231.83 · 232.91 232.14 · 233.05 232.32 · 233.20 232.25 · 233.35 231.75 · 233.50 231.76 · 233.65 231.89 · 233.80 231.19
CHAINAGE	0+000.00 · 0+020.00 0+023.45 · 0+040.00 · 0+060.00 · 0+080.00 · 0+097.09 0+100.00 · 0+120.00 · 0+140.00 · 0+148.00 · 0+160.00 · 0+180.00 · 0+198.91 0+200.00 · 0+220.00 · 0+240.00 · 0+260.00 · 0+280.00 · 0+300.00 · 0+320.00 · 0+334.64 0+340.00 · 0+360.00 · 0+376.08 0+380.00 · 0+400.00 · 0+417.52 0+420.00 · 0+440.00

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

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Fax: (905) 738-6875
E-mail:
design@schaeffers.com

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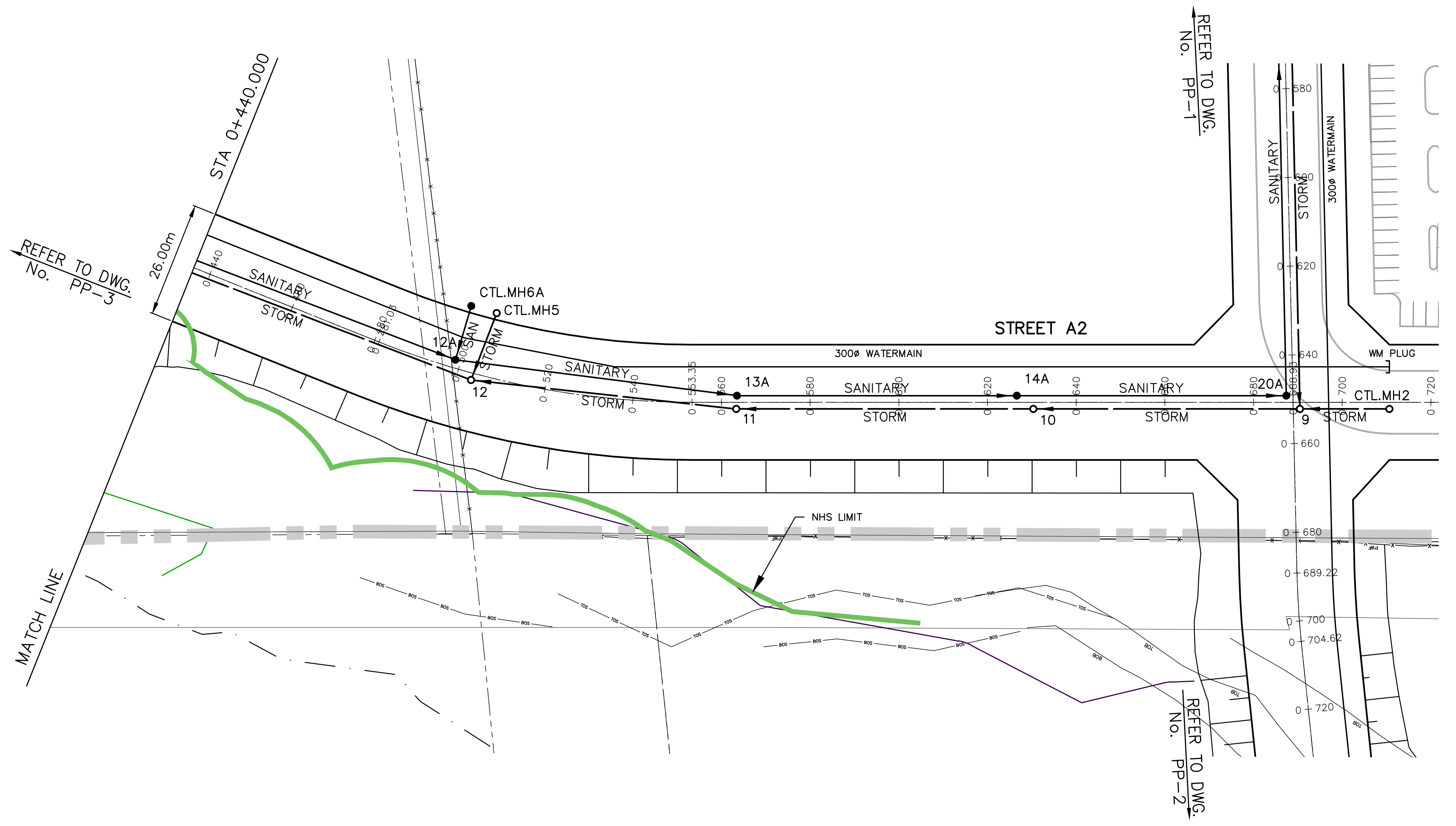
TOWN OF CALEDON

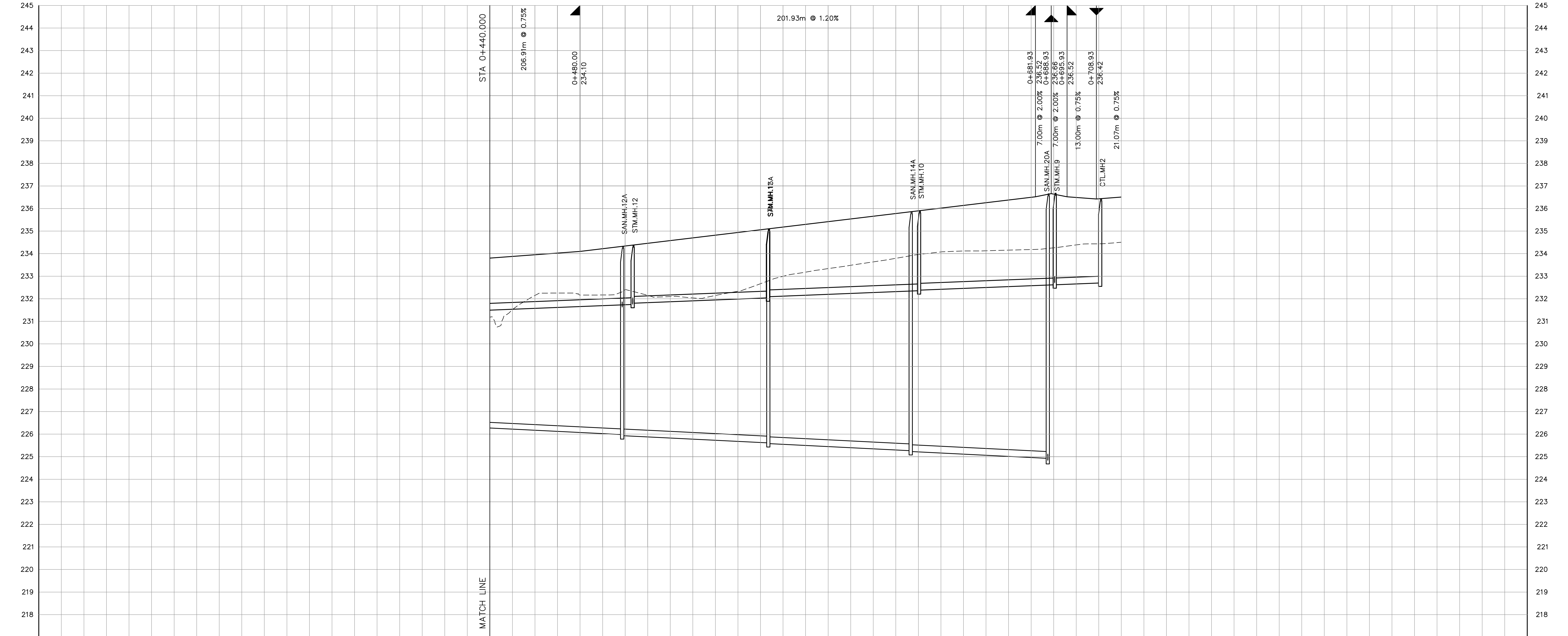
PLAN AND PROFILE OF

STREET A2

FROM STA. 0+000.000 TO STA. 0+440.000

SCALE H 1:1000 V 1:100		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. PP-3
CHECKED BY: F.T.	DATE: AUGUST 2021	



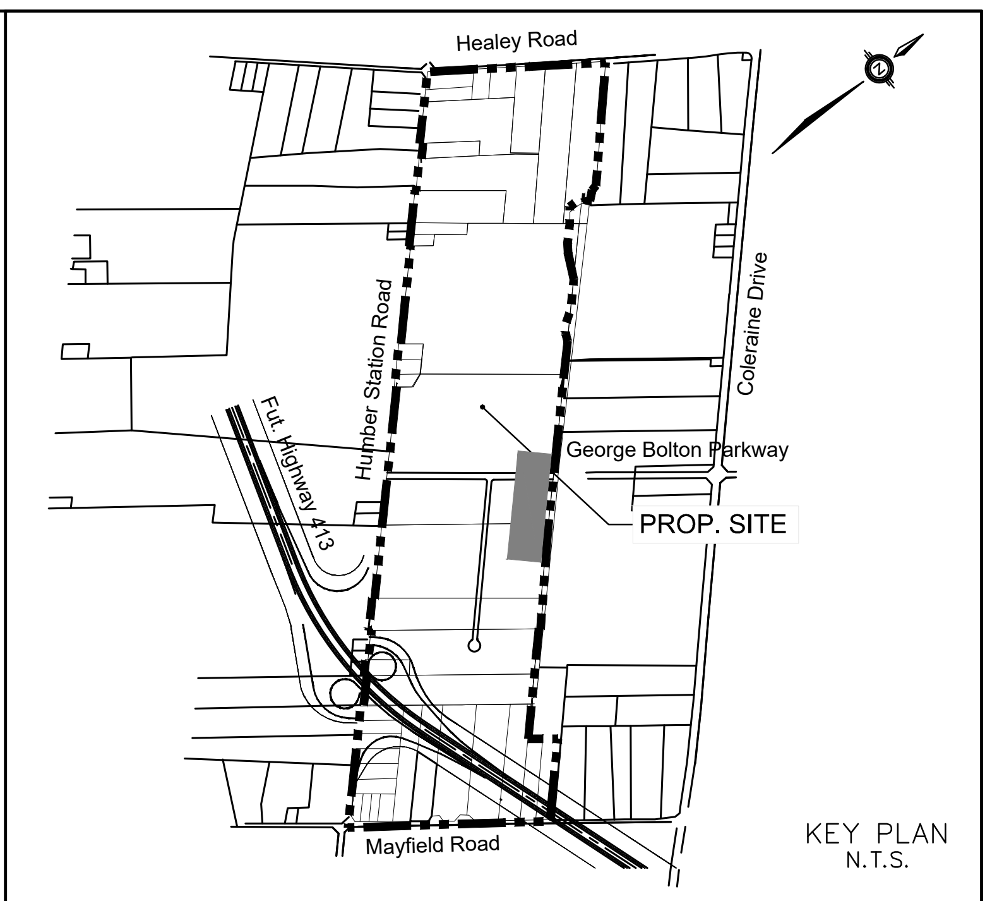


SANITARY SEWER: 225.98 | 225.93 | 225.61 | 225.58 | 225.26 | 225.23 | 224.93

STORM SEWER: 231.75 | 231.80 | 232.04 | 232.09 | 232.36 | 232.38 | 232.62 | 232.62 | 232.70

PROPOSED ELEVATION: 233.80 231.19 | 233.95 232.14 | 234.10 232.17 | 234.34 232.40 | 234.58 232.10 | 234.82 232.15 | 235.06 232.67 | 235.30 233.18 | 235.54 233.48 | 235.78 233.79 | 236.02 234.08 | 236.26 234.13 | 236.50 234.18 | 236.49 234.39 | 236.51 234.50

CHAINAGE: 0+440.00 | 0+460.00 | 0+480.00 | 0+481.93 | 0+500.00 | 0+517.19 | 0+520.00 | 0+540.00 | 0+553.35 | 0+560.00 | 0+580.00 | 0+600.00 | 0+620.00 | 0+640.00 | 0+660.00 | 0+680.00 | 0+688.93 | 0+700.00 | 0+720.00



KEY PLAN
N.T.S.

LEGEND

○	DENOTES STORM MANHOLE
— - —	DENOTES STORM SEWER
●	DENOTES SANITARY MANHOLE
——	DENOTES SANITARY SEWER
▬ ▪ ▪	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
▨	DENOTES PROPOSED LID/SWM FACILITY
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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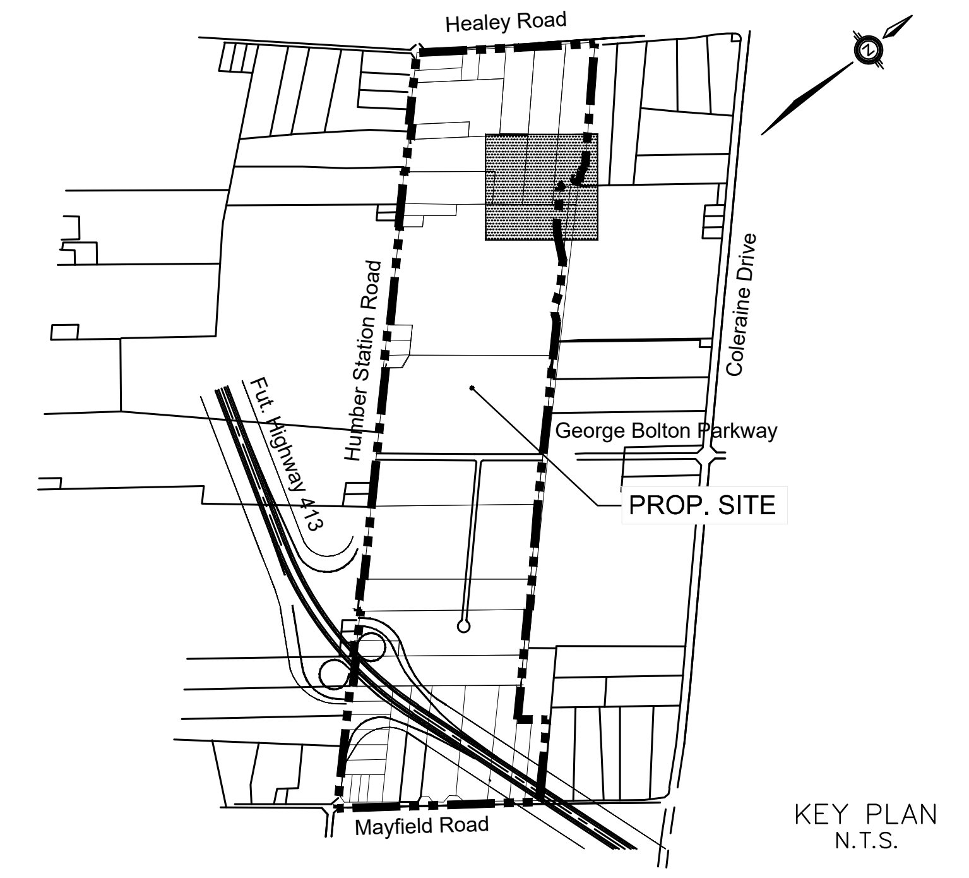
PLAN AND PROFILE OF

STREET A2

FROM STA. 0+440.000 TO STA. 0+720.000

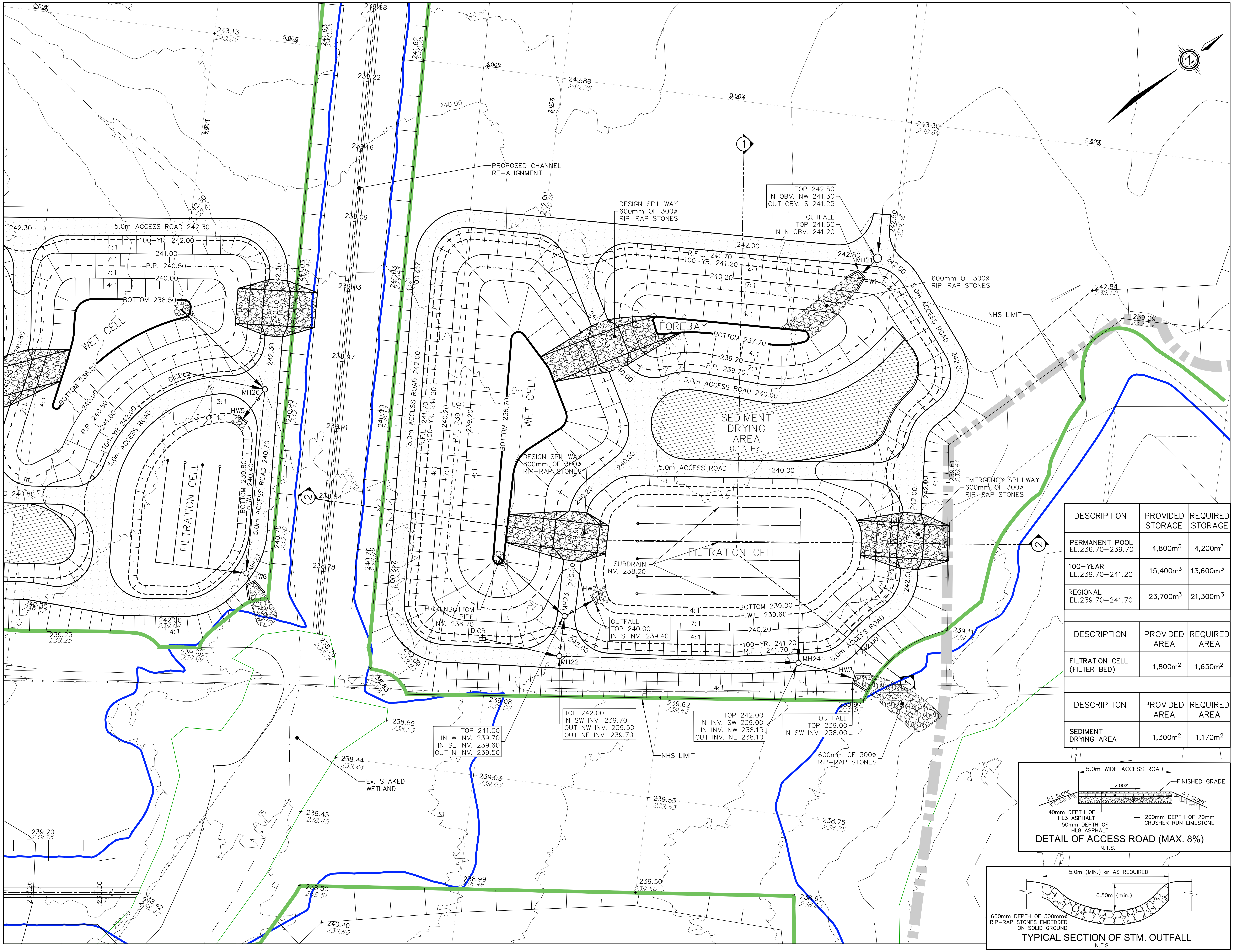
SCALE H 1:1000
V 1:100
DESIGNED BY: M.Z.
DRAWN BY: M.Z.
CHECKED BY: F.T.
DATE: AUGUST 2021
PROJECT No. 2021-5139
DRAWING No. PP-4



KEY PLAN
N.T.S.

LEGEND

— · — · —	DENOTES REGIONAL WATER LEVEL
– – – – –	DENOTES 100–YEAR WATER LEVEL
— ·· — ·· —	DENOTES PERMANENT POOL LEVEL
━━━	DENOTES SWM POND BOTTOM
———	DENOTES SWM POND CONTOUR
░	DENOTES ACCESS ROAD
▩	DENOTES RIP–RAP STONE ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R OR APPROVED EQUAL.
▨	DENOTES SEDIMENT DRYING AREA
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM
▬ ▪ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
211.0	DENOTES EXISTING CONTOUR ELEVATION
208.00	DENOTES PROPOSED ELEVATION
━━━	DENOTES REGULATORY FLOODLINE



DETAIL OF ACCESS ROAD (MAX. 8%)
N.T.S.

TYPICAL SECTION OF STM. OUTFALL
N.T.S.

DESCRIPTION	PROVIDED STORAGE	REQUIRED STORAGE
PERMANENT POOL EL.236.70–239.70	4,800m³	4,200m³
100–YEAR EL.239.70–241.20	15,400m³	13,600m³
REGIONAL EL.239.70–241.70	23,700m³	21,300m³

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
FILTRATION CELL (FILTER BED)	1,800m²	1,650m²

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
SEDIMENT DRYING AREA	1,300m²	1,170m²

NO.	DATE	ISSUED FOR
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H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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CONSULTING ENGINEERS
SCHAEFFER & ASSOCIATES LTD.

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TOWN OF CALEDON

SWM POND 1

SCALE: 1:500		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. SWM-1-1
CHECKED BY: P.S.	DATE: AUGUST 2024	

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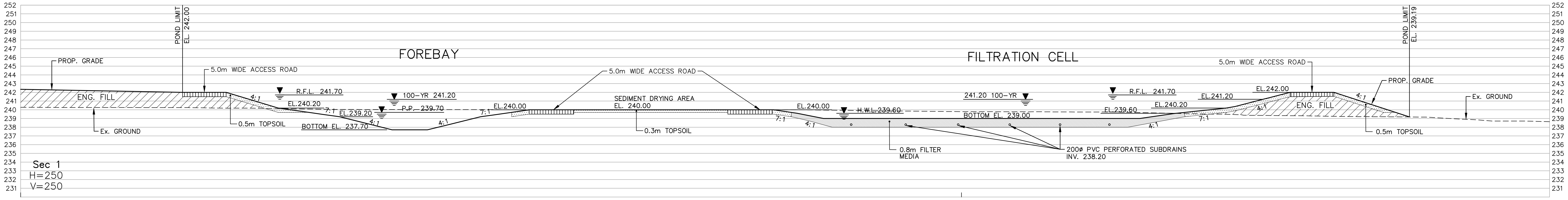

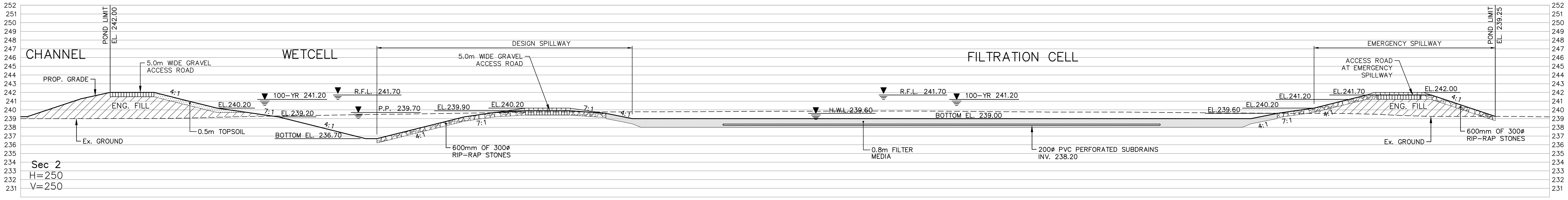

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REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

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SWM POND 1
SECTIONS

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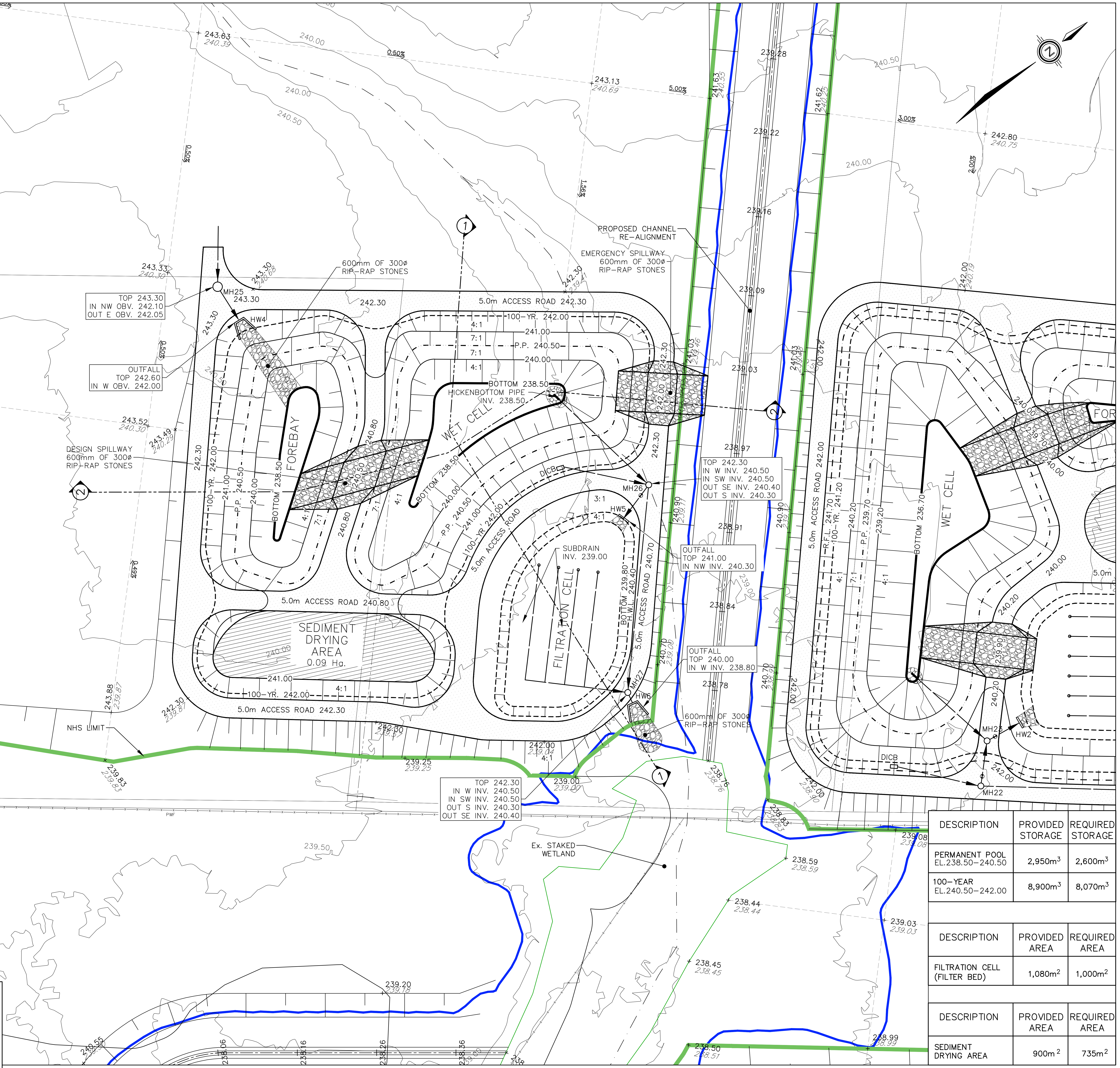
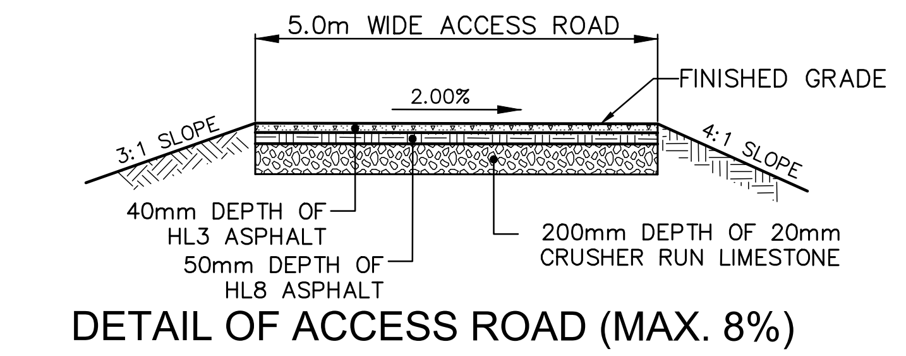
DRAWN BY: M.Z.
CHECKED BY: P.S.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. SWM-1-2



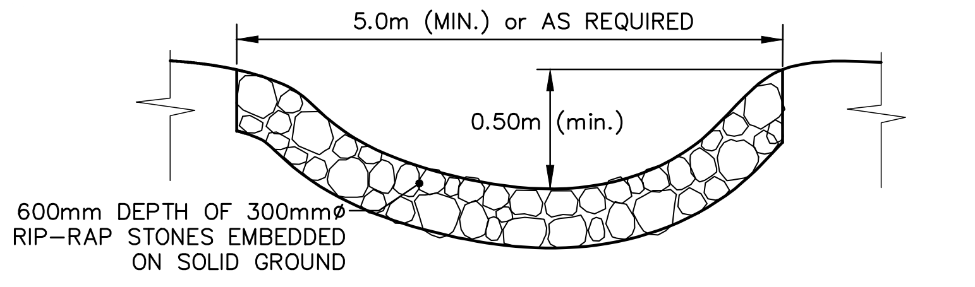
DESCRIPTION	PROVIDED STORAGE	REQUIRED STORAGE
PERMANENT POOL EL.238.50-240.50	2,950m^3	2,600m^3
100-YEAR EL.240.50-242.00	8,900m^3	8,070m^3

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
FILTRATION CELL (FILTER BED)	1,080m^2	1,000m^2

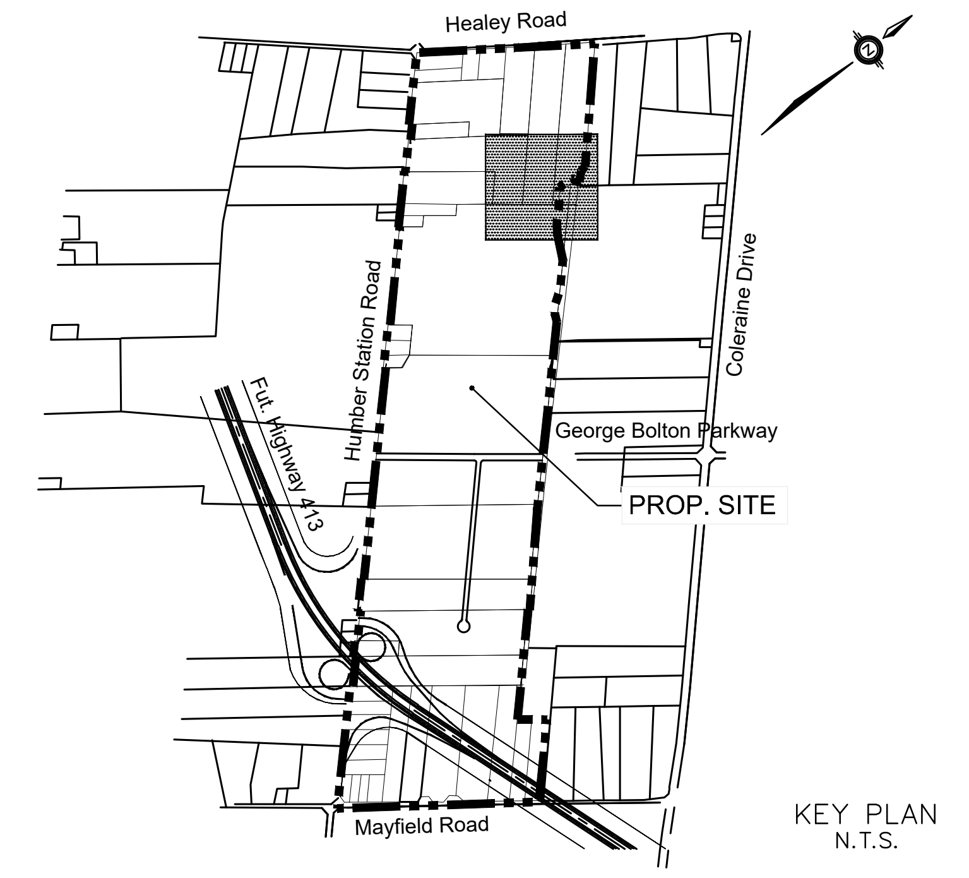
DESCRIPTION	PROVIDED AREA	REQUIRED AREA
SEDIMENT DRYING AREA	900m^2	735m^2



DETAIL OF ACCESS ROAD (MAX. 8%)
N.T.S.



TYPICAL SECTION OF STM. OUTFALL
N.T.S.



KEY PLAN
N.T.S.

LEGEND

— · — · —	DENOTES REGIONAL WATER LEVEL
- - - - - -	DENOTES 100-YEAR WATER LEVEL
— ·· — ·· —	DENOTES PERMANENT POOL LEVEL
━━━	DENOTES SWM POND BOTTOM
───	DENOTES SWM POND CONTOUR
▒	DENOTES ACCESS ROAD
▩	DENOTES RIP-RAP STONE ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R OR APPROVED EQUAL.
▨	DENOTES SEDIMENT DRYING AREA
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM
▬ ■ ■ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
211.0	DENOTES EXISTING CONTOUR ELEVATION
208.00	DENOTES PROPOSED ELEVATION
🟦	DENOTES REGULATORY FLOODLINE

NO.	DATE	ISSUED FOR
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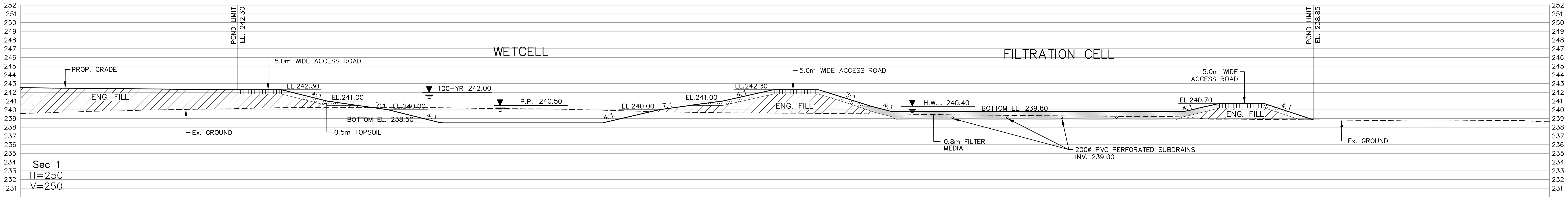
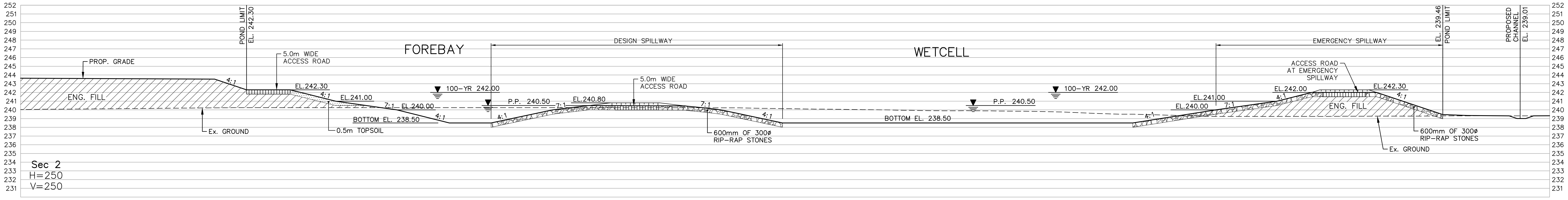
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. SWM-2-1





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SWM POND 2
SECTIONS

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DRAWN BY: M.Z.
CHECKED BY: P.S.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. SWM-2-2

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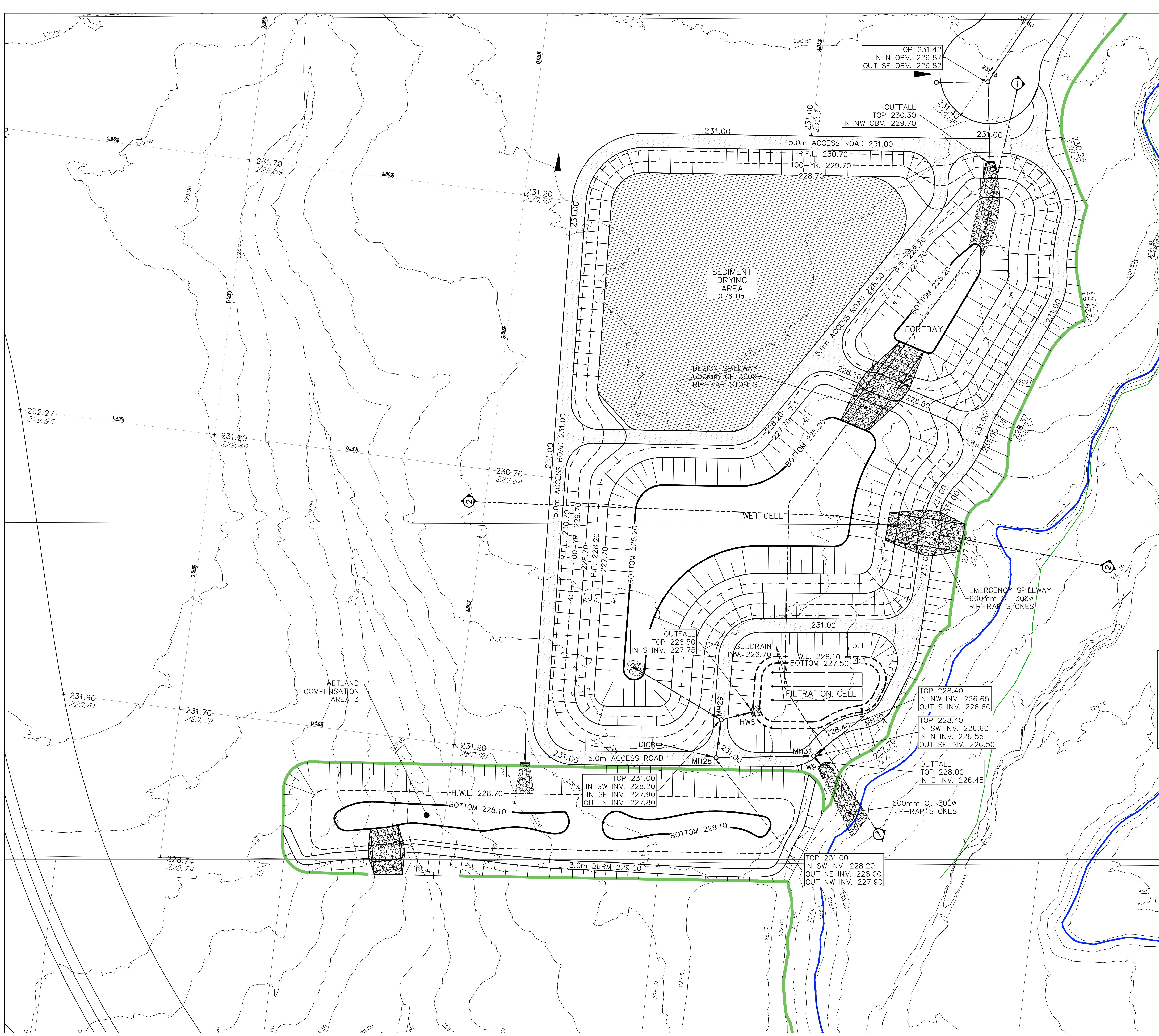

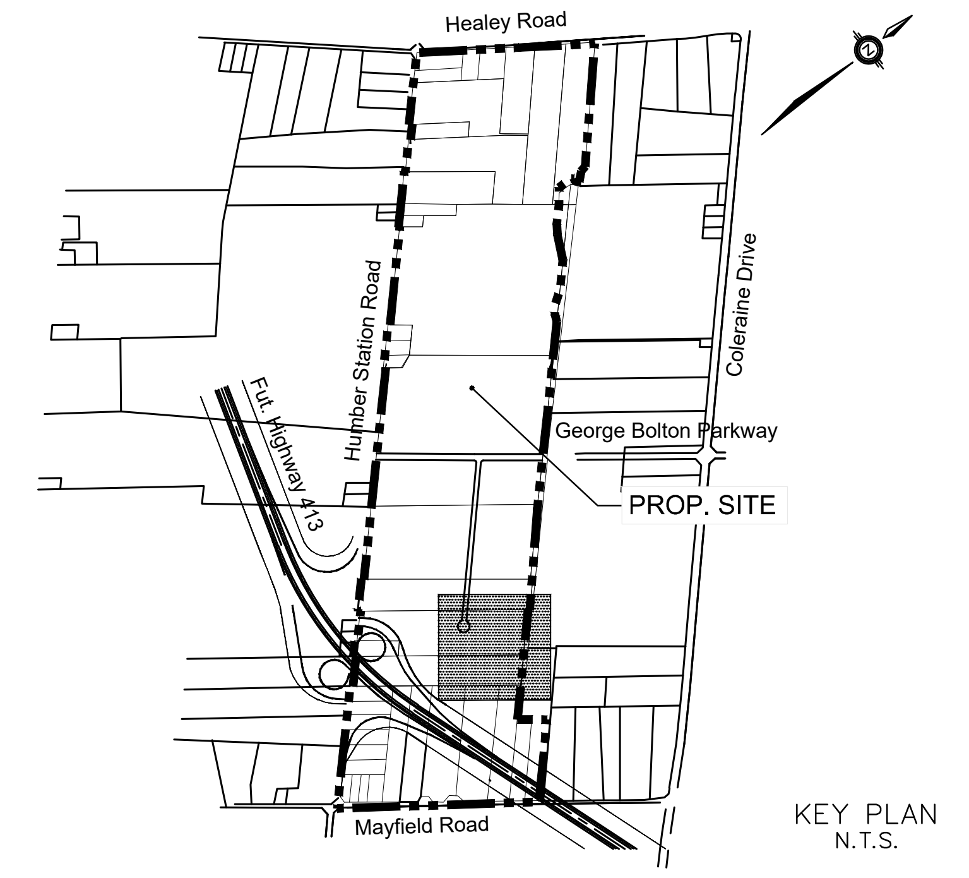

KEY PLAN
N.T.S.

LEGEND

- DENOTES REGIONAL WATER LEVEL
- DENOTES 100–YEAR WATER LEVEL
- DENOTES PERMANENT POOL LEVEL
- DENOTES SWM POND BOTTOM
- DENOTES SWM POND CONTOUR
- ░ DENOTES ACCESS ROAD
- DENOTES RIP–RAP STONE ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R OR APPROVED EQUAL.
- ▨ DENOTES SEDIMENT DRYING AREA
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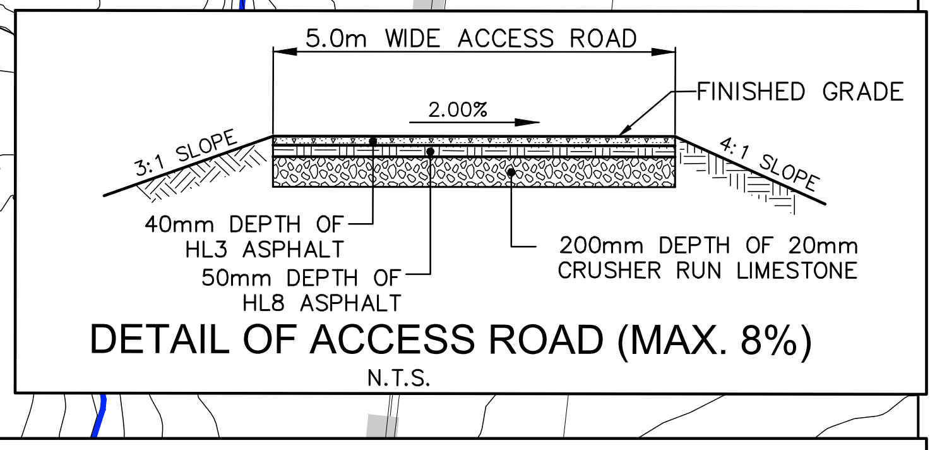
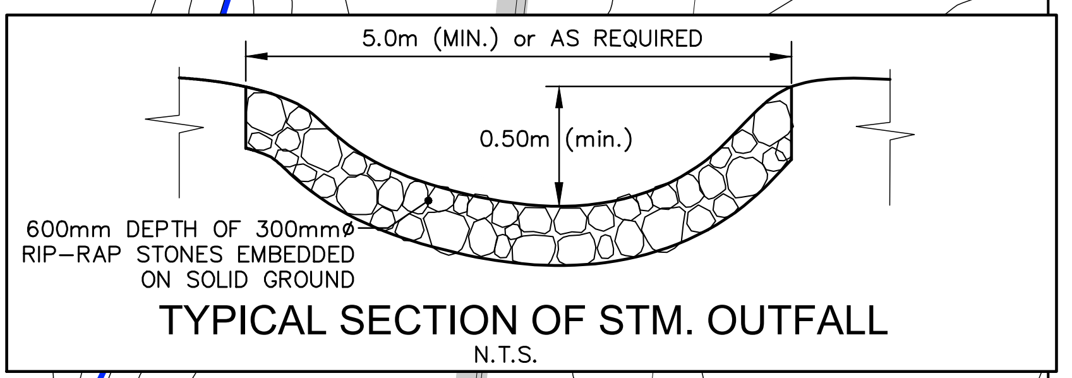
- 211.0 DENOTES EXISTING CONTOUR ELEVATION
- 208.00 DENOTES PROPOSED ELEVATION
- 🟦 DENOTES REGULATORY FLOODLINE



DETAIL OF ACCESS ROAD (MAX. 8%)
N.T.S.



TYPICAL SECTION OF STM. OUTFALL
N.T.S.

DESCRIPTION	PROVIDED STORAGE	REQUIRED STORAGE
PERMANENT POOL EL.225.20–228.20	19,510m^3	18,500m^3
100–YEAR EL.228.20–229.70	29,670m^3	28,000m^3
REGIONAL EL.228.20–230.70	48,500m^3	44,000m^3

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
FILTRATION CELL (FILTER BED)	750m^2	600m^2

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
SEDIMENT DRYING AREA	7,600m^2	7,140m^2

NO.	DATE	ISSUED FOR
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NOV. 1, 2024

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SWM POND 3

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CHECKED BY: P.S.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. SWM-3-1

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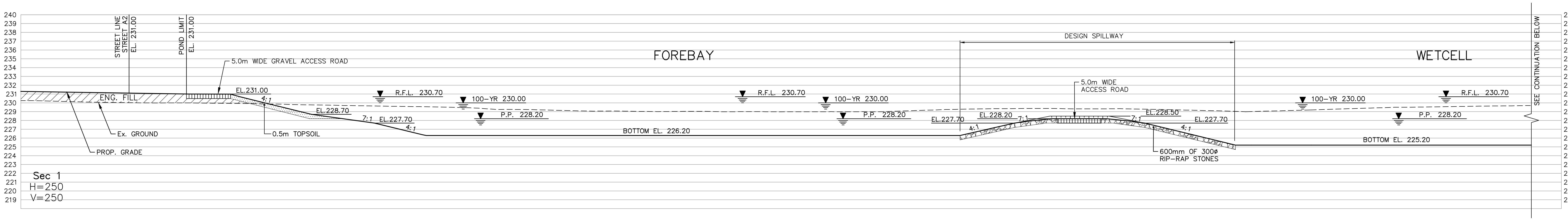

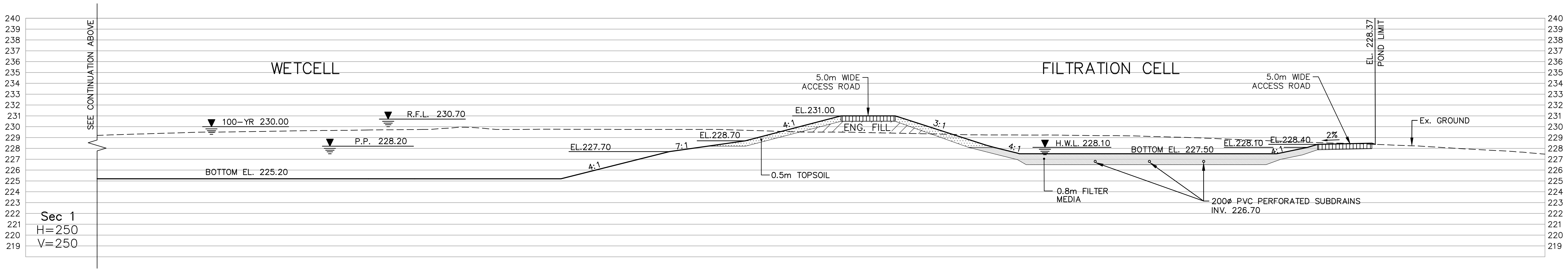

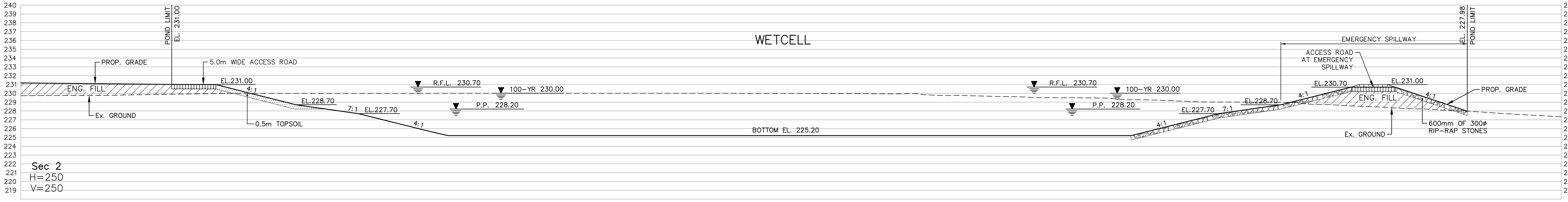

NO.	DATE	ISSUED FOR
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REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

HUMBER STATION VILLAGES

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SWM POND 3
SECTIONS

SCALE: AS SHOWN		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. SWM-3-2
CHECKED BY: P.S.	DATE: AUGUST 2024	

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APPENDIX D

Geotechnical Engineering

APPENDIX D- Humber Station CEISMP – Geotechnical Review

Summary of Previous Reports

Past geotechnical reporting for the Study Area includes the following:

- Preliminary Geotechnical Study, DS Consultants LTD. – Southeast of Humber Station Road and Healy Road, Bolton, Ontario., June 7, 2023.
- Supplemental Geotechnical Investigation, Pinchin - 12519-12713 Humber Station Road, Caledon, Ontario., October 6, 2023.
- Arcadis – Preliminary Geotechnical Investigation. 12834 Humber Station Rd., Caledon, ON. June 2024

Soil conditions were first investigated in 2023 by DS Consultants Ltd. (DS) in their Preliminary Geotechnical Investigation for Proposed Employment Land. DS Consultants completed geotechnical studies on the northern-most portion of the study area, just south of Healy Road, as well as the southern section to the north of Mayfield Road. Thirteen boreholes were advanced to depths ranging from 7.9 m to 8.2 m below existing grade. A supplemental geotechnical investigation for the proposed industrial development (12519 to 12713 Humber Station Rd., Caledon) was conducted by Pinchin in 2023 in advance of a proposed development of five slab-on-grade industrial warehouse buildings located at 12519 to 12713 Humber Station Road.

The survey data of the boreholes/test-pits indicated that the Site is at an elevation which ranges from approximately 232 to 239 m above sea level (masl). From the review of available topographic maps, it is noted that a tributary of the West Humber River is located on-Site and ranges in elevation between 230 and 240 masl with a total elevation change of up to approximately 6.0 m proceeding from northern high to the lower southern property boundary. This tributary enters the Site from the north and travels southward to an on-Site pond. The pond discharges into a tributary of the West Humber River that exists on the south and west side of the Site. The West Humber River is located approximately 12 km southeast of the Site.

Data obtained from the Ontario Geological Survey (OGS) Maps, as published by the Ontario Ministry of Natural Resources, indicates that the overburden soil at the Site consists of Halton Till: clay to silt-textured till (young tills: clayey silt till). The underlying bedrock at this Site is shale, limestone, dolostone, siltstone of the Georgian Bay Formation.

Based on the review of the regional geology map and the available well records, the overburden soils are underlain by bedrock between 16.0 and 40.0 metres below ground surface (mbgs). Static groundwater levels were recorded in open boreholes to range from 2.2 mbgs to greater than 5.5 m bgs but may be affected by perched groundwater conditions in the dense and tight till soils. Permanent saturated conditions were inferred to be present at approximately 3 mbgs to 4.5 mbgs. The Study Area is characterized by gently rolling topography and the ground slopes generally southward across the Subject Lands.

Soil conditions were first investigated in 2023 by DS Consultants Ltd. (DS) in their Preliminary Geotechnical Investigation for Proposed Employment Land. DS Consultants completed geotechnical studies on the northern-most portion of the study area, just south of Healy Road, as well as the southern section to the north of Mayfield Road. Thirteen boreholes were advanced to depths ranging from 7.9 to 8.2 m below existing grade. A summary of the geotechnical findings of the DS report are as follows:

- Based on all thirteen (13) boreholes, DS (2023) encountered a topsoil/organic layer with a thickness ranging from 250 to 350 mm throughout the site. The topsoil is underlain with a shallow layer of weathered/disturbed/reworked native till extending 0.5 to 1.5 mbgs. SPT values ranged from 5 to 13 blows per 0.3 m penetration.
- Clayey Silt to Silty Clay Till was encountered in all DS (2023) boreholes extending to depths ranging from 2.3 to 8.2 mbgs. This soil was in a stiff to hard consistency with SPT values ranging from 11 to greater than 50 blows per 300mm penetration depth. Cobbles and boulders were inferred to be present in this stratum, based on auger grinding. Atterberg Limits testing on three samples in this stratum yielded the following data: Liquid Limit (W_L)= 27.7 to 27.8%, Plasticity Limit (W_P)= 15.4 to 16.6%

  Plasticity Index (PI)= 11.2 to 12.4, Typical moisture content (w)= <15% at depths >1 mbgs (at BH23-2b). Grain Size tests conducted on five soil samples in this strata found the following fractions: Clay= 20 to 33%; Silt = 44 to 75%; Sand= 4 to 21% and Gravel= 0 to 4%
- A Sandy Silt to Silty Sand (Till) to Silt was also encountered in al boreholes, except BH23-3, BH23-8 and BH23-9. Cobbles and boulders were inferred to be present in this stratum. This soil type extended to depths of 7.9 to 8.2 mbgs. All boreholes were terminated in this stratum, except for BH23-3, -8, -9 and -10. This soil was in a dense to very dense state with measured SPT blow counts ranging from 32 to over 50 blows per 300 mm. Grain size analyses on five samples in this stratum found the following fractions: Clay= 3 to 15%; Silt = 29 to 87%; Sand= 2 to 68% and Gravel= 0 to 8%.
- Groundwater was encountered at depths ranging from 0.3 to 3.8 m bgs.

Pinchin completed the Supplemental Geotechnical Investigation- Proposed Industrial Development (12519 to 12713 Humber Station Rd., Caledon) Oct 2023 report in advance of a proposed development of five slab-on-grade industrial warehouse buildings located at 12519 to 12713 Humber Station Road. Eighteen boreholes and fourteen shallow topsoil probes were completed in July 2022 and an additional 82 boreholes, and 14 surficial topsoil test pits were advanced in 2023 across their study area. Six monitoring wells were installed. A summary of the geotechnical findings is provided below:

- Topsoil was encountered in all boreholes of 150 mm to 260 mm thickness. Localized thicknesses of up to 545 mm were also encountered with an average of 235 mm calculated. The topsoil consisted of silt, trace to some sand with some organics.
- Sandy Silty Clay to Silty Clay with Sand Till of 2.9 to 6.5 m thickness was present beneath the topsoil in all boreholes. The cohesive till had a stiff to hard consistency, low plasticity, with SPT values ranging from 8 to >50 blows per 300mm penetration. Grain size analyses found that samples contained 14 to 36% clay, 43 to 78% silt, 7 to 31% sand and 1 to 9% gravels. Atterberg testing found liquid limits between 21 to 28%, plastic limits from 13 to 15% and a typical moisture content between 10 to 15% with localized areas of higher or lower moisture content.
- Sandy Silt / Silty Sand and Sand and Gravel layers were encountered at the bottom of 21 of 82 boreholes at depths ranging from 2.3 to 6.1 mbgs extending to the full depth of boreholes. SPT values ranged from 30 to >50 indicating a dense to very dense condition in these non-cohesive deposits.

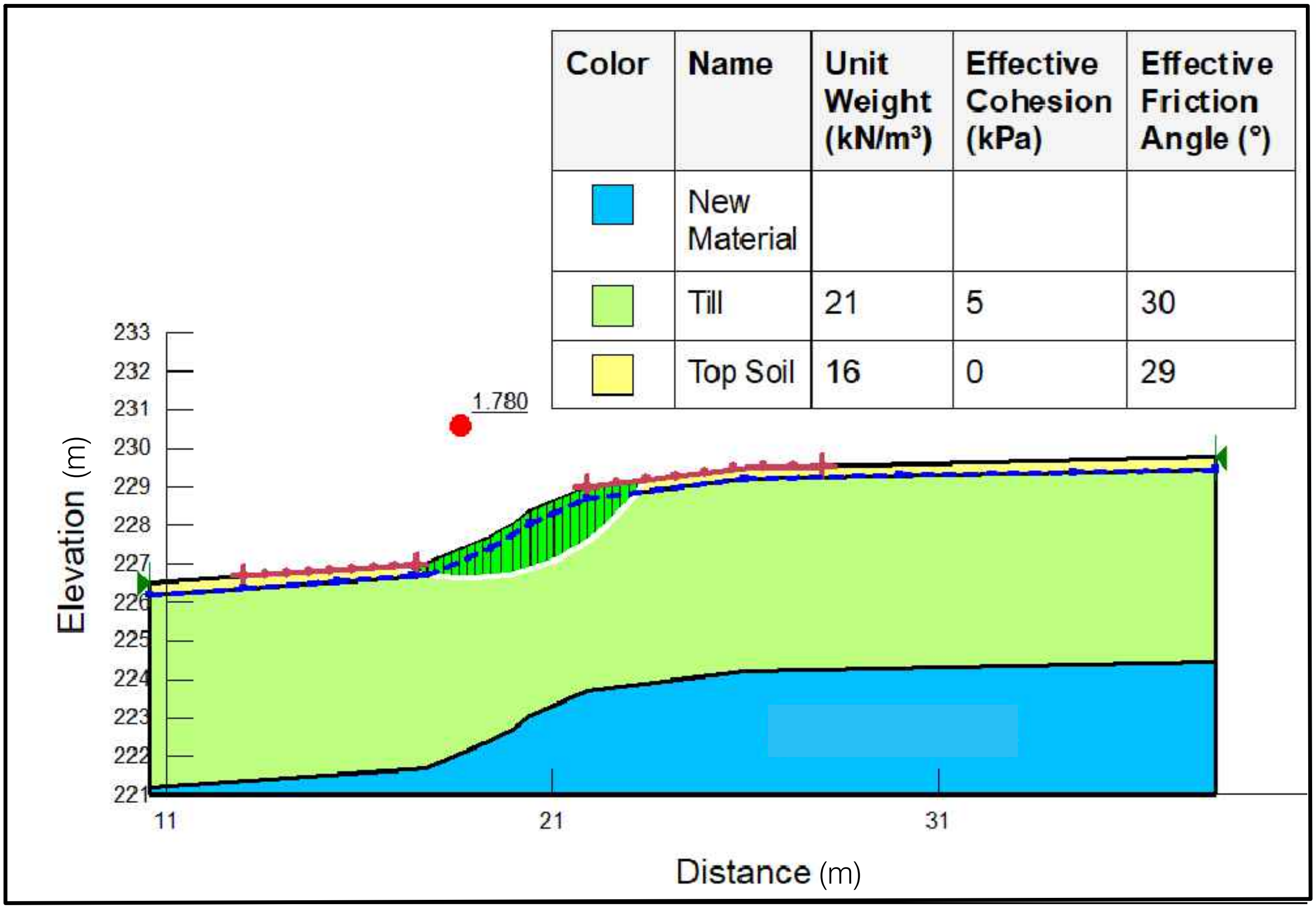
- Groundwater was encountered at depths of approximately 2.2 to 5.5 mbgs in open boreholes. Permanent groundwater was inferred at 3.0 to 4.5 mbgs based on depths of grey colour of soils, although perched conditions were likely to occur.
- For purposes of slope stability modelling, it was determined that the unit weight of the silty clay till should equal 21 kN/m^3 with a friction angle of 30 degrees and a cohesion of 5 kPa.

Recommended Components of a Sediment and Erosion Protection Plan

Arcadis recommends preparation of a Sediment and Erosion Protection Plan, which should include the following work items:

- Install stone mud mats at all construction entrances.
- Install silt fence at the downslope side of disturbed areas and snow fence (if necessary) along the perimeter of the development envelope, prior to the start of construction.
- Accumulated silt shall be removed from all sediment control devices as required during construction and disposed of in locations approved by the Town of Caledon and TRCA.
- All catch basins are to be fitted with sediment control devices as directed by the engineer and in accordance with Town of Caledon’s standard requirements.
- All exposed soils are to be stabilized and vegetated as soon as possible using seed and mulch application on a cover of 100 mm of topsoil, as directed by the engineer.
- Half bulk head to be installed in storm manholes immediately upstream from outfall structures and removed after all building construction and landscaping activity has been completed.
- No construction activity/machinery shall intrude beyond the silt/snow fence or property limit. All construction vehicles shall enter and leave the site via designated entrances.
- Stockpile topsoil at designated locations and at least 15 m away from the top bank of the watercourse. Stockpiles will be contained by silt fences on the downslope side.
- Additional erosion/sediment controls may be required on site as determined by the engineer.
- All regraded areas that are not occupied by buildings, roads, sidewalks, driveways, park, and other services shall be provided with a 100 mm topsoil cover and sodded/seeded immediately after completion of final grading operations, as directed by the engineer.
- All temporary erosion and sediment controls must be installed prior to the commencement of site grading. All such must be inspected on a regular basis and after every rainfall event and must be cleaned and maintained as required to prevent the migration of sediment from the site.
- All sediment and erosion control facilities are to remain in place until finalization of construction activity.
- All temporary erosion and sediment controls must be removed after construction and once the site has been stabilized to the Town of Caledon’s satisfaction. All areas disturbed by erosion/sediment control devices are to be restored with a cover of 100 mm topsoil and sodded/seeded after construction.

All material and workmanship shall conform to the current Ontario OPSD standards and the standards endorsed by the Town of Caledon, the TRCA and other regulatory agencies.



Color	Name	Unit Weight (kN/m³)	Effective Cohesion (kPa)	Effective Friction Angle (°)
🟦	New Material			
🟩	Till	21	5	30
🟨	Top Soil	16	0	29

Title: **SLOPE STABILITY PLOT/X-SECTION AT CLARKWAY DRIVE TRIBUTARY**

Project: **HUMBER STATION CEISMP**

Client: **DELTA URBAN INC.**

ARCADIS

Date: August 2024

FIGURE D-1

APPENDIX E

Hydrogeology Dewatering Estimates

Confined Aquifer - George Bolton Parkway

Pumping Rate Formula for a Confined Aquifer (Powers et al., 2007):

$$Q = \frac{2\pi KB(H-h)}{\ln(R_0 / r_s)} + 2\left[\frac{xKB(H-h)}{L}\right]$$

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
B = Thickness of the aquifer (m)
H = Distance from initial static water level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m)
x = Trench Length (m)
L = Distance from a line source to the trench, equivalent to R_o (m)

Parameter	Units	Value
Q	**m^3/day**	639.4
K	**m/day**	8.64
B	**m**	4.09
H	**m**	4.1
h	**m**	-10.7
R_0	**m**	1889.3
Trench width	**m**	1.0
r_s	**m**	9.9
x	**m**	30.0
L	**m**	1889.3

Q (L/s) = 7.40

Considering a factor of safety of 3
Required Dewatering Rate:
Q = 1918 m^3/day
Q = 22.20 L/s

Formula for r_s (Powers et al., 2007):

$$r_s = \frac{a+b}{\pi}$$

Where:

r_s = Distance to the wellpoints from the centre of the trench (m)
a = Length of the trench (m)
b = Width of the trench (m)

Parameter	Units	Value
r_s	**m**	9.9
a	**m**	30.0
b	**m**	1.0

Radius of Influence Formula (Bear, 1979):

$$R_0 = 2.45\sqrt{\frac{T}{S}t}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
T = Transmissivity of the aquifer (m^2/s)
S = Storage coefficient of the aquifer formation
t =Time (s) required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)

Parameter	Units	Value
R_0	**m**	1889.3
T	**m^2/s**	4.1E-04
S		8.32E-04
t	**s**	1209600

Storage Coefficient Formula (Freeze and Cherry, 1979):

$$S = S_s B$$

Where:

S = Storage coefficient of the aquifer formation
Ss = Specific storage of the aquifer (1/m)
B = Thickness of the aquifer (m)

Parameter	Units	Value
S		8.32E-04
S_s	1/m	2.03E-04
B	m	4.09

Legend:

🟩 Input
⬜ Calculated Output

Confined Aquifer - George Bolton Parkway

Pumping Rate Formula for a Confined Aquifer (Powers et al., 2007):

$$Q = \frac{2\pi KB(H-h)}{\ln(R_0 / r_s)} + 2\left[\frac{xKB(H-h)}{L}\right]$$

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
B = Thickness of the aquifer (m)
H = Distance from initial static water level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m)
x = Trench Length (m)
L = Distance from a line source to the trench, equivalent to R_o (m)

Parameter	Units	Value
Q	**m^3/day**	85.0
K	**m/day**	0.86
B	**m**	4.09
H	**m**	4.1
h	**m**	-10.7
R_0	**m**	597.4
Trench width	**m**	1.0
r_s	**m**	9.9
x	**m**	30.0
L	**m**	597.4

Q (L/s) = 0.98

Considering a factor of safety of 3
Required Dewatering Rate:
Q = 255 m^3/day
Q = 2.95 L/s

Formula for r_s (Powers et al., 2007):

$$r_s = \frac{a+b}{\pi}$$

Where:

r_s = Distance to the wellpoints from the centre of the trench (m)
a = Length of the trench (m)
b = Width of the trench (m)

Parameter	Units	Value
r_s	**m**	9.9
a	**m**	30.0
b	**m**	1.0

Radius of Influence Formula (Bear, 1979):

$$R_0 = 2.45\sqrt{\frac{T}{S}t}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
T = Transmissivity of the aquifer (m^2/s)
S = Storage coefficient of the aquifer formation
t =Time (s) required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)

Parameter	Units	Value
R_0	**m**	597.4
T	**m^2/s**	4.1E-05
S		8.32E-04
t	**s**	1209600

Storage Coefficient Formula (Freeze and Cherry, 1979):

$$S = S_s B$$

Where:

S = Storage coefficient of the aquifer formation
Ss = Specific storage of the aquifer (1/m)
B = Thickness of the aquifer (m)

Parameter	Units	Value
S		8.32E-04
S_s	1/m	2.03E-04
B	m	4.09

Legend:

🟩	Input
⬜	Calculated Output

Dewatering Calculations
Dewatering @ Street A2

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

$$Q = \frac{\pi K(H^2 - h^2)}{\ln(R_0 / r_s)} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right]$$

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
H = Distance from initial static water level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
x = Trench Length (m)
L = Distance from a line source to the trench, equivalent to R_o (m)

Parameter	Units	Value
Q	**m^3/day**	1.5
K	**m/day**	0.00
H	**m**	10.2
h	**m**	2.5
R_0	**m**	3.6
Trench width	**m**	1
r_s	**m**	0.5
x	**m**	30.0
L	**m**	3.6

Q (L/s) = 0.02

Considering a factor of safety of **3.0**
Required Dewatering Rate:
Q = 4.5 m^3/day
Q = 0.05 L/s

Radius of Influence Formula (Bear, 1979):

$$R_0 = 2.45\sqrt{\frac{HK}{S_y}t}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
H = Distance from initial static water level to bottom of saturated aquifer (m)
K = Hydraulic conductivity (m/s)
S_y = Specific yield of the aquifer formation
t = Time (s) required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)

Parameter	Units	Value
R_0	**m**	3.6
H	**m**	10.2
K	**m/s**	1.8E-08
S_y		0.10
t	**s**	1209600

Legend:

🟩	Input
☐	Calculated Output

Dewatering Calculations
Dewatering @ SWM 3 Pond

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

$$Q = \frac{\pi K(H^2 - h^2)}{\ln(R_0 / r_s)} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right]$$

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
H = Distance from initial static water level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
x = Trench Length (m)
L = Distance from a line source to the trench, equivalent to R_o (m)

Parameter	Units	Value
Q	**m^3/day**	1.5
K	**m/day**	0.00
H	**m**	4.4
h	**m**	1.4
R_0	**m**	1.3
Trench width	**m**	1
r_s	**m**	0.5
x	**m**	240.0
L	**m**	1.3

Q (L/s) = 0.02

Considering a factor of safety of **3.0**
Required Dewatering Rate:
Q = 4.4 m^3/day
Q = 0.05 L/s

Radius of Influence Formula (Bear, 1979):

$$R_0 = 2.45\sqrt{\frac{HK}{S_y}t}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
H = Distance from initial static water level to bottom of saturated aquifer (m)
K = Hydraulic conductivity (m/s)
S_y = Specific yield of the aquifer formation
t =Time (s) required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)

Parameter	Units	Value
R_0	**m**	1.3
H	**m**	4.4
K	**m/s**	5.0E-09
S_y		0.10
t	**s**	1209600

Legend:

🟩	Input
⬜	Calculated Output

Dewatering Calculations
Dewatering @ SWM Tank (LID Feature)

Dewatering Rate Formula for an Unconfined Aquifer (Powers et al., 2007):

$$Q = \frac{\pi K(H^2 - h^2)}{\ln(R_0 / r_s)} + 2\left[\frac{xK(H^2 - h^2)}{2L}\right]$$

Where:

Q = Anticipated pumping rate (m^3/day)
K = Hydraulic Conductivity (m/day)
H = Distance from initial static water level to bottom of the saturated aquifer (m)
h = Depth of water in the well while pumping (m)
R_0 = Distance from a point of greatest drawdown to a point where there is no drawdown (Radius of influence) (m)
r_s = Distance to the wellpoints from the centre of the trench (m), assumed to be half of the trench width
x = Trench Length (m)
L = Distance from a line source to the trench, equivalent to R_o (m)

Parameter	Units	Value
Q	**m^3/day**	0.8
K	**m/day**	0.01
H	**m**	2.1
h	**m**	0.0
R_0	**m**	3.3
Trench width	**m**	1
r_s	**m**	0.5
x	**m**	90.0
L	**m**	3.3

Q (L/s) = 0.01

Considering a factor of safety of 3.0
Required Dewatering Rate:
Q = 2.4 m^3/day
Q = 0.03 L/s

Radius of Influence Formula (Bear, 1979):

$$R_0 = 2.45\sqrt{\frac{HK}{S_y}t}$$

Where:

R_0 = Radius of Influence (m), beyond which there is negligible drawdown
H = Distance from initial static water level to bottom of saturated aquifer (m)
K = Hydraulic conductivity (m/s)
S_y = Specific yield of the aquifer formation
t =Time (s) required to draw the static groundwater level to the desired level (assumed to be equivalent to 14 days)

Parameter	Units	Value
R_0	**m**	3.3
H	**m**	2.1
K	**m/s**	6.8E-08
S_y		0.10
t	**s**	1209600

Legend:

🟩	Input
☐	Calculated Output

APPENDIX F

Floodplain Analysis

FLOODPLAIN ANALYSIS REPORT (PHASE 2)

HUMBER STATION VILLAGES COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY & MANAGEMENT PLAN (CEISMP)

TOWN OF CALEDON

PROJECT:2021-5139

AUGUST 2024
OCTOBER 2023

Revision	Description	Prepared		Checked	
		By	Date	By	Date
1	Second Submission (Phase II)	D.Y	August 2024	K.S.	August 2024
0	First Submission (Phase I)	D.Y	October 2023	K.S.	October 2023

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1.0 Introduction

In support of the Comprehensive Environmental Impact Study & Management Plan (CEISMP), Phase 2 being developed for the proposed Humber Station Villages development in the Town of Caledon, Schaeffers & Associates Ltd. (SCE) has conducted a Floodplain Analysis and delineation.

The floodplain analysis aimed to determine the extent of the floodplain through HEC-RAS modeling and the mapping of the regulatory flood line along various drainage features in the Humber Station Village area. This analysis is part of the Humber Station Village Comprehensive Environmental Impact Study & Management Plan (CEISMP) Phase 2 Report. The floodplain analysis report will provide supporting calculations and modelling, incorporating updated hydrology and hydraulic modeling as part of the CEISMP work. Please note that SCE has prepared the “Floodplain Analysis Report (Phase-1), Humber Station Village Comprehensive Environmental Impact Study & Management Plan (CEISMP)” Report, dated October 2023.

The current floodplain analysis includes a hydraulic assessment of existing conditions to establish a baseline and uncontrolled post-development conditions to delineate the regulatory floodplain. Realigned drainage features storage volume has also been estimated to balance cut and fill gradings. The regulatory floodplain map is used to define the development limits of the subject area and to inform channel design.

This report details the floodplain analysis results for both existing and future uncontrolled scenarios, including a review of hydraulic modeling parameters and analysis for the study area. The analysis encompasses all drainage features within and surrounding Humber Station Village. It is also important to note that TRCA has an approved hydraulic model for this area.

We have received two hydraulic models (i.e., for the west and east tributaries). The hydraulic model for the west tributaries was labeled as “Final-West_Humber” and for the east tributaries was labeled as “Clarkway_Trib”. SCE has combined the two models and created a combined HEC-RAS model. In addition to this, SCE has created two new Head Water Drainage Features (HDF) with in the subject area. One of the HDFs is created following the existing headwater drainage features along the north east corner of the subject area (defined as "HDF - 3") and the other one is created around the south end of the subject area (defined as "HDF-8") in the current modelling. Please refer to the Floodplain Map in **Appendix C** and the Digital Hydraulic Model in **Appendix E**.

As part of the CEISMP Phase 2, the future uncontrolled scenario was further updated to reflect the following updates:

- Proposed drainage realignment
- Addition of new Cross sections based on proposed terrain.
- Updating the hydrology model based on the latest post-development drainage plan

1.1 Background Information Review

The following reports, drawings, and information were reviewed in the preparation of this report:

- TRCA Stormwater Management Criteria (August 2012);
- Ministry of Transportation (MTO) Drainage Management Manual (1997);
- TRCA Stream Crossing Guideline (2015);
- Detailed topographic survey conducted by R-PE Surveying Ltd. (dated December 17th, 2021);
- TRCA approved Hydraulic (HEC-RAS) Model for the west tributary defined as "Final-West_Humber", received from TRCA on January 30th, 2023;
- TRCA approved Hydraulic (HEC-RAS) Model for the east tributary defined as "Clarkway Trib", received from TRCA on July 11th, 2023;
- TRCA approved Floodplain Mapping labeled as "hum_145", "hum_171", and "hum_172", received from TRCA on July 11th, 2023;
- TRCA approved Floodplain Mapping labeled as "1409-TRCA Floodlines_A1300237", received from TRCA on July 11th, 2023;

- TRCA approved the Humber River Virtual OTTHYMO (VO5) Hydrology Model, dated December 2018.
- TRCA approved the Humber River Existing Scenario Catchment Area (CAD), dated December 2017.
- Opportunities and Constraints (Figure 6), Prepared by GEI Consultants.

1.2 Study Area and Subject Site

The Humber Station Village Area (hereon referred to as Study Area) is bounded by Healey Road to the northwest, Coleraine Drive to the northeast, Mayfield Road to the southeast, and Humber Station Road to the southwest as shown in **Figure 1**. The site is generally characterized by agricultural land and drainage into the West Humber River.

The Study Area mainly consists of agricultural lands, with some estate residential properties and woodlots. The majority of the topography of the subject site slopes in a south and southwesterly direction following the drainage pattern of the West Humber River. Within the subject lands, there are three drainage features. These drainage features are defined in the current HEC-RAS Model as “HDF-3”, “HDF-8” and “Clarkway Trib A”. These watercourses are further discussed as follows:

- HDF-3: The drainage feature was defined as starting near Healy Road, flowing southwest, and exiting the area through an existing culvert at Humber Station Road. This drainage feature is classified as HDF. The drainage line traverses farmland, extending up to the bank edges, and does not show significant riverbank vegetation along most of its course. However, two wetland features are present along the watercourse, located near the middle and end of the reach, as illustrated in the Natural Heritage Figure prepared by GEI (see Appendix D). HDF-3 joins the major watercourse known as the “Gore Road Tributary” after crossing Humber Station Road. Under the proposed conditions, part of HDF-3 is planned for realignment.

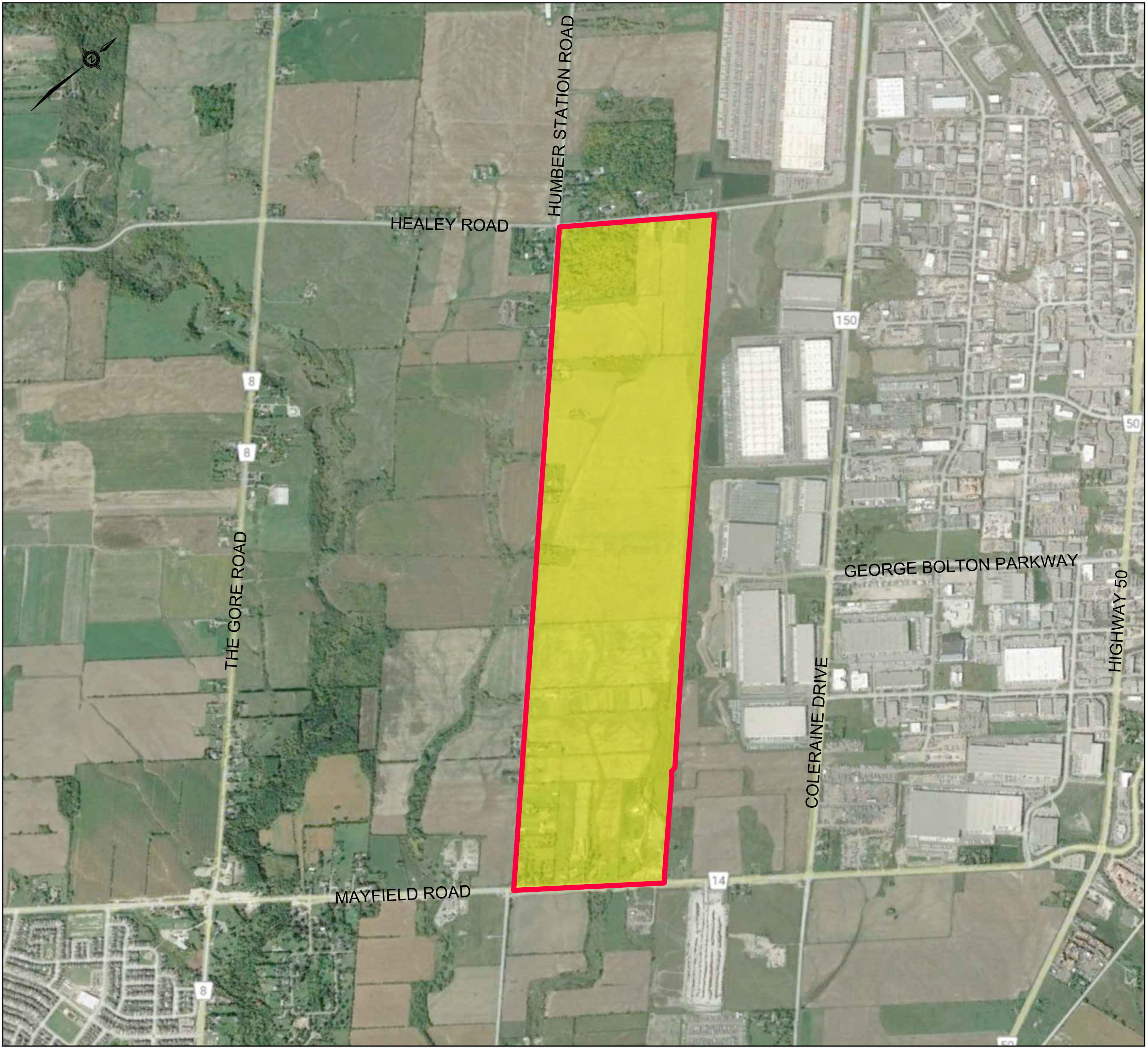
- HDF-8: It is an HDF draining southward across the farmland. The flow of this feature is generated fully from the subject area. Since the watercourse drainage area is small and has a narrow drainage feature, after discussing with TRCA we concluded that the first 50ha drainage area of the watercourse is not a regulatory floodplain. Hence, in the current analysis, the watercourse was analyzed after the drainage area was nearly higher than 47.38ha (See Node "A" in **Figure 2**). The watercourse length is approximately 900m, of which the first 340m length (i.e., between Node "A" and "B") is within the subject area and the remaining watercourse reach falls within the proposed Highway 413 corridor. The channel storage volume of the watercourse within the subject area (i.e., between Node "A" and Node "B") was approximated to be 1,750m^3. This will be further discussed in detail in *Section 4.2*.

- Clarkway Trib A: is a major watercourse draining in the south direction following the east boundary of the subject area. There is an engineered channel coming from the east direction and connected to this watercourse. It should be noted that the two major tributaries (i.e., Clarkway and Gore Road Tributaries) drain parallelly for more than 10km downstream of the subject area before the confluent at West Humber River.

1.3 Topographic Surveying

A detailed topographic ground survey along the Humber Station Road of the study area was conducted by R-PE Surveying Ltd. (dated December 17th, 2021). An additional topographic survey was prepared by David B. Searles Surveying Ltd., dated December 2023.

In this study, the available detailed topographic field data and aerial topographic data (where the detailed survey was not available) were used to produce a high-resolution Triangulated Irregular Network (TIN) for generating digital terrain layers. Furthermore, major road crossings have been surveyed. Please refer to **Appendix D** for the topographic map information.



HUMBER STATION VILLAGES
TOWN OF CALEDON

LEGEND

🟨 SUBJECT LOCATION

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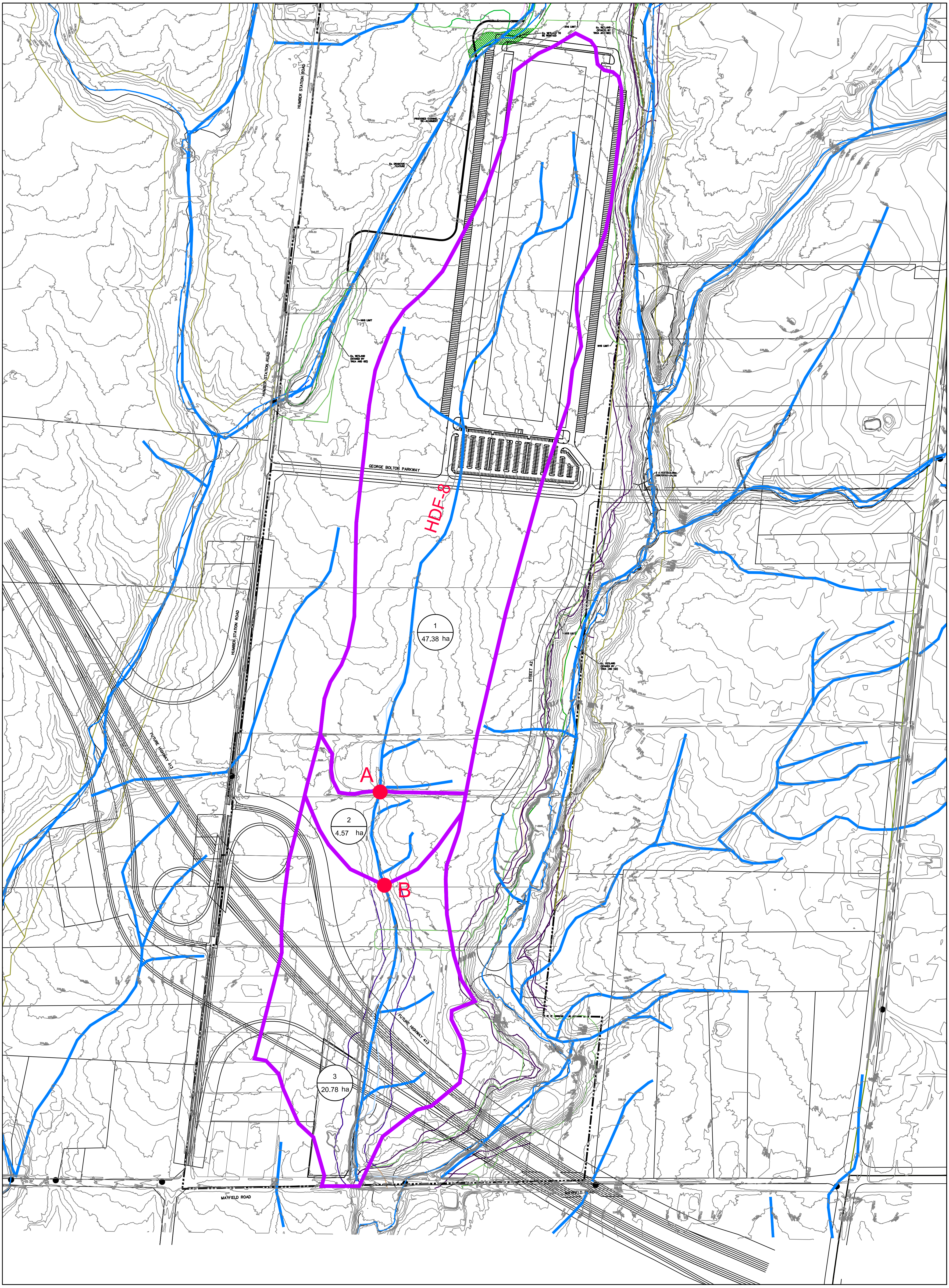
www.schaeffers.com

FIGURE 1
LOCATION PLAN

2021-5139	JULY 2024	SCALE: N.T.S.

W:\5100's\5139 - Humber Station Village\Drawings\Drainage\2024-07-26-5139-Pre-Dev Drainage HDF-8.dwg

Phil Gotfried



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LEGEND

▭ PRE DEVELOPMENT DRAINAGE BOUNDARY

13 / 3.11 ha TRCA CATCHMENT ID
TRCA AREA IN HECTARES

● NODE

FIGURE 2
HEADWATER DRAINAGE FEATURE
(HDF-8)
AREA FOR FLOODPLAIN ANALSIS

2021-5139
JULY 2024
SCALE: N.T.S.

2.0 Methodology of HEC-RAS Modelling and Floodplain Analysis

2.1 SCE Modified Existing Conditions HEC-RAS Model

SCE has prepared the hydraulic (HEC-RAS) model via HEC-RAS 6.2 based on the latest TRCA-approved hydraulic model of the subject site. Detailed topographic survey data were reviewed for the subject area. Bank location, watercourse center lines, cross-section geometries, hydraulic structures information, and all related information have been updated based on the detailed topographic survey data. Additional HEC-RAS cross-sections and crossing structures were added to the TRCA model to better reflect existing conditions. Please see **Figure 4** for the location map of existing culverts within and around the subject area.

For the remainder of the report, this model will be called the “SCE Modified Existing HEC-RAS Model.” The table below outlines the key modifications made to the original TRCA HEC-RAS model to create this updated version.

Table 2-1: Summary of Modifications Applied to Establish SCE Modified Existing HEC-RAS Model

Drainage Feature	Description	Changes Made	TRCA Original Model	SCE Existing Revised Model
HDF-3	New drainage feature defined.	HDF-3 defined	N/A	New drainage feature defined as “HDF-3” created in HEC-RAS following the existing drainage feature from Healey Road towards southwest direction.
Humber Station	Culvert	Existing culvert at Humber Station Rd crossing	N/A	Existing Ø 0.75m and 16.5m long PVC pipe culvert located at Humber Station Road crossing was modelled.
HDF-8	New drainage feature defined	HDF-8 defined	N/A	A new drainage feature defined as “HDF-8” was created in HEC-RAS following the existing drainage feature around 900m north of Mayfield Road.
HDF-8	Culvert	The existing culvert at Mayfield Road	N/A	The existing Ø 0.9m and 31m long CSP culvert located at May Field Road crossing was modelled.
Clarkway Trib A	Merge the east tributary engineered	The east site (i.e., “Clarkway Trib” HEC-RAS Model) merged to the west	The east “Clarkway Trib” HEC-RAS Model and the west	The east site engineered channel (i.e., “Clarkway Trib” HEC-RAS Model) merged to west (i.e., “Final-West Humber” HEC-RAS Model. Accordingly, HEC-RAS

Drainage Feature	Description	Changes Made	TRCA Original Model	SCE Existing Revised Model
	channel	(i.e., “Final-West_Humber” HEC-RAS Model	“Final-West_Humber” HEC-RAS Model presented separately.	Cross-Section # 1560.977 - # 1515.784 modified to attain the cross-section geometry of the “Clarkway Trib” model.
Clarkway Trib A	Culvert	Existing culvert at Healey Rd	N/A	Existing Ø 1.60m, and 14.0m long CSP Culvert located at Healey Road crossing was modelled.
Clarkway Trib A	Culvert	Existing culvert at Mayfield Rd	N/A	Existing culvert (2.2mx5.5m), and 21.80m long Box Culvert located at May Field Road crossing was modelled.

2.2 SCE Proposed Condition Model

Under post-development conditions, the subject site will be developed in accordance with the post development plan as shown in **Figure 5**. The site will be graded and serviced to capture and convey surface runoff toward stormwater management ponds. The geometric data and the existing watercourse's alignment will change around drainage features to reflect post-development conditions and provide required storage. The proposed condition hydraulic modelling of the current analysis includes the proposed drainage realignment at HDF-3, wetland compensation area at HDF-8, and new culvert crossing at the Clarkway Tributary.

A drainage realignment is proposed for HDF-3, which includes modifying the existing cross-sections from #995 to #987 and updating the geometric details based on current conditions. New HEC-RAS cross-sections have been introduced along the proposed drainage alignment at HDF-3 to improve the model's accuracy. The realignment extends approximately 1300 meters and is part of the proposed development, as shown in **Figure 5**.

The proposed realignment also takes into account existing natural heritage features, as detailed in **Appendix D** (Figure 6, Opportunities and Constraints Map, prepared by GEI). The new drainage alignment will be trapezoidal, with a bottom width of 18.0 meters, a depth of 2.0 meters, and a 3:1 side slope. A low-flow channel, with a bottom width of 1.0 meters, a depth of 0.30 meters, and a 3:1 side slope, is included in the center of the channel. This low-flow channel is designed to handle 2-year flow events. For further details, please refer to the Engineering Drawing in **Appendix C**. Additionally, a cut-and-fill analysis has been performed to balance the channel storage between existing and proposed grades. This analysis can be found in *Section 4* of the current report.

A wetland compensation area (Wetland Compensation Area 3) has been proposed at HDF-8. This area is designed to offset the channel storage volume for the drainage reaches between HEC-RAS Cross-Sections #31 and #36. The HDF-8 drainage feature was analyzed for the watercourse south of the proposed wetland compensation area under the proposed conditions. Additional details can be found in *Section 4.2* of the current report.

In addition to these changes, a new culvert crossing is proposed at the Clarkway Tributary, following the planned extension of George Bolton Parkway. This culvert will be a double ConSpan type, with each unit measuring 3.66 meters in rise, 10.975 meters in span, and 65.0 meters in length.

Aside from these modifications, no further changes are proposed for the floodplain analysis within the Study Area. The existing conditions HEC-RAS model uses existing flow data, while the post-development conditions HEC-RAS model uses post-development flow data (hydrologic data sources are discussed in *Section 2.6*). The table below summarizes the changes made to develop the SCE Proposed HEC-RAS model.

Table 2-2: Summary of Modifications Applied to Establish SCE Proposed Condition HEC-RAS Model

Drainage Feature	Changes Made	Description of changes
HDF-3	HDF-3 Proposed drainage realignment	Following the proposed grading, the proposed drainage (HDF-3) has been realigned.
HDF-3	The existing channel section has been replaced with an engineered channel.	Engineered drainage realignment proposed north of HEC-RAS Cross-Section # 900 and between Cross-Section # 995.2 and 989.
HDF-8	The Headwater Drainage Feature replaced with a storm storage feature	Storm storage system designed around the HEC-RAS Cross-Section # 31. The storage system has been proposed to accommodate the channel storage volume of the HDF-8 within the subject area.
Clarkway Tributary	New Culvert	Double ConSpan Culvert proposed at the proposed extension of the George Bolton Pkwy.

2.3 General Modelling Procedure

The general modelling procedure and development of the hydraulic model can be summarized as follows:

- Determine georeferenced alignment of the reach (NAD83 / UTM zone 17N);
- Generate surface terrain layer based on the elevation data source;
- Determine cross-section locations considering the hydraulic characteristics of the study area and HEC-RAS Hydraulic Reference Manual criteria;
- Generate geo-referenced cross-sections using a digital terrain layer along a watercourse reach;
- Add hydraulic structures data to the model and calculate Ineffective Flow Areas;
- Determine key model parameters (e.g., Loss Coefficients and Manning's ‘n’ values, Flow lengths, and Ineffective Flow Areas);
- Add simulated storm flows data to the model;
- Determine boundary conditions for hydraulic modelling;
- Conduct Steady Flow analysis and Water Surface Profile calculation; and
- Generate required floodplains for different storm events.

2.4 Hydraulic Modelling

Hydraulic model development in HEC-RAS software includes creating proper HEC-RAS cross-section, modelling crossing structures, properly defining Manning’s roughness coefficient, Contraction and Expansion coefficients, and ineffective areas. Cross-sections are coded left to right looking downstream and alignment of the cross-sections is considered perpendicular to the flow direction and is extended to contain the entire floodplain. Overbank flow lengths were also determined considering Flow Mass centerlines.

2.4.1 Manning’s n

Manning’s 'n' values for the cross-sections of the main channel, as well as the left and right overbanks, were assigned according to TRCA requirements and the HEC-RAS Hydraulic Reference Manual. These values were selected based on TRCA standards for various stream reaches throughout the study area. Typically, Manning’s 'n' values of 0.035 and 0.08 were used for the channel and overbank flow sections, respectively. For the small tributaries of HDF-3 and HDF-8, Manning’s 'n' values were assumed to be 0.03 for the channel flow and 0.05 for overbank flows, taking into account land cover and channel characteristics. These headwater drainage features primarily flow through farmland, with banks that are not heavily vegetated.

ulic Reference Manual. These values were selected based on TRCA standards for various stream reaches throughout the study area. Typically, Manning’s 'n' values of 0.035 and 0.08 were used for the channel and overbank flow sections, respectively. For the small tributaries of HDF-3 and HDF-8, Manning’s 'n' values were assumed to be 0.03 for the channel flow and 0.05 for overbank flows, taking into account land cover and channel characteristics. These headwater drainage features primarily flow through farmland, with banks that are not heavily vegetated.

the channel flow and 0.05 for overbank flows, taking into account land cover and channel characteristics. These headwater drainage features primarily flow through farmland, with banks that are not heavily vegetated.

, with banks that are not heavily vegetated.

The proposed realignment of HDF-3 includes several sharp bends, which are expected to cause energy losses in the channel’s hydraulic flows. To account for these losses, Manning’s 'n' values at these cross-sections have been adjusted to 0.035 and 0.08 for the channel and overbank flows, respectively.

2.4.2 Boundary Condition

According to the HEC-RAS modelling recommendations, upstream and downstream boundary conditions are required at the upstream and downstream ends of all reaches that are not connected to other reaches or storage areas. The downstream boundary conditions are assigned at junctions. Upstream boundary conditions for along drainage features are assigned as critical depth. In the current hydraulic modelling, boundary conditions are set to be consistent with the original TRCA-approved hydraulic model.

2.4.3 Contraction and Expansion Coefficients

It should be noted that in the current model, where changes in river cross-sections are small, and the flow is subcritical (HEC-RAS Hydraulic Reference Manual, Table 3.3), Contraction and Expansion Coefficients were set to 0.1 and 0.3 respectively for gradual transitions. For the channel sections where changes in cross-sections are significant and channel alignment is not straight, the Contraction and Expansion Coefficients of 0.6 and 0.8 were respectively adopted. The Contraction and Expansion Coefficients of 0.6 and 0.8 were also respectively adopted for the Pipe and box culvert crossings. Contraction and Expansion Coefficients of 0.3 and 0.5 were respectively adopted for the Conspan culvert crossings.

To define Ineffective Flow Areas at the boundary cross-sections of the culverts, the Contraction reach upstream of the culvert was calculated based on a 1:1 contraction rate, and the Expansion reach downstream of the culvert was calculated considering a 1.5:1 expansion rate. The elevation of Ineffective Flow areas at the upstream road crossings was set to the lowest elevation of the high chord of the subject crossings and for the downstream cross-section was set to the average elevation of the obvert of crossing and lowest cord elevation of the road.

2.5 Road Crossings

2.5.1 Road Crossing Design Criteria

A new road crossing is proposed at the location where the George Bolton Parkway extension intersects the Clarkway Tributary watercourse. The design of this crossing follows the guidelines set by the TRCA Crossing Guideline for Valley and Stream Corridors. The following summarizes the requirements outlined in the guidelines.

TRCA – Watercourse Crossing Design and Submission Requirements (September 2015):

- Early planning considering the natural hazards and natural heritage objectives is essential for new crossings.
- Proposed crossings should be perpendicular to the valley and stream corridors and, where possible, should cross at the narrowest point of the valley/ stream.
- Minimize the total number of crossings in valley corridors to reduce overall impacts;
- Minimize Flood Risk:
  - Ensure that the proposed crossing does not increase flood risk for all storm events up to and including regional storm events;
  - Safely convey the applicable design flows from the upstream tributary considering future land use; and
  - Ensure safe ingress/egress access points in case of overtopping of the culvert during regional storm events.
- Minimize Geomorphic Hazards: Crossing should span the meander belt or the 100-year erosion limit to reduce risks from channel migration over time.
- Minimize Geotechnical Hazards:
  - Avoid sites of active erosion and locations with a risk of slope instability (i.e.

    over-steepened slopes and locations where the watercourse is coincident with the toe of the slope).
    - Ensure that the construction of the crossing structure does not aggravate valley slope instability.
    - Avoid siting crossing infrastructure where there is a need for permanent dewatering.
    - Ensure appropriate restoration of valley slopes where slope treatments are necessary.
    - Valley and stream corridor crossings should be sited and designed to avoid or minimize the physical footprint impact on habitats and terrestrial and aquatic connectivity.
- Minimize impacts on the aquatic and terrestrial habitat;
    - Crossings should be designed to satisfy the openness ratio for the passage of wildlife habitat.

2.5.2 Road Crossings in and Around the Subject Area

The current HEC-RAS modeling includes three existing culverts within the subject area located at the Humber Station Road and Mayfield Road crossings as well as additional culverts outside the area, specifically at Coleraine Drive and Mayfield Road crossings. Information about these culverts was obtained either from the approved Hydraulic Model or through detailed surveys.

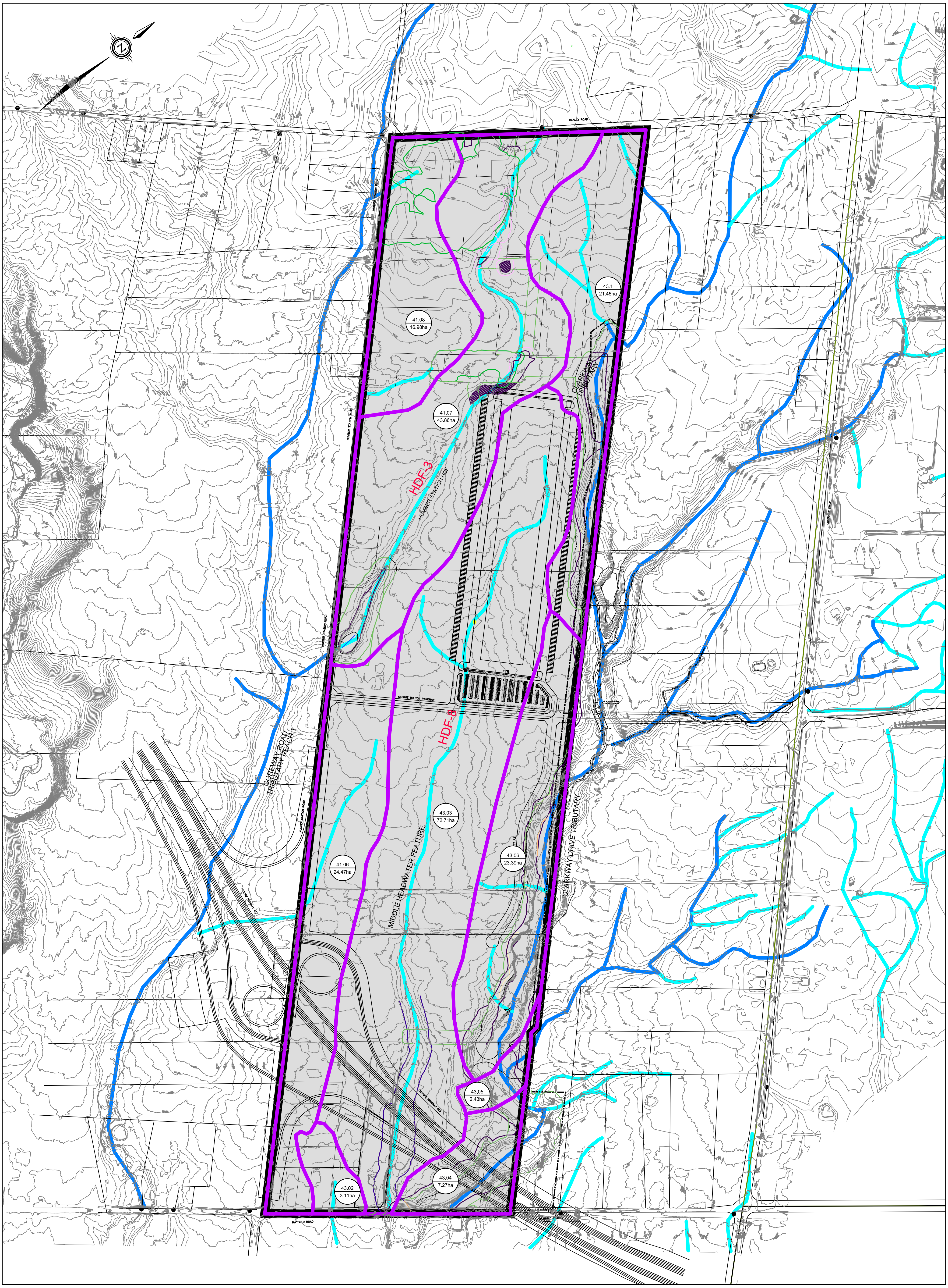
Please refer to **Figure 4** for the locations of existing culverts within and around the subject area. The "Culvert ID" referenced in the following table is based on **Figure 4**. As mentioned in *Section 2.2*, a new culvert crossing is proposed at the intersection of the George Bolton Parkway extension and Clarkway Tributary. A summary of both existing and proposed watercourse crossing structures is provided in **Table 2-3** below.

Table 2-3: Summary of Road Crossing Data

Street Name	Reach	HEC-RAS Cross Section	Type of Culvert	Culvert Dimensions (m)		Invert Elevation (m)		Culv ID*
				Depth x Span	Length	U/S	D/S	
Humber Station Rd	HDF-3	982.58	PVC Pipe	Ø 0.75	16.5	231.24	230.86	A
Mayfield Rd	HDF-8	23.4	CSP	Ø 0.90	30.0	221.17	220.36	G
Mayfield Rd	Clarkway Trib A	1514.331	Box	2.2 x 5.5	21.8	219.71	219.72	H
Healey Rd	Clarkway Trib A	1594	CSP	Ø 1.60	14.0	241.48	241.25	P
Coleraine Dr	Reach 2	1027	Box	2.40 x 3.40	19.0	236.65	236.60	N
Side Ditch Coleraine Dr	Reach 2	951	Pipe	3.0	325.91	235.33	234.56	N
George Bolton Pkwy**	Clarkway Trib A	1516.245	Double Conspan	2(3.66 x 10.98)	65.0	230.15	229.50	

Note:

* *Culvert ID, please refer to Figure 4.*
** *Culvert Crossing considered only for the Proposed Condition Scenarios*



HUMBER STATION VILLAGES
TOWN OF CALEDON

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CONSULTING ENGINEERS

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www.schaeffers.com

LEGEND

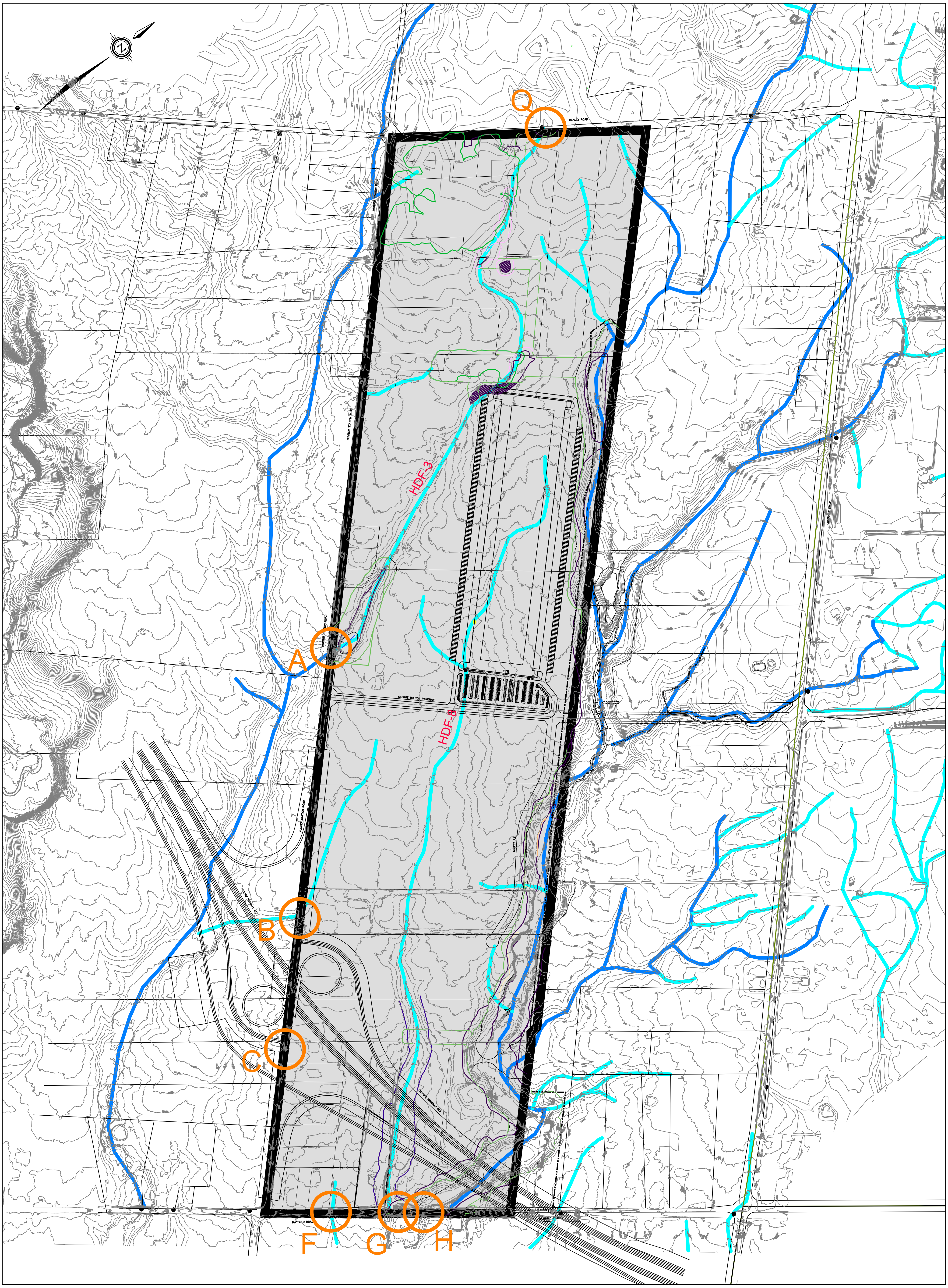
▨	SUBJECT LOCATION	━	WATERCOURSE
☐	PRE DEVELOPMENT DRAINAGE BOUNDARY	━	HDF
43.02 3.11ha	TRCA CATCHMENT ID TRCA AREA IN HECTARES		

FIGURE 3
PRE-DEVELOPMENT
DRAINAGE PLAN

2021-5139	JULY 2024	SCALE: N.T.S.

W:\5100's\5139 - Humber Station Village\Drawings\Drainage\2024-07-26-5139-Pre-Dev Drainage.dwg

Phil Gotfried



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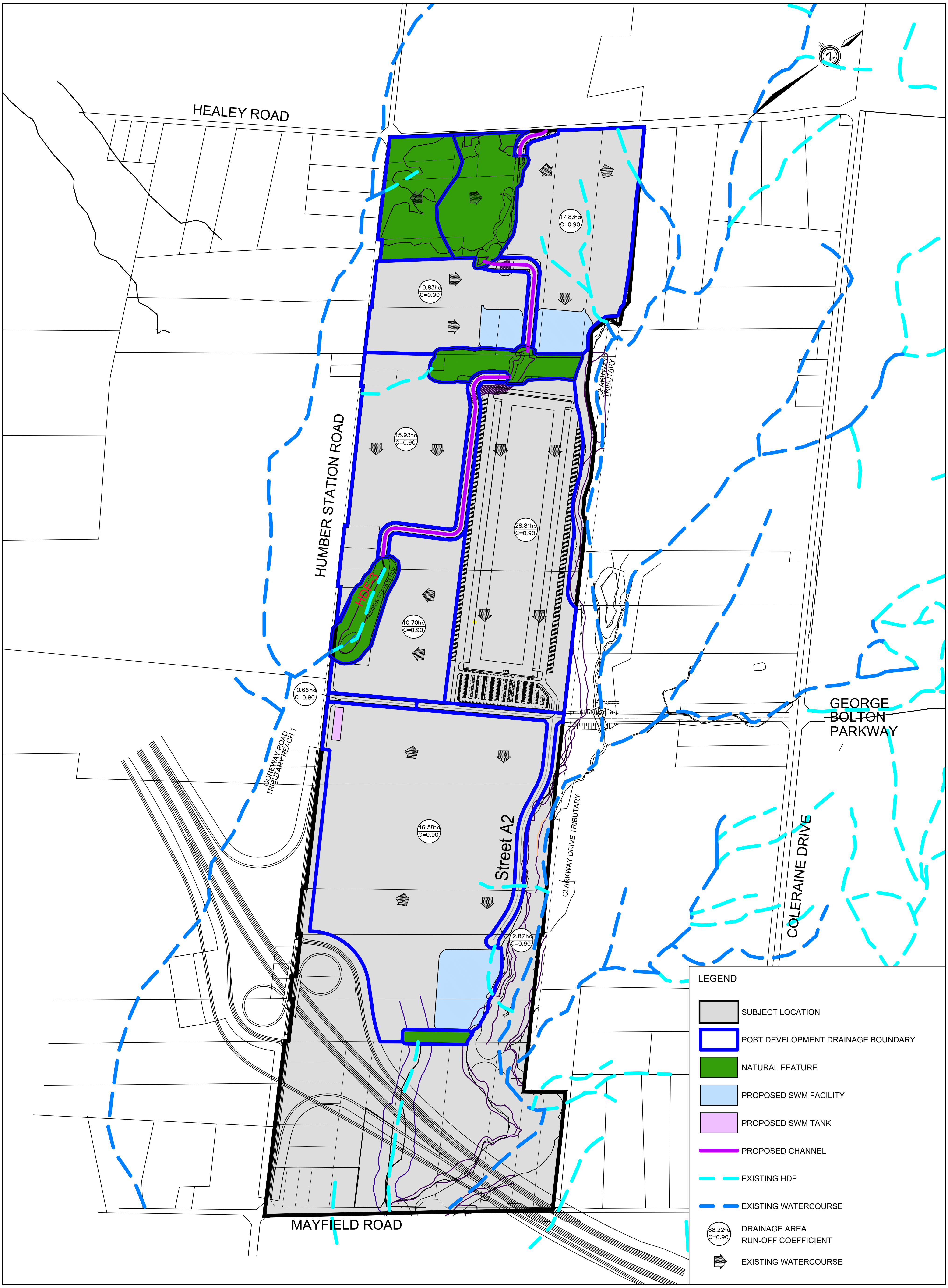
LEGEND

▬	SUBJECT LOCATION	━	WATERCOURSE
○	EXISTING CULVERT LOCATION	━	HDF

FIGURE 4
EXISTING
CULVERT LOCATION

2021-5139	JULY 2024	SCALE: N.T.S.



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LEGEND
(SEE ABOVE)

FIGURE 5
POST-DEVELOPMENT
BOUNDARIES

2021-5139	JULY 2024	SCALE: N.T.S.

2.6 Hydrologic Data

2.6.1 Existing Condition

In the current floodplain analysis, peak flows have been computed using the TRCA (December 2018) Virtual OTTHYMO (VO5) Hydrology model, as well as the flows from the TRCA-approved Hydraulic Model. Detailed drainage area delineation was performed based on comprehensive topographic survey data within the subject area. As a result, revisions have been made to the TRCA Catchment IDs (#41.07, 41.08, 41.06, 43.03, 43.1, 43.06, 43.05, 43.04, and 43.02), as illustrated in **Figure 3**. More detailed drainage area breakdown is presented in **Appendix A** (Figure # A). This breakdown provides a detailed depiction of the drainage areas both within and outside the subject area boundary.

The Visual OTTHYMO model has been updated to reflect the redefined drainage areas corresponding to these catchments. It is important to note that while the original TRCA Hydrology model defined each of these catchment areas with a single NashHyds parameter, the redefined catchment areas now use two or more NashHyds parameters where applicable. However, only the "Area" parameter for each catchment was revised. Other hydrological parameters, such as time of concentration, remain unchanged from the original TRCA hydrology model to ensure that peak flows to the downstream junctions of the hydrology model are not affected.

r for each catchment was revised. Other hydrological parameters, such as time of concentration, remain unchanged from the original TRCA hydrology model to ensure that peak flows to the downstream junctions of the hydrology model are not affected.

CA hydrology model to ensure that peak flows to the downstream junctions of the hydrology model are not affected.

It should be noted that in the Humber Station Phase-1 Floodplain Analysis Report (Dated

October 2023), the existing condition peak flows for the HDF-3 were directly adopted as presented by TRCA (Please see email communications in **Appendix A**). Due to the revised detailed drainage area breakdown within the subject area, the existing condition peak flows for the HDF-3 may have a slight variation from the flows adopted for the Phase-1 Floodplain report. This has been discussed with TRCA in a meeting held on June 27, 2024. Please see the Meeting Minutes in **Appendix A**.

Peak flows were calculated at the necessary nodes along the reach for storm events ranging from the 2-year to the 100-year storms, using both 6-hour and 12-hour AES distributions, as well as the Regional uncontrolled storm event (Hurricane Hazel, Last 12 hours distribution). The peak flow results for the 6-hour and 12-hour AES distributions were compared, and the distribution that produced the higher peak flow was selected for further analysis.

Peak flows were determined at the outlets of the subcatchments, with the subcatchment areas overlaid on the hydraulic model to identify the peak flow nodes for the corresponding HEC-RAS cross-sections. It is important to note that the peak flows calculated for each subcatchment outlet were applied to the HEC-RAS cross-section corresponding to the top of the respective catchment.

with the subcatchment areas overlaid on the hydraulic model to identify the peak flow nodes for the corresponding HEC-RAS cross-sections. It is important to note that the peak flows calculated for each subcatchment outlet were applied to the HEC-RAS cross-section corresponding to the top of the respective catchment.

For subcatchments with relatively large areas, the Ministry of Transportation (MTO) flow proration equation was used to estimate peak flows within the subcatchment. Refer to **Appendix D** for the MTO reference document. **Table 2-4** below shows the flow proration calculation used for the Existing condition HDF-8. It should be noted that the catchment area of the HDF-8 watercourse is identified as catchment ID 43.03 in the Existing condition VO5 Model. The total catchment area at the watercourse was estimated to be 72.71ha. The peak flows for the 2-year to

100-year and regional events, corresponding to the total catchment area, were calculated at the catchment area outlet defining Node. These flows were then prorated to Node "A" and Node "B" using the MTO Flow Proration equation. Please refer to **Figure 2** for the drainage area breakdown and locations of Node "A" and Node "B".

As discussed in Section 1.2, the area upstream of Node "A" does not fall within the regulatory floodplain. The total drainage area up to Node "A" was estimated at 47.38ha. Therefore, the regulatory floodplain reach for HDF-8 begins at Node "A".

To ensure a conservative approach, the peak flow computed at Node "B" was applied to the HEC-RAS cross-section located at the upstream end of the channel (i.e., HEC-RAS Cross-Section #36). Conversely, the peak flow calculated at the channel outlet was used for the HEC-RAS cross-section near Node "B" (i.e., HEC-RAS Cross-Section #31). It is important to note that the total drainage area up to Node "B" is 56.26 hectares (47.38ha. + 8.88ha.), and the drainage area extending to the end of HDF-8 is estimated at 72.71 hectares (56.26ha. + 16.45ha.).

Table 2-4 provides a summary of the peak flows applied to all drainage features considered in the current modeling. Detailed calculation results can be found in **Appendix A**, and a digital copy of the VO Model is available in **Appendix E**.

Table 2-4: Peak Flow Proration for the HDF-8 (Existing Condition Flows)

Node	Total 43.03* (VO Node 7654)	A**	B**
Catchment Area (ha)	72.71	47.38	56.26
2yr	0.36	0.26	0.30
5yr	0.613	0.44	0.51
10yr	1.291	0.94	1.07
25yr	1.613	1.17	1.33
50yr	1.853	1.34	1.53
100yr	2.095	1.52	1.73
Regional	5.15	3.74	4.25

*Note: *: 43.03 is the VO5 Node that defines HDF-8 in the Existing Hydrology Model.*
***: For the Location of Node "A" and Node "B", please refer to Figure 2*

Table 2-5: Peak Flow Proration for the HDF-3 (Existing Condition Flows)

Node	Total 41.07* (VO Node 7622)	A**	B**
Catchment Area (ha)	96.91	47.13	71.62
2yr	0.468	0.27	0.37
5yr	0.805	0.47	0.64
10yr	1.683	0.98	1.34
25yr	2.127	1.24	1.70
50yr	2.46	1.43	1.96
100yr	2.798	1.63	2.23
Regional	7.135	4.16	5.69

*Note: *: 41.07 is the VO5 Node that defines HDF-3 in the Existing Hydrology Model.*
***: For the Location of Node "A" and Node "B", please refer to Figure A (**Appendix A**)*

Table 2-6: Peak Flows Applied for SCE Modified Existing Condition HEC-RAS Modelling

River	**Reach**	**HEC-RAS Stn.**	**Existing Condition Peak Flows (m^3/s)**						
			2 Yr	**5 Yr**	**10 yr**	**25 Yr**	**50 Yr**	**100 Yr**	**Regional**
HDF-3	1	1002	0.27	0.47	0.98	1.24	1.43	1.63	4.16
		991	0.37	0.64	1.34	1.7	1.96	2.23	5.69
HDF-8	1	36	0.3	0.51	1.07	1.33	1.53	1.73	4.25
		31	0.36	0.613	1.291	1.613	1.853	2.095	5.15
Clarkway Trib A*	1	1597	3.94	8.8	18.3	23	26.2	30.2	24.21
	1-DS-0	1651	6.42	10.49	21.11	27.87	32.38	37.88	52.86
		1516.384	5.57	10.49	21.11	27.87	32.38	37.88	54.06
		1514.912	5.83	10.3	21.51	28.52	33.52	39.34	65.98
Reach 2*	2	1105	2.7	4.2	7.2	9.2	10.6	11.9	24.36
		661	2.7	4.2	7.2	9.2	10.6	11.9	25.34
Gore Road Trib*	1	1416.798	1.73	3.22	7.16	9.17	10.7	12.23	31.51
	1-DS-0	1416.041	1.92	3.71	8.6	11.11	13.08	15.08	40.85
		1414.253	1.75	3.72	8.7	11.46	13.44	15.53	39.9

*Note: *: Peak Flows directly adopted as defined on the TRCA Approved HEC-RAS Model.*

2.6.2 Proposed Condition

The post-development hydrology model has been analyzed using the Visual OTTHYMO (VO) hydrologic model to calculate SCE peak uncontrolled flows under post-development conditions. The post development has been prepared based on the proposed condition land use and gradings as shown in **Figure 5**. Similar to the existing model, peak flows at required nodes located along the reach for 100-year storms the Regional storm (Hurricane Hazel) event has been simulated. It should be noted that for regulatory floodplain analysis, SCE future 100 year and Regional uncontrolled flows were analyzed.

Table 2-7 displays the modeling flows under post-development conditions. The table shows that in most reaches, regional flow represents the regulatory flows, with the 100-year (6-hour AES) storm being higher only in a few reaches. The 100-year (12-hour AES) storm is consistently lower than the 100-year (6-hour AES) storm across all reaches. Notably, the Regional uncontrolled storm (Hurricane Hazel) is considered the regulatory flood storm since it exceeds the 100-year (6-hour and 12-hour AES) storms in nearly all watercourses. Detailed information on the hydrologic modeling is provided in Appendix A, with a digital copy of the VO Model available in **Appendix E**.

As shown in the proposed condition drainage plan (**Figure 5**), the HDF-8 drainage system has been redirected to the regional controlled SWM Pond (SWM Pond #3). The outlet of this SWM Pond will discharge directly into the Clarkway Tributary rather than HDF-8. Consequently, no significant flow from the subject area will be directed to HDF-8.

As discussed in *Section 2.2*, a wetland compensation area (Wetland Compensation Area 3) is proposed at HDF-8, which will be replenished by clean roof runoff from the subject area. In the proposed condition scenario, the HDF-8 drainage feature was analyzed only for the watercourse portion located south of the proposed wetland compensation area. To ensure a conservative approach, the remaining portion of the HDF-8 drainage feature has been sized according to the regulatory flows of the existing conditions.

Table 2-7: Proposed Condition Flows Applied for the Floodplain Analysis

River	Reach	HEC-RAS Stn.	VO Node	Proposed Condition Peak Flows (m^3/s)						
				2 Yr	**5 Yr**	**10 yr**	**25 Yr**	**50 Yr**	**100 Yr**	**Regional**
HDF-3	1	1002	7712	0.285	0.543	0.743	1.018	1.236	1.460	3.786
		991	7715	0.294	0.586	0.711	0.974	1.189	1.416	3.829
		989	7708	0.338	0.604	0.751	1.003	1.209	1.434	7.294
HDF-8*	1	30		0.36	0.61	1.29	1.61	1.85	2.09	5.15
Clarkway Trib A	1	1597	641	7.902	13.09	16.36	20.552	23.724	26.873	26.116
		1560.88	7683	8.252	13.58	16.99	21.488	24.898	28.312	29.737
	1-DS-0	1651	850	10.86	17.72	29.78	37.922	44.132	50.349	56.844
		1516.384	854	15.16	23.59	36.11	45.606	52.717	60.089	66.556
		1514.912	857	11.92	18.93	32.69	40.744	47.33	54.353	85.948
Reach 2**	2	1105		2.7	4.2	7.2	9.2	10.6	11.9	24.36
		661		2.7	4.2	7.2	9.2	10.6	11.9	25.34
Gore Road Trib**	1	1416.798		1.73	3.22	7.16	9.17	10.7	12.23	31.51
	1-DS-0	1416.041		1.92	3.71	8.6	11.11	13.08	15.08	40.85
		1414.253		1.75	3.72	8.7	11.46	13.44	15.53	39.9

Note: Since the proposed condition major flow is diverted to SWM Pond 3, the existing condition flow has been considered to be conservative.*
*** Peak Flows directly adopted as defined on the TRCA Approved HEC-RAS Model*

3.0 Hydraulic Modelling and Floodplain Analysis Results

Steady State Flow Analysis using HEC-RAS has been conducted to model the hydraulic conditions for the subject development under both existing and proposed scenarios. The hydraulic modeling covers storm events ranging from the 2-year to the 100-year (6-hour and 12-hour AES distributions) and the Regional (Hurricane Hazel) events. Comprehensive HEC-RAS outputs are provided in Appendix B and summarized in the following sections.

Water surface elevations for both existing and post-development conditions are summarized in **Tables 3-1 and 3-2**, respectively. Detailed results can be found in the summary tables in Appendix B. Floodplain Mapping drawings for existing and post-development conditions are included in **Appendix C**, while the topographic survey is provided in **Appendix D**. The digital HEC-RAS model is available in **Appendix E**.

The hydraulic analysis summary table in **Appendix B** highlights the key changes made to develop the Future Uncontrolled Flow Conditions hydraulic model from the existing conditions. Channel bed levels remain largely unchanged across most reaches, except where modifications were made due to proposed drainage realignment (e.g., HDF-3).

In future uncontrolled scenarios, water elevations are higher than in existing conditions across all reaches. The rise in water levels is primarily due to increased peak flows in the future uncontrolled scenarios (refer to the flow comparison table in **Appendix A**). It is important to note that the post-development plan is designed to manage all storm events, including the regional storm (see **Appendix A** for a comparison of existing and future controlled regional storm flows), which is crucial for downstream analysis and determining the need for regional control SWM Ponds. Therefore, future uncontrolled flows are analyzed for regulatory floodplain assessment purposes. The regulatory floodplain analysis indicates that the regulatory flood lines do not encroach on the proposed developments (see floodplain mappings in **Appendix C**). A Floodplain map has been generated both for the existing and future uncontrolled regulatory flow scenarios.

3.1.1 Existing Condition Hydraulic Analysis Results

The results of the hydraulic analysis for existing conditions, regarding the drainage features, are summarized in **Table 3-1**. As shown in the summary tables, regional flows exceed the 100-year flows in most reaches, making the Regional Storm the regulatory event.

Table 3-1: Existing Condition Hydraulic Analysis Results Summary Table

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
HDF-3	1	1002	242.78	243.23	243.09	243.23
HDF-3	1	1001	242.72	243.16	243.03	243.16
HDF-3	1	1000	242.49	242.85	242.72	242.85
HDF-3	1	999	241.92	242.34	242.21	242.34
HDF-3	1	998	241.84	242.08	241.97	242.08
HDF-3	1	997	240.98	241.67	241.48	241.67
HDF-3	1	996.5	240.96	241.37	241.23	241.37
HDF-3	1	996	240.55	240.99	240.86	240.99
HDF-3	1	995	240.22	240.68	240.52	240.68
HDF-3	1	994	239.74	240.13	240	240.13
HDF-3	1	993	238.99	239.18	239.1	239.18
HDF-3	1	992	238.18	238.4	238.31	238.4
HDF-3	1	991	237.1	237.56	237.42	237.56
HDF-3	1	990	236.39	236.64	236.55	236.64
HDF-3	1	989	235.2	235.6	235.47	235.6
HDF-3	1	988	234.1	234.63	234.49	234.63
HDF-3	1	987.5	233.34	233.81	233.66	233.81
HDF-3	1	987	232.3	233.42	233.12	233.42
HDF-3	1	986	231.93	233.41	233.12	233.41
HDF-3	1	985	231.75	233.41	233.12	233.41
HDF-3	1	984	232.05	233.14	233.06	233.14
HDF-3	1	983	231.24	233.18	233.07	233.18
HDF-3	1	982.58	(Existing Culvert @ Humber Station Rd)			
HDF-3	1	982	230.86	231.88	231.51	231.88
HDF-3	1	981	230.86	231.35	231.23	231.35
HDF-3	1	980	230.22	230.43	230.34	230.43
HDF-8	1	36	229.5	229.78	229.65	229.78

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
HDF-8	1	35	228.5	228.85	228.72	228.85
HDF-8	1	34	228.24	228.62	228.49	228.62
HDF-8	1	33	227.98	228.2	228.1	228.2
HDF-8	1	32	227.25	227.69	227.56	227.69
HDF-8	1	31	226.96	227.22	227.11	227.22
HDF-8	1	30	226.13	226.46	226.36	226.46
HDF-8	1	29	225.72	225.97	225.87	225.97
HDF-8	1	28	224.75	225.18	225.05	225.18
HDF-8	1	27	224.49	224.87	224.73	224.87
HDF-8	1	26	224.16	224.37	224.31	224.37
HDF-8	1	25	223	224.3	223.83	224.3
HDF-8	1	24	221.76	224.31	223.84	224.31
HDF-8	1	23.6	221.2	224.31	223.84	224.31
HDF-8	1	23.3	(Existing Culvert @ Mayfield Rd)			
HDF-8	1	23	220.91	222.17	221.63	222.17
HDF-8	1	22	220.99	222.19	221.64	222.19
Clarkway Trib A	Reach1	1597	241.79	243.7	243.74	243.74
Clarkway Trib A	Reach1	1594	(Existing Culvert @ Healey Rd)			
Clarkway Trib A	Reach1	1591	241.48	243.19	243.19	243.19
Clarkway Trib A	Reach1	1583	241.24	242.66	242.73	242.73
Clarkway Trib A	Reach1	1561.698	241.38	242.12	242.17	242.17
Clarkway Trib A	Reach1	1561.551	240.81	241.58	241.65	241.65
Clarkway Trib A	Reach1	1561.404	239.94	241.08	241.15	241.15
Clarkway Trib A	Reach1	1561.256	239.1	240.25	240.35	240.35
Clarkway Trib A	Reach1	1561.12	238.71	239.71	239.8	239.8
Clarkway Trib A	Reach1	1560.977	238.53	239.17	239.24	239.24
Clarkway Trib A	Reach1	1560.88	237.95	238.73	238.79	238.79
Clarkway Trib A	Reach1	1560.685	236.78	237.31	237.36	237.36
Clarkway Trib A	Reach1	1560.6	236.23	237.01	237.12	237.12
Clarkway Trib A	Reach1	1560.57	235.97	236.71	236.81	236.81
Clarkway Trib A	Reach1	1560.5	235.24	236.12	236.21	236.21
Clarkway Trib A	Reach1	1519.898	234.49	235.29	235.42	235.42
Clarkway Trib A	Reach1	1430.348	234	234.92	234.86	234.92
Clarkway Trib A	Reach1-DS-0	1651	233.59	234.52	234.33	234.52
Clarkway Trib A	Reach1-DS-0	1580	232.98	234.14	233.96	234.14
Clarkway Trib A	Reach1-DS-0	1573	232.49	233.46	233.3	233.46

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
Clarkway Trib A	Reach1-DS-0	1534	230.44	232.37	232.12	232.37
Clarkway Trib A	Reach1-DS-0	1528	229.7	232.19	231.97	232.19
Clarkway Trib A	Reach1-DS-0	1516.384	230.28	232.06	231.85	232.06
Clarkway Trib A	Reach1-DS-0	1516.312	230.52	231.76	231.59	231.76
Clarkway Trib A	Reach1-DS-0	1516.276	230.46	231.48	231.29	231.48
Clarkway Trib A	Reach1-DS-0	1516.214	229.35	231.05	230.83	231.05
Clarkway Trib A	Reach1-DS-0	1516.156	229.11	230.88	230.65	230.88
Clarkway Trib A	Reach1-DS-0	1516.103	228.87	230.66	230.44	230.66
Clarkway Trib A	Reach1-DS-0	1515.984	228.6	230.25	230.04	230.25
Clarkway Trib A	Reach1-DS-0	1515.784	227.73	229.41	229.19	229.41
Clarkway Trib A	Reach1-DS-0	1515.584	226.41	228.67	228.48	228.67
Clarkway Trib A	Reach1-DS-0	1515.386	226.38	227.25	227.06	227.25
Clarkway Trib A	Reach1-DS-0	1515.185	224.64	226.66	226.44	226.66
Clarkway Trib A	Reach1-DS-0	1515.084	224.37	226.52	226.32	226.52
Clarkway Trib A	Reach1-DS-0	1514.985	224.01	226.07	225.74	226.07
Clarkway Trib A	Reach1-DS-0	1514.912	224.1	225.52	225.29	225.52
Clarkway Trib A	Reach1-DS-0	1514.788	223.95	224.87	224.5	224.87
Clarkway Trib A	Reach1-DS-0	1514.658	222.72	224.68	224.1	224.68
Clarkway Trib A	Reach1-DS-0	1514.585	221.73	224.64	224.03	224.64
Clarkway Trib A	Reach1-DS-0	1514.506	221.43	223.87	223.49	223.87
Clarkway Trib A	Reach1-DS-0	1514.414	220.83	223.81	223.32	223.81
Clarkway Trib A	Reach1-DS-0	1514.353	220.8	223.76	223.27	223.76
Clarkway Trib A	Reach1-DS-0	1514.345	220.68	223.76	223.27	223.76
Clarkway Trib A	Reach1-DS-0	1514.331	(Existing Culvert @ Healey Rd)			
Clarkway Trib A	Reach1-DS-0	1514.312	220.59	223	222.54	223
Clarkway Trib A	Reach1-DS-0	1514.306	220.5	222.53	222.1	222.53
Clarkway Trib A	Reach1-DS-0	1514.247	220.38	222.44	221.95	222.44
Reach 2	Reach 2	1105	237.49	239.66	238.77	239.66
Reach 2	Reach 2	1068	237.41	239.64	238.41	239.64
Reach 2	Reach 2	1054	236.65	239.64	238.45	239.64
Reach 2	Reach 2	1027	(Existing Culvert @ Coleraine Rd)			
Reach 2	Reach 2	1018	236.6	238.83	237.62	238.83
Reach 2	Reach 2	1008	235.58	238.86	237.42	238.86
Reach 2	Reach 2	1005	235.57	238.85	237.43	238.85
Reach 2	Reach 2	999	235.55	238.59	237.21	238.59
Reach 2	Reach 2	951	(Existing Culvert @ Coleraine Rd)			

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
Reach 2	Reach 2	666	234.65	236.59	235.87	236.59
Reach 2	Reach 2	661	234.62	236.32	235.85	236.32
Reach 2	Reach 2	656	234.66	236.31	235.84	236.31
Reach 2	Reach 2	604	234.65	236.24	235.78	236.24
Reach 2	Reach 2	498	234.51	236.07	235.61	236.07
Reach 2	Reach 2	388	234.38	235.88	235.43	235.88
Reach 2	Reach 2	307	234.11	235.73	235.3	235.73
Reach 2	Reach 2	213	233.98	235.51	235.14	235.51
Reach 2	Reach 2	172	234.11	235.31	234.95	235.31
Reach 2	Reach 2	117	233.8	235.19	234.85	235.19
Reach 2	Reach 2	85	233.83	235.06	234.76	235.06
Reach 2	Reach 2	63	233.87	234.73	234.49	234.73
Reach 2	Reach 2	45	233.72	234.53	234.35	234.53
Gore Road Trib	Reach2	1450.572	237.54	238.48	238.25	238.48
Gore Road Trib	Reach2	1450.428	235.83	236.82	236.46	236.82
Gore Road Trib	Reach2	1450.284	234.78	235.41	235.2	235.41
Gore Road Trib	Reach2	1450.168	233.73	234.36	234.16	234.36
Gore Road Trib	Reach2	1450	233.28	234.14	233.81	234.14
Gore Road Trib	Reach1	1416.798	232.98	233.91	233.56	233.91
Gore Road Trib	Reach1	1416.721	232.59	233.49	233.12	233.49
Gore Road Trib	Reach1	1416.598	231.99	232.88	232.58	232.88
Gore Road Trib	Reach1	1416.398	230.73	231.81	231.42	231.81
Gore Road Trib	Reach1	1416.261	229.56	230.78	230.54	230.78
Gore Road Trib	Reach1	1416.193	229.05	230.3	229.94	230.3
Gore Road Trib	Reach1-DS-0	1416.041	228.39	229.49	229.16	229.49
Gore Road Trib	Reach1-DS-0	1415.982	228.33	229.02	228.79	229.02
Gore Road Trib	Reach1-DS-0	1415.904	227.4	228.58	228.2	228.58
Gore Road Trib	Reach1-DS-0	1415.793	226.47	228.11	227.7	228.11
Gore Road Trib	Reach1-DS-0	1415.72	226.47	227.79	227.41	227.79
Gore Road Trib	Reach1-DS-0	1415.59	225.93	227.27	226.9	227.27
Gore Road Trib	Reach1-DS-0	1415.515	225.78	226.71	226.43	226.71
Gore Road Trib	Reach1-DS-0	1415.353	225.06	226.08	225.73	226.08
Gore Road Trib	Reach1-DS-0	1415.201	224.34	225.48	225.12	225.48
Gore Road Trib	Reach1-DS-0	1415.055	223.77	224.66	224.36	224.66
Gore Road Trib	Reach1-DS-0	1414.792	222.48	223.55	223.24	223.55
Gore Road Trib	Reach1-DS-0	1414.601	221.55	222.9	222.37	222.9

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
Gore Road Trib	Reach1-DS-0	1414.401	220.38	222.59	221.9	222.59
Gore Road Trib	Reach1-DS-0	1414.292	220.38	222.58	221.9	222.58
Gore Road Trib	Reach1-DS-0	1414.284	220.38	222.58	221.84	222.58
Gore Road Trib	Reach1-DS-0	1414.268	(Existing Culvert @ Mayfield Rd)			
Gore Road Trib	Reach1-DS-0	1414.253	220.41	221.65	221.2	221.65
Gore Road Trib	Reach1-DS-0	1414.247	220.32	221.55	221.19	221.55
Gore Road Trib	Reach1-DS-0	1414.191	219.93	221.31	220.93	221.31

3.1.2 Proposed Condition Hydraulic Analysis Results

The results of the hydraulic analysis for the proposed conditions, concerning the drainage features, are summarized in **Table 3-2**. The summary tables indicate that regional flows exceed the 100-year flows in most reaches, thereby making the Regional Storm the regulatory event.

Table 3-2: Proposed Condition Hydraulic Analysis Results Summary Table

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
HDF-3	1	1002	242.73	243.32	243.18	243.32
HDF-3	1	1001	242.68	243.27	243.12	243.27
HDF-3	1	1000	242.51	243.13	242.97	243.13
HDF-3	1	999.4	242.32	242.84	242.74	242.84
HDF-3	1	999	241.91	242.35	242.21	242.35
HDF-3	1	998	241.84	242.07	241.97	242.07
HDF-3	1	997	240.98	241.65	241.46	241.65
HDF-3	1	996.5	240.96	241.41	241.28	241.41
HDF-3	1	996	240.55	240.92	240.79	240.92
HDF-3	1	995.2	240.21	240.71	240.54	240.71
HDF-3	1	994.82	239.94	240.47	240.37	240.47
HDF-3	1	993.82	239.69	240.31	240.16	240.31
HDF-3	1	993.63	239.57	240.22	240.06	240.22
HDF-3	1	993.52	239.39	240.03	239.87	240.03
HDF-3	1	993.36	239.15	239.77	239.61	239.77
HDF-3	1	992.97	238.95	239.6	239.43	239.6

River	**Reach**	**River Station**	**Min Ch El (m)**	**W.S. Elev (m)**		
				Regional	**100Year**	**Regulatory**
HDF-3	1	992.79	238.76	239.28	239.18	239.28
HDF-3	1	992.56	238.5	239.03	238.85	239.03
HDF-3	1	992.13	238.28	239.02	238.84	239.02
HDF-3	1	991.9	238.35	238.96	238.79	238.96
HDF-3	1	991.6	238.13	238.77	238.6	238.77
HDF-3	1	991	237.69	238.32	238.13	238.32
HDF-3	1	990	236.97	237.53	237.4	237.53
HDF-3	1	989.68	236.25	236.84	236.67	236.84
HDF-3	1	989.5	235.94	236.61	236.42	236.61
HDF-3	1	989.4	235.65	236.22	236.07	236.22
HDF-3	1	989.3	235.18	235.72	235.59	235.72
HDF-3	1	989.2	234.58	235.18	235.02	235.18
HDF-3	1	989.1	234.14	234.72	234.57	234.72
HDF-3	1	989	233.72	234.38	234.1	234.38
HDF-3	1	987.5	233.31	233.89	233.64	233.89
HDF-3	1	987	232.3	233.58	232.85	233.58
HDF-3	1	986	231.9	233.58	232.85	233.58
HDF-3	1	985	231.75	233.58	232.85	233.58
HDF-3	1	984	232.05	233.16	232.78	233.16
HDF-3	1	983	231.24	233.21	232.79	233.21
HDF-3	1	982.58	(Existing Culvert @ Humber Station Rd)			
HDF-3	1	982	230.86	232.01	231.4	232.01
HDF-3	1	981	230.86	231.39	231.17	231.39
HDF-3	1	980	230.22	230.46	230.33	230.46
HDF-8	1	30	226.13	226.46	226.36	226.46
HDF-8	1	29	225.72	225.97	225.87	225.97
HDF-8	1	28	224.75	225.18	225.05	225.18
HDF-8	1	27	224.49	224.87	224.73	224.87
HDF-8	1	26	224.16	224.37	224.31	224.37
HDF-8	1	25	223	224.3	223.81	224.3
HDF-8	1	24	221.76	224.31	223.82	224.31
HDF-8	1	23.6	221.2	224.31	223.82	224.31
HDF-8	1	23.3	(Existing Culvert @ Mayfield Rd)			
HDF-8	1	23	220.91	222.17	221.63	222.17
HDF-8	1	22	220.99	222.19	221.64	222.19
Clarkway Trib A	Reach1	1597	241.79	243.72	243.72	243.72

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
Clarkway Trib A	Reach1	1594	(Existing Culvert @ Healey Rd)			
Clarkway Trib A	Reach1	1591	241.48	243.19	243.19	243.19
Clarkway Trib A	Reach1	1583	241.24	242.68	242.69	242.69
Clarkway Trib A	Reach1	1561.698	241.38	242.14	242.14	242.14
Clarkway Trib A	Reach1	1561.551	240.81	241.6	241.61	241.61
Clarkway Trib A	Reach1	1561.404	239.94	241.1	241.11	241.11
Clarkway Trib A	Reach1	1561.256	239.1	240.28	240.29	240.29
Clarkway Trib A	Reach1	1561.12	238.71	239.74	239.75	239.75
Clarkway Trib A	Reach1	1560.977	238.53	239.22	239.21	239.22
Clarkway Trib A	Reach1	1560.88	237.95	238.79	238.77	238.79
Clarkway Trib A	Reach1	1560.685	236.78	237.36	237.35	237.36
Clarkway Trib A	Reach1	1560.6	236.23	237.11	237.09	237.11
Clarkway Trib A	Reach1	1560.57	235.97	236.8	236.78	236.8
Clarkway Trib A	Reach1	1560.5	235.24	236.21	236.19	236.21
Clarkway Trib A	Reach1	1519.898	234.49	235.38	235.37	235.38
Clarkway Trib A	Reach1	1430.348	234	234.97	234.92	234.97
Clarkway Trib A	Reach1-DS-0	1651	233.59	234.57	234.49	234.57
Clarkway Trib A	Reach1-DS-0	1580	232.98	234.19	234.11	234.19
Clarkway Trib A	Reach1-DS-0	1573	232.49	233.5	233.44	233.5
Clarkway Trib A	Reach1-DS-0	1534	230.44	232.63	232.53	232.63
Clarkway Trib A	Reach1-DS-0	1528	229.7	232.51	232.42	232.51
Clarkway Trib A	Reach1-DS-0	1516.384	230.28	232.48	232.38	232.48
Clarkway Trib A	Reach1-DS-0	1516.312	230.49	232.35	232.25	232.35
Clarkway Trib A	Reach1-DS-0	1516.276	230.2	231.68	231.61	231.68
Clarkway Trib A	Reach1-DS-0	1516.245	(Proposed Culvert @ George Bolton Pkwy)			
Clarkway Trib A	Reach1-DS-0	1516.214	229.48	231.13	231.06	231.13
Clarkway Trib A	Reach1-DS-0	1516.156	229.11	230.85	230.78	230.85
Clarkway Trib A	Reach1-DS-0	1516.103	228.87	230.7	230.62	230.7
Clarkway Trib A	Reach1-DS-0	1516.043	228.72	230.56	230.48	230.56
Clarkway Trib A	Reach1-DS-0	1515.984	228.6	230.34	230.26	230.34
Clarkway Trib A	Reach1-DS-0	1515.899	228.23	229.9	229.83	229.9
Clarkway Trib A	Reach1-DS-0	1515.784	227.73	229.56	229.49	229.56
Clarkway Trib A	Reach1-DS-0	1515.584	226.41	228.8	228.74	228.8
Clarkway Trib A	Reach1-DS-0	1515.386	226.38	227.38	227.31	227.38
Clarkway Trib A	Reach1-DS-0	1515.185	224.64	226.82	226.74	226.82
Clarkway Trib A	Reach1-DS-0	1515.084	224.37	226.68	226.61	226.68

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
Clarkway Trib A	Reach1-DS-0	1514.985	224.01	226.28	226.03	226.28
Clarkway Trib A	Reach1-DS-0	1514.912	224.1	225.67	225.43	225.67
Clarkway Trib A	Reach1-DS-0	1514.788	223.95	225.16	224.7	225.16
Clarkway Trib A	Reach1-DS-0	1514.658	222.72	225.02	224.45	225.02
Clarkway Trib A	Reach1-DS-0	1514.585	221.73	224.97	224.4	224.97
Clarkway Trib A	Reach1-DS-0	1514.506	221.43	224.17	223.72	224.17
Clarkway Trib A	Reach1-DS-0	1514.414	220.83	223.96	223.61	223.96
Clarkway Trib A	Reach1-DS-0	1514.353	220.8	223.9	223.57	223.9
Clarkway Trib A	Reach1-DS-0	1514.345	220.68	223.89	223.56	223.89
Clarkway Trib A	Reach1-DS-0	1514.331	(Existing Culvert @ Healey Rd)			
Clarkway Trib A	Reach1-DS-0	1514.312	220.59	223.1	222.81	223.1
Clarkway Trib A	Reach1-DS-0	1514.306	220.5	222.62	222.22	222.62
Clarkway Trib A	Reach1-DS-0	1514.247	220.38	222.49	222.01	222.49
Reach 2	Reach 2	1105	237.49	239.66	238.77	239.66
Reach 2	Reach 2	1068	237.41	239.64	238.41	239.64
Reach 2	Reach 2	1054	236.65	239.64	238.45	239.64
Reach 2	Reach 2	1027	(Existing Culvert @ Coleraine Rd)			
Reach 2	Reach 2	1018	236.6	238.83	237.62	238.83
Reach 2	Reach 2	1008	235.58	238.86	237.42	238.86
Reach 2	Reach 2	1005	235.57	238.85	237.43	238.85
Reach 2	Reach 2	999	235.55	238.59	237.21	238.59
Reach 2	Reach 2	951	(Existing Culvert @ Coleraine Rd)			
Reach 2	Reach 2	666	234.65	236.59	235.87	236.59
Reach 2	Reach 2	661	234.62	236.32	235.85	236.32
Reach 2	Reach 2	656	234.66	236.31	235.84	236.31
Reach 2	Reach 2	604	234.65	236.24	235.78	236.24
Reach 2	Reach 2	498	234.51	236.07	235.61	236.07
Reach 2	Reach 2	388	234.38	235.88	235.43	235.88
Reach 2	Reach 2	307	234.11	235.73	235.3	235.73
Reach 2	Reach 2	213	233.98	235.51	235.14	235.51
Reach 2	Reach 2	172	234.11	235.31	234.95	235.31
Reach 2	Reach 2	117	233.8	235.19	234.86	235.19
Reach 2	Reach 2	85	233.83	235.06	234.76	235.06
Reach 2	Reach 2	63	233.87	234.73	234.49	234.73
Reach 2	Reach 2	45	233.72	234.59	234.53	234.59
Gore Road Trib	Reach2	1450.572	237.54	238.48	238.25	238.48

River	Reach	River Station	Min Ch El (m)	W.S. Elev (m)		
				Regional	100Year	Regulatory
Gore Road Trib	Reach2	1450.428	235.83	236.82	236.46	236.82
Gore Road Trib	Reach2	1450.284	234.78	235.41	235.2	235.41
Gore Road Trib	Reach2	1450.168	233.73	234.36	234.16	234.36
Gore Road Trib	Reach2	1450	233.28	234.14	233.81	234.14
Gore Road Trib	Reach1	1416.798	232.98	233.91	233.56	233.91
Gore Road Trib	Reach1	1416.721	232.59	233.49	233.12	233.49
Gore Road Trib	Reach1	1416.598	231.99	232.88	232.58	232.88
Gore Road Trib	Reach1	1416.398	230.73	231.81	231.42	231.81
Gore Road Trib	Reach1	1416.261	229.56	230.78	230.54	230.78
Gore Road Trib	Reach1	1416.193	229.05	230.3	229.94	230.3
Gore Road Trib	Reach1-DS-0	1416.041	228.39	229.49	229.16	229.49
Gore Road Trib	Reach1-DS-0	1415.982	228.33	229.02	228.79	229.02
Gore Road Trib	Reach1-DS-0	1415.904	227.4	228.58	228.2	228.58
Gore Road Trib	Reach1-DS-0	1415.793	226.47	228.11	227.7	228.11
Gore Road Trib	Reach1-DS-0	1415.72	226.47	227.79	227.41	227.79
Gore Road Trib	Reach1-DS-0	1415.59	225.93	227.27	226.9	227.27
Gore Road Trib	Reach1-DS-0	1415.515	225.78	226.71	226.43	226.71
Gore Road Trib	Reach1-DS-0	1415.353	225.06	226.08	225.73	226.08
Gore Road Trib	Reach1-DS-0	1415.201	224.34	225.48	225.12	225.48
Gore Road Trib	Reach1-DS-0	1415.055	223.77	224.66	224.36	224.66
Gore Road Trib	Reach1-DS-0	1414.792	222.48	223.55	223.24	223.55
Gore Road Trib	Reach1-DS-0	1414.601	221.55	222.9	222.37	222.9
Gore Road Trib	Reach1-DS-0	1414.401	220.38	222.59	221.9	222.59
Gore Road Trib	Reach1-DS-0	1414.292	220.38	222.58	221.9	222.58
Gore Road Trib	Reach1-DS-0	1414.284	220.38	222.58	221.84	222.58
Gore Road Trib	Reach1-DS-0	1414.268	(Existing Culvert @ Mayfield Rd)			
Gore Road Trib	Reach1-DS-0	1414.253	220.41	221.65	221.2	221.65
Gore Road Trib	Reach1-DS-0	1414.247	220.32	221.55	221.19	221.55
Gore Road Trib	Reach1-DS-0	1414.191	219.93	221.31	220.93	221.31

3.2 Comparison of Hydraulic Analysis Results

3.2.1 Comparison of the TRCA Original Model and SCE Existing Condition Model Hydraulic Analysis Results.

As mentioned previously, SCE received two separate hydraulic models from TRCA (one for the west tributary and one for the east tributaries), which includes channel realignment works. SCE combined these two models into a single HEC-RAS model. For the engineered channel areas, SCE adopted both the culvert and HEC-RAS cross-section geometries as defined in the original TRCA-approved HEC-RAS model. This choice was made because the TRCA-approved model was already validated, and there was limited grading data available for the proposed realigned channel.

SCE revised the existing HEC-RAS model and performed a separate hydraulic analysis using the original TRCA-approved model. A comparison of the results is detailed in **Appendix B**. This comparison was conducted only for the “Clarkway Trib A,” “Reach 2,” and “Gore Road Trib” watercourses. The “HDF-3” and “HDF-8” headwater drainage features were defined solely in the SCE Existing Condition model and were therefore not included in the comparison table.

The comparison results indicate that channel bed levels and water surface elevations are consistent across most channel routes. However, some minor and significant differences in channel bed levels were observed, particularly in the Clarkway Tributary. The water level differences appear reasonable. Additionally, the regulatory flood levels are within the valley for both the original TRCA model and the SCE revised model results.

kway Tributary. The water level differences appear reasonable. Additionally, the regulatory flood levels are within the valley for both the original TRCA model and the SCE revised model results.

The observed differences in channel bed levels are attributed to the realignment process. It is important to note that the original TRCA model was not geo-referenced but was instead based on

HEC-RAS locations relative to floodplain mapping. As a result, when attempting to geo-reference these cross-sections, alignment issues may have occurred. Despite this, the overall flood levels computed are within a reasonable range.

3.2.2 Comparison of the SCE Existing Condition and SCE Proposed Condition Model Hydraulic Analysis Results.

Table 3-3 presents a comparison of hydraulic analysis results between existing and proposed conditions for all tributaries within the subject area. The comparison focuses on channel bed levels and regulatory water surface elevations. Note that if HEC-RAS cross-sections are taken at identical locations with similar alignments in both the existing and proposed condition models, they will have the same Cross-Section number. Comparisons are based on cross-sections with matching Cross-Section numbers. For a detailed summary of the comparisons, including regulatory peak flow and velocity parameters, please refer to **Appendix B**. Floodplain maps can be found in **Appendix C**.

Table 3-3: SCE Existing and Proposed Condition HEC-RAS Results Comparison

River	Reach	Existing Condition			Proposed Condition			Difference (Proposed – Existing)		
		River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)
HDF-3	1	1002	242.78	243.23	1002	242.73	243.32	0	-0.05	0.09
		1001	242.72	243.16	1001	242.68	243.27	0	-0.04	0.11
		1000	242.49	242.85	1000	242.51	243.13	0	0.02	0.28
		N/A	N/A	N/A	999.4	242.32	242.84	N/A	N/A	N/A
		999	241.92	242.34	999	241.91	242.35	0	-0.01	0.01
		998	241.84	242.08	998	241.84	242.07	0	0	-0.01
		997	240.98	241.67	997	240.98	241.65	0	0	-0.02
		996.5	240.96	241.37	996.5	240.96	241.41	0	0	0.04
		996	240.55	240.99	996	240.55	240.92	0	0	-0.07
		995	240.22	240.68	995.2	240.21	240.71	0.2	N/A	N/A
		994	239.74	240.13	994.82	239.94	240.47	0.82	N/A	N/A
		993	238.99	239.18	993.82	239.69	240.31	0.82	N/A	N/A
		992	238.18	238.4	993.63	239.57	240.22	1.63	N/A	N/A

River	Reach	Existing Condition			Proposed Condition			Difference (Proposed – Existing)		
		River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)
		N/A	N/A	N/A	993.52	239.39	240.03	N/A	N/A	N/A
		N/A	N/A	N/A	993.36	239.15	239.77	N/A	N/A	N/A
		N/A	N/A	N/A	992.97	238.95	239.6	N/A	N/A	N/A
		N/A	N/A	N/A	992.79	238.76	239.28	N/A	N/A	N/A
		N/A	N/A	N/A	992.56	238.5	239.03	N/A	N/A	N/A
		N/A	N/A	N/A	992.13	238.28	239.02	N/A	N/A	N/A
		N/A	N/A	N/A	991.9	238.35	238.96	N/A	N/A	N/A
		N/A	N/A	N/A	991.6	238.13	238.77	N/A	N/A	N/A
		991	237.1	237.56	991	237.69	238.32	N/A	N/A	N/A
		990	236.39	236.64	990	236.97	237.53	N/A	N/A	N/A
		N/A	N/A	N/A	989.68	236.25	236.84	N/A	N/A	N/A
		N/A	N/A	N/A	989.5	235.94	236.61	N/A	N/A	N/A
		N/A	N/A	N/A	989.4	235.65	236.22	N/A	N/A	N/A
		N/A	N/A	N/A	989.3	235.18	235.72	N/A	N/A	N/A
		N/A	N/A	N/A	989.2	234.58	235.18	N/A	N/A	N/A
		N/A	N/A	N/A	989.1	234.14	234.72	N/A	N/A	N/A
		989	235.2	235.6	989	233.72	234.38	N/A	N/A	N/A
		988	234.1	234.63	N/A	N/A	N/A	N/A	N/A	N/A
		987.5	233.34	233.81	987.5	233.31	233.89	0	-0.03	0.08
		987	232.3	233.42	987	232.3	233.58	0	0	0.16
		986	231.93	233.41	986	231.9	233.58	0	-0.03	0.17
		985	231.75	233.41	985	231.75	233.58	0	0	0.17
		984	232.05	233.14	984	232.05	233.16	0	0	0.02
		983	231.24	233.18	983	231.24	233.21	0	0	0.03
		982.58			982.58		(Existing Culvert @ Humber Station Rd)			
		982	230.86	231.88	982	230.86	232.01	0	0	0.13
		981	230.86	231.35	981	230.86	231.39	0	0	0.04
		980	230.22	230.43	980	230.22	230.46	0	0	0.03
HDF-8	1	36	229.5	229.78	N/A	N/A	N/A	N/A	N/A	N/A
		35	228.5	228.85	N/A	N/A	N/A	N/A	N/A	N/A
		34	228.24	228.62	N/A	N/A	N/A	N/A	N/A	N/A
		33	227.98	228.2	N/A	N/A	N/A	N/A	N/A	N/A
		32	227.25	227.69	N/A	N/A	N/A	N/A	N/A	N/A
		31	226.96	227.22	N/A	N/A	N/A	N/A	N/A	N/A

River	Reach	Existing Condition			Proposed Condition			Difference (Proposed – Existing)		
		River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)
		30	226.13	226.46	30	226.13	226.46	0	0	0
		29	225.72	225.97	29	225.72	225.97	0	0	0
		28	224.75	225.18	28	224.75	225.18	0	0	0
		27	224.49	224.87	27	224.49	224.87	0	0	0
		26	224.16	224.37	26	224.16	224.37	0	0	0
		25	223	224.3	25	223	224.3	0	0	0
		24	221.76	224.31	24	221.76	224.31	0	0	0
		23.6	221.2	224.31	23.6	221.2	224.31	0	0	0
		23.3			23.3		(Existing Culvert @ Mayfield Rd)			
		23	220.91	222.17	23	220.91	222.17	0	0	0
		22	220.99	222.19	22	220.99	222.19	0	0	0
Clarkway Trib A	Reach1	1597	241.79	243.7	1597	241.79	243.72	0	0	0.02
		1594			1594		(Existing Culvert @ Healey Rd)			
		1591	241.48	243.19	1591	241.48	243.19	0	0	0
		1583	241.24	242.66	1583	241.24	242.68	0	0	0.02
		1561.698	241.38	242.12	1561.698	241.38	242.14	0	0	0.02
		1561.551	240.81	241.58	1561.551	240.81	241.6	0	0	0.02
		1561.404	239.94	241.08	1561.404	239.94	241.1	0	0	0.02
		1561.256	239.1	240.25	1561.256	239.1	240.28	0	0	0.03
		1561.12	238.71	239.71	1561.12	238.71	239.74	0	0	0.03
		1560.977	238.53	239.17	1560.977	238.53	239.22	0	0	0.05
		1560.88	237.95	238.73	1560.88	237.95	238.79	0	0	0.06
		1560.685	236.78	237.31	1560.685	236.78	237.36	0	0	0.05
		1560.6	236.23	237.01	1560.6	236.23	237.11	0	0	0.1
		1560.57	235.97	236.71	1560.57	235.97	236.8	0	0	0.09
		1560.5	235.24	236.12	1560.5	235.24	236.21	0	0	0.09
		1519.898	234.49	235.29	1519.898	234.49	235.38	0	0	0.09
		1430.348	234	234.92	1430.348	234	234.97	0	0	0.05
Clarkway Trib A	Reach1-DS-0	1651	233.59	234.52	1651	233.59	234.57	0	0	0.05
		1580	232.98	234.14	1580	232.98	234.19	0	0	0.05
		1573	232.49	233.46	1573	232.49	233.5	0	0	0.04
		1534	230.44	232.37	1534	230.44	232.63	0	0	0.26
		1528	229.7	232.19	1528	229.7	232.51	0	0	0.32
		1516.384	230.28	232.06	1516.384	230.28	232.48	0	0	0.42

River	Reach	Existing Condition			Proposed Condition			Difference (Proposed – Existing)		
		River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)
		1516.312	230.52	231.76	1516.312	230.49	232.35	0	-0.03	0.59
		1516.276	230.46	231.48	1516.276	230.2	231.68	0	-0.26	0.2
		N/A	N/A	N/A	1516.245	(Proposed Culvert @ George Bolton Pkwy)				
		1516.214	229.35	231.05	1516.214	229.48	231.13	0	0.13	0.08
		1516.156	229.11	230.88	1516.156	229.11	230.85	0	0	-0.03
		1516.103	228.87	230.66	1516.103	228.87	230.7	0	0	0.04
		N/A	N/A	N/A	1516.043	228.72	230.56	N/A	N/A	N/A
		1515.984	228.6	230.25	1515.984	228.6	230.34	0	0	0.09
		N/A	N/A	N/A	1515.899	228.23	229.9	N/A	N/A	N/A
		1515.784	227.73	229.41	1515.784	227.73	229.56	0	0	0.15
		1515.584	226.41	228.67	1515.584	226.41	228.8	0	0	0.13
		1515.386	226.38	227.25	1515.386	226.38	227.38	0	0	0.13
		1515.185	224.64	226.66	1515.185	224.64	226.82	0	0	0.16
		1515.084	224.37	226.52	1515.084	224.37	226.68	0	0	0.16
		1514.985	224.01	226.07	1514.985	224.01	226.28	0	0	0.21
		1514.912	224.1	225.52	1514.912	224.1	225.67	0	0	0.15
		1514.788	223.95	224.87	1514.788	223.95	225.16	0	0	0.29
		1514.658	222.72	224.68	1514.658	222.72	225.02	0	0	0.34
		1514.585	221.73	224.64	1514.585	221.73	224.97	0	0	0.33
		1514.506	221.43	223.87	1514.506	221.43	224.17	0	0	0.3
		1514.414	220.83	223.81	1514.414	220.83	223.96	0	0	0.15
		1514.353	220.8	223.76	1514.353	220.8	223.9	0	0	0.14
		1514.345	220.68	223.76	1514.345	220.68	223.89	0	0	0.13
		1514.331			1514.331		(Existing Culvert @ Healey Rd)			
		1514.312	220.59	223	1514.312	220.59	223.1	0	0	0.1
		1514.306	220.5	222.53	1514.306	220.5	222.62	0	0	0.09
		1514.247	220.38	222.44	1514.247	220.38	222.49	0	0	0.05
Reach 2	Reach 2	1105	237.49	239.66	1105	237.49	239.66	0	0	0
		1068	237.41	239.64	1068	237.41	239.64	0	0	0
		1054	236.65	239.64	1054	236.65	239.64	0	0	0
		1027			1027		(Existing Culvert @ Coleraine Rd)			
		1018	236.6	238.83	1018	236.6	238.83	0	0	0
		1008	235.58	238.86	1008	235.58	238.86	0	0	0
		1005	235.57	238.85	1005	235.57	238.85	0	0	0

River	Reach	Existing Condition			Proposed Condition			Difference (Proposed – Existing)		
		River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)
		999	235.55	238.59	999	235.55	238.59	0	0	0
		951			951		(Existing Culvert @ Coleraine Rd)			
		666	234.65	236.59	666	234.65	236.59	0	0	0
		661	234.62	236.32	661	234.62	236.32	0	0	0
		656	234.66	236.31	656	234.66	236.31	0	0	0
		604	234.65	236.24	604	234.65	236.24	0	0	0
		498	234.51	236.07	498	234.51	236.07	0	0	0
		388	234.38	235.88	388	234.38	235.88	0	0	0
		307	234.11	235.73	307	234.11	235.73	0	0	0
		213	233.98	235.51	213	233.98	235.51	0	0	0
		172	234.11	235.31	172	234.11	235.31	0	0	0
		117	233.8	235.19	117	233.8	235.19	0	0	0
		85	233.83	235.06	85	233.83	235.06	0	0	0
		63	233.87	234.73	63	233.87	234.73	0	0	0
		45	233.72	234.53	45	233.72	234.59	0	0	0.06
Gore Road Trib	Reach2	1450.572	237.54	238.48	1450.572	237.54	238.48	0	0	0
		1450.428	235.83	236.82	1450.428	235.83	236.82	0	0	0
		1450.284	234.78	235.41	1450.284	234.78	235.41	0	0	0
		1450.168	233.73	234.36	1450.168	233.73	234.36	0	0	0
		1450	233.28	234.14	1450	233.28	234.14	0	0	0
Gore Road Trib	Reach1	1416.798	232.98	233.91	1416.798	232.98	233.91	0	0	0
		1416.721	232.59	233.49	1416.721	232.59	233.49	0	0	0
		1416.598	231.99	232.88	1416.598	231.99	232.88	0	0	0
		1416.398	230.73	231.81	1416.398	230.73	231.81	0	0	0
		1416.261	229.56	230.78	1416.261	229.56	230.78	0	0	0
		1416.193	229.05	230.3	1416.193	229.05	230.3	0	0	0
Gore Road Trib	Reach1-DS-0	1416.041	228.39	229.49	1416.041	228.39	229.49	0	0	0
		1415.982	228.33	229.02	1415.982	228.33	229.02	0	0	0
		1415.904	227.4	228.58	1415.904	227.4	228.58	0	0	0
		1415.793	226.47	228.11	1415.793	226.47	228.11	0	0	0
		1415.72	226.47	227.79	1415.72	226.47	227.79	0	0	0
		1415.59	225.93	227.27	1415.59	225.93	227.27	0	0	0
		1415.515	225.78	226.71	1415.515	225.78	226.71	0	0	0
		1415.353	225.06	226.08	1415.353	225.06	226.08	0	0	0

River	Reach	Existing Condition			Proposed Condition			Difference (Proposed – Existing)		
		River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)	River Station	Min Ch El (m)	W.S.Elev (m)
		1415.201	224.34	225.48	1415.201	224.34	225.48	0	0	0
		1415.055	223.77	224.66	1415.055	223.77	224.66	0	0	0
		1414.792	222.48	223.55	1414.792	222.48	223.55	0	0	0
		1414.601	221.55	222.9	1414.601	221.55	222.9	0	0	0
		1414.401	220.38	222.59	1414.401	220.38	222.59	0	0	0
		1414.292	220.38	222.58	1414.292	220.38	222.58	0	0	0
		1414.284	220.38	222.58	1414.284	220.38	222.58	0	0	0
		1414.268			1414.268		(Existing Culvert @ Mayfield Rd)			
		1414.253	220.41	221.65	1414.253	220.41	221.65	0	0	0
		1414.247	220.32	221.55	1414.247	220.32	221.55	0	0	0
		1414.191	219.93	221.31	1414.191	219.93	221.31	0	0	0

Table 3-3 above presents a comparison between the existing and proposed condition results of hydraulic analysis for the drainage features in and around the studied area (specifically HDF-3, HDF-8, Clarkway Trib A, and Gore Road Trib).

HDF-3 experiences a realignment of drainage in two segments, specifically between HEC-RAS Station #1002 - #999 and HEC-RAS Station #994.82 - #987.5. Therefore, a comparison between the existing and proposed conditions is not applicable in these segments of the HDF-3 drainage feature. Instead, comparison focuses on segments where the alignment and channel geometry remain consistent across existing and proposed conditions.

In the proposed condition, HDF-3 aligns with the existing channel in the northern (Station #999 - #996) and southern (Station #987.5 - #980) parts of the drainage feature. In the northern segment, the proposed condition shows a maximum water elevation increase of 4cm at HEC-RAS Station #996.5 corresponding to regional flows. In the southern segment, the proposed condition indicates a maximum regulatory water level increase of 17cm at stations #986 and #985 due to a 7.29m³/s rise in uncontrolled regional peak flow compared to the existing condition (detailed comparison in **Appendix B**). Please note that this area includes an established traditional pond and is designated as "Wetland E1" in both the existing and proposed conditions. Please refer to **Appendix D**, Figure 6, "Opportunities and Constraints Map" prepared by GEI for details. The proposed floodplain is situated within the valley and does not extend into the proposed development area.

In the proposed scenario, the analysis of the HDF-8 drainage feature was specifically focused on the watercourse segment located south of the designated wetland compensation area (Wetland Compensation Area 3). The main drainage originating from the subject area has been redirected to a regional control pond (SWM Pond # 3), as detailed in ***Section 2-2***. To adopt a conservative approach, the section of HDF-8 south of the proposed wetland compensation area was modeled using existing condition peak flows. As a result of this approach, no differences were noted in either water level or channel bed level within HDF-8.

The Clarkway Tributary runs along the eastern boundary of the area in question. As part of the proposed changes, a culvert will be installed at the extension of George Bolton Pkwy to manage increased regional peak flow, which can reach up to 20.0m^3/s. No alterations are planned for the channel bed of the watercourse. To improve the accuracy of water elevation estimates, additional HEC-RAS cross-sections have been established at HEC-RAS Station #1516.043 and #1515.899, specifically to monitor the Stormwater Management (SWM) pond located south of George Bolton Pkwy.

According to the floodplain analysis under the proposed conditions, the maximum water elevation increase upstream of the culvert at HEC-RAS Station #1516.312 in the Clarkway Tributary is 59.0cm. The floodplain map indicates that the regulatory floodline is within the valley. The proposed development is situated outside this regulatory floodline. It has also been confirmed that the flood levels will not affect the existing or proposed SWM ponds in the vicinity of the area under consideration.

3.3 Water Level Impact on the Existing and Proposed SWM Ponds

The planned Stormwater Management (SWM) ponds are configured to channel water towards natural drainage elements. Proposed SWM Ponds #1 and #3 will guide flows towards the Clarkway Tributary, while SWM Pond #2 is tailored to direct water towards HDF-3. Alongside these new SWM Ponds in the specified area, there are also two established SWM Ponds situated along the eastern boundary of the Clarkway Tributary. Detailed illustrations of both the proposed and existing SWM Ponds can be found in **Appendix D** of the Engineering Drawings.

To assess the impact of water levels on the design of the proposed and existing SWM ponds, regional and 100-year water levels were compared with the permanent pool level and spillway levels of adjacent SWM ponds. The water level of the watercourse is primarily influenced by the HEC-RAS cross-section located near the outlet of the SWM pond.

According to the comparison shown in the table below, the 100-year flow is lower than the permanent pool levels (PPL), and the regulatory flood level is lower than the emergency spillway level of each SWM Pond. Therefore, it can be concluded that the proposed flood line will not adversely affect the SWM ponds. Please refer to the Floodplain mappings (**Appendix C**) and Engineering Drawings included in the submission package for further details.

Table 3-4: SWM Pond Elevations and Floodplain Elevations Comparison.

SWM Pond Information			**Watercourse Location**		**Proposed Condition Water Course Flood Level (m)**	
SWM Pond ID	PPL	Spillway Level	Water Course Name	HEC-RAS ID	100 Year	Regional
Proposed SWM 1	239.70	241.70	Clarkway Trib	1560.88	238.77	238.79
Proposed SWM 2	240.5	242.0	HDF-3	992.97	239.60	239.43
Proposed SWM 3	228.20	230.70	Clarkway Trib	1515.185	226.82	226.74
Existing SWM Pond (#4+5) *	230.5	234.25	Clarkway Trib	1516.043	230.48	230.56
Existing SWM Pond (3) **	234.75	237.74	Clarkway Tributary***	1430.348	234.97	234.92
			Engineered Channel_Reach 2***	63	234.73	234.49

Note: * Existing SWM Pond (4+5) is located east of Clarkwy Tributary and South of George Bolton Parkway.
** Existing SWM Pond (# 3) is located east of Clarkwy Tributary and North of the existing Engineered Channel (Reach 2).
*** Spillway is directed to Clarkway Tributary. Hence, the regional water level at (1430.348) compared with the spillway level of the pond.
*** The bottom outlet is directed to the Engineered channel. Hence, the 100 year water level at (63) compared with the permanent pool level.

3.4 Hydraulic Analysis Results of the Proposed Road Crossing

The hydraulic assessment of the proposed road crossing was conducted using HEC-RAS, focusing on post-development uncontrolled flows. The culvert planned for the Clarkway Tributary crossing was appropriately sized to accommodate regulatory flows. The road crossing design criteria outlined in ***Section 2.5.1*** were applied in this analysis. The proposed culvert is a double Conspan culvert, each with dimensions of 3.66m in rise, 10.98m in span, and 65.0m in length. In the crossing area, the channel bed features a low-flow channel with a depth of 0.30m and side slopes of 3:1. **Table 3-5** summarizes the results of the hydraulic modeling, indicating no flood overtopping over the road crossings since the regulatory water level is below the road top level. Notably, the high water level corresponding to the first upstream HEC-RAS cross-section of the culvert was reported for clarity.

Table 3-5 details the calculations used to determine the opening depth within the culvert and the clearance depths. The dryland opening depth, located below the culvert's obvert level and the top of the low-flow channel, provides access for animals during dry flow seasons. It was found to be 3.36m. The freeboard depth, which is the space between the culvert's obvert and the high water level, exceeds 2.1m above high flood levels. The provided clearance of more than 1.0m meets the Ontario Ministry of Transportation (MTO) requirements.

Table 3-5: Summary of Proposed Road Crossing Hydraulic Analysis Results

Description	**Information**	**Remarks**
Water Course Name	Clarkway Tributary	** Culvert U/S Obvert Elevation = Invert Elevation + Culvert depth (230.15+3.66 = 233.81)* *** Depth above dryland is the depth available within the culvert to pass animals through during dry water conditions. It is measured above the low flow channel depth and below the obvert level of the culvert = Obvert level – Low flow channel depth – Invert elevation. (233.81 – 0.30 – 230.15 = 3.36m).* **** Clearance is the height between the obvert level and the high-water level = Obvert level – High water level. (233.81 – 231.68 = 2.13m).*
Road Name	George Bolton Pkwy	
Culvert Type and Dimensions	Double Conspan (Each 3.66m rise, 10.98m span, and 65.0m length)	
Proposed condition peak flows	Regional 66.56m^3/s and 100year 60.09m^3/s	
High Water Level	Regional 231.68m and 100year 231.61m	
Culvert Elevation	Upstream Invert = 230.15m Downstream Invert = 229.50m Upstream Obvert* = 233.81m	
Low flow channel depth (m)	0.30m	
Road Top Elevation (m)	235.60m	
Depth (m)	Depth above dry land** =3.36 Freeboard depth (Clearance)*** = 2.13	

4.0 Cut and Fill Analysis

4.1 Headwater Drainage Feature (HDF-3)

As previously discussed in *Section 2.2*, significant drainage realignment was necessary for HDF-3 due to the proposed grading in the area under consideration. The redesigned drainage alignment was intended to enhance channel conveyance and create adequate channel storage to offset the fill volume.

Cut and fill analysis was performed using Civil 3D software, with water elevations derived from the HEC-RAS Model for volume calculations. The analysis considered existing condition flows from 2-year to regional storm events (refer to **Appendix B** for specific water elevations used). Detailed summaries of the cut and fill calculations, including tables and maps, are provided in **Appendix C**.

The required fill volume was determined by cross-sections across the channel based on the existing floodplain map area (see **Appendix C**, Drawing # EFP-1 to EFP-3). Water elevations corresponding to each storm event were plotted on these cross-sections, and storage area calculations were conducted using the end area method. Similarly, the provided volume was estimated by generating cross-sections based on proposed floodplain mappings and plotting proposed condition water elevations (**Appendix C**, Drawing # FP-1 to FP-4).

The total volume represents cumulative storage from the channel bed to the specified water elevation, while incremental volume denotes the difference in storage between successive storm events' flood levels.

The cut and fill volume calculations confirm that the total provided storage volume exceeds the required total storage volumes for all storm events, as detailed in the summary table (**Table 4-1**).

Table 4-1: Cut and fill Volume Calculation Summary Table

Incremental Volume Calculation				Total Volume Calculation			
Return Period	**Required Storage (m^3)**	**Provided Storage (m^3)**	**Surplus (m^3)**	**Return Period**	**Required Storage (m^3)**	**Provided Storage (m^3)**	**Surplus (m^3)**
Less than 2 Year	1038	1336	298	2 Year	1038	1336	298
2 Year - 5 Year	320	1238	918	5 Year	1358	2574	1216
5 Year - 10 Year	707	3028	2320	10 Year	2065	5601	3536
10 Year - 25 Year	391	1425	1034	25 Year	2457	7026	4570
25 Year - 50 Year	248	785	536	50 Year	2705	7811	5106
50 Year - 100 Year	264	691	427	100 Year	2969	8502	5534
100 Year - Regional	3655	8104	4449	Regional	6624	16606	9983

4.2 Headwater Drainage Feature (HDF-8)

As detailed in earlier sections, the major flows previously directed to the HDF-8 catchment area are now proposed to be redirected to SWM Pond 3. This pond will manage quantity control for 2-to-100 year storm events through unitary flows as specified by the TRCA Humber River subbasin 36 and will include regional control measures. Instead of discharging into HDF-8, SWM Pond 3 will discharge into the Clarkway Tributary. Consequently, the flow into the remaining part of HDF-8 will be reduced. It is important to note that the Clarkway Tributary and HDF-8 merge shortly after the Humber Station Villages Study area.

As noted in *Section 1.2*, the final 900 meters of the drainage feature (north of the Mayfield Road crossing) are within a regulatory floodplain. Consequently, a detailed hydraulic analysis was performed for this section. Of the total 900 meters, only the initial 340 meters (between Node “A” and Node “B” as depicted in **Figure 2**) fall within the subject area. This segment of HDF-8 is located between HEC-RAS Cross-Section #36 and #31, as shown in the Floodplain mapping (see **Appendix C**).

Under the proposed conditions, the top 340 meters of the drainage feature will be removed, as illustrated in **Figure 5**. To compensate for this change, a wetland compensation area (Wetland Compensation Area 3) will be created upstream of the remaining section of HDF-8. This area will be replenished with clean roof runoff from the proposed employment land. Given that the runoff area of the proposed employment land is smaller than the existing drainage area, and the peak flow will be roof-controlled, the system has been designed to match the existing flow volume with a release rate of 42 l/s/ha.

Thus, the peak flow into the remaining part of HDF-8 will be lower than the current conditions, which will help reduce erosion. Additionally, Wetland Compensation Area 3 is designed to replace the floodplain volume lost from HDF-8. Its surface area will correspond to the floodplain area required for frequent storms (i.e., a 25mm storm), estimated to be approximately 3,300 m^2.

The wetland compensation area will also accommodate the floodplain volume for regional storms, estimated at about 1,750 m^3 based on HEC-RAS analysis for the HDF-8 floodplain between Cross-Section #36 and #31. For more details, refer to the calculation summary table below, with additional results in **Appendix B** and the floodplain map in **Appendix C**.

Table 4-2: Summary of Volume Calculation for the HDF-8 within the Subject Area

		Q Total	**Min Ch El**	**W.S. Elev**	**Flood Storage Volume (1000m^3)**		**Incremental Storage Volume Between Successive Storm Events (1000m^3)**	
River Stan.	**Profile**	**(m^3/s)**	**(m)**	**(m)**	**Cumulative***	**Between Stan. #36 and #31****	**Profile**	**Incremental Volume**
36	2-year	0.3	229.5	229.55	0.72			
36	5-year	0.51	229.5	229.57	1.11			
36	10-year	1.07	229.5	229.61	2.36			
36	25-year	1.33	229.5	229.63	3.52			
36	50-year	1.53	229.5	229.64	4.84			
36	100-year	1.73	229.5	229.65	6.67			
36	Regional	4.25	229.5	229.78	12.39			
31	2-year	0.36	226.96	227.01	0.47	0.25	2-Yr	0.25
31	5-year	0.61	226.96	227.03	0.75	0.36	2Yr - 5Yr	0.11
31	10-year	1.29	226.96	227.06	1.75	0.61	5Yr -10Yr	0.25
31	25-year	1.61	226.96	227.08	2.81	0.71	10Yr - 25Yr	0.1
31	50-year	1.85	226.96	227.11	4.05	0.79	25Yr - 50Yr	0.08
31	100-year	2.1	226.96	227.11	5.8	0.87	50Yr - 100Yr	0.08
31	Regional	5.15	226.96	227.22	10.64	1.75	100Yr - Regional	0.88

*Note: * Total cumulative channel storage volume from the downstream end of the watercourse up to Stations #36 and #31. For detailed results, please refer to the HEC-RAS analysis in Appendix B.*
*** Storage volume between Station #36 and #31. For example, channel storage volume corresponding to the regional flow = (Cumulative Volume @ Station #36(i.e.,12.39*1000) – (Volume @ Station # 31(i.e., 10.64*1000) = 1.75*1000m^3).*

5.0 Summary and Conclusion

This report presents hydraulic modelling, calculated water surface elevations, and associated flood lines with the existing condition flows along the drainage features in the Humber Station Village area in the Town of Caledon. A comparison between existing and post-development conditions is also presented to assess the impact of the proposed development on the existing drainage system. The results of the analysis can be summarized as follows:

- The Study Area falls under the jurisdiction of the TRCA and hydraulic modelling was performed using HEC-RAS software;
- Regional storm (Hurricane Hazel) and 100-year storms (AES 6hr and AES 12hr distribution) events were simulated based on the current hydrological information and considered in the hydraulic modelling;
- Peak flows adopted as shown in the TRCA-approved HEC-RAS Models. The peak flows were computed for 100 year and regional storm events were used to delineate flood lines;
- In this study, the available detailed topographic field data and aerial topographic data (where the detailed survey was not available) were used to produce a high-resolution Triangulated Irregular Network (TIN) for generating digital terrain layers;
- SCE Combined two TRCA-approved HEC-RAS approved models and created one combined SCE existing HEC-RAS Model. Since the Original TRCA Model was not georeferenced, in the process of georeferencing the original TRCA Model, there were some channel bed level variations from the original model. However, the overall water level result was reasonably defined;
- Drainage features defined within the subject area are HDF-3, HDF-8, and Clarkway Tributary;
- HDF-3 considers 1300m long drainage realignment in the proposed condition. The drainage realignment considered balanced cut and fill volume calculations and connected to the existing and proposed wetland features;

- Cut and fill analyses were conducted using a Civil 3D Model. The provided riparian storage volume was found sufficiently higher than the required storage volume for all storm events;

- Under the proposed condition, the major flows that used to drain into the HDF-8 catchment area will be redirected to the regional control SWM Pond #3. A wetland compensation area has been designed at HDF-8 to balance the existing condition floodplain volume and frequent flow floodplain surface area;

- There is a Conspan culvert proposed at the Clarkway Tributary following the proposed extension of George Bolton Pkwy. The road crossing is designed to adhere to the requirements of the City of Vaughan, and TRCA guidelines;

- Analysis results depicted that the 100 year water level is below the permanent pool levels and the regulatory flood level is lower than the spillway level of each SWM Pond within and around the subject area.

- The floodplain mapping depicts the regulatory flood line along drainage features;

We trust that you will find this analysis satisfactory. If you have any questions or comments concerning hydraulic analysis, please do not hesitate to contact us.
Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.

LICENSED PROFESSIONAL ENGINEER
D.L. YILAK
100508157
Aug. 16, 2024
PROVINCE OF ONTARIO

Debebe Yilak, M.Sc., P.Eng.,
Water Resources Engineer

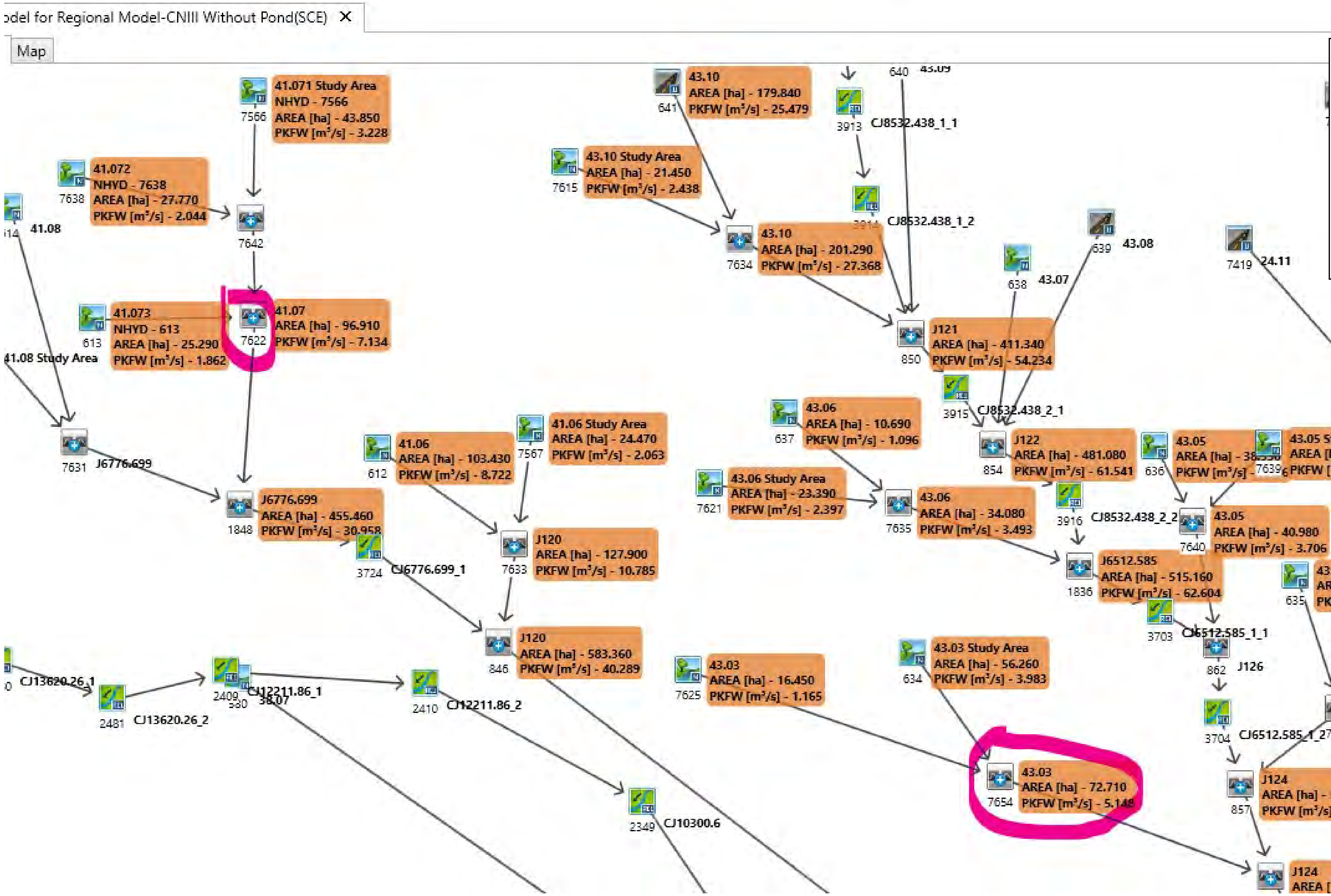
APPENDICES

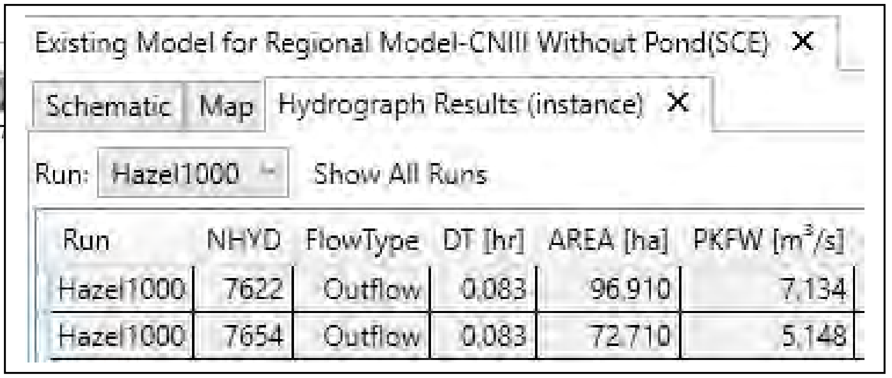
APPENDIX A

HYDROLOGICAL ANALYSIS RESULTS

&

SUPPORTIVE DOCUMENTS





Run: Hazel1000

Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m³/s]
Hazel1000	7622	Outflow	0.083	96.910	7.134
Hazel1000	7654	Outflow	0.083	72.710	5.148

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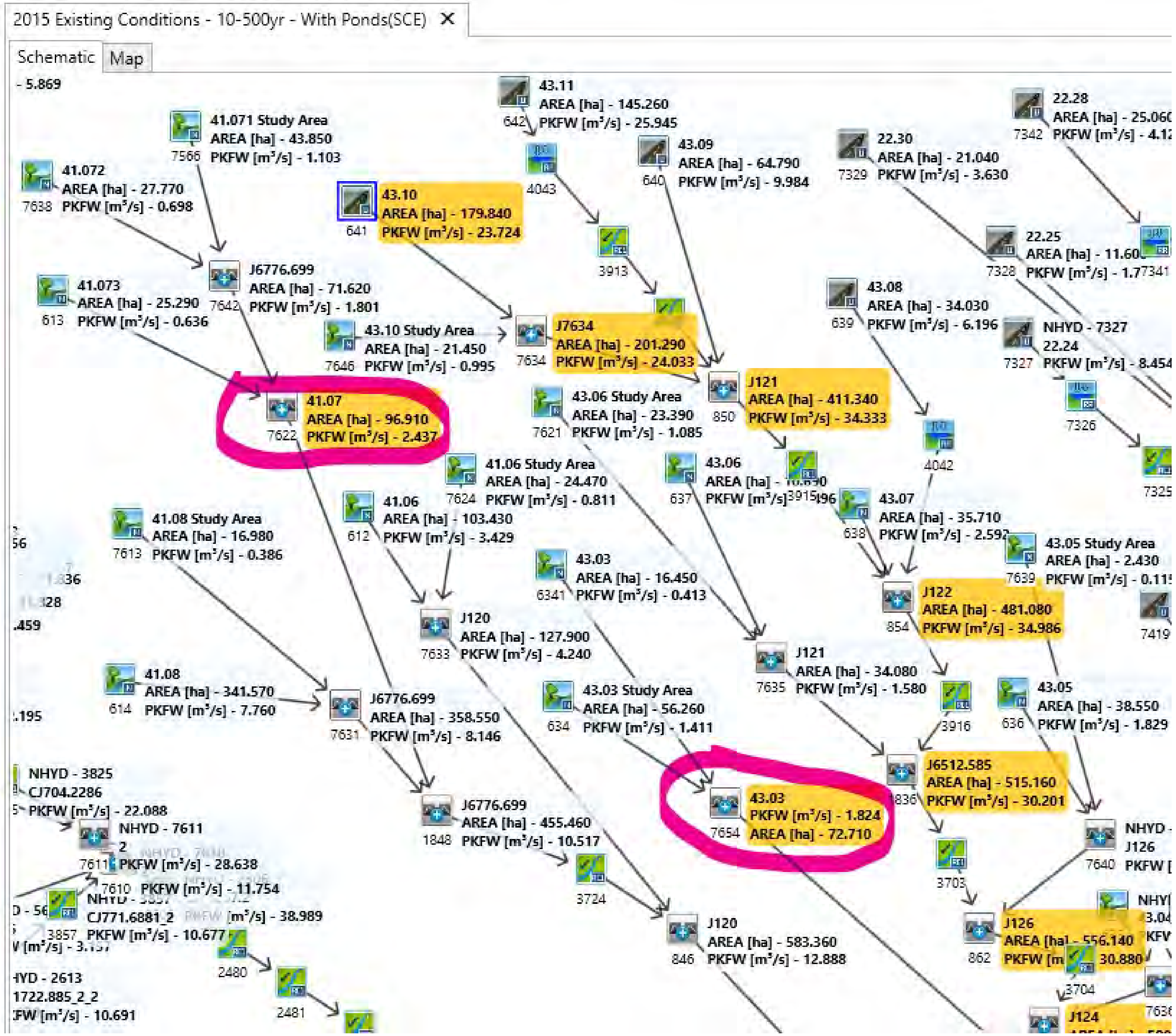
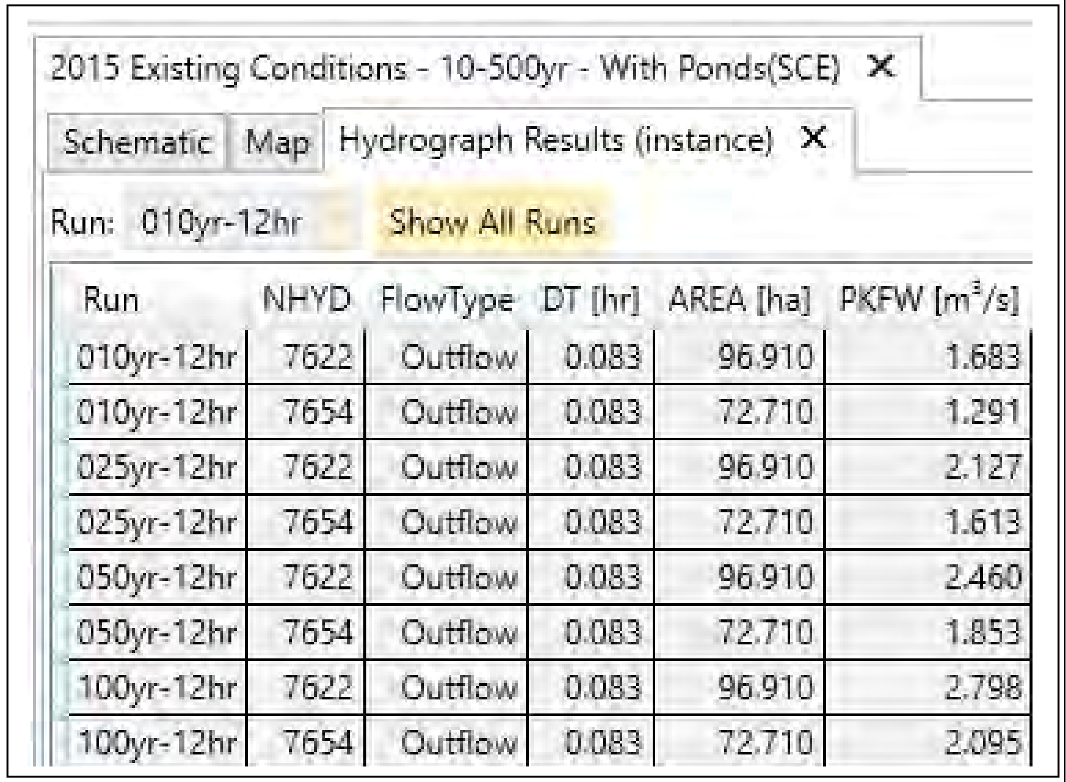
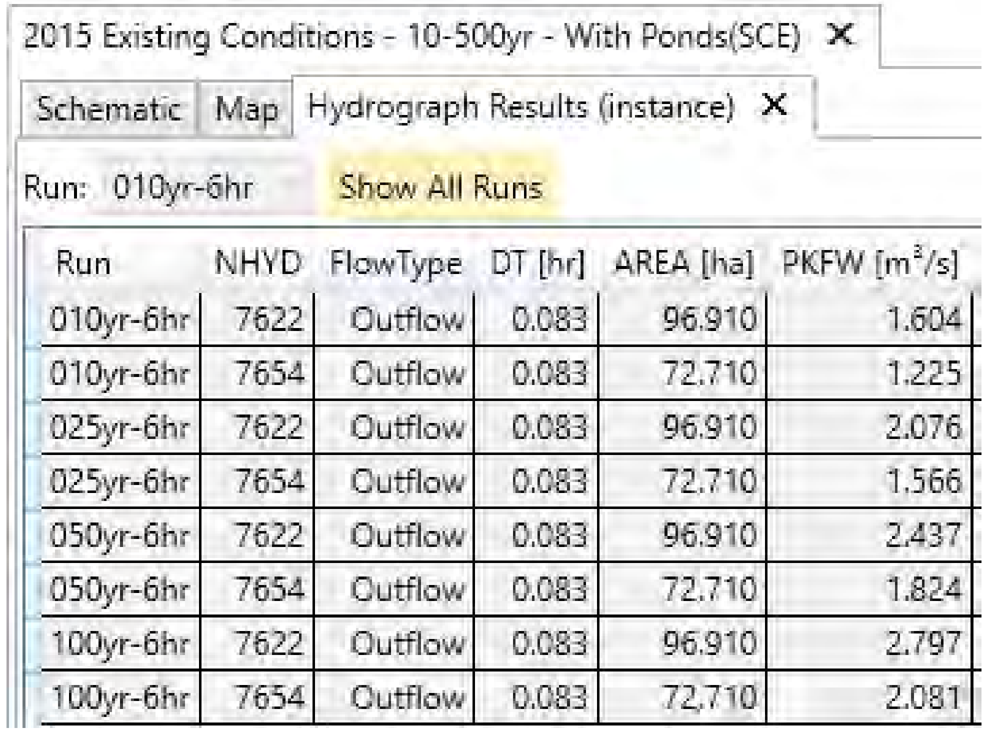
Humber Station Visual OTTHYMO™ Schematic –SCE Existing Conditions
(SCE Existing Condition Regional Flow)

Job # 2021-5139 **Date: July, 2024**





Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m³/s]
010yr-12hr	7622	Outflow	0.083	96.910	1.683
010yr-12hr	7654	Outflow	0.083	72.710	1.291
025yr-12hr	7622	Outflow	0.083	96.910	2.127
025yr-12hr	7654	Outflow	0.083	72.710	1.613
050yr-12hr	7622	Outflow	0.083	96.910	2.460
050yr-12hr	7654	Outflow	0.083	72.710	1.853
100yr-12hr	7622	Outflow	0.083	96.910	2.798
100yr-12hr	7654	Outflow	0.083	72.710	2.095



Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m³/s]
010yr-6hr	7622	Outflow	0.083	96.910	1.604
010yr-6hr	7654	Outflow	0.083	72.710	1.225
025yr-6hr	7622	Outflow	0.083	96.910	2.076
025yr-6hr	7654	Outflow	0.083	72.710	1.566
050yr-6hr	7622	Outflow	0.083	96.910	2.437
050yr-6hr	7654	Outflow	0.083	72.710	1.824
100yr-6hr	7622	Outflow	0.083	96.910	2.797
100yr-6hr	7654	Outflow	0.083	72.710	2.081

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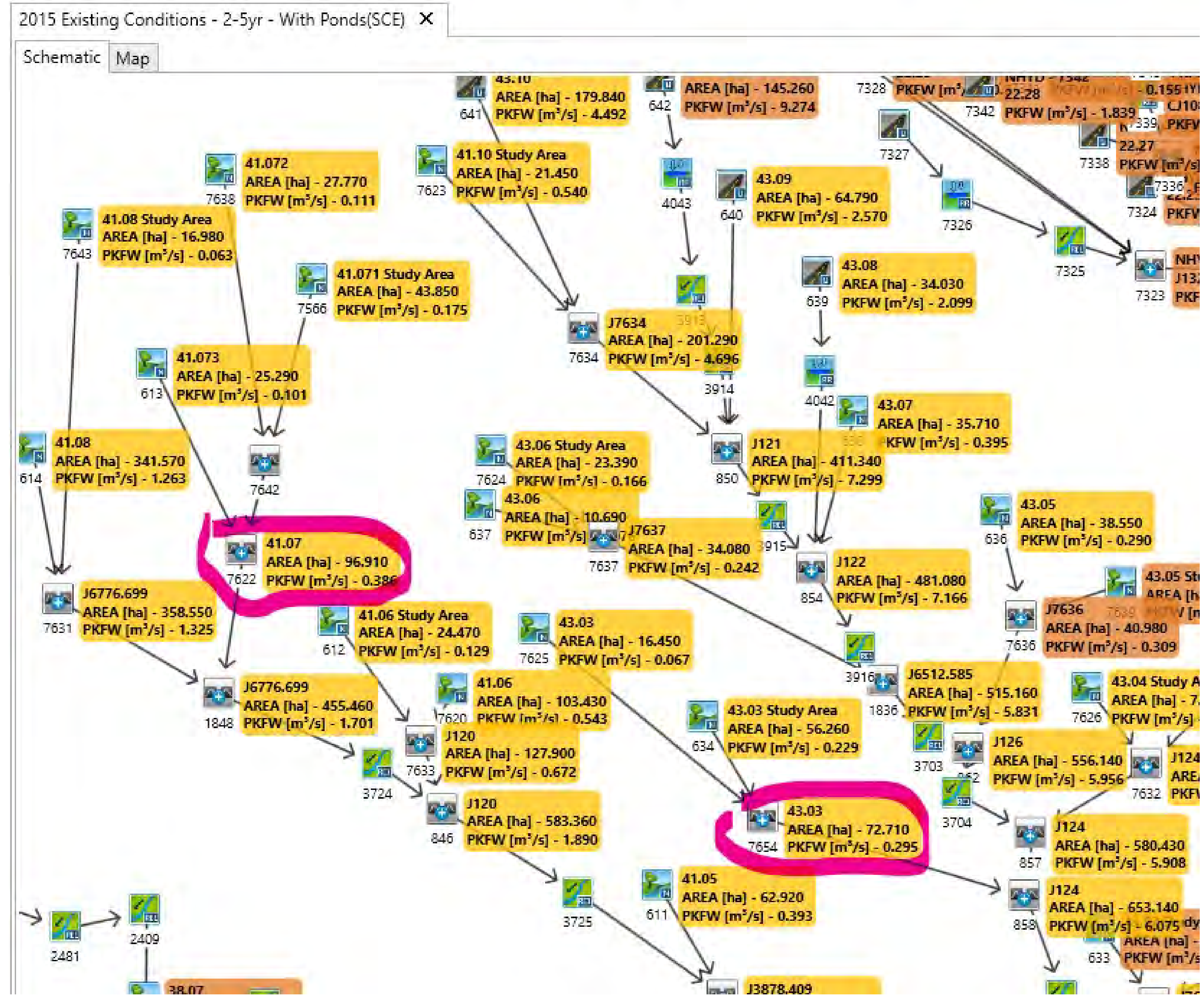
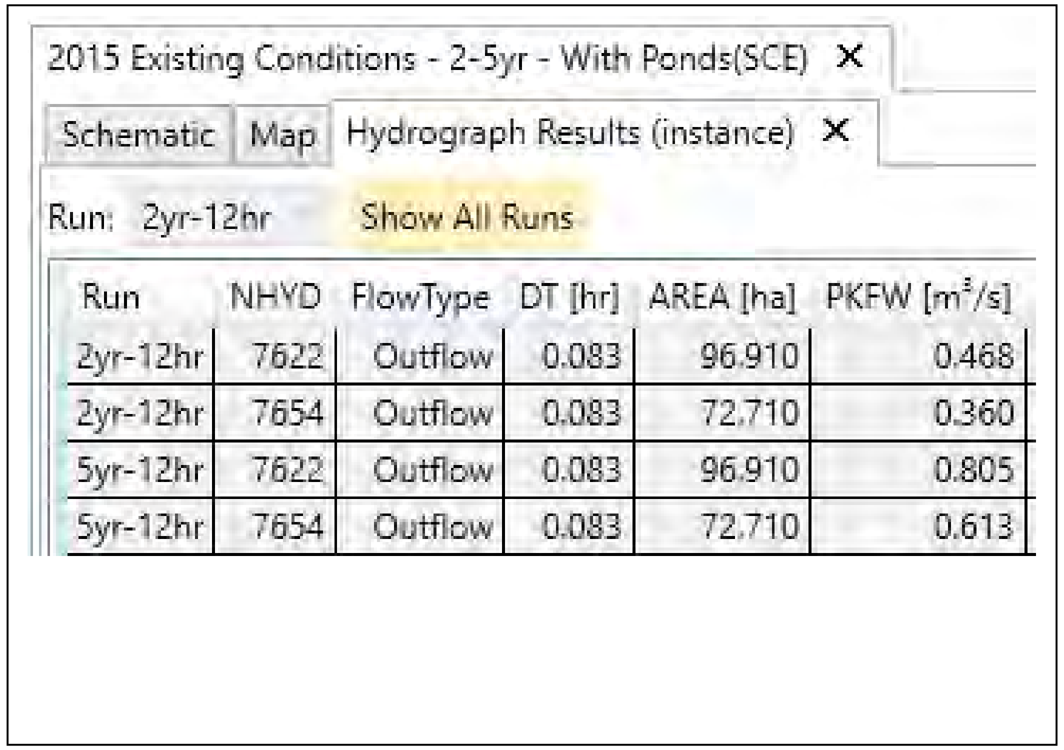
Humber Station Visual OTTHYMO^{TM} Schematic –SCE Existing Conditions
(SCE Existing Condition 10 Year – 100 Year)

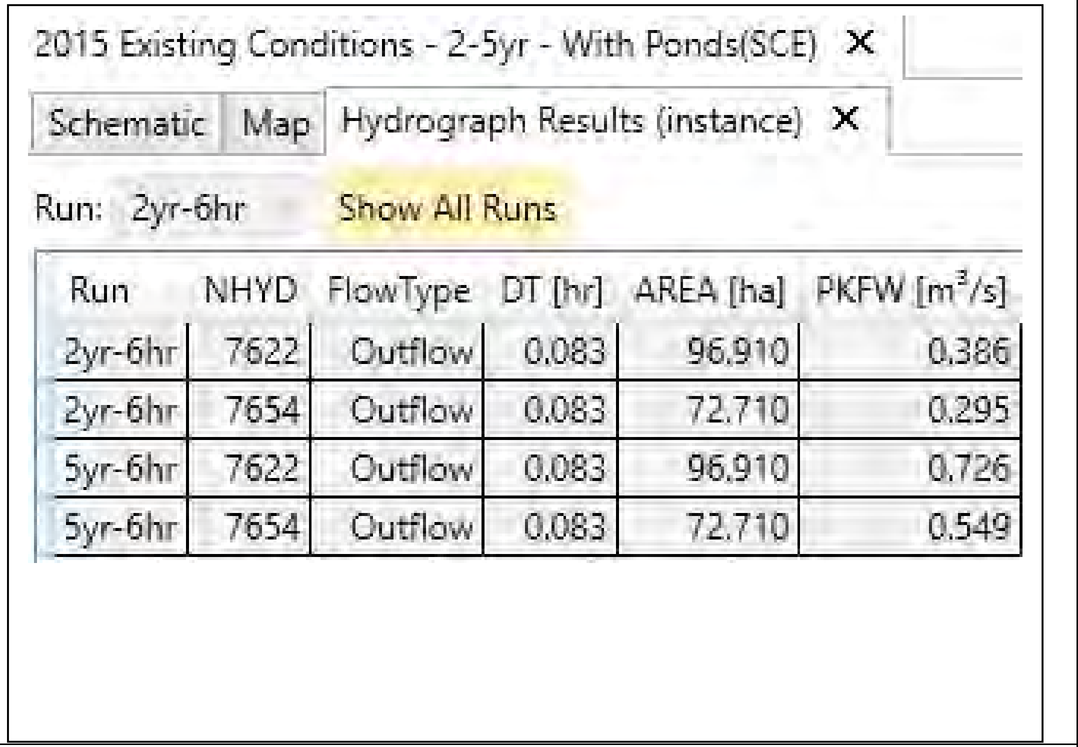
Job # 2021-5139 **Date: July, 2024**





Run: 2yr-12hr

Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m³/s]
2yr-12hr	7622	Outflow	0.083	96.910	0.468
2yr-12hr	7654	Outflow	0.083	72.710	0.360
5yr-12hr	7622	Outflow	0.083	96.910	0.805
5yr-12hr	7654	Outflow	0.083	72.710	0.613



Run: 2yr-6hr

Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m³/s]
2yr-6hr	7622	Outflow	0.083	96.910	0.386
2yr-6hr	7654	Outflow	0.083	72.710	0.295
5yr-6hr	7622	Outflow	0.083	96.910	0.726
5yr-6hr	7654	Outflow	0.083	72.710	0.549

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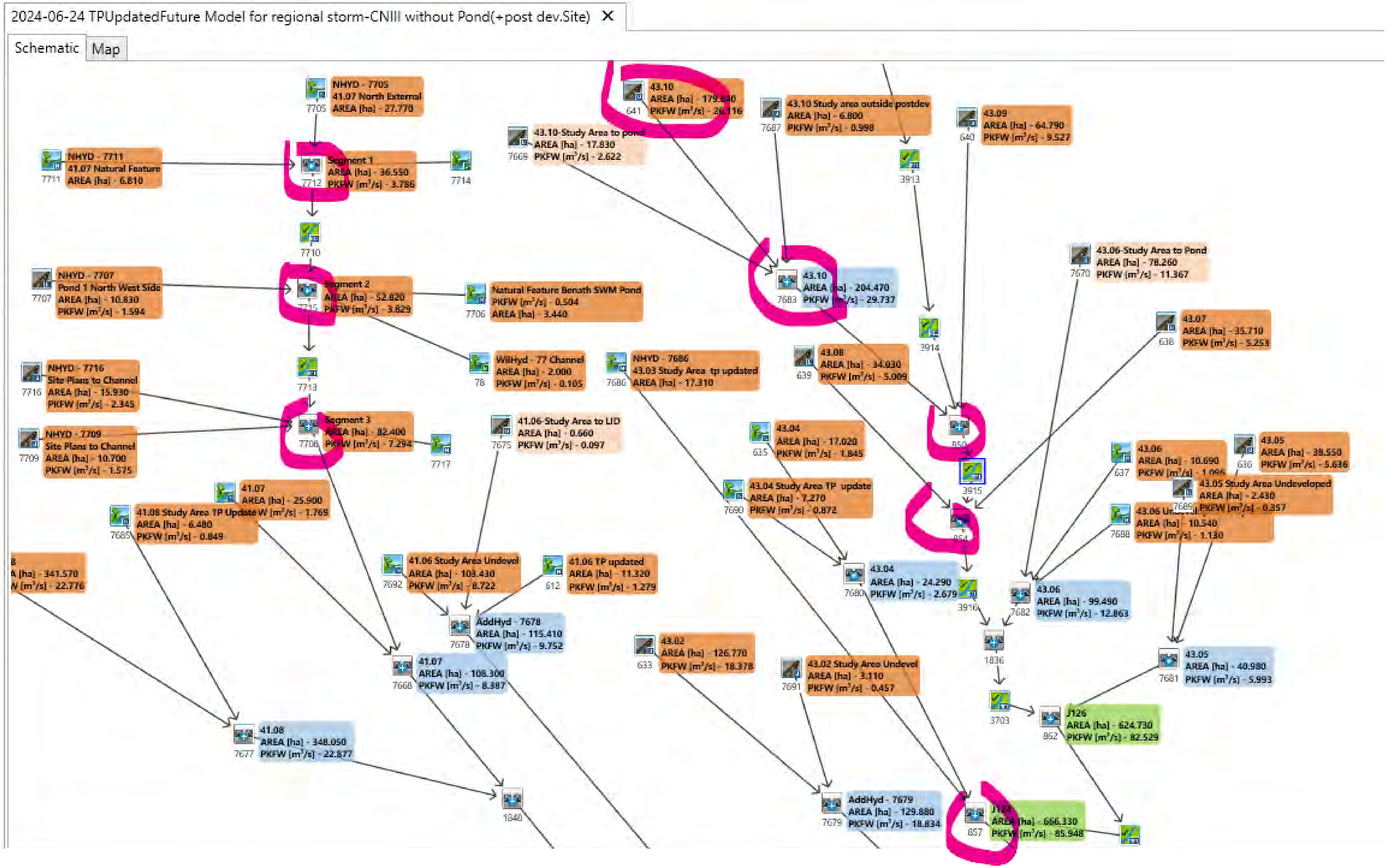
Humber Station Visual OTTHYMO^{TM} Schematic –SCE Existing Conditions
(SCE Existing Condition 2 Year – 5 Year)

Job # 2021-5139 **Date: July, 2024**



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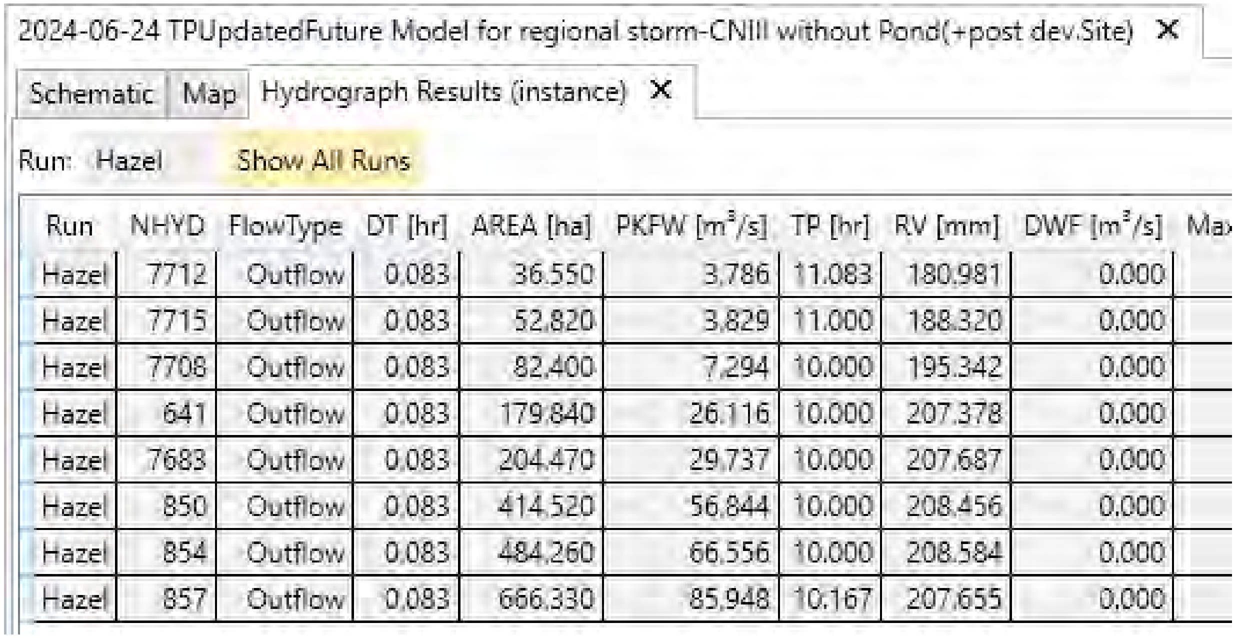
Humber Station Visual OTTHYMO^{TM} Schematic –SCE Post Development Conditions
(SCE Post Development Condition Regional Flow)

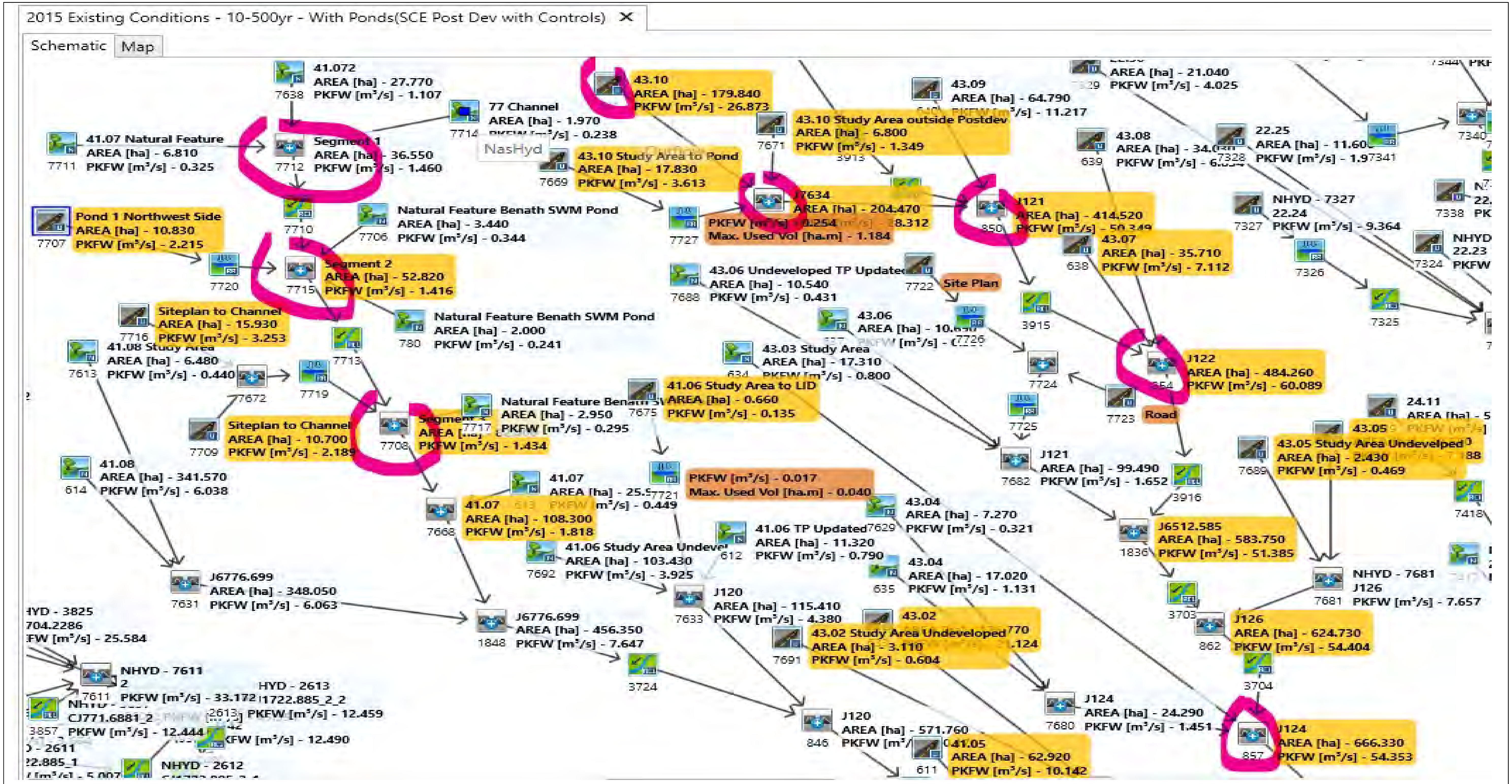
Job # 2021-5139 **Date: July, 2024**



2024-06-24 TPUpdatedFuture Model for regional storm-CNIII without Pond(+post dev.Site)

Run: Hazel

Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m³/s]	TP [hr]	RV [mm]	DWF [m³/s]	Ma
Hazel	7712	Outflow	0.083	36.550	3.786	11.083	180.981	0.000	
Hazel	7715	Outflow	0.083	52.820	3.829	11.000	188.320	0.000	
Hazel	7708	Outflow	0.083	82.400	7.294	10.000	195.342	0.000	
Hazel	641	Outflow	0.083	179.840	26.116	10.000	207.378	0.000	
Hazel	7683	Outflow	0.083	204.470	29.737	10.000	207.687	0.000	
Hazel	850	Outflow	0.083	414.520	56.844	10.000	208.456	0.000	
Hazel	854	Outflow	0.083	484.260	66.556	10.000	208.584	0.000	
Hazel	857	Outflow	0.083	666.330	85.948	10.167	207.655	0.000	



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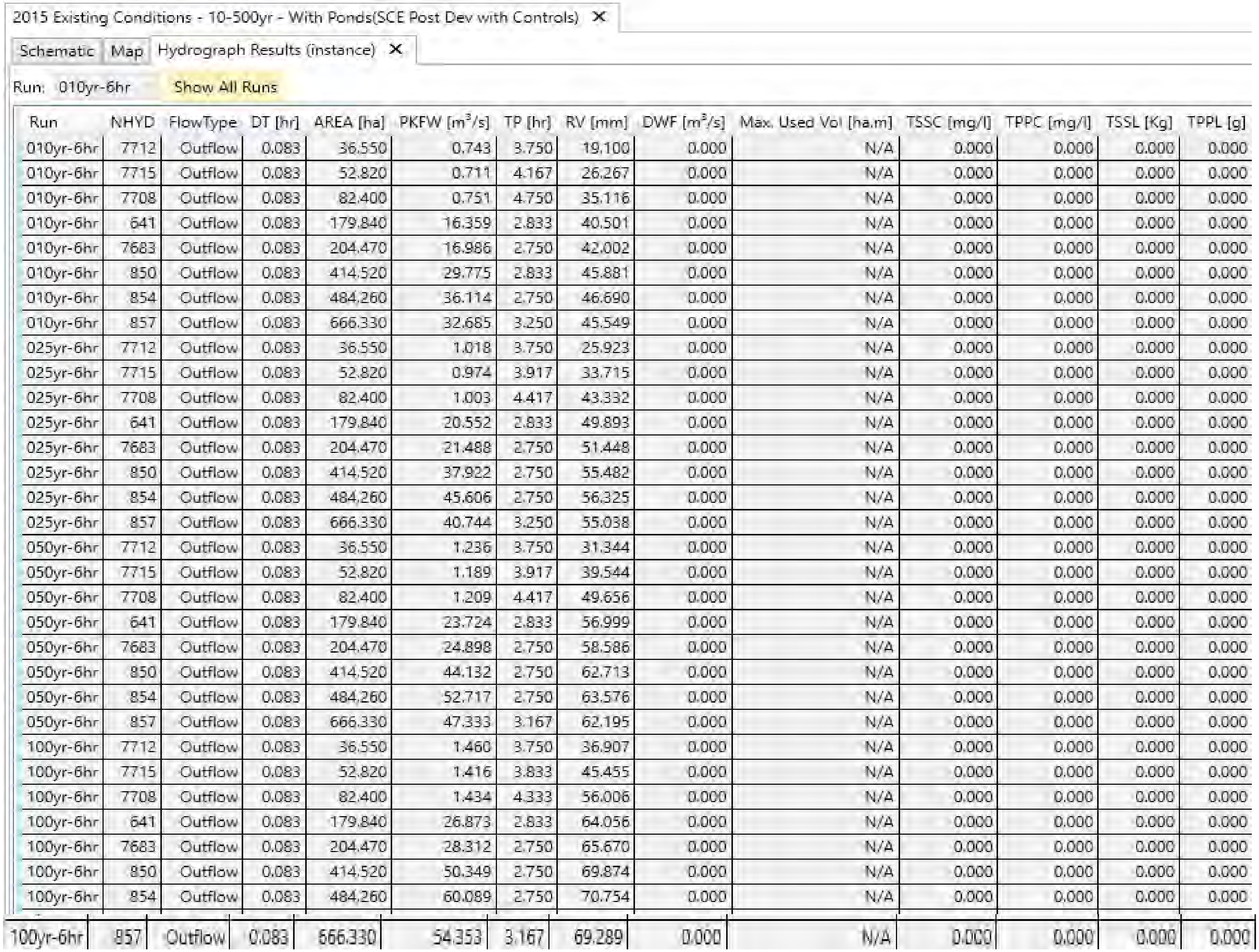
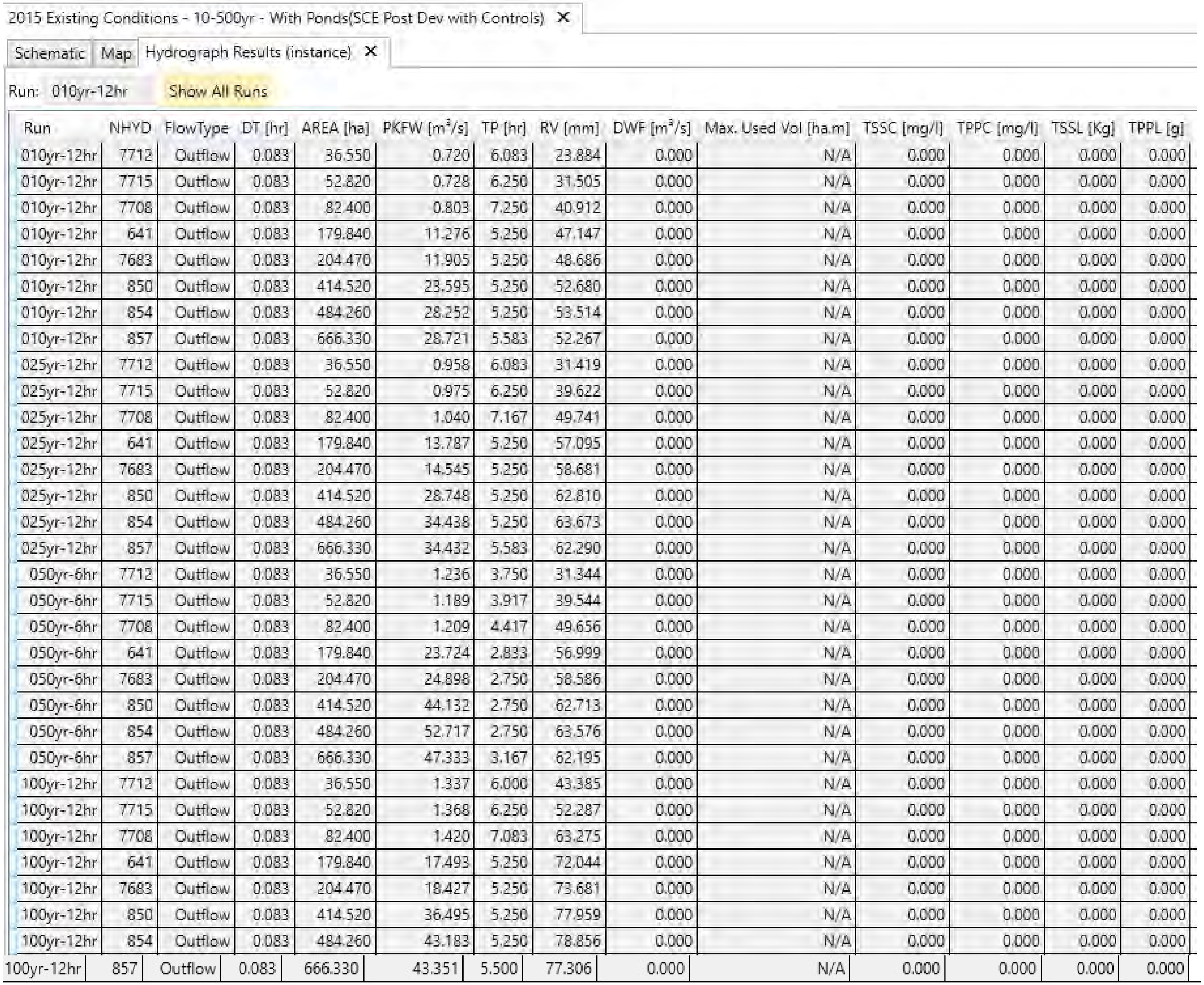
Humber Station Visual OTTHYMO™ Schematic –SCE Post Development Conditions
(SCE Post Development Condition 10 Year – 100 Year)

Job # 2021-5139 **Date: July, 2024**

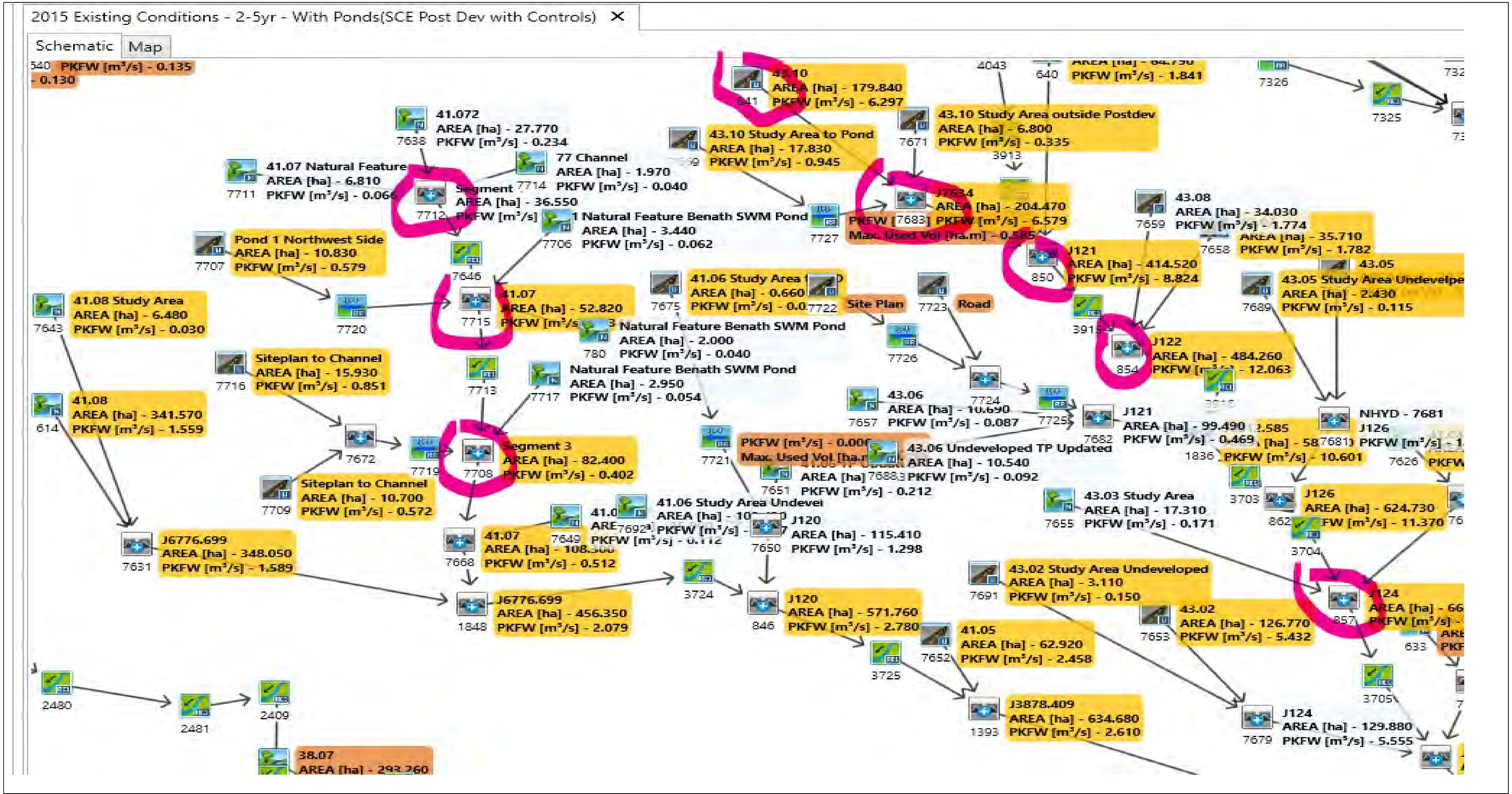


Run: 010yr-6hr

Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m^3/s]	TP [hr]	RV [mm]	DWF [m^3/s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
010yr-6hr	7712	Outflow	0.083	36.550	0.743	3.750	19.100	0.000	N/A	0.000	0.000	0.000	0.000
010yr-6hr	7715	Outflow	0.083	52.820	0.711	4.167	26.267	0.000	N/A	0.000	0.000	0.000	0.000
010yr-6hr	7708	Outflow	0.083	82.400	0.751	4.750	35.116	0.000	N/A	0.000	0.000	0.000	0.000
010yr-6hr	641	Outflow	0.083	179.840	16.359	2.833	40.501	0.000	N/A	0.000	0.000	0.000	0.000
010yr-6hr	7683	Outflow	0.083	204.470	16.986	2.750	42.002	0.000	N/A	0.000	0.000	0.000	0.000
010yr-6hr	850	Outflow	0.083	414.520	29.775	2.833	45.881	0.000	N/A	0.000	0.000	0.000	0.000
010yr-6hr	854	Outflow	0.083	484.260	36.114	2.750	46.690	0.000	N/A	0.000	0.000	0.000	0.000
010yr-6hr	857	Outflow	0.083	666.330	32.685	3.250	45.549	0.000	N/A	0.000	0.000	0.000	0.000
025yr-6hr	7712	Outflow	0.083	36.550	1.018	3.750	25.923	0.000	N/A	0.000	0.000	0.000	0.000
025yr-6hr	7715	Outflow	0.083	52.820	0.974	3.917	33.715	0.000	N/A	0.000	0.000	0.000	0.000
025yr-6hr	7708	Outflow	0.083	82.400	1.003	4.417	43.332	0.000	N/A	0.000	0.000	0.000	0.000
025yr-6hr	641	Outflow	0.083	179.840	20.552	2.833	49.893	0.000	N/A	0.000	0.000	0.000	0.000
025yr-6hr	7683	Outflow	0.083	204.470	21.488	2.750	51.448	0.000	N/A	0.000	0.000	0.000	0.000
025yr-6hr	850	Outflow	0.083	414.520	37.922	2.750	55.482	0.000	N/A	0.000	0.000	0.000	0.000
025yr-6hr	854	Outflow	0.083	484.260	45.606	2.750	56.325	0.000	N/A	0.000	0.000	0.000	0.000
025yr-6hr	857	Outflow	0.083	666.330	40.744	3.250	55.038	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	7712	Outflow	0.083	36.550	1.236	3.750	31.344	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	7715	Outflow	0.083	52.820	1.189	3.917	39.544	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	7708	Outflow	0.083	82.400	1.209	4.417	49.656	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	641	Outflow	0.083	179.840	23.724	2.833	56.999	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	7683	Outflow	0.083	204.470	24.898	2.750	58.586	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	850	Outflow	0.083	414.520	44.132	2.750	62.713	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	854	Outflow	0.083	484.260	52.717	2.750	63.576	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	857	Outflow	0.083	666.330	47.333	3.167	62.195	0.000	N/A	0.000	0.000	0.000	0.000
100yr-6hr	7712	Outflow	0.083	36.550	1.460	3.750	36.907	0.000	N/A	0.000	0.000	0.000	0.000
100yr-6hr	7715	Outflow	0.083	52.820	1.416	3.833	45.455	0.000	N/A	0.000	0.000	0.000	0.000
100yr-6hr	7708	Outflow	0.083	82.400	1.434	4.333	56.006	0.000	N/A	0.000	0.000	0.000	0.000
100yr-6hr	641	Outflow	0.083	179.840	26.873	2.833	64.056	0.000	N/A	0.000	0.000	0.000	0.000
100yr-6hr	7683	Outflow	0.083	204.470	28.312	2.750	65.670	0.000	N/A	0.000	0.000	0.000	0.000
100yr-6hr	850	Outflow	0.083	414.520	50.349	2.750	69.874	0.000	N/A	0.000	0.000	0.000	0.000
100yr-6hr	854	Outflow	0.083	484.260	60.089	2.750	70.754	0.000	N/A	0.000	0.000	0.000	0.000
100yr-6hr	857	Outflow	0.083	666.330	54.353	3.167	69.289	0.000	N/A	0.000	0.000	0.000	0.000



Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m^3/s]	TP [hr]	RV [mm]	DWF [m^3/s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
010yr-12hr	7712	Outflow	0.083	36.550	0.720	6.083	23.884	0.000	N/A	0.000	0.000	0.000	0.000
010yr-12hr	7715	Outflow	0.083	52.820	0.728	6.250	31.505	0.000	N/A	0.000	0.000	0.000	0.000
010yr-12hr	7708	Outflow	0.083	82.400	0.803	7.250	40.912	0.000	N/A	0.000	0.000	0.000	0.000
010yr-12hr	641	Outflow	0.083	179.840	11.276	5.250	47.147	0.000	N/A	0.000	0.000	0.000	0.000
010yr-12hr	7683	Outflow	0.083	204.470	11.905	5.250	48.686	0.000	N/A	0.000	0.000	0.000	0.000
010yr-12hr	850	Outflow	0.083	414.520	23.595	5.250	52.680	0.000	N/A	0.000	0.000	0.000	0.000
010yr-12hr	854	Outflow	0.083	484.260	28.252	5.250	53.514	0.000	N/A	0.000	0.000	0.000	0.000
010yr-12hr	857	Outflow	0.083	666.330	28.721	5.583	52.267	0.000	N/A	0.000	0.000	0.000	0.000
025yr-12hr	7712	Outflow	0.083	36.550	0.958	6.083	31.419	0.000	N/A	0.000	0.000	0.000	0.000
025yr-12hr	7715	Outflow	0.083	52.820	0.975	6.250	39.622	0.000	N/A	0.000	0.000	0.000	0.000
025yr-12hr	7708	Outflow	0.083	82.400	1.040	7.167	49.741	0.000	N/A	0.000	0.000	0.000	0.000
025yr-12hr	641	Outflow	0.083	179.840	13.787	5.250	57.095	0.000	N/A	0.000	0.000	0.000	0.000
025yr-12hr	7683	Outflow	0.083	204.470	14.545	5.250	58.681	0.000	N/A	0.000	0.000	0.000	0.000
025yr-12hr	850	Outflow	0.083	414.520	28.748	5.250	62.810	0.000	N/A	0.000	0.000	0.000	0.000
025yr-12hr	854	Outflow	0.083	484.260	34.438	5.250	63.673	0.000	N/A	0.000	0.000	0.000	0.000
025yr-12hr	857	Outflow	0.083	666.330	34.432	5.583	62.290	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	7712	Outflow	0.083	36.550	1.236	3.750	31.344	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	7715	Outflow	0.083	52.820	1.189	3.917	39.544	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	7708	Outflow	0.083	82.400	1.209	4.417	49.656	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	641	Outflow	0.083	179.840	23.724	2.833	56.999	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	7683	Outflow	0.083	204.470	24.898	2.750	58.586	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	850	Outflow	0.083	414.520	44.132	2.750	62.713	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	854	Outflow	0.083	484.260	52.717	2.750	63.576	0.000	N/A	0.000	0.000	0.000	0.000
050yr-6hr	857	Outflow	0.083	666.330	47.333	3.167	62.195	0.000	N/A	0.000	0.000	0.000	0.000
100yr-12hr	7712	Outflow	0.083	36.550	1.337	6.000	43.385	0.000	N/A	0.000	0.000	0.000	0.000
100yr-12hr	7715	Outflow	0.083	52.820	1.368	6.250	52.287	0.000	N/A	0.000	0.000	0.000	0.000
100yr-12hr	7708	Outflow	0.083	82.400	1.420	7.083	63.275	0.000	N/A	0.000	0.000	0.000	0.000
100yr-12hr	641	Outflow	0.083	179.840	17.493	5.250	72.044	0.000	N/A	0.000	0.000	0.000	0.000
100yr-12hr	7683	Outflow	0.083	204.470	18.427	5.250	73.681	0.000	N/A	0.000	0.000	0.000	0.000
100yr-12hr	850	Outflow	0.083	414.520	36.495	5.250	77.959	0.000	N/A	0.000	0.000	0.000	0.000
100yr-12hr	854	Outflow	0.083	484.260	43.183	5.250	78.856	0.000	N/A	0.000	0.000	0.000	0.000
100yr-12hr	857	Outflow	0.083	666.330	43.351	5.500	77.306	0.000	N/A	0.000	0.000	0.000	0.000



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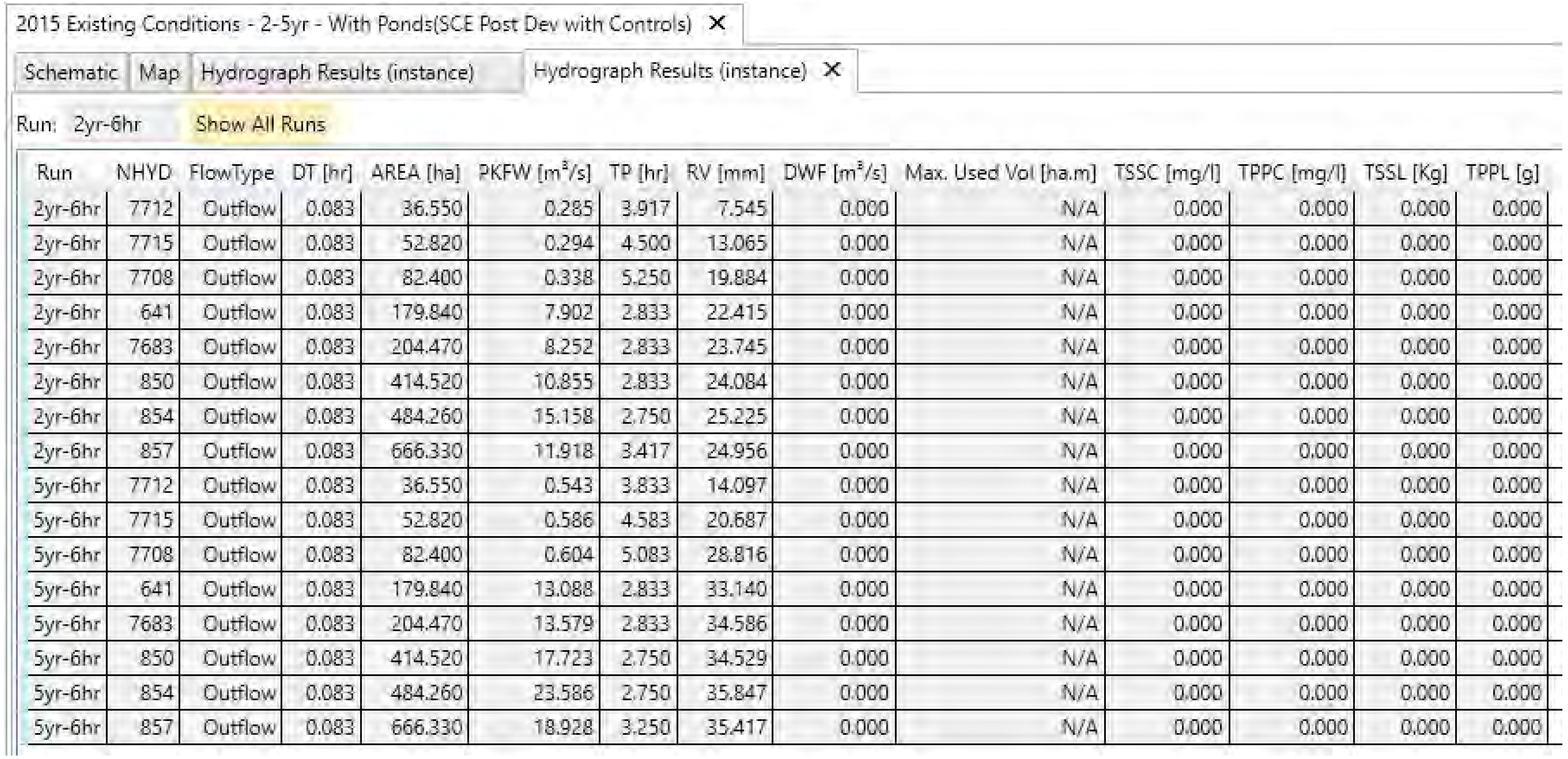
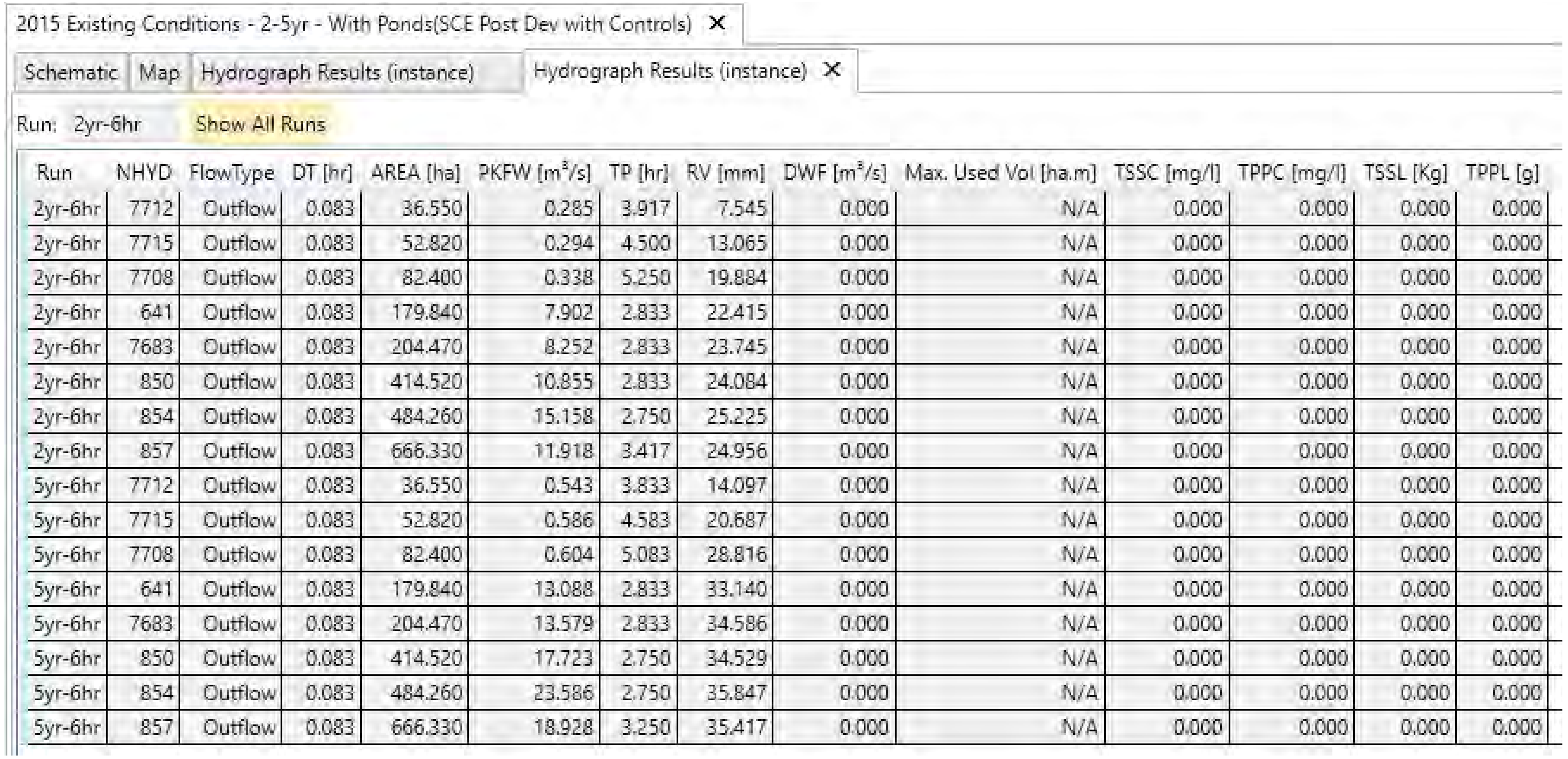
Humber Station Visual OTTHYMO™ Schematic –SCE Post Development Conditions
(Post Development Condition 2 Year – 5 Year)

Job # 2021-5139 **Date: July, 2024**



Run: 2yr-6hr

Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m^3/s]	TP [hr]	RV [mm]	DWF [m^3/s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
2yr-6hr	7712	Outflow	0.083	36.550	0.285	3.917	7.545	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	7715	Outflow	0.083	52.820	0.294	4.500	13.065	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	7708	Outflow	0.083	82.400	0.338	5.250	19.884	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	641	Outflow	0.083	179.840	7.902	2.833	22.415	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	7683	Outflow	0.083	204.470	8.252	2.833	23.745	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	850	Outflow	0.083	414.520	10.855	2.833	24.084	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	854	Outflow	0.083	484.260	15.158	2.750	25.225	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	857	Outflow	0.083	666.330	11.918	3.417	24.956	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	7712	Outflow	0.083	36.550	0.543	3.833	14.097	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	7715	Outflow	0.083	52.820	0.586	4.583	20.687	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	7708	Outflow	0.083	82.400	0.604	5.083	28.816	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	641	Outflow	0.083	179.840	13.088	2.833	33.140	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	7683	Outflow	0.083	204.470	13.579	2.833	34.586	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	850	Outflow	0.083	414.520	17.723	2.750	34.529	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	854	Outflow	0.083	484.260	23.586	2.750	35.847	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	857	Outflow	0.083	666.330	18.928	3.250	35.417	0.000	N/A	0.000	0.000	0.000	0.000



Run: 2yr-6hr

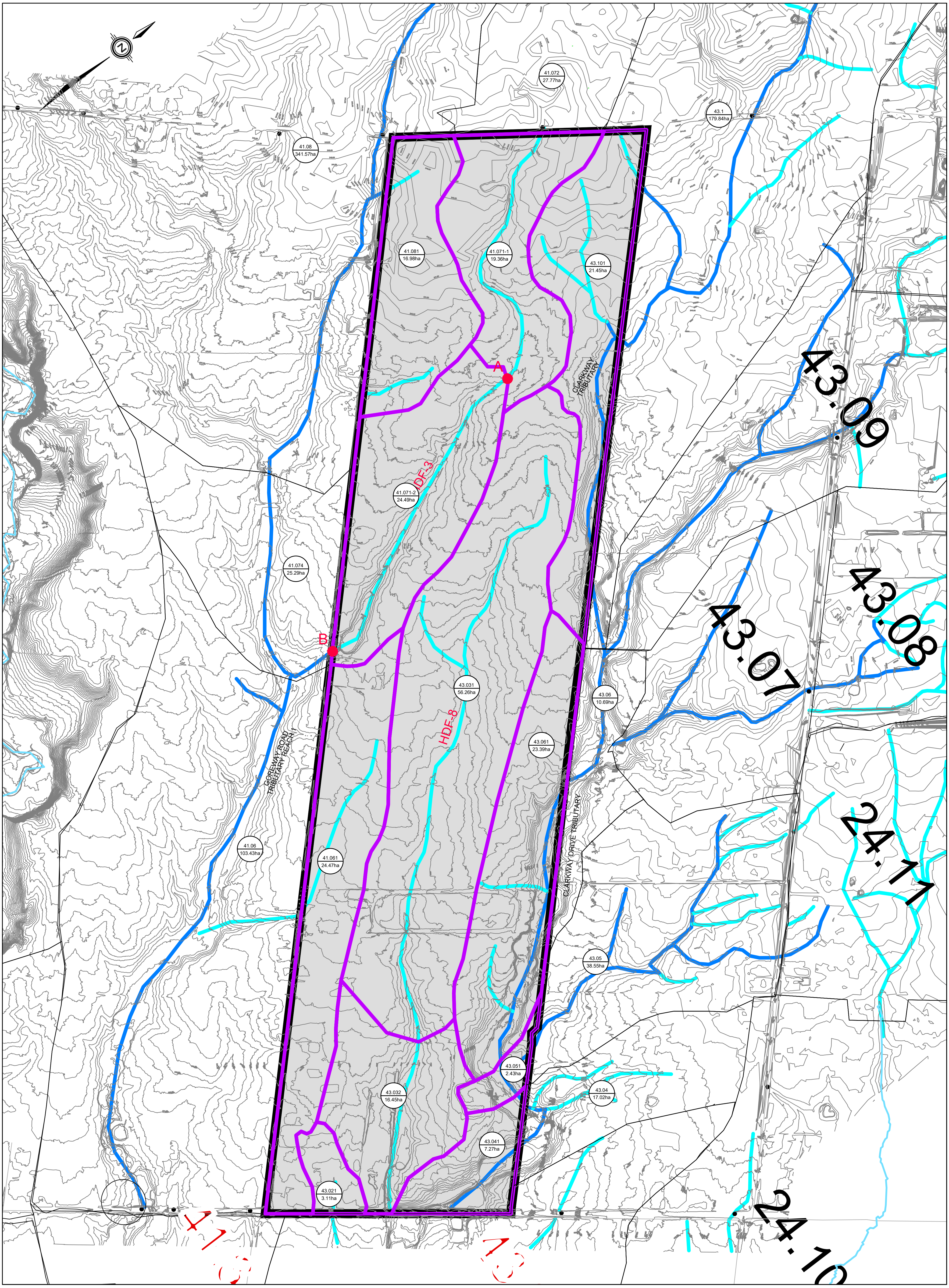
Run	NHYD	FlowType	DT [hr]	AREA [ha]	PKFW [m^3/s]	TP [hr]	RV [mm]	DWF [m^3/s]	Max. Used Vol [ha.m]	TSSC [mg/l]	TPPC [mg/l]	TSSL [Kg]	TPPL [g]
2yr-6hr	7712	Outflow	0.083	36.550	0.285	3.917	7.545	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	7715	Outflow	0.083	52.820	0.294	4.500	13.065	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	7708	Outflow	0.083	82.400	0.338	5.250	19.884	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	641	Outflow	0.083	179.840	7.902	2.833	22.415	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	7683	Outflow	0.083	204.470	8.252	2.833	23.745	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	850	Outflow	0.083	414.520	10.855	2.833	24.084	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	854	Outflow	0.083	484.260	15.158	2.750	25.225	0.000	N/A	0.000	0.000	0.000	0.000
2yr-6hr	857	Outflow	0.083	666.330	11.918	3.417	24.956	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	7712	Outflow	0.083	36.550	0.543	3.833	14.097	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	7715	Outflow	0.083	52.820	0.586	4.583	20.687	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	7708	Outflow	0.083	82.400	0.604	5.083	28.816	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	641	Outflow	0.083	179.840	13.088	2.833	33.140	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	7683	Outflow	0.083	204.470	13.579	2.833	34.586	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	850	Outflow	0.083	414.520	17.723	2.750	34.529	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	854	Outflow	0.083	484.260	23.586	2.750	35.847	0.000	N/A	0.000	0.000	0.000	0.000
5yr-6hr	857	Outflow	0.083	666.330	18.928	3.250	35.417	0.000	N/A	0.000	0.000	0.000	0.000

Table: Regional Flows Comparison for the Purpose of Downstream Analysis

Regional Flows (m3/s)									
Tributary	Area Reduction Factor	Adhyd Node	TRCA Future Model	SCE Modified Future Model	Post Dev Updated TP Future Model	Post Dev with Controlls	ratio= SCE Modified Future Model/TRCA Future Model	ratio= Post Dev Updated TP Future Model/SCE Modified Future Model	ratio= Post with Controlsl/SCE Modified Future Model
		A	B	C	E	F	I = B/C	L = E / C	N = F/C
Clarkway Tributary	100	**857**	76.14	76.41	85.95	75.95	1.00	1.12	0.99
	100	1458	90.29	90.66	100.61	90.07	1.00	1.11	0.99
	97.1	1012	107.49	107.87	115.69	107.18	1.00	1.07	0.99
	97.1	1766	129.44	129.78	137.35	129.10	1.00	1.06	0.99
	97.1	1545	132.27	132.69	140.53	131.79	1.00	1.06	0.99
	94.8	1307	144.88	145.45	152.60	144.26	1.00	1.05	0.99
	94.8	1100	147.20	147.84	154.92	146.52	1.00	1.05	0.99
Gore Road Tributary	100	846	40.85	40.29	36.39	37.01	0.99	0.90	0.92
	99.2	1393	39.90	39.35	38.42	37.43	0.99	0.98	0.95
	99.2	1461	51.03	50.66	54.37	50.96	0.99	1.07	1.01
	97.1	1819	68.92	68.62	70.07	67.82	1.00	1.02	0.99
	97.1	1962	77.72	77.48	78.71	76.82	1.00	1.02	0.99
	97.1	1853	84.33	84.09	85.23	83.43	1.00	1.01	0.99
	97.1	1696	84.31	84.04	85.49	83.38	1.00	1.02	0.99
	97.1	1389	99.22	98.95	100.60	98.35	1.00	1.02	0.99
	95.4	1690	99.29	99.04	100.41	98.28	1.00	1.01	0.99
	95.4	1959	107.85	107.60	108.65	106.84	1.00	1.01	0.99
Combined	94.2	727	258.89	259.26	267.21	257.16	1.00	1.03	0.99
	89.4	7589	245.52	245.94	254.40	243.76	1.00	1.03	0.99

W:\5100's\5139 - Humber Station Village\Restored\Drawings\Calcs\Floodplain\Drainage Area\2024-07-30-5139-Pre-Dev Drainage calc.dwg

Debebe Yilak



HUMBER STATION VILLAGES
TOWN OF CALEDON

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
www.schaeffers.com

LEGEND

▨	SUBJECT LOCATION
☐	TRCA PRE DEVELOPMENT DRAINAGE BOUNDARY
43.02 3.11ha	TRCA CATCHMENT ID TRCA AREA IN HECTARES
☐	SCE REVISED DRAINAGE BOUNDARY
━	WATERCOURSE
━	HDF

FIGURE A
PRE-DEVELOPMENT
DRAINAGE PLAN

□0□1-5139	OCTOBER □0□3	SCALE: N.T.S.

From: Priyantha Hunukumbura
To: Debebe Yilak
Cc: Dilnesaw Chekol; Anthony Syhlonyk; Koryun Shahbikian
Subject: RE: Request for Hydraulic Model
Date: February 3, 2023 11:05:28 AM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
image007.png

Hi Debebe,
Please use the flowing flow values in the HEC-RAS model that you are going to create for the watercourse shown below.

	Flow at Flow Change Location(m3/s)	
Storm Event	**A**	**B**
Regional	6.45	4.21
100-Year	2.53	1.65
50-Year	2.22	1.45
25-Year	1.92	1.25
10-Year	1.52	0.99
5-Year	0.73	0.48
2-Year	0.42	0.28

If you need any further clarification, please let me know.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: +1 647-426-4554
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region
Conservation
Authority

From: Debebe Yilak <dyilak@schaeffers.com>
Sent: February 1, 2023 1:36 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>; Anthony Syhlonyk <Anthony.Syhlonyk@trca.ca>; Koryun Shahbikian <kshahbikian@schaeffers.com>
Subject: RE: Request for Hydraulic Model

Hi Priyantha;
The model contains prorated flow for the regional storm for our interest catchment area. Could you please share with us the estimated flows for the 2-year – 100 Year storm events as well?

Kind Regards;

Debebe Yilak, M.Sc., P.Eng.
Water Resources Analyst

SCHAEFFERS
CONSULTING ENGINEERS

6 Ronrose Drive, Concord, Ontario, L4K4R3
(905) 738-6100 – Ext. 234
www.schaeffers.com

From: Debebe Yilak
Sent: January 30, 2023 1:34 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>; Anthony Syhlonyk <Anthony.Syhlonyk@trca.ca>; Koryun Shahbikian <kshahbikian@schaeffers.com>
Subject: RE: Request for Hydraulic Model

Hello Priyantha;

Thank you very much for sharing the data and detailed information.

Kind Regards;

Debebe Yilak, M.Sc., P.Eng.
Water Resources Analyst

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario, L4K4R3
(905) 738-6100 – Ext. 234
www.schaeffers.com

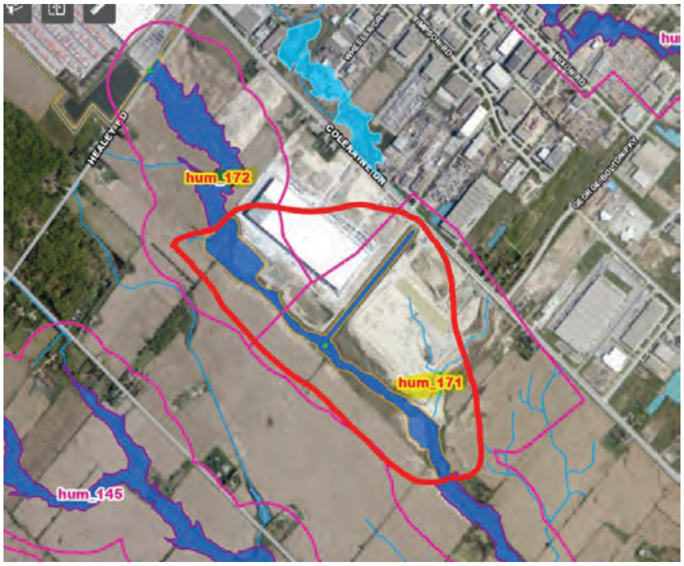
From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: January 30, 2023 12:10 PM
To: Debebe Yilak <dyilak@schaeffers.com>
Cc: Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>; Anthony Syhlonyk <Anthony.Syhlonyk@trca.ca>; Koryun Shahbikian <kshahbikian@schaeffers.com>
Subject: RE: Request for Hydraulic Model

Hi Debebe,
Thanks for completing the online payment.
Please access the following link to download the requested data.

Healey_Coleraine_HumberStation_Mayfield(Debebe)

Please note the following.

1. Floodplain mapping sheets
   Areas within the RED Circle shown below.
   Please do not use the floodplain mapping sheet **hum_171** and **hum_172** for the area circled in RED below. Instead, please use the floodplain information in the “For the realignment Area” folder for the circled area in RED.



2. HEC-RAS modeling

   Please do not use the WEST HUMBER HEC-RAS model for the Area circled in RED above (Channel Realignment Area). I will provide the HEC-RAS model for the realignment area later.

3. The regional Peak flow values and flow change locations for the tributary shown in the figure below.

   Catchment area for the sub catchments SUB01 and SUB02 shown below are 83.467 ha and 47.274 ha respectively.

   Peak flows at SUB01 and SUB02 were calculated using the approved Humber hydrology model and with the MTO transposition equation.

   TRCA typically apply downstream peak flows at the upstream location for floodplain mapping. Therefore, please use the locations showing below as the flow change location in the HEC-RAS model that you are planning to develop.

Flow change Locations	Flow (CMS)
A	6.45
B	4.21

If you need any further clarification, please let me know.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: +1 647-426-4554
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region Conservation Authority

From: Debebe Yilak <dyilak@schaeffers.com>
Sent: January 27, 2023 9:19 AM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Koryun Shahbikian <kshahbikian@schaeffers.com>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: Request for Hydraulic Model

Hi Priyantha;

We have paid the payment. Please find the attached receipt.

Let me know if you need more information;

Kind Regards;

Debebe Yilak, M.Sc., P.Eng.
Water Resources Analyst

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario, L4K4R3
(905) 738-6100 – Ext. 234
www.schaeffers.com

From: Debebe Yilak
Sent: January 20, 2023 10:43 AM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Koryun Shahbikian <kshahbikian@schaeffers.com>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: Request for Hydraulic Model

Hi Priyantha;

Thank you for sharing the data-sharing agreement. Please find the signed data-sharing agreement.

Let me know if you need more information;

Kind Regards;

Debebe Yilak, M.Sc., P.Eng.
Water Resources Analyst

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario, L4K4R3
(905) 738-6100 – Ext. 234
www.schaeffers.com

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: January 20, 2023 9:42 AM
To: Debebe Yilak <dyilak@schaeffers.com>
Cc: Koryun Shahbikian <kshahbikian@schaeffers.com>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: Request for Hydraulic Model

Hi Debebe,
My apologies for not attaching the data sharing agreement in the previous email. If the data is for the same project, one data sharing agreement is fine. Please include everything in the attached data sharing agreement.
If you need any other clarification, please let me know.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: +1 647-426-4554
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region Conservation Authority

From: Debebe Yilak <dyilak@schaeffers.com>
Sent: January 20, 2023 9:38 AM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Koryun Shahbikian <kshahbikian@schaeffers.com>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: Request for Hydraulic Model

Hi Priyantha;
Thank you for the detailed email. I think the data-sharing agreement is missing. Could you please attach it? Regarding the eastern portion of the model, it belongs to the same project as the western portion but we are planning to use it for a different level of study. Hence, I think both parts of the model can be done with one data-sharing agreement. It could be easy for us if we could get both in one model. I am not sure how long would it take to you to combine both models in one and share it with us.

Please let me know if you need more information;

Kind Regards;

Debebe Yilak, M.Sc., P.Eng.,
Water Resources Analyst

SCHAEFFERS
CONSULTING ENGINEERS

6 Ronrose Drive, Concord, Ontario, L4K4R3
(905) 738-6100 – Ext. 234
www.schaeffers.com

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: January 19, 2023 6:59 PM
To: Debebe Yilak <dyilak@schaeffers.com>
Cc: Koryun Shahbikian <kshahbikian@schaeffers.com>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: Request for Hydraulic Model

Hi Debebe,
Herewith I attached the TRCA's data sharing agreement. Can you please send me back the signed data sharing agreement.
As Discussed, I am preparing the floodplain mapping sheet "**hum_145**" in CAD format, corresponding engineered HEC-RAS model and the regional peak flow data to be used in developing the HEC-RASA model for the watercourse circled in RED below.

I will prepare the data you requested for the eastern watercourse located close to Coleraine Dr. My understanding is that this data is for another project. If so, please send me a separate data sharing agreement.

If you need any clarification, please let me know.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: +1 647-426-4554
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region
Conservation
Authority

From: Debebe Yilak <dyilak@schaeffers.com>
Sent: January 17, 2023 12:03 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Koryun Shahbikian <kshahbikian@schaeffers.com>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: Request for Hydraulic Model

Hi Priyantha;
Hope you are doing well. This is to follow up on our previous request for a hydraulic model for a subject area located in the attached map.

Let me know if you need more information.

Kind Regards;

Debebe Yilak, M.Sc., P.Eng.,
Water Resources Analyst

SCHAEFFERS
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario, L4K4R3
(905) 738-6100 – Ext. 234
www.schaeffers.com

From: Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Sent: January 5, 2023 1:25 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>; Debebe Yilak <dyilak@schaeffers.com>
Cc: Koryun Shahbikian <kshahbikian@schaeffers.com>
Subject: FW: Request for Hydraulic Model

Hi Debebe and Koryun

Happy New Year to all of you!

Priyantha will take care of your requests.

Regards,

Dilnesaw Chekol, Ph.D, P.Eng
Senior Engineer, Water Resources
Engineering Services | Development and Engineering Services

T: (437) 880-1979
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E: dilnesaw.chekol@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region Conservation Authority

From: Debebe Yilak <dyilak@schaeffers.com>
Sent: Thursday, January 5, 2023 1:15 PM
To: Alwish Gnanaraj <Alwish.Gnanaraj@trca.ca>
Cc: Koryun Shahbikian <kshahbikian@schaeffers.com>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: Request for Hydraulic Model

Hi Alwish and Dilnesaw .. Happy New Year!!

We are working floodplain analysis for a project described in the attached location map. The site is bounded by:

- Healey Rd to the North
- Coleraine Dr to the east
- Humber Station Rd to the west, and
- Mayfield Rd to the south.

Could you please check the availability of the latest TRCA-approved hydraulic model and share the data-sharing agreement?

Kind Regards;

Debebe Yilak, M.Sc., P.Eng.,
Water Resources Analyst

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MEETING MINUTES – HUMBER STATION FLOODPLAIN HYDROLOGY

Prepared By: DY

Meeting Date: June 27, 2024

Meeting Time: 11:30-12:00AM

Meeting Purpose: Discuss with TRCA about the Humber Station Hydrology Data for Floodplain Analysis.

Project No: 2021-5139

A. PARTICIPANTS:

- Dilnesaw Chekol (TRCA)
- Anthony Syhlonyk (TRCA)
- Jody Scott (TRCA)
- Debebe Yilak (SCE)
- Ishraque Chandan (SCE)

B. MEETING PURPOSE:

1. Discuss the source of the hydrology information TRCA used to compute peakflows for Humber Station Watercourse Floodplain Modelling.
2. Methodology of utilizing TRCA provided drainage area and SCE revised drainage area based on detailed topographic information.

3. Is it required to revise Phase 1 Floodplain report due to using the SCE revised drainage area based on detailed topographic information for the existing condition

C. COMMENTS:

Went through the background documents. The 2015 and 2018 TRCA Humber River Hydrology Model checked.

Comment 1:

Confirmed that TRCA used the 2018 VO Model.

Under the 2018 Humber River VO Model;

a. For the 2year and 5year peak flows, we have to adopt scenario “2015 Existing Condition – 2-5yr-with Ponds”
b. For the 10 – 100 year, we have to use the the scenario “2015 Existing Conditions -10-500yr-With Ponds”

Comment 2:

Go with the revised drainage area.

Comment 3:

Given the impact of the floodplain using the TRCA areas vs the SCE revised Areas are minimal, it was agreed there is no need to revise the Phase 1 Floodplain report. Prepare existing condion and proposed condition floodplain map in the Phase 2 submission and mention this discussion minute in the submission for better understandings of the differences between the Phase 1 and Phase Existing condition Floodplain Maps.

APPENDIX B

HYDRAULIC ANALYSIS RESULTS

APPENDIX B-1

TRCA – ORIGINAL MODEL RESULTS
(EAST TRIBUTARIES)

HEC-RAS Plan: Plan 01 Locations: User Defined   Profile: REGIONAL

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
West Humber	Reach 9_2	13843	REGIONAL	24.21	247.70	248.60	248.44	248.66	0.021089	2.53	24.19	60.90	0.91	0.99	0.95	1.00	72.42
West Humber	Reach 9_2	13667	REGIONAL	24.21	244.70	246.36		246.41	0.007793	2.42	31.68	59.01	0.62	0.69	0.77	0.76	67.19
West Humber	Reach 9_2	13448	REGIONAL	24.21	242.70	244.15	243.97	244.27	0.019683	3.47	19.64	36.28	0.96	1.21	1.04	1.23	62.56
West Humber	Reach 9_2	13318	REGIONAL	24.21	241.50	244.06	243.65	244.06	0.000277	0.62	122.35	142.27	0.13	0.20	0.18	0.20	51.84
West Humber	Reach 9_2	13302		Culvert													
West Humber	Reach 9_2	13285	REGIONAL	24.21	241.47	242.72	242.68	242.86	0.020351	3.22	21.10	48.21	0.94	1.01	0.99	1.15	51.40
West Humber	Reach 9_2	13207	REGIONAL	24.21	240.70	241.83		241.86	0.007607	1.81	36.19	77.56	0.57	0.64	0.67	0.67	49.04
West Humber	Reach 9_2	12805	REGIONAL	24.21	238.70	240.19		240.21	0.003280	1.45	51.80	104.07	0.40	0.49	0.39	0.47	34.00
West Humber	Reach 9_2	12487	REGIONAL	24.21	237.70	238.82	238.51	238.84	0.005517	1.52	46.31	112.42	0.49	0.51	0.51	0.52	17.77
West Humber	Reach 9_2	12315	REGIONAL	24.21	236.78	237.38	237.38	237.53	0.009797	1.87	23.34	107.35	0.81	0.43	0.34	1.04	11.38
West Humber	Reach 9_2	12132	REGIONAL	24.21	235.14	235.98	235.80	236.10	0.004605	1.59	19.12	35.16	0.59	0.41	0.36	1.27	7.67
West Humber	Reach 9_2	11990	REGIONAL	24.21	234.13	235.19		235.35	0.005963	2.14	21.69	41.86	0.70	0.52	0.55	1.12	4.74
West Humber	Clarkway Trib 2	11848	REGIONAL	52.86	233.41	234.52		234.64	0.005098	2.05	50.67	71.14	0.65	0.73	0.60	1.04	84.84
West Humber	Clarkway Trib 2	11732	REGIONAL	52.86	231.93	233.33	233.33	233.70	0.016301	4.04	30.24	39.46	1.16	1.36	0.93	1.75	80.48
West Humber	Clarkway Trib 2	11577	REGIONAL	52.86	230.53	232.35	231.53	232.37	0.000989	1.29	116.09	109.05	0.31	0.39	0.41	0.46	71.05
West Humber	Clarkway Trib 2	11559	REGIONAL	52.86	230.37	232.12		232.32	0.005693	3.01	42.42	41.18	0.74	0.84	0.98	1.25	69.63
West Humber	Clarkway Trib 2	11455	REGIONAL	54.06	230.03	231.33		231.55	0.010099	3.05	39.46	50.59	0.93	0.98	1.04	1.37	65.43
West Humber	Clarkway Trib 2	11313	REGIONAL	54.06	228.92	230.36		230.55	0.005976	2.54	53.47	104.55	0.72	0.48	0.72	1.01	59.61
West Humber	Clarkway Trib 2	11133	REGIONAL	54.06	228.45	229.78		229.88	0.002369	1.61	54.09	64.54	0.46	0.54	0.32	1.00	49.83
West Humber	Clarkway Trib 2	10878	REGIONAL	54.06	227.70	229.02		229.05	0.004660	1.95	71.55	89.74	0.57	0.77	0.67	0.76	34.14
West Humber	Clarkway Trib 2	10743	REGIONAL	54.06	225.70	227.91		228.07	0.008448	3.80	43.79	45.03	0.84	1.13	1.06	1.23	25.03
West Humber	Clarkway Trib 2	10673	REGIONAL	54.06	225.70	227.65		227.69	0.003516	2.24	65.29	58.79	0.53	0.81	0.77	0.83	21.45
West Humber	Clarkway Trib 2	10565	REGIONAL	65.98	225.70	227.23		227.27	0.003871	1.98	76.39	67.70	0.53	0.85	0.65	0.86	13.43
West Humber	Clarkway Trib 2	10515	REGIONAL	65.98	224.80	227.02		227.09	0.004149	2.87	74.74	71.63	0.63	0.88	0.76	0.88	9.99
West Humber	Clarkway Trib 2	10392	REGIONAL	65.98	224.70	226.64	226.01	226.67	0.002849	2.01	92.43	87.48	0.48	0.69	0.68	0.71	
North Channel	9b	1069	REGIONAL	24.36	237.70	239.80	238.61	239.80	0.000310	0.57	108.04	107.65	0.13	0.20	0.24	0.23	30.86
North Channel	9b	1005	REGIONAL	24.36	236.65	239.24	238.39	239.63	0.002634	2.77	8.81	86.42	0.55			2.77	23.02
North Channel	9b	0980		Culvert													
North Channel	9b	975	REGIONAL	24.36	236.60	238.59	238.34	239.25	0.003264	3.60	6.77	3.40	0.81			3.60	22.88
North Channel	9b	970	REGIONAL	24.36	235.58	238.85	237.32	239.14	0.001737	2.39	10.20		0.42			2.39	22.88
North Channel	9b	850	REGIONAL	24.36	235.57	238.75	237.46	239.12	0.002419	2.71	9.00		0.48			2.71	22.82
North Channel	9b	825	REGIONAL	24.36	235.55	238.73	237.44	239.11	0.002420	2.71	9.00		0.48			2.71	22.77
North Channel	9b	750		Culvert													
North Channel	9b	700	REGIONAL	24.36	234.56	236.44	236.44	237.39	0.009773	4.31	5.65	26.83	1.00			4.31	20.67
North Channel	9b	690	REGIONAL	25.34	234.56	236.41	235.65	236.47	0.001686	1.63	33.80	27.09	0.40	0.57	0.57	0.75	20.45
North Channel	9b	650	REGIONAL	25.34	234.46	236.28		236.35	0.001787	1.67	33.12	26.93	0.41	0.58	0.58	0.77	18.08
North Channel	9b	550	REGIONAL	25.34	234.29	236.10		236.17	0.001838	1.68	32.80	26.86	0.42	0.58	0.58	0.77	14.79
North Channel	9b	450	REGIONAL	25.34	234.12	235.91		235.98	0.001925	1.71	32.26	26.74	0.42	0.59	0.59	0.79	11.54
North Channel	9b	400	REGIONAL	25.34	233.99	235.76		235.83	0.002018	1.73	31.74	26.62	0.43	0.60	0.60	0.80	9.14
North Channel	9b	350	REGIONAL	25.34	233.86	235.60		235.67	0.002197	1.78	30.80	26.41	0.45	0.62	0.62	0.82	6.75
North Channel	9b	300	REGIONAL	25.34	233.78	235.47		235.55	0.002435	1.84	29.71	26.16	0.47	0.64	0.64	0.85	5.24
North Channel	9b	250	REGIONAL	25.34	233.69	235.34		235.42	0.002745	1.92	28.49	25.88	0.50	0.66	0.66	0.89	3.78
North Channel	9b	200	REGIONAL	25.34	233.61	235.16		235.27	0.003528	2.08	26.10	25.32	0.56	0.72	0.72	0.97	2.42
North Channel	9b	150	REGIONAL	25.34	233.52	234.69	234.61	234.95	0.012695	3.19	16.72	22.99	1.01	1.08	1.08	1.52	1.35

APPENDIX B-2

TRCA – ORIGINAL MODEL RESULTS
(WEST TRIBUTARIES)

HEC-RAS Plan: Default Scenario Locations: User Defined   Profile: Regional

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Gore Road Trib	Reach2	1450.572 41.08-05	Regional	10.74	237.54	238.48	238.48	238.73	0.015495	2.22	4.87	10.47	1.00
Gore Road Trib	Reach2	1450.428 41.08-04	Regional	10.74	235.83	236.82	236.82	236.99	0.007948	2.02	9.50	33.15	0.76
Gore Road Trib	Reach2	1450.284 41.08-03	Regional	10.74	234.78	235.41		235.45	0.006546	1.22	16.76	48.69	0.50
Gore Road Trib	Reach2	1450.168 41.08-02	Regional	10.74	233.73	234.36	234.36	234.49	0.010563	1.99	12.38	47.31	0.85
Gore Road Trib	Reach2	1450.000 41.08-01	Regional	10.74	233.28	234.14		234.14	0.000246	0.38	64.96	98.45	0.14
Gore Road Trib	Reach1	1416.798 41.07-06	Regional	31.51	232.98	233.91		233.95	0.007724	0.96	35.37	56.49	0.33
Gore Road Trib	Reach1	1416.721 41.07-05	Regional	31.51	232.59	233.49		233.52	0.004238	0.74	43.05	51.62	0.25
Gore Road Trib	Reach1	1416.598 41.07-04	Regional	31.51	231.99	232.88		232.93	0.005703	1.93	43.82	74.13	0.67
Gore Road Trib	Reach1	1416.398 41.07-03	Regional	31.51	230.73	231.81		231.85	0.005109	0.90	38.26	56.28	0.29
Gore Road Trib	Reach1	1416.261 41.07-02	Regional	31.51	229.56	230.78		230.91	0.009631	2.47	32.94	68.95	0.85
Gore Road Trib	Reach1	1416.193 41.07-01	Regional	31.51	229.05	230.30		230.33	0.006801	1.09	44.84	90.19	0.33
Gore Road Trib	Reach1	1416.041 41.06-16	Regional	40.85	228.39	229.49		229.60	0.003878	1.69	39.64	62.06	0.56
Gore Road Trib	Reach1	1415.982 41.06-15	Regional	40.85	228.33	229.02		229.12	0.024935	1.48	29.85	66.74	0.59
Gore Road Trib	Reach1	1415.904 41.06-14	Regional	40.85	227.40	228.58		228.64	0.002642	1.44	41.99	67.10	0.46
Gore Road Trib	Reach1	1415.793 41.06-13	Regional	40.85	226.47	228.11	227.87	228.23	0.005317	2.23	42.04	61.60	0.66
Gore Road Trib	Reach1	1415.720 41.06-12	Regional	40.85	226.47	227.79		227.87	0.004384	2.07	52.93	78.81	0.61
Gore Road Trib	Reach1	1415.590 41.06-11	Regional	40.85	225.93	227.27		227.29	0.004121	0.88	65.42	99.36	0.26
Gore Road Trib	Reach1	1415.515 41.06-10	Regional	40.85	225.78	226.71		226.84	0.008798	2.30	39.09	72.86	0.82
Gore Road Trib	Reach1	1415.353 41.06-09	Regional	40.85	225.06	226.08		226.10	0.002606	0.58	71.17	111.60	0.20
Gore Road Trib	Reach1	1415.201 41.06-08	Regional	40.85	224.34	225.48		225.53	0.005014	2.02	51.73	73.34	0.64
Gore Road Trib	Reach1	1415.055 41.06-07	Regional	40.85	223.77	224.66		224.69	0.006808	0.93	54.69	101.84	0.32
Gore Road Trib	Reach1	1414.792 41.06-06	Regional	40.85	222.48	223.55		223.58	0.006198	0.93	54.10	81.22	0.31
Gore Road Trib	Reach1	1414.601 41.06-05	Regional	40.85	221.55	222.90		222.98	0.002258	1.57	51.08	61.50	0.45
Gore Road Trib	Reach1	1414.401 41.06-04	Regional	40.85	220.38	222.59		222.66	0.001237	1.47	61.46	74.84	0.35
Gore Road Trib	Reach1	1414.292 41.06-03	Regional	40.85	220.38	222.58	221.46	222.59	0.000225	0.69	151.21	123.11	0.15
Gore Road Trib	Reach1	1414.284 41.06-02	Regional	40.85	220.38	222.58	221.65	222.59	0.000208	0.67	151.62	132.40	0.15
Gore Road Trib	Reach1	1414.268 x-124 (41.06-01)		Culvert									
Gore Road Trib	Reach1	1414.253 41.05-13	Regional	39.90	220.41	221.65	221.65	222.10	0.011501	3.21	16.47	88.84	0.98
Gore Road Trib	Reach1	1414.247 41.05-12	Regional	39.90	220.32	221.55		221.57	0.002518	0.62	75.54	98.29	0.20
Gore Road Trib	Reach1	1414.191 41.05-11	Regional	39.90	219.93	221.31		221.42	0.005758	2.43	44.54	65.48	0.71

APPENDIX B-3

SCE REVISED EXISTING CONDITION HEC-RAS MODEL RESULTS

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
HDF-3	1	1002	2-year	0.27	242.78	242.93		242.95	0.005220	0.60	0.58	7.24	0.54
HDF-3	1	1002	5-year	0.47	242.78	242.97		242.99	0.005763	0.75	0.87	8.70	0.60
HDF-3	1	1002	10-year	0.98	242.78	243.03		243.07	0.006491	0.99	1.53	11.54	0.67
HDF-3	1	1002	25-year	1.24	242.78	243.06		243.10	0.006630	1.08	1.83	12.50	0.69
HDF-3	1	1002	50-year	1.43	242.78	243.08		243.12	0.006690	1.13	2.05	13.12	0.70
HDF-3	1	1002	100-year	1.63	242.78	243.09		243.14	0.006768	1.18	2.26	13.71	0.71
HDF-3	1	1002	Regional	4.16	242.78	243.23		243.32	0.007611	1.64	4.60	19.19	0.80
HDF-3	1	1001	2-year	0.27	242.72	242.88	242.83	242.89	0.003248	0.43	0.69	8.52	0.42
HDF-3	1	1001	5-year	0.47	242.72	242.91	242.86	242.93	0.003550	0.54	1.02	10.33	0.46
HDF-3	1	1001	10-year	0.98	242.72	242.97	242.91	243.00	0.004335	0.74	1.69	13.37	0.53
HDF-3	1	1001	25-year	1.24	242.72	242.99	242.94	243.02	0.004509	0.82	2.02	14.65	0.56
HDF-3	1	1001	50-year	1.43	242.72	243.01	242.95	243.04	0.004368	0.85	2.30	15.65	0.55
HDF-3	1	1001	100-year	1.63	242.72	243.03	242.97	243.06	0.004493	0.90	2.53	16.48	0.57
HDF-3	1	1001	Regional	4.16	242.72	243.16	243.10	243.22	0.004954	1.25	5.30	23.71	0.64
HDF-3	1	1000	2-year	0.27	242.49	242.59	242.59	242.62	0.027135	0.81	0.34	6.54	1.09
HDF-3	1	1000	5-year	0.47	242.49	242.62	242.62	242.66	0.022528	0.93	0.54	7.94	1.05
HDF-3	1	1000	10-year	0.98	242.49	242.67	242.67	242.73	0.015221	1.07	1.05	10.68	0.94
HDF-3	1	1000	25-year	1.24	242.49	242.69	242.69	242.76	0.014311	1.15	1.29	11.72	0.93
HDF-3	1	1000	50-year	1.43	242.49	242.71	242.71	242.77	0.014146	1.21	1.44	12.33	0.94
HDF-3	1	1000	100-year	1.63	242.49	242.72	242.72	242.79	0.013424	1.24	1.63	13.04	0.93
HDF-3	1	1000	Regional	4.16	242.49	242.85	242.85	242.96	0.011025	1.61	3.76	20.00	0.92
HDF-3	1	999	2-year	0.27	241.92	242.06	242.01	242.07	0.001744	0.33	0.99	12.77	0.31
HDF-3	1	999	5-year	0.47	241.92	242.09	242.03	242.10	0.002175	0.43	1.41	15.21	0.36
HDF-3	1	999	10-year	0.98	241.92	242.15	242.08	242.17	0.002351	0.56	2.50	20.25	0.40
HDF-3	1	999	25-year	1.24	241.92	242.17	242.11	242.19	0.002761	0.64	2.84	21.54	0.43
HDF-3	1	999	50-year	1.43	241.92	242.19	242.11	242.21	0.002521	0.65	3.32	23.30	0.42
HDF-3	1	999	100-year	1.63	241.92	242.21		242.23	0.002491	0.68	3.71	24.70	0.42
HDF-3	1	999	Regional	4.16	241.92	242.34		242.37	0.002923	0.96	7.55	35.21	0.49
HDF-3	1	998	2-year	0.27	241.84	241.88	241.88	241.90	0.026524	0.68	0.45	11.84	1.03
HDF-3	1	998	5-year	0.47	241.84	241.91	241.91	241.93	0.017293	0.74	0.76	13.37	0.90
HDF-3	1	998	10-year	0.98	241.84	241.94	241.94	241.98	0.018326	0.99	1.24	15.59	0.99
HDF-3	1	998	25-year	1.24	241.84	241.97	241.97	242.01	0.012757	0.96	1.68	17.36	0.85
HDF-3	1	998	50-year	1.43	241.84	241.96	241.96	242.02	0.017654	1.12	1.66	17.27	1.00
HDF-3	1	998	100-year	1.63	241.84	241.97	241.97	242.03	0.019178	1.21	1.77	17.65	1.05
HDF-3	1	998	Regional	4.16	241.84	242.08	242.08	242.16	0.013281	1.49	4.08	24.72	0.97
HDF-3	1	997	2-year	0.27	240.98	241.24		241.25	0.001312	0.39	0.78	5.57	0.29
HDF-3	1	997	5-year	0.47	240.98	241.30		241.31	0.001391	0.48	1.16	6.78	0.31
HDF-3	1	997	10-year	0.98	240.98	241.39		241.42	0.001793	0.68	1.87	8.51	0.37
HDF-3	1	997	25-year	1.24	240.98	241.43		241.46	0.001868	0.75	2.22	9.34	0.39
HDF-3	1	997	50-year	1.43	240.98	241.46		241.48	0.001993	0.80	2.43	9.78	0.41
HDF-3	1	997	100-year	1.63	240.98	241.48		241.51	0.002076	0.85	2.66	10.25	0.42
HDF-3	1	997	Regional	4.16	240.98	241.67		241.73	0.003004	1.31	4.95	13.87	0.54
HDF-3	1	996.5	2-year	0.27	240.96	241.10		241.12	0.009042	0.62	0.45	6.37	0.67
HDF-3	1	996.5	5-year	0.47	240.96	241.12	241.12	241.16	0.011039	0.82	0.63	7.47	0.78
HDF-3	1	996.5	10-year	0.98	240.96	241.18	241.17	241.23	0.011138	1.07	1.12	10.04	0.83
HDF-3	1	996.5	25-year	1.24	240.96	241.20	241.19	241.26	0.012170	1.20	1.30	10.81	0.89
HDF-3	1	996.5	50-year	1.43	240.96	241.21	241.21	241.28	0.012533	1.27	1.45	11.39	0.91
HDF-3	1	996.5	100-year	1.63	240.96	241.23	241.23	241.30	0.012132	1.32	1.63	12.16	0.91
HDF-3	1	996.5	Regional	4.16	240.96	241.37	241.37	241.48	0.010458	1.71	3.79	18.76	0.92
HDF-3	1	996	2-year	0.27	240.55	240.71		240.72	0.005916	0.48	0.56	6.98	0.54
HDF-3	1	996	5-year	0.47	240.55	240.75		240.76	0.004974	0.52	0.90	8.68	0.51
HDF-3	1	996	10-year	0.98	240.55	240.81		240.83	0.004981	0.66	1.54	12.29	0.55
HDF-3	1	996	25-year	1.24	240.55	240.83		240.86	0.004920	0.72	1.83	13.92	0.56
HDF-3	1	996	50-year	1.43	240.55	240.85		240.88	0.004632	0.74	2.09	15.17	0.55
HDF-3	1	996	100-year	1.63	240.55	240.86		240.89	0.004694	0.78	2.30	16.18	0.56
HDF-3	1	996	Regional	4.16	240.55	240.99		241.05	0.004864	1.11	4.95	25.47	0.62
HDF-3	1	995	2-year	0.27	240.22	240.36		240.37	0.003098	0.41	0.72	9.23	0.41
HDF-3	1	995	5-year	0.47	240.22	240.40		240.41	0.003560	0.52	1.05	11.15	0.45
HDF-3	1	995	10-year	0.98	240.22	240.46		240.48	0.003546	0.68	1.89	15.00	0.48
HDF-3	1	995	25-year	1.24	240.22	240.49		240.51	0.003316	0.72	2.36	16.80	0.48
HDF-3	1	995	50-year	1.43	240.22	240.50		240.53	0.003486	0.77	2.60	17.63	0.50
HDF-3	1	995	100-year	1.63	240.22	240.52		240.55	0.003497	0.80	2.89	18.61	0.50
HDF-3	1	995	Regional	4.16	240.22	240.68		240.72	0.002946	1.02	6.77	28.46	0.50
HDF-3	1	994	2-year	0.27	239.74	239.84	239.82	239.85	0.007647	0.59	0.53	7.44	0.62
HDF-3	1	994	5-year	0.47	239.74	239.88		239.90	0.006195	0.67	0.86	8.68	0.60
HDF-3	1	994	10-year	0.98	239.74	239.94	239.90	239.97	0.006481	0.89	1.45	10.63	0.65
HDF-3	1	994	25-year	1.24	239.74	239.96	239.92	240.00	0.006501	0.97	1.73	11.41	0.67
HDF-3	1	994	50-year	1.43	239.74	239.98		240.02	0.006323	1.01	1.95	11.99	0.67
HDF-3	1	994	100-year	1.63	239.74	240.00		240.05	0.006245	1.06	2.16	12.56	0.67
HDF-3	1	994	Regional	4.16	239.74	240.13	240.09	240.22	0.007712	1.56	4.17	17.39	0.80
HDF-3	1	993	2-year	0.27	238.99	239.03	239.01	239.04	0.003088	0.21	1.84	46.93	0.34
HDF-3	1	993	5-year	0.47	238.99	239.05		239.05	0.003763	0.28	2.44	48.09	0.40
HDF-3	1	993	10-year	0.98	238.99	239.07		239.08	0.003937	0.39	3.82	50.77	0.44
HDF-3	1	993	25-year	1.24	238.99	239.09		239.09	0.004090	0.43	4.38	51.61	0.46
HDF-3	1	993	50-year	1.43	238.99	239.09		239.10	0.004315	0.46	4.72	52.33	0.47
HDF-3	1	993	100-year	1.63	238.99	239.10		239.11	0.004559	0.49	5.05	52.93	0.49
HDF-3	1	993	Regional	4.16	238.99	239.18		239.19	0.004447	0.71	9.42	60.64	0.53
HDF-3	1	992	2-year	0.27	238.18	238.22		238.23	0.014291	0.46	0.78	23.99	0.74
HDF-3	1	992	5-year	0.47	238.18	238.24	238.23	238.25	0.009726	0.50	1.29	25.87	0.66
HDF-3	1	992	10-year	0.98	238.18	238.27		238.29	0.008707	0.63	2.17	28.04	0.67
HDF-3	1	992	25-year	1.24	238.18	238.29		238.30	0.008018	0.67	2.60	28.81	0.66
HDF-3	1	992	50-year	1.43	238.18	238.30		238.32	0.007604	0.70	2.91	29.36	0.65
HDF-3	1	992	100-year	1.63	238.18	238.31		238.33	0.007021	0.71	3.26	30.03	0.63
HDF-3	1	992	Regional	4.16	238.18	238.40		238.44	0.006448	0.99	6.36	36.02	0.67
HDF-3	1	991	2-year	0.37	237.10	237.29		237.30	0.004606	0.42	0.89	11.77	0.47

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
HDF-3	1	991	5-year	0.64	237.10	237.31		237.33	0.005361	0.55	1.21	13.14	0.54
HDF-3	1	991	10-year	1.34	237.10	237.37	237.33	237.40	0.005476	0.73	2.03	16.42	0.58
HDF-3	1	991	25-year	1.70	237.10	237.39	237.34	237.42	0.005529	0.80	2.42	17.83	0.60
HDF-3	1	991	50-year	1.96	237.10	237.41	237.36	237.44	0.005682	0.85	2.67	18.71	0.61
HDF-3	1	991	100-year	2.23	237.10	237.42	237.37	237.46	0.005860	0.90	2.91	19.55	0.63
HDF-3	1	991	Regional	5.69	237.10	237.56		237.62	0.005600	1.24	6.32	29.29	0.67
HDF-3	1	990	2-year	0.37	236.39	236.46		236.46	0.010497	0.46	1.06	24.17	0.66
HDF-3	1	990	5-year	0.64	236.39	236.48		236.49	0.008919	0.54	1.61	26.30	0.65
HDF-3	1	990	10-year	1.34	236.39	236.51		236.53	0.008943	0.72	2.64	29.04	0.70
HDF-3	1	990	25-year	1.70	236.39	236.53	236.51	236.55	0.009241	0.79	3.06	30.06	0.72
HDF-3	1	990	50-year	1.96	236.39	236.54	236.51	236.56	0.008931	0.83	3.41	30.93	0.72
HDF-3	1	990	100-year	2.23	236.39	236.55	236.51	236.58	0.008836	0.86	3.74	31.89	0.73
HDF-3	1	990	Regional	5.69	236.39	236.64	236.60	236.69	0.010523	1.28	6.68	36.62	0.85
HDF-3	1	989	2-year	0.37	235.20	235.34		235.35	0.006965	0.49	0.76	10.23	0.57
HDF-3	1	989	5-year	0.64	235.20	235.36	235.33	235.38	0.007979	0.61	1.06	11.47	0.64
HDF-3	1	989	10-year	1.34	235.20	235.42		235.45	0.007659	0.78	1.73	13.82	0.67
HDF-3	1	989	25-year	1.70	235.20	235.44		235.48	0.007288	0.83	2.12	18.35	0.67
HDF-3	1	989	50-year	1.96	235.20	235.46		235.50	0.007462	0.87	2.39	21.01	0.68
HDF-3	1	989	100-year	2.23	235.20	235.47	235.43	235.51	0.007480	0.91	2.69	23.73	0.69
HDF-3	1	989	Regional	5.69	235.20	235.60	235.56	235.66	0.005999	1.17	6.68	37.71	0.68
HDF-3	1	988	2-year	0.37	234.10	234.31	234.27	234.33	0.004950	0.54	0.72	9.70	0.52
HDF-3	1	988	5-year	0.64	234.10	234.36	234.31	234.38	0.004273	0.60	1.30	14.07	0.50
HDF-3	1	988	10-year	1.34	234.10	234.43	234.37	234.45	0.004377	0.72	2.38	17.01	0.53
HDF-3	1	988	25-year	1.70	234.10	234.45	234.40	234.48	0.004425	0.79	2.82	18.32	0.55
HDF-3	1	988	50-year	1.96	234.10	234.47	234.41	234.50	0.004425	0.83	3.13	19.16	0.55
HDF-3	1	988	100-year	2.23	234.10	234.49	234.42	234.52	0.004427	0.87	3.44	19.82	0.56
HDF-3	1	988	Regional	5.69	234.10	234.63		234.69	0.004982	1.25	6.67	25.63	0.64
HDF-3	1	987.5	2-year	0.37	233.34	233.49	233.49	233.52	0.014692	0.79	0.47	5.33	0.86
HDF-3	1	987.5	5-year	0.64	233.34	233.52	233.52	233.57	0.018760	1.00	0.64	6.19	1.00
HDF-3	1	987.5	10-year	1.34	233.34	233.59	233.59	233.66	0.016989	1.17	1.15	8.19	1.00
HDF-3	1	987.5	25-year	1.70	233.34	233.62	233.62	233.70	0.016413	1.23	1.39	9.00	1.00
HDF-3	1	987.5	50-year	1.96	233.34	233.64	233.64	233.72	0.016102	1.26	1.55	9.51	1.00
HDF-3	1	987.5	100-year	2.23	233.34	233.66	233.66	233.74	0.015734	1.30	1.72	10.06	1.00
HDF-3	1	987.5	Regional	5.69	233.34	233.81	233.81	233.96	0.011563	1.70	3.61	14.47	0.95
HDF-3	1	987	2-year	0.37	232.30	232.44		232.44	0.003493	0.36	1.25	16.95	0.41
HDF-3	1	987	5-year	0.64	232.30	232.54		232.55	0.000522	0.25	3.27	19.91	0.18
HDF-3	1	987	10-year	1.34	232.30	232.77		232.77	0.000141	0.22	8.41	25.59	0.11
HDF-3	1	987	25-year	1.70	232.30	233.05		233.05	0.000034	0.15	16.51	31.45	0.06
HDF-3	1	987	50-year	1.96	232.30	233.09		233.09	0.000036	0.16	17.76	32.15	0.06
HDF-3	1	987	100-year	2.23	232.30	233.12		233.12	0.000042	0.18	18.56	32.59	0.07
HDF-3	1	987	Regional	5.69	232.30	233.42		233.42	0.000077	0.30	29.09	37.96	0.09
HDF-3	1	986	2-year	0.37	231.93	232.44		232.44	0.000006	0.05	10.55	28.34	0.02
HDF-3	1	986	5-year	0.64	231.93	232.54		232.54	0.000009	0.07	13.70	30.23	0.03
HDF-3	1	986	10-year	1.34	231.93	232.77		232.77	0.000011	0.10	20.92	33.63	0.03
HDF-3	1	986	25-year	1.70	231.93	233.05		233.05	0.000006	0.08	30.89	37.05	0.03
HDF-3	1	986	50-year	1.96	231.93	233.09		233.09	0.000007	0.09	32.36	37.59	0.03
HDF-3	1	986	100-year	2.23	231.93	233.12		233.12	0.000008	0.10	33.28	37.99	0.03
HDF-3	1	986	Regional	5.69	231.93	233.41		233.41	0.000022	0.20	45.39	43.54	0.05
HDF-3	1	985	2-year	0.37	231.75	232.44		232.44	0.000001	0.02	19.93	34.12	0.01
HDF-3	1	985	5-year	0.64	231.75	232.54		232.54	0.000002	0.04	23.67	35.45	0.01
HDF-3	1	985	10-year	1.34	231.75	232.77		232.77	0.000003	0.06	31.92	37.85	0.02
HDF-3	1	985	25-year	1.70	231.75	233.05		233.05	0.000002	0.06	43.58	43.63	0.02
HDF-3	1	985	50-year	1.96	231.75	233.09		233.09	0.000003	0.06	45.30	44.13	0.02
HDF-3	1	985	100-year	2.23	231.75	233.12		233.12	0.000003	0.07	46.38	44.44	0.02
HDF-3	1	985	Regional	5.69	231.75	233.41		233.41	0.000010	0.14	60.15	48.12	0.03
HDF-3	1	984	2-year	0.37	232.05	232.32	232.32	232.39	0.018530	1.19	0.31	2.19	1.01
HDF-3	1	984	5-year	0.64	232.05	232.39	232.39	232.48	0.017423	1.39	0.46	2.43	1.02
HDF-3	1	984	10-year	1.34	232.05	232.68	232.51	232.73	0.003063	1.08	1.41	4.41	0.50
HDF-3	1	984	25-year	1.70	232.05	233.02	232.57	233.04	0.000657	0.72	3.23	19.68	0.25
HDF-3	1	984	50-year	1.96	232.05	233.05	232.60	233.07	0.000750	0.79	3.45	25.45	0.27
HDF-3	1	984	100-year	2.23	232.05	233.06	232.64	233.10	0.000908	0.87	3.55	28.58	0.30
HDF-3	1	984	Regional	5.69	232.05	233.14	232.99	233.31	0.004220	2.00	4.17	40.06	0.66
HDF-3	1	983	2-year	0.37	231.24	231.83	231.40	231.83	0.000089	0.20	1.89	15.61	0.09
HDF-3	1	983	5-year	0.64	231.24	232.06	231.46	232.06	0.000075	0.23	2.76	22.06	0.09
HDF-3	1	983	10-year	1.34	231.24	232.69	231.57	232.69	0.000041	0.26	5.15	55.33	0.07
HDF-3	1	983	25-year	1.70	231.24	233.02	231.61	233.02	0.000003	0.07	48.41	70.69	0.02
HDF-3	1	983	50-year	1.96	231.24	233.05	231.63	233.05	0.000003	0.08	50.80	72.82	0.02
HDF-3	1	983	100-year	2.23	231.24	233.07	231.66	233.07	0.000004	0.09	51.95	73.96	0.02
HDF-3	1	983	Regional	5.69	231.24	233.18	231.95	233.18	0.000018	0.20	60.22	80.48	0.05
HDF-3	1	982.58		Culvert									
HDF-3	1	982	2-year	0.37	230.86	231.21	231.15	231.26	0.009083	0.94	0.40	4.41	0.65
HDF-3	1	982	5-year	0.64	230.86	231.26	231.23	231.35	0.015070	1.32	0.49	4.87	0.86
HDF-3	1	982	10-year	1.34	230.86	231.38	231.38	231.54	0.018857	1.78	0.75	14.58	1.01
HDF-3	1	982	25-year	1.70	230.86	231.44	231.44	231.62	0.016996	1.89	0.93	18.73	0.99
HDF-3	1	982	50-year	1.96	230.86	231.48	231.48	231.67	0.015992	1.96	1.05	20.11	0.97
HDF-3	1	982	100-year	2.23	230.86	231.51	231.51	231.72	0.015337	2.04	1.16	21.29	0.97
HDF-3	1	982	Regional	5.69	230.86	231.88	231.88	232.26	0.013030	2.78	2.25	33.25	0.98
HDF-3	1	981	2-year	0.37	230.86	231.08	231.07	231.10	0.009796	0.65	1.05	17.15	0.62
HDF-3	1	981	5-year	0.64	230.86	231.12	231.09	231.14	0.008526	0.73	1.73	19.83	0.61
HDF-3	1	981	10-year	1.34	230.86	231.17	231.14	231.20	0.010655	1.00	3.01	29.28	0.71
HDF-3	1	981	25-year	1.70	230.86	231.20	231.16	231.23	0.007783	0.95	4.08	30.36	0.63
HDF-3	1	981	50-year	1.96	230.86	231.21	231.18	231.24	0.008804	1.03	4.33	30.57	0.67
HDF-3	1	981	100-year	2.23	230.86	231.23	231.18	231.26	0.008972	1.08	4.73	30.97	0.68
HDF-3	1	981	Regional	5.69	230.86	231.35	231.28	231.40	0.010119	1.50	8.90	35.33	0.77

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
HDF-3	1	980	2-year	0.37	230.22	230.27	230.27	230.29	0.023427	0.59	1.01	29.48	0.84
HDF-3	1	980	5-year	0.64	230.22	230.29	230.29	230.31	0.030990	0.78	1.35	30.31	1.01
HDF-3	1	980	10-year	1.34	230.22	230.32	230.32	230.35	0.022279	0.90	2.53	32.90	0.92
HDF-3	1	980	25-year	1.70	230.22	230.32	230.32	230.37	0.039308	1.18	2.45	32.74	1.22
HDF-3	1	980	50-year	1.96	230.22	230.33	230.33	230.38	0.031671	1.16	2.91	33.71	1.12
HDF-3	1	980	100-year	2.23	230.22	230.34	230.34	230.39	0.030014	1.19	3.23	34.29	1.11
HDF-3	1	980	Regional	5.69	230.22	230.43	230.43	230.51	0.026085	1.61	6.64	43.14	1.13
HDF-8	1	36	2-year	0.30	229.50	229.55	229.55	229.58	0.039210	0.77	0.39	10.16	1.23
HDF-8	1	36	5-year	0.51	229.50	229.57	229.57	229.61	0.024534	0.82	0.64	10.77	1.05
HDF-8	1	36	10-year	1.07	229.50	229.61	229.61	229.66	0.021575	1.05	1.06	11.72	1.06
HDF-8	1	36	25-year	1.33	229.50	229.63	229.63	229.69	0.017176	1.07	1.32	12.25	0.98
HDF-8	1	36	50-year	1.53	229.50	229.64	229.64	229.70	0.017559	1.13	1.44	12.49	1.00
HDF-8	1	36	100-year	1.73	229.50	229.65	229.65	229.72	0.016099	1.16	1.60	12.82	0.98
HDF-8	1	36	Regional	4.25	229.50	229.78	229.78	229.87	0.010199	1.41	3.88	28.65	0.86
HDF-8	1	35	2-year	0.30	228.50	228.58		228.59	0.005922	0.43	0.74	13.00	0.53
HDF-8	1	35	5-year	0.51	228.50	228.62		228.63	0.004712	0.49	1.21	16.45	0.50
HDF-8	1	35	10-year	1.07	228.50	228.67		228.69	0.004121	0.61	2.24	21.66	0.50
HDF-8	1	35	25-year	1.33	228.50	228.69		228.71	0.003911	0.65	2.70	23.51	0.50
HDF-8	1	35	50-year	1.53	228.50	228.71		228.73	0.003469	0.65	3.16	25.21	0.48
HDF-8	1	35	100-year	1.73	228.50	228.72		228.74	0.003672	0.69	3.41	26.07	0.49
HDF-8	1	35	Regional	4.25	228.50	228.85		228.88	0.002799	0.85	7.81	37.41	0.47
HDF-8	1	34	2-year	0.30	228.24	228.35		228.36	0.001743	0.29	1.15	13.77	0.30
HDF-8	1	34	5-year	0.51	228.24	228.38		228.39	0.002044	0.37	1.56	15.13	0.34
HDF-8	1	34	10-year	1.07	228.24	228.44		228.45	0.002149	0.50	2.57	17.69	0.37
HDF-8	1	34	25-year	1.33	228.24	228.46		228.47	0.002296	0.55	2.93	18.49	0.39
HDF-8	1	34	50-year	1.53	228.24	228.47		228.49	0.002405	0.59	3.19	19.03	0.41
HDF-8	1	34	100-year	1.73	228.24	228.49		228.51	0.002265	0.61	3.56	19.80	0.40
HDF-8	1	34	Regional	4.25	228.24	228.62		228.65	0.002774	0.90	6.45	25.20	0.47
HDF-8	1	33	2-year	0.30	227.98	228.02	228.02	228.04	0.035126	0.69	0.50	14.98	1.15
HDF-8	1	33	5-year	0.51	227.98	228.04	228.04	228.07	0.027815	0.79	0.76	15.63	1.09
HDF-8	1	33	10-year	1.07	227.98	228.07	228.07	228.11	0.024478	1.01	1.28	16.87	1.10
HDF-8	1	33	25-year	1.33	227.98	228.09	228.09	228.13	0.020280	1.04	1.57	17.53	1.04
HDF-8	1	33	50-year	1.53	227.98	228.09	228.09	228.15	0.020985	1.11	1.70	17.82	1.07
HDF-8	1	33	100-year	1.73	227.98	228.10	228.10	228.16	0.022985	1.19	1.79	18.02	1.12
HDF-8	1	33	Regional	4.25	227.98	228.20	228.20	228.29	0.015824	1.49	3.74	21.88	1.03
HDF-8	1	32	2-year	0.30	227.25	227.40		227.41	0.001870	0.33	0.92	8.43	0.32
HDF-8	1	32	5-year	0.51	227.25	227.44		227.45	0.002145	0.40	1.27	9.49	0.35
HDF-8	1	32	10-year	1.07	227.25	227.51		227.53	0.002371	0.55	1.99	11.35	0.39
HDF-8	1	32	25-year	1.33	227.25	227.53		227.55	0.002881	0.63	2.15	11.79	0.44
HDF-8	1	32	50-year	1.53	227.25	227.53		227.56	0.003415	0.70	2.24	12.00	0.48
HDF-8	1	32	100-year	1.73	227.25	227.56		227.59	0.002944	0.70	2.56	12.86	0.46
HDF-8	1	32	Regional	4.25	227.25	227.69		227.75	0.004014	1.09	4.47	17.02	0.57
HDF-8	1	31	2-year	0.36	226.96	227.01	227.01	227.04	0.042081	0.78	0.54	15.79	1.27
HDF-8	1	31	5-year	0.61	226.96	227.03	227.03	227.06	0.036664	0.92	0.79	16.51	1.25
HDF-8	1	31	10-year	1.29	226.96	227.06	227.06	227.12	0.029856	1.14	1.39	18.15	1.23
HDF-8	1	31	25-year	1.61	226.96	227.08	227.08	227.14	0.019696	1.09	1.85	19.25	1.04
HDF-8	1	31	50-year	1.85	226.96	227.11	227.11	227.15	0.014119	1.04	2.27	20.19	0.91
HDF-8	1	31	100-year	2.10	226.96	227.11	227.11	227.16	0.018736	1.19	2.25	20.14	1.04
HDF-8	1	31	Regional	5.15	226.96	227.22	227.22	227.30	0.012421	1.47	4.89	26.39	0.94
HDF-8	1	30	2-year	0.36	226.13	226.25		226.25	0.003703	0.40	1.01	15.82	0.43
HDF-8	1	30	5-year	0.61	226.13	226.28		226.29	0.003329	0.46	1.64	21.60	0.43
HDF-8	1	30	10-year	1.29	226.13	226.32		226.34	0.004360	0.65	2.64	24.23	0.52
HDF-8	1	30	25-year	1.61	226.13	226.34		226.36	0.004069	0.69	3.20	25.59	0.51
HDF-8	1	30	50-year	1.85	226.13	226.36	226.30	226.38	0.004137	0.73	3.53	26.35	0.52
HDF-8	1	30	100-year	2.10	226.13	226.36	226.31	226.39	0.005149	0.81	3.58	26.46	0.58
HDF-8	1	30	Regional	5.15	226.13	226.46		226.51	0.005894	1.15	6.79	34.48	0.67
HDF-8	1	29	2-year	0.36	225.72	225.78	225.78	225.79	0.015952	0.56	0.84	21.24	0.81
HDF-8	1	29	5-year	0.61	225.72	225.79	225.79	225.81	0.024707	0.78	1.03	22.05	1.04
HDF-8	1	29	10-year	1.29	225.72	225.83	225.83	225.86	0.013062	0.84	2.14	26.04	0.83
HDF-8	1	29	25-year	1.61	225.72	225.84	225.84	225.88	0.015533	0.96	2.34	26.59	0.92
HDF-8	1	29	50-year	1.85	225.72	225.85	225.84	225.89	0.016419	1.03	2.53	27.00	0.96
HDF-8	1	29	100-year	2.10	225.72	225.87		225.90	0.010768	0.94	3.18	28.39	0.80
HDF-8	1	29	Regional	5.15	225.72	225.97	225.93	226.02	0.009556	1.25	6.20	34.37	0.82
HDF-8	1	28	2-year	0.36	224.75	224.88		224.89	0.004693	0.52	0.69	6.30	0.50
HDF-8	1	28	5-year	0.61	224.75	224.93		224.94	0.004770	0.62	0.99	7.12	0.53
HDF-8	1	28	10-year	1.29	224.75	225.02		225.05	0.005416	0.75	1.78	13.56	0.58
HDF-8	1	28	25-year	1.61	224.75	225.04		225.07	0.005411	0.82	2.11	15.13	0.59
HDF-8	1	28	50-year	1.85	224.75	225.05		225.09	0.005692	0.87	2.31	16.00	0.62
HDF-8	1	28	100-year	2.10	224.75	225.05		225.10	0.007685	1.01	2.27	15.82	0.71
HDF-8	1	28	Regional	5.15	224.75	225.18	225.15	225.26	0.007482	1.38	4.84	24.50	0.76
HDF-8	1	27	2-year	0.36	224.49	224.59		224.59	0.004358	0.42	0.94	13.43	0.46
HDF-8	1	27	5-year	0.61	224.49	224.61		224.62	0.004766	0.52	1.32	15.09	0.51
HDF-8	1	27	10-year	1.29	224.49	224.66		224.69	0.005179	0.71	2.20	18.73	0.57
HDF-8	1	27	25-year	1.61	224.49	224.68		224.71	0.005284	0.78	2.59	20.08	0.58
HDF-8	1	27	50-year	1.85	224.49	224.70		224.73	0.004733	0.79	2.99	21.09	0.56
HDF-8	1	27	100-year	2.10	224.49	224.73	224.66	224.76	0.003533	0.75	3.67	22.68	0.50
HDF-8	1	27	Regional	5.15	224.49	224.87	224.77	224.91	0.003622	1.03	7.24	29.51	0.54
HDF-8	1	26	2-year	0.36	224.16	224.24	224.22	224.25	0.005962	0.44	1.08	27.05	0.53
HDF-8	1	26	5-year	0.61	224.16	224.26	224.24	224.27	0.005681	0.51	1.70	29.21	0.54
HDF-8	1	26	10-year	1.29	224.16	224.30	224.27	224.32	0.005780	0.65	2.85	29.51	0.58
HDF-8	1	26	25-year	1.61	224.16	224.32		224.34	0.005852	0.71	3.29	29.62	0.59
HDF-8	1	26	50-year	1.85	224.16	224.32		224.34	0.006939	0.78	3.41	29.65	0.65
HDF-8	1	26	100-year	2.10	224.16	224.31	224.31	224.35	0.012661	1.00	3.04	29.56	0.86
HDF-8	1	26	Regional	5.15	224.16	224.37	224.37	224.45	0.017087	1.50	4.95	30.04	1.07
HDF-8	1	25	2-year	0.36	223.00	223.16	223.16	223.20	0.020281	0.91	0.39	4.67	1.00

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
HDF-8	1	25	5-year	0.61	223.00	223.19	223.19	223.25	0.020723	1.06	0.58	5.52	1.05
HDF-8	1	25	10-year	1.29	223.00	223.27	223.27	223.34	0.017071	1.22	1.05	7.05	1.01
HDF-8	1	25	25-year	1.61	223.00	223.29	223.29	223.38	0.015826	1.29	1.25	7.25	0.99
HDF-8	1	25	50-year	1.85	223.00	223.32	223.32	223.40	0.012133	1.26	1.47	7.49	0.89
HDF-8	1	25	100-year	2.10	223.00	223.83		223.84	0.000220	0.37	6.20	10.95	0.15
HDF-8	1	25	Regional	5.15	223.00	224.30		224.32	0.000219	0.50	11.99	13.98	0.15
HDF-8	1	24	2-year	0.36	221.76	222.09	222.09	222.17	0.018259	1.26	0.29	1.79	1.01
HDF-8	1	24	5-year	0.61	221.76	222.17	222.17	222.27	0.017177	1.40	0.43	2.23	1.01
HDF-8	1	24	10-year	1.29	221.76	222.30	222.30	222.44	0.015569	1.63	0.79	3.04	1.02
HDF-8	1	24	25-year	1.61	221.76	222.75		222.77	0.000926	0.56	2.88	6.98	0.27
HDF-8	1	24	50-year	1.85	221.76	223.27		223.27	0.000082	0.26	8.00	11.37	0.09
HDF-8	1	24	100-year	2.10	221.76	223.84		223.84	0.000019	0.16	15.65	15.38	0.05
HDF-8	1	24	Regional	5.15	221.76	224.31		224.31	0.000034	0.26	25.52	25.55	0.06
HDF-8	1	23.6	2-year	0.36	221.20	221.61	221.52	221.65	0.005080	0.83	0.43	1.93	0.56
HDF-8	1	23.6	5-year	0.61	221.20	221.79	221.60	221.82	0.002362	0.71	0.86	2.67	0.40
HDF-8	1	23.6	10-year	1.29	221.20	222.28	221.75	222.29	0.000331	0.40	3.25	47.07	0.17
HDF-8	1	23.6	25-year	1.61	221.20	222.76	221.81	222.76	0.000074	0.27	6.07	72.69	0.09
HDF-8	1	23.6	50-year	1.85	221.20	223.26	221.87	223.27	0.000027	0.20	9.39	76.44	0.05
HDF-8	1	23.6	100-year	2.10	221.20	223.84	221.92	223.84	0.000011	0.16	13.38	84.22	0.04
HDF-8	1	23.6	Regional	5.15	221.20	224.31	222.14	224.31	0.000001	0.05	153.78	89.65	0.01
HDF-8	1	23.3		Culvert									
HDF-8	1	23	2-year	0.36	220.91	221.29	221.17	221.31	0.002167	0.52	0.70	3.63	0.37
HDF-8	1	23	5-year	0.61	220.91	221.24	221.23	221.31	0.013616	1.16	0.53	3.15	0.91
HDF-8	1	23	10-year	1.29	220.91	221.37	221.34	221.46	0.009079	1.31	0.98	5.02	0.80
HDF-8	1	23	25-year	1.61	220.91	221.46	221.37	221.54	0.005589	1.24	1.30	9.81	0.66
HDF-8	1	23	50-year	1.85	220.91	221.55	221.40	221.62	0.003479	1.14	1.63	18.21	0.54
HDF-8	1	23	100-year	2.10	220.91	221.63	221.42	221.69	0.002674	1.10	1.90	22.69	0.49
HDF-8	1	23	Regional	5.15	220.91	222.17	221.69	222.26	0.001505	1.33	3.87	43.92	0.41
HDF-8	1	22	2-year	0.36	220.99	221.05		221.06	0.012816	0.52	0.91	20.29	0.73
HDF-8	1	22	5-year	0.61	220.99	221.16		221.16	0.000600	0.24	4.01	37.37	0.19
HDF-8	1	22	10-year	1.29	220.99	221.38		221.38	0.000059	0.13	18.18	76.43	0.07
HDF-8	1	22	25-year	1.61	220.99	221.47		221.47	0.000034	0.12	25.26	81.78	0.05
HDF-8	1	22	50-year	1.85	220.99	221.56		221.56	0.000022	0.11	33.11	90.25	0.05
HDF-8	1	22	100-year	2.10	220.99	221.64		221.64	0.000016	0.10	40.01	90.35	0.04
HDF-8	1	22	Regional	5.15	220.99	222.19		222.19	0.000007	0.10	90.43	91.66	0.03
Clarkway Trib A	Reach1	1597	2-year	3.94	241.79	243.01	242.14	243.01	0.000157	0.38	10.45	85.64	0.12
Clarkway Trib A	Reach1	1597	5-year	8.80	241.79	243.50	242.35	243.51	0.000060	0.30	54.68	106.85	0.08
Clarkway Trib A	Reach1	1597	10-year	18.30	241.79	243.65	242.64	243.65	0.000112	0.43	97.36	114.95	0.10
Clarkway Trib A	Reach1	1597	25-year	23.00	241.79	243.68	242.75	243.69	0.000160	0.52	101.35	115.70	0.13
Clarkway Trib A	Reach1	1597	50-year	26.20	241.79	243.71	242.83	243.72	0.000193	0.58	104.26	117.55	0.14
Clarkway Trib A	Reach1	1597	100-year	30.20	241.79	243.74	242.92	243.75	0.000233	0.64	108.28	119.44	0.15
Clarkway Trib A	Reach1	1597	Regional	24.21	241.79	243.70	242.79	243.70	0.000170	0.54	102.95	116.55	0.13
Clarkway Trib A	Reach1	1594		Culvert									
Clarkway Trib A	Reach1	1591	2-year	3.94	241.48	242.32	242.32	242.57	0.017229	2.22	1.78	32.80	1.01
Clarkway Trib A	Reach1	1591	5-year	8.80	241.48	242.67	242.67	243.10	0.014213	2.89	3.05	71.74	1.00
Clarkway Trib A	Reach1	1591	10-year	18.30	241.48	243.19	243.19	243.20	0.000409	0.62	66.25	84.83	0.18
Clarkway Trib A	Reach1	1591	25-year	23.00	241.48	243.19	243.19	243.21	0.000646	0.78	66.25	84.83	0.23
Clarkway Trib A	Reach1	1591	50-year	26.20	241.48	243.19	243.19	243.21	0.000838	0.89	66.25	84.83	0.26
Clarkway Trib A	Reach1	1591	100-year	30.20	241.48	243.19	243.19	243.22	0.001114	1.02	66.25	84.83	0.30
Clarkway Trib A	Reach1	1591	Regional	24.21	241.48	243.19	243.19	243.21	0.000716	0.82	66.25	84.83	0.24
Clarkway Trib A	Reach1	1583	2-year	3.94	241.24	242.21	242.04	242.24	0.003121	0.88	5.92	31.66	0.43
Clarkway Trib A	Reach1	1583	5-year	8.80	241.24	242.39	242.26	242.44	0.003335	1.15	13.56	46.36	0.48
Clarkway Trib A	Reach1	1583	10-year	18.30	241.24	242.56	242.42	242.65	0.004576	1.60	22.47	55.18	0.58
Clarkway Trib A	Reach1	1583	25-year	23.00	241.24	242.65	242.48	242.75	0.004520	1.71	27.41	59.50	0.59
Clarkway Trib A	Reach1	1583	50-year	26.20	241.24	242.68	242.53	242.79	0.004921	1.83	29.52	61.36	0.62
Clarkway Trib A	Reach1	1583	100-year	30.20	241.24	242.73	242.58	242.85	0.005185	1.94	32.54	63.91	0.64
Clarkway Trib A	Reach1	1583	Regional	24.21	241.24	242.66	242.50	242.76	0.004661	1.75	28.26	60.26	0.60
Clarkway Trib A	Reach1	1561.698	2-year	3.94	241.38	241.86	241.86	241.91	0.009909	1.49	7.56	50.78	0.76
Clarkway Trib A	Reach1	1561.698	5-year	8.80	241.38	241.94	241.94	242.03	0.015667	2.13	12.19	59.12	0.99
Clarkway Trib A	Reach1	1561.698	10-year	18.30	241.38	242.08	242.08	242.18	0.015456	2.52	22.81	81.53	1.03
Clarkway Trib A	Reach1	1561.698	25-year	23.00	241.38	242.11	242.11	242.23	0.018791	2.86	25.03	82.51	1.14
Clarkway Trib A	Reach1	1561.698	50-year	26.20	241.38	242.14	242.14	242.26	0.018551	2.93	27.61	84.07	1.14
Clarkway Trib A	Reach1	1561.698	100-year	30.20	241.38	242.17	242.16	242.30	0.019180	3.07	30.18	85.58	1.17
Clarkway Trib A	Reach1	1561.698	Regional	24.21	241.38	242.12	242.12	242.24	0.018733	2.89	26.01	83.18	1.14
Clarkway Trib A	Reach1	1561.551	2-year	3.94	240.81	241.23		241.24	0.001752	0.47	21.55	128.34	0.30
Clarkway Trib A	Reach1	1561.551	5-year	8.80	240.81	241.36		241.36	0.001678	0.55	38.07	145.96	0.29
Clarkway Trib A	Reach1	1561.551	10-year	18.30	240.81	241.51		241.52	0.001708	0.67	62.14	160.61	0.30
Clarkway Trib A	Reach1	1561.551	25-year	23.00	240.81	241.57		241.57	0.001796	0.72	71.06	164.42	0.31
Clarkway Trib A	Reach1	1561.551	50-year	26.20	240.81	241.60		241.61	0.001812	0.75	77.02	165.91	0.31
Clarkway Trib A	Reach1	1561.551	100-year	30.20	240.81	241.65		241.66	0.001802	0.78	84.54	167.80	0.31
Clarkway Trib A	Reach1	1561.551	Regional	24.21	240.81	241.58		241.59	0.001799	0.73	73.38	164.89	0.31
Clarkway Trib A	Reach1	1561.404	2-year	3.94	239.94	240.70	240.55	240.80	0.005834	1.43	4.36	46.77	0.61
Clarkway Trib A	Reach1	1561.404	5-year	8.80	239.94	240.86	240.85	240.94	0.005422	1.63	16.37	91.83	0.61
Clarkway Trib A	Reach1	1561.404	10-year	18.30	239.94	241.02		241.09	0.005428	1.86	32.69	116.35	0.63
Clarkway Trib A	Reach1	1561.404	25-year	23.00	239.94	241.07		241.15	0.005469	1.94	39.14	120.33	0.64
Clarkway Trib A	Reach1	1561.404	50-year	26.20	239.94	241.11		241.18	0.005389	1.98	43.53	122.59	0.64
Clarkway Trib A	Reach1	1561.404	100-year	30.20	239.94	241.15		241.23	0.005315	2.02	49.60	137.57	0.64
Clarkway Trib A	Reach1	1561.404	Regional	24.21	239.94	241.08		241.16	0.005498	1.96	40.65	121.03	0.64
Clarkway Trib A	Reach1	1561.256	2-year	3.94	239.10	239.72	239.61	239.78	0.007926	1.32	5.85	26.03	0.68
Clarkway Trib A	Reach1	1561.256	5-year	8.80	239.10	239.90	239.81	239.98	0.007920	1.69	11.65	45.70	0.72
Clarkway Trib A	Reach1	1561.256	10-year	18.30	239.10	240.13	240.00	240.22	0.006373	1.92	24.43	63.46	0.68
Clarkway Trib A	Reach1	1561.256	25-year	23.00	239.10	240.23	240.07	240.31	0.005804	1.97	30.66	69.08	0.66
Clarkway Trib A	Reach1	1561.256	50-year	26.20	239.10	240.28	240.11	240.36	0.005618	2.02	34.52	72.37	0.66
Clarkway Trib A	Reach1	1561.256	100-year	30.20	239.10	240.35	240.16	240.43	0.005376	2.07	39.55	77.32	0.65

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Clarkway Trib A	Reach1	1561.256	Regional	24.21	239.10	240.25	240.08	240.33	0.005738	1.99	32.13	70.54	0.66
Clarkway Trib A	Reach1	1561.120	2-year	3.94	238.71	239.22	239.08	239.24	0.002471	0.64	7.92	30.71	0.37
Clarkway Trib A	Reach1	1561.120	5-year	8.80	238.71	239.40	239.18	239.43	0.002450	0.86	13.99	37.33	0.40
Clarkway Trib A	Reach1	1561.120	10-year	18.30	238.71	239.61	239.34	239.67	0.002853	1.19	22.61	43.97	0.46
Clarkway Trib A	Reach1	1561.120	25-year	23.00	238.71	239.69	239.41	239.76	0.003019	1.32	26.31	47.30	0.48
Clarkway Trib A	Reach1	1561.120	50-year	26.20	238.71	239.74	239.45	239.82	0.003125	1.40	28.71	49.35	0.49
Clarkway Trib A	Reach1	1561.120	100-year	30.20	238.71	239.80	239.50	239.89	0.003233	1.49	31.62	51.23	0.51
Clarkway Trib A	Reach1	1561.120	Regional	24.21	238.71	239.71	239.42	239.79	0.003061	1.35	27.23	48.21	0.48
Clarkway Trib A	Reach1	1560.977	2-year	3.94	238.53	238.79	238.66	238.81	0.003840	0.67	10.94	51.94	0.42
Clarkway Trib A	Reach1	1560.977	5-year	8.80	238.53	238.91	238.75	238.93	0.005145	0.99	17.41	61.05	0.52
Clarkway Trib A	Reach1	1560.977	10-year	18.30	238.53	239.08	238.88	239.12	0.005287	1.30	29.19	73.60	0.56
Clarkway Trib A	Reach1	1560.977	25-year	23.00	238.53	239.15	238.93	239.20	0.005282	1.41	34.37	77.62	0.57
Clarkway Trib A	Reach1	1560.977	50-year	26.20	238.53	239.19	238.95	239.24	0.005280	1.47	37.74	80.12	0.58
Clarkway Trib A	Reach1	1560.977	100-year	30.20	238.53	239.24	238.99	239.30	0.005304	1.55	41.73	83.00	0.59
Clarkway Trib A	Reach1	1560.977	Regional	24.21	238.53	239.17	238.93	239.22	0.005281	1.43	35.65	78.58	0.58
Clarkway Trib A	Reach1	1560.88	2-year	6.14	237.95	238.44	238.28	238.47	0.002907	0.89	15.41	86.34	0.43
Clarkway Trib A	Reach1	1560.88	5-year	8.80	237.95	238.50	238.34	238.53	0.003104	1.00	20.75	91.78	0.45
Clarkway Trib A	Reach1	1560.88	10-year	18.30	237.95	238.66	238.51	238.70	0.003396	1.26	36.42	106.16	0.50
Clarkway Trib A	Reach1	1560.88	25-year	23.00	237.95	238.72	238.56	238.76	0.003533	1.36	42.69	109.98	0.51
Clarkway Trib A	Reach1	1560.88	50-year	26.20	237.95	238.75	238.59	238.80	0.003649	1.42	46.53	112.47	0.53
Clarkway Trib A	Reach1	1560.88	100-year	30.20	237.95	238.79	238.62	238.84	0.003760	1.50	51.19	115.40	0.54
Clarkway Trib A	Reach1	1560.88	Regional	24.21	237.95	238.73	238.57	238.78	0.003575	1.38	44.18	110.95	0.52
Clarkway Trib A	Reach1	1560.685	2-year	6.14	236.78	237.07	237.07	237.14	0.021538	1.24	5.05	33.21	0.99
Clarkway Trib A	Reach1	1560.685	5-year	8.80	236.78	237.12	237.12	237.21	0.017560	1.32	6.88	35.88	0.93
Clarkway Trib A	Reach1	1560.685	10-year	18.30	236.78	237.25	237.25	237.37	0.014599	1.61	14.09	77.23	0.91
Clarkway Trib A	Reach1	1560.685	25-year	23.00	236.78	237.29	237.29	237.43	0.013550	1.70	18.21	92.96	0.90
Clarkway Trib A	Reach1	1560.685	50-year	26.20	236.78	237.33	237.33	237.47	0.012790	1.75	21.28	103.18	0.88
Clarkway Trib A	Reach1	1560.685	100-year	30.20	236.78	237.36	237.36	237.51	0.012189	1.80	25.07	114.37	0.88
Clarkway Trib A	Reach1	1560.685	Regional	24.21	236.78	237.31	237.31	237.44	0.013274	1.72	19.34	96.84	0.89
Clarkway Trib A	Reach1	1560.6	2-year	6.14	236.23	236.61		236.63	0.002136	0.60	19.08	79.42	0.35
Clarkway Trib A	Reach1	1560.6	5-year	8.80	236.23	236.69		236.70	0.001984	0.66	24.89	81.66	0.34
Clarkway Trib A	Reach1	1560.6	10-year	18.30	236.23	236.90		236.92	0.001651	0.82	43.20	89.43	0.34
Clarkway Trib A	Reach1	1560.6	25-year	23.00	236.23	236.99		237.01	0.001549	0.87	51.50	92.85	0.34
Clarkway Trib A	Reach1	1560.6	50-year	26.20	236.23	237.05		237.07	0.001490	0.90	57.08	95.56	0.33
Clarkway Trib A	Reach1	1560.6	100-year	30.20	236.23	237.12		237.14	0.001437	0.94	63.77	98.73	0.33
Clarkway Trib A	Reach1	1560.6	Regional	24.21	236.23	237.01		237.03	0.001532	0.88	53.54	93.84	0.34
Clarkway Trib A	Reach1	1560.57	2-year	6.14	235.97	236.30	236.30	236.41	0.017079	1.65	5.60	26.65	0.97
Clarkway Trib A	Reach1	1560.57	5-year	8.80	235.97	236.38	236.36	236.50	0.013716	1.75	7.97	29.76	0.91
Clarkway Trib A	Reach1	1560.57	10-year	18.30	235.97	236.60		236.75	0.010314	2.06	15.33	36.39	0.85
Clarkway Trib A	Reach1	1560.57	25-year	23.00	235.97	236.69		236.85	0.009534	2.17	18.65	38.16	0.84
Clarkway Trib A	Reach1	1560.57	50-year	26.20	235.97	236.75		236.92	0.008975	2.23	20.99	39.53	0.82
Clarkway Trib A	Reach1	1560.57	100-year	30.20	235.97	236.81		236.99	0.008783	2.32	23.46	40.76	0.83
Clarkway Trib A	Reach1	1560.57	Regional	24.21	235.97	236.71		236.88	0.009692	2.22	19.25	38.47	0.85
Clarkway Trib A	Reach1	1560.5	2-year	6.14	235.24	235.70	235.52	235.73	0.003201	0.93	10.62	31.03	0.45
Clarkway Trib A	Reach1	1560.5	5-year	8.80	235.24	235.78	235.58	235.83	0.003554	1.10	13.20	32.69	0.49
Clarkway Trib A	Reach1	1560.5	10-year	18.30	235.24	236.00	235.77	236.08	0.004226	1.52	20.63	35.42	0.56
Clarkway Trib A	Reach1	1560.5	25-year	23.00	235.24	236.09	235.84	236.18	0.004423	1.67	23.75	36.26	0.59
Clarkway Trib A	Reach1	1560.5	50-year	26.20	235.24	236.14	235.88	236.25	0.004532	1.76	25.75	36.77	0.60
Clarkway Trib A	Reach1	1560.5	100-year	30.20	235.24	236.21	235.93	236.32	0.004667	1.88	28.09	37.40	0.62
Clarkway Trib A	Reach1	1560.5	Regional	24.21	235.24	236.12	235.86	236.22	0.004215	1.68	25.01	36.58	0.58
Clarkway Trib A	Reach1	1519.898	2-year	6.14	234.49	234.91	234.87	234.98	0.009287	1.35	7.56	35.32	0.73
Clarkway Trib A	Reach1	1519.898	5-year	8.80	234.49	234.99	234.93	235.07	0.008201	1.46	10.50	38.17	0.71
Clarkway Trib A	Reach1	1519.898	10-year	18.30	234.49	235.21	235.09	235.31	0.006583	1.73	19.56	43.33	0.69
Clarkway Trib A	Reach1	1519.898	25-year	23.00	234.49	235.30	235.15	235.41	0.006321	1.84	23.42	45.19	0.69
Clarkway Trib A	Reach1	1519.898	50-year	26.20	234.49	235.36	235.19	235.47	0.006145	1.91	26.10	47.12	0.69
Clarkway Trib A	Reach1	1519.898	100-year	30.20	234.49	235.42	235.24	235.54	0.006073	2.00	29.01	48.13	0.69
Clarkway Trib A	Reach1	1519.898	Regional	24.21	234.49	235.29	235.17	235.41	0.007289	1.97	23.08	45.00	0.74
Clarkway Trib A	Reach1	1430.348	2-year	6.14	234.00	234.44		234.48	0.004047	1.01	10.87	35.86	0.50
Clarkway Trib A	Reach1	1430.348	5-year	8.80	234.00	234.52		234.57	0.004381	1.18	13.79	39.16	0.53
Clarkway Trib A	Reach1	1430.348	10-year	18.30	234.00	234.69		234.78	0.005997	1.68	20.88	43.60	0.66
Clarkway Trib A	Reach1	1430.348	25-year	23.00	234.00	234.77		234.87	0.006508	1.87	24.11	46.77	0.70
Clarkway Trib A	Reach1	1430.348	50-year	26.20	234.00	234.81		234.93	0.006845	2.00	26.30	49.65	0.72
Clarkway Trib A	Reach1	1430.348	100-year	30.20	234.00	234.86		234.99	0.007054	2.12	28.94	51.43	0.74
Clarkway Trib A	Reach1	1430.348	Regional	24.21	234.00	234.92		234.99	0.003488	1.56	31.87	52.92	0.53
Clarkway Trib A	Reach1-DS-0	1651	2-year	6.42	233.59	233.78		233.80	0.007345	0.81	14.42	67.16	0.59
Clarkway Trib A	Reach1-DS-0	1651	5-year	10.49	233.59	233.87		233.89	0.006309	0.97	20.48	69.89	0.59
Clarkway Trib A	Reach1-DS-0	1651	10-year	21.11	233.59	234.07		234.10	0.004734	1.20	34.83	75.33	0.55
Clarkway Trib A	Reach1-DS-0	1651	25-year	27.87	233.59	234.18		234.21	0.004142	1.29	43.25	77.30	0.54
Clarkway Trib A	Reach1-DS-0	1651	50-year	32.38	233.59	234.25		234.28	0.003886	1.34	48.52	78.44	0.53
Clarkway Trib A	Reach1-DS-0	1651	100-year	37.88	233.59	234.33		234.37	0.003649	1.40	54.68	79.75	0.52
Clarkway Trib A	Reach1-DS-0	1651	Regional	52.86	233.59	234.52		234.57	0.003236	1.54	70.27	82.69	0.51
Clarkway Trib A	Reach1-DS-0	1580	2-year	6.42	232.98	233.38		233.41	0.005425	0.98	10.92	34.61	0.55
Clarkway Trib A	Reach1-DS-0	1580	5-year	10.49	232.98	233.49		233.54	0.005441	1.20	14.93	37.03	0.58
Clarkway Trib A	Reach1-DS-0	1580	10-year	21.11	232.98	233.70		233.78	0.005906	1.63	23.03	41.13	0.65
Clarkway Trib A	Reach1-DS-0	1580	25-year	27.87	232.98	233.81		233.91	0.005911	1.81	27.74	43.14	0.67
Clarkway Trib A	Reach1-DS-0	1580	50-year	32.38	232.98	233.88		233.99	0.005868	1.91	30.77	44.23	0.68
Clarkway Trib A	Reach1-DS-0	1580	100-year	37.88	232.98	233.96		234.08	0.005851	2.03	34.25	45.46	0.68
Clarkway Trib A	Reach1-DS-0	1580	Regional	52.86	232.98	234.14		234.29	0.005844	2.30	42.80	47.53	0.71
Clarkway Trib A	Reach1-DS-0	1573	2-year	6.42	232.49	232.79	232.79	232.90	0.031824	1.82	5.27	23.72	1.26
Clarkway Trib A	Reach1-DS-0	1573	5-year	10.49	232.49	232.88	232.88	233.04	0.029556	2.16	7.42	26.35	1.28
Clarkway Trib A	Reach1-DS-0	1573	10-year	21.11	232.49	233.08	233.08	233.30	0.020817	2.57	13.37	31.88	1.17
Clarkway Trib A	Reach1-DS-0	1573	25-year	27.87	232.49	233.17	233.17	233.44	0.019845	2.82	16.43	33.58	1.18
Clarkway Trib A	Reach1-DS-0	1573	50-year	32.38	232.49	233.23	233.23	233.52	0.018766	2.93	18.57	34.71	1.16
Clarkway Trib A	Reach1-DS-0	1573	100-year	37.88	232.49	233.30	233.30	233.61	0.018445	3.10	20.81	35.74	1.17
Clarkway Trib A	Reach1-DS-0	1573	Regional	52.86	232.49	233.46	233.46	233.84	0.017046	3.42	26.98	38.38	1.17

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Clarkway Trib A	Reach1-DS-0	1534	2-year	6.42	230.44	231.28		231.29	0.000825	0.59	16.71	42.49	0.24
Clarkway Trib A	Reach1-DS-0	1534	5-year	10.49	230.44	231.47		231.49	0.000750	0.68	25.89	56.22	0.24
Clarkway Trib A	Reach1-DS-0	1534	10-year	21.11	230.44	231.78		231.81	0.000851	0.89	46.42	77.38	0.27
Clarkway Trib A	Reach1-DS-0	1534	25-year	27.87	230.44	231.93		231.96	0.000840	0.96	58.49	82.14	0.27
Clarkway Trib A	Reach1-DS-0	1534	50-year	32.38	230.44	232.02		232.05	0.000848	1.01	65.96	86.23	0.28
Clarkway Trib A	Reach1-DS-0	1534	100-year	37.88	230.44	232.12		232.15	0.000839	1.06	74.75	89.26	0.28
Clarkway Trib A	Reach1-DS-0	1534	Regional	52.86	230.44	232.37		232.42	0.000857	1.19	100.42	110.96	0.29
Clarkway Trib A	Reach1-DS-0	1528	2-year	6.42	229.70	231.23		231.26	0.002281	0.87	10.24	21.08	0.37
Clarkway Trib A	Reach1-DS-0	1528	5-year	10.49	229.70	231.42		231.46	0.002309	1.06	14.53	24.89	0.40
Clarkway Trib A	Reach1-DS-0	1528	10-year	21.11	229.70	231.68		231.77	0.003196	1.53	22.15	32.08	0.49
Clarkway Trib A	Reach1-DS-0	1528	25-year	27.87	229.70	231.81		231.92	0.003515	1.74	26.50	35.40	0.52
Clarkway Trib A	Reach1-DS-0	1528	50-year	32.38	229.70	231.88		232.01	0.003672	1.86	29.22	36.38	0.54
Clarkway Trib A	Reach1-DS-0	1528	100-year	37.88	229.70	231.97		232.11	0.003851	1.99	32.33	37.41	0.56
Clarkway Trib A	Reach1-DS-0	1528	Regional	52.86	229.70	232.19		232.37	0.004142	2.29	40.98	42.12	0.60
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	2-year	5.57	230.28	231.15		231.18	0.002436	1.00	11.39	32.62	0.41
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	5-year	10.49	230.28	231.32		231.37	0.002930	1.30	17.64	38.12	0.47
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	10-year	21.11	230.28	231.57		231.64	0.003612	1.73	27.55	42.22	0.54
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	25-year	27.87	230.28	231.69		231.78	0.003877	1.93	32.88	44.09	0.57
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	50-year	32.38	230.28	231.77		231.86	0.004009	2.05	36.17	45.01	0.59
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	100-year	37.88	230.28	231.85		231.96	0.004148	2.17	39.94	45.97	0.60
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	Regional	54.06	230.28	232.06		232.20	0.004476	2.50	50.13	48.75	0.64
Clarkway Trib A	Reach1-DS-0	1516.312	2-year	5.57	230.52	231.04		231.07	0.002898	0.96	10.43	32.26	0.44
Clarkway Trib A	Reach1-DS-0	1516.312	5-year	10.49	230.52	231.19		231.24	0.003554	1.27	15.66	37.00	0.50
Clarkway Trib A	Reach1-DS-0	1516.312	10-year	21.11	230.52	231.37		231.47	0.005363	1.83	22.60	40.74	0.65
Clarkway Trib A	Reach1-DS-0	1516.312	25-year	27.87	230.52	231.46		231.59	0.006025	2.09	26.50	42.24	0.70
Clarkway Trib A	Reach1-DS-0	1516.312	50-year	32.38	230.52	231.52		231.67	0.006362	2.23	28.94	43.08	0.72
Clarkway Trib A	Reach1-DS-0	1516.312	100-year	37.88	230.52	231.59		231.75	0.006600	2.38	31.92	43.87	0.75
Clarkway Trib A	Reach1-DS-0	1516.312	Regional	54.06	230.52	231.76		231.97	0.007264	2.77	39.74	46.46	0.80
Clarkway Trib A	Reach1-DS-0	1516.276	2-year	5.57	230.46	230.70	230.70	230.79	0.036201	1.68	5.20	28.60	1.29
Clarkway Trib A	Reach1-DS-0	1516.276	5-year	10.49	230.46	230.82	230.82	230.94	0.024190	1.94	9.67	40.90	1.15
Clarkway Trib A	Reach1-DS-0	1516.276	10-year	21.11	230.46	231.03		231.16	0.013001	2.06	18.94	45.74	0.93
Clarkway Trib A	Reach1-DS-0	1516.276	25-year	27.87	230.46	231.14		231.27	0.011333	2.18	23.84	47.42	0.89
Clarkway Trib A	Reach1-DS-0	1516.276	50-year	32.38	230.46	231.20		231.34	0.010741	2.27	26.82	48.38	0.88
Clarkway Trib A	Reach1-DS-0	1516.276	100-year	37.88	230.46	231.29		231.43	0.009532	2.31	30.99	49.76	0.85
Clarkway Trib A	Reach1-DS-0	1516.276	Regional	54.06	230.46	231.48		231.65	0.008499	2.54	40.93	53.02	0.83
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	2-year	5.57	229.35	230.14		230.18	0.001972	0.93	7.72	33.66	0.37
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	5-year	10.49	229.35	230.33		230.39	0.002159	1.15	15.78	45.37	0.40
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	10-year	21.11	229.35	230.58		230.66	0.002622	1.51	28.33	55.94	0.46
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	25-year	27.87	229.35	230.71		230.80	0.002621	1.63	35.99	59.35	0.47
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	50-year	32.38	229.35	230.80		230.89	0.002541	1.68	41.31	61.56	0.47
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	100-year	37.88	229.35	230.83		230.94	0.003122	1.89	43.25	62.81	0.52
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	Regional	54.06	229.35	231.05		231.18	0.003135	2.09	57.60	68.58	0.54
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	2-year	5.57	229.11	229.92	229.72	229.96	0.010902	0.95	7.50	24.63	0.38
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	5-year	10.49	229.11	230.12	229.88	230.15	0.010124	1.09	15.40	51.16	0.38
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	10-year	21.11	229.11	230.42	230.10	230.45	0.005503	0.99	32.42	60.77	0.30
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	25-year	27.87	229.11	230.56	230.20	230.59	0.004806	1.00	41.65	66.03	0.28
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	50-year	32.38	229.11	230.67	230.21	230.69	0.004289	1.00	48.59	70.54	0.27
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	100-year	37.88	229.11	230.65	230.27	230.69	0.006262	1.20	47.48	69.99	0.33
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	Regional	54.06	229.11	230.88	230.38	230.92	0.005987	1.30	65.65	90.03	0.33
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	2-year	5.57	228.87	229.75		229.78	0.001619	0.91	12.89	51.23	0.34
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	5-year	10.49	228.87	229.97		230.00	0.001332	0.99	25.30	60.07	0.33
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	10-year	21.11	228.87	230.30		230.33	0.001139	1.11	46.46	67.32	0.32
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	25-year	27.87	228.87	230.45		230.48	0.001166	1.21	56.43	69.51	0.33
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	50-year	32.38	228.87	230.55		230.59	0.001119	1.25	64.03	72.10	0.32
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	100-year	37.88	228.87	230.44		230.51	0.002192	1.66	56.07	69.42	0.45
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	Regional	54.06	228.87	230.66		230.73	0.002268	1.86	71.73	73.53	0.46
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	2-year	5.57	228.60	229.40	229.28	229.48	0.004371	1.44	7.28	39.12	0.56
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	5-year	10.49	228.60	229.52	229.45	229.68	0.007574	2.12	10.03	43.46	0.76
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	10-year	21.11	228.60	229.74	229.74	230.00	0.010601	2.93	15.81	49.97	0.93
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	25-year	27.87	228.60	229.98	229.86	230.19	0.006806	2.72	23.65	56.73	0.77
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	50-year	32.38	228.60	229.92	229.92	230.25	0.011317	3.40	21.77	54.85	0.99
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	100-year	37.88	228.60	230.04	230.00	230.14	0.004509	2.28	43.66	57.71	0.63
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	Regional	54.06	228.60	230.25	230.00	230.36	0.004492	2.51	56.27	61.23	0.65
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	2-year	5.57	227.73	228.44		228.45	0.005890	0.60	12.15	39.93	0.27
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	5-year	10.49	227.73	228.69		228.70	0.003131	0.58	23.43	48.86	0.21
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	10-year	21.11	227.73	229.04		229.06	0.002302	0.64	42.32	58.38	0.19
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	25-year	27.87	227.73	229.02		229.04	0.004470	0.87	40.73	57.54	0.27
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	50-year	32.38	227.73	229.09		229.12	0.004452	0.91	45.34	59.72	0.27
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	100-year	37.88	227.73	229.19		229.22	0.004394	0.95	50.92	62.34	0.27
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	Regional	54.06	227.73	229.41		229.44	0.004375	1.06	65.27	67.61	0.28
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	2-year	5.57	226.41	227.65	226.95	227.67	0.002874	0.58	9.61	39.10	0.20
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	5-year	10.49	226.41	228.00	227.17	228.03	0.003792	0.75	13.90	51.73	0.24
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	10-year	21.11	226.41	227.96	227.49	228.08	0.017106	1.58	13.35	50.99	0.51
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	25-year	27.87	226.41	228.30	227.66	228.32	0.003223	0.78	44.78	60.94	0.23
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	50-year	32.38	226.41	228.38	227.76	228.40	0.003184	0.81	49.93	62.33	0.23
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	100-year	37.88	226.41	228.48	227.88	228.51	0.003157	0.85	56.24	63.86	0.23
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	Regional	54.06	226.41	228.67	228.18	228.71	0.003511	0.98	68.62	65.51	0.25
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	2-year	5.57	226.38	226.73		226.75	0.009959	1.30	10.38	46.16	0.75
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	5-year	10.49	226.38	226.82		226.86	0.011530	1.67	14.90	47.67	0.84
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	10-year	21.11	226.38	226.94	226.84	227.03	0.016324	2.38	20.90	49.55	1.04
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	25-year	27.87	226.38	227.01	226.91	227.12	0.018638	2.73	23.93	50.30	1.14
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	50-year	32.38	226.38	227.04	226.95	227.17	0.020886	2.99	25.44	50.93	1.21
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	100-year	37.88	226.38	227.06	226.99	227.23	0.024836	3.34	26.68	51.66	1.33
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	Regional	54.06	226.38	227.25	227.12	227.42	0.018767	3.45	36.76	53.98	1.21

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	2-year	5.57	224.64	225.57		225.62	0.004019	1.07	5.61	20.15	0.50
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	5-year	10.49	224.64	225.78		225.84	0.003248	1.24	13.83	57.39	0.48
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	10-year	21.11	224.64	226.06		226.12	0.002374	1.33	33.06	72.44	0.43
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	25-year	27.87	224.64	226.21		226.27	0.002060	1.37	43.99	75.83	0.41
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	50-year	32.38	224.64	226.31		226.36	0.001841	1.37	51.61	77.64	0.40
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	100-year	37.88	224.64	226.44		226.49	0.001533	1.34	62.16	79.66	0.37
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	Regional	54.06	224.64	226.66		226.72	0.001571	1.50	79.80	82.91	0.38
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	2-year	5.57	224.37	225.34		225.38	0.001564	0.93	9.65	32.88	0.34
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	5-year	10.49	224.37	225.57		225.62	0.001591	1.11	20.37	63.09	0.35
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	10-year	21.11	224.37	225.90		225.94	0.001329	1.23	43.02	72.52	0.34
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	25-year	27.87	224.37	226.06		226.10	0.001237	1.28	55.04	75.37	0.33
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	50-year	32.38	224.37	226.17		226.21	0.001150	1.29	63.92	86.55	0.33
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	100-year	37.88	224.37	226.32		226.36	0.001068	1.32	77.49	94.84	0.32
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	Regional	54.06	224.37	226.52		226.57	0.001224	1.52	97.80	105.69	0.35
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	2-year	5.57	224.01	225.08		225.15	0.003745	1.32	7.37	22.95	0.50
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	5-year	10.49	224.01	225.26	225.11	225.36	0.004655	1.71	11.73	25.48	0.58
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	10-year	21.11	224.01	225.51	225.36	225.68	0.006081	2.32	18.91	30.62	0.69
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	25-year	27.87	224.01	225.62	225.51	225.84	0.007084	2.66	22.48	33.60	0.76
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	50-year	32.38	224.01	225.66	225.55	225.94	0.008656	3.01	23.99	37.66	0.85
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	100-year	37.88	224.01	225.74	225.59	226.09	0.009999	3.36	27.11	48.68	0.92
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	Regional	54.06	224.01	226.07		226.32	0.006473	3.12	44.66	58.90	0.77
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	2-year	5.83	224.10	224.64	224.64	224.76	0.008428	1.58	6.20	36.45	0.73
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	5-year	10.30	224.10	224.75	224.75	224.90	0.009776	1.94	10.22	38.73	0.81
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	10-year	21.51	224.10	224.96	224.94	225.15	0.009959	2.41	18.71	42.62	0.86
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	25-year	28.52	224.10	225.07		225.27	0.009445	2.56	23.65	44.27	0.86
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	50-year	33.52	224.10	225.21		225.37	0.006956	2.42	29.81	46.01	0.76
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	100-year	39.34	224.10	225.29	225.15	225.47	0.006923	2.53	33.62	47.42	0.76
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	Regional	65.98	224.10	225.52		225.79	0.008860	3.24	45.05	51.78	0.89
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	2-year	5.83	223.95	224.11		224.11	0.003818	0.21	17.15	64.71	0.18
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	5-year	10.30	223.95	224.24		224.24	0.003491	0.31	25.48	65.74	0.19
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	10-year	21.51	223.95	224.46		224.48	0.003478	0.46	40.49	67.22	0.21
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	25-year	28.52	223.95	224.55		224.57	0.003934	0.55	46.46	67.75	0.23
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	50-year	33.52	223.95	224.46		224.50	0.008469	0.72	40.46	67.22	0.33
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	100-year	39.34	223.95	224.50		224.55	0.009360	0.80	43.34	67.49	0.35
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	Regional	65.98	223.95	224.87		224.92	0.005961	0.90	68.76	69.46	0.30
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	2-year	5.83	222.72	223.22	223.22	223.34	0.015690	1.92	6.13	24.47	0.98
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	5-year	10.30	222.72	223.33	223.33	223.49	0.017026	2.36	8.91	26.04	1.06
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	10-year	21.51	222.72	223.59	223.59	223.78	0.013380	2.77	19.00	87.58	1.01
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	25-year	28.52	222.72	223.75	223.68	223.91	0.009613	2.65	26.10	91.32	0.88
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	50-year	33.52	222.72	223.94	223.73	223.98	0.002965	1.67	58.40	97.44	0.50
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	100-year	39.34	222.72	224.10	223.79	224.13	0.002052	1.51	73.98	100.99	0.43
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	Regional	65.98	222.72	224.68	223.92	224.71	0.000928	1.31	137.32	112.54	0.31
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	2-year	5.83	221.73	222.72		222.77	0.003325	1.31	11.75	40.13	0.49
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	5-year	10.30	221.73	222.99		223.02	0.001780	1.18	24.61	52.16	0.37
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	10-year	21.51	221.73	223.47		223.49	0.000987	1.14	52.16	61.43	0.30
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	25-year	28.52	221.73	223.71		223.74	0.000871	1.18	68.88	72.11	0.29
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	50-year	33.52	221.73	223.87		223.89	0.000787	1.19	79.91	74.42	0.28
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	100-year	39.34	221.73	224.03		224.05	0.000711	1.20	92.46	76.78	0.27
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	Regional	65.98	221.73	224.64		224.66	0.000576	1.28	141.24	83.69	0.25
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	2-year	5.83	221.43	222.46		222.53	0.002639	1.14	5.11	6.99	0.43
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	5-year	10.30	221.43	222.71		222.82	0.003490	1.48	6.94	7.80	0.50
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	10-year	21.51	221.43	223.09		223.32	0.005412	2.11	10.21	9.40	0.64
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	25-year	28.52	221.43	223.26		223.56	0.006075	2.41	11.89	10.38	0.70
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	50-year	33.52	221.43	223.37		223.72	0.006477	2.60	13.05	11.31	0.73
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	100-year	39.34	221.43	223.49	223.22	223.88	0.006905	2.80	14.54	15.04	0.76
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	Regional	65.98	221.43	223.87	223.84	224.49	0.008326	3.54	22.59	27.25	0.86
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	2-year	5.83	220.83	222.17		222.20	0.004775	0.76	9.49	23.80	0.26
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	5-year	10.30	220.83	222.33		222.37	0.006592	1.00	13.50	27.77	0.32
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	10-year	21.51	220.83	222.75		222.79	0.004915	1.09	26.55	34.16	0.29
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	25-year	28.52	220.83	223.01		223.05	0.003695	1.06	36.19	37.91	0.26
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	50-year	33.52	220.83	223.16		223.20	0.003414	1.07	42.02	40.35	0.25
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	100-year	39.34	220.83	223.32		223.36	0.003173	1.09	48.61	42.93	0.25
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	Regional	65.98	220.83	223.81		223.86	0.003277	1.28	71.65	52.91	0.26
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	2-year	5.83	220.80	221.76	221.57	221.80	0.011756	1.00	8.44	30.74	0.39
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	5-year	10.30	220.80	222.07	221.67	222.09	0.004014	0.75	20.68	47.82	0.25
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	10-year	21.51	220.80	222.66	221.92	222.67	0.001151	0.56	53.69	63.88	0.14
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	25-year	28.52	220.80	222.95	222.03	222.96	0.000809	0.52	73.35	68.72	0.12
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	50-year	33.52	220.80	223.11	222.07	223.12	0.000755	0.53	84.24	72.26	0.12
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	100-year	39.34	220.80	223.27	222.10	223.28	0.000714	0.55	96.34	75.86	0.12
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	Regional	65.98	220.80	223.76	222.28	223.77	0.000762	0.65	136.04	86.26	0.13
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	2-year	5.83	220.68	221.65	221.35	221.70	0.010012	1.14	6.33	18.82	0.39
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	5-year	10.30	220.68	221.95	221.57	222.01	0.008677	1.29	10.03	44.28	0.38
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	10-year	21.51	220.68	222.54	221.87	222.61	0.005718	1.38	18.96	76.54	0.33
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	25-year	28.52	220.68	222.82	222.07	222.91	0.005235	1.45	23.26	87.98	0.32
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	50-year	33.52	220.68	223.10	222.15	223.11	0.000739	0.59	80.13	96.17	0.12
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	100-year	39.34	220.68	223.27	222.24	223.27	0.000529	0.53	109.38	106.13	0.11
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	Regional	65.98	220.68	223.76	222.61	223.76	0.000505	0.58	174.65	124.81	0.11
Clarkway Trib A	Reach1-DS-0	1514.331 x-80 (43.04-03)		Culvert									
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	2-year	5.83	220.59	221.55	221.40	221.70	0.006786	1.78	3.87	45.05	0.68
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	5-year	10.30	220.59	221.65	221.65	222.00	0.012894	2.68	4.67	61.64	0.95
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	10-year	21.51	220.59	222.14	222.14	222.53	0.008926	3.06	11.03	90.65	0.86
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	25-year	28.52	220.59	222.31	222.31	222.77	0.009254	3.38	13.62	96.00	0.89
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	50-year	33.52	220.59	222.43	222.43	222.92	0.009290	3.56	15.38	98.47	0.90
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	100-year	39.34	220.59	222.54	222.54	223.09	0.009569	3.79	17.11	100.89	0.93
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	Regional	65.98	220.59	223.00	223.00	223.75	0.010224	4.59	24.01	111.04	1.00

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	2-year	5.83	220.50	221.49	221.49	221.58	0.024608	1.65	6.75	50.24	0.59
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	5-year	10.30	220.50	221.63		221.68	0.014681	1.42	15.42	68.21	0.46
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	10-year	21.51	220.50	221.85		221.88	0.008686	1.25	32.71	83.61	0.37
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	25-year	28.52	220.50	221.95		221.98	0.007478	1.23	41.36	85.49	0.35
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	50-year	33.52	220.50	222.03		222.06	0.006789	1.21	47.76	88.45	0.33
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	100-year	39.34	220.50	222.10		222.13	0.006251	1.21	54.68	90.97	0.32
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	Regional	65.98	220.50	222.53		222.56	0.003196	1.03	96.08	101.45	0.24
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	2-year	5.83	220.38	221.35		221.36	0.001357	0.44	26.05	84.62	0.14
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	5-year	10.30	220.38	221.46		221.47	0.001677	0.52	35.09	85.27	0.16
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	10-year	21.51	220.38	221.69		221.70	0.001797	0.61	54.52	86.57	0.17
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	25-year	28.52	220.38	221.79		221.80	0.001946	0.67	63.34	87.02	0.18
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	50-year	33.52	220.38	221.87		221.88	0.001886	0.69	70.68	87.37	0.18
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	100-year	39.34	220.38	221.95		221.96	0.001928	0.72	77.49	87.67	0.19
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	Regional	65.98	220.38	222.44		222.46	0.001288	0.71	121.29	91.03	0.16
Reach 2	Reach 2	1105	2-year	2.70	237.49	238.27		238.32	0.003433	0.98	2.81	8.27	0.49
Reach 2	Reach 2	1105	5-year	4.20	237.49	238.39	238.20	238.46	0.003412	1.16	3.99	13.37	0.51
Reach 2	Reach 2	1105	10-year	7.20	237.49	238.57	238.36	238.65	0.003113	1.34	6.61	16.94	0.52
Reach 2	Reach 2	1105	25-year	9.20	237.49	238.67	238.47	238.76	0.002823	1.41	8.75	25.43	0.50
Reach 2	Reach 2	1105	50-year	10.60	237.49	238.72	238.51	238.82	0.002928	1.49	10.10	29.16	0.52
Reach 2	Reach 2	1105	100-year	11.90	237.49	238.77	238.57	238.87	0.002757	1.51	11.66	31.48	0.51
Reach 2	Reach 2	1105	Regional	24.36	237.49	239.66		239.68	0.000359	0.86	51.95	60.00	0.21
Reach 2	Reach 2	1068	2-year	2.70	237.41	237.90	237.90	238.05	0.018963	1.70	1.59	5.48	1.01
Reach 2	Reach 2	1068	5-year	4.20	237.41	238.01	238.01	238.19	0.017913	1.89	2.22	6.42	1.01
Reach 2	Reach 2	1068	10-year	7.20	237.41	238.18	238.18	238.41	0.015359	2.15	3.47	8.93	0.99
Reach 2	Reach 2	1068	25-year	9.20	237.41	238.26	238.26	238.53	0.014979	2.35	4.23	10.69	1.00
Reach 2	Reach 2	1068	50-year	10.60	237.41	238.36	238.36	238.61	0.011151	2.26	5.56	16.87	0.89
Reach 2	Reach 2	1068	100-year	11.90	237.41	238.41	238.41	238.67	0.010668	2.32	6.42	17.81	0.88
Reach 2	Reach 2	1068	Regional	24.36	237.41	239.64		239.67	0.000456	0.94	61.82	67.55	0.21
Reach 2	Reach 2	1054	2-year	2.70	236.65	237.29	237.02	237.34	0.003069	1.00	2.70	4.78	0.43
Reach 2	Reach 2	1054	5-year	4.20	236.65	237.52	237.14	237.58	0.002861	1.09	3.86	5.71	0.42
Reach 2	Reach 2	1054	10-year	7.20	236.65	237.92	237.34	237.98	0.001744	1.13	7.02	10.11	0.35
Reach 2	Reach 2	1054	25-year	9.20	236.65	238.15	237.47	238.22	0.001370	1.15	9.86	14.35	0.32
Reach 2	Reach 2	1054	50-year	10.60	236.65	238.31	237.56	238.37	0.001180	1.15	12.49	20.19	0.31
Reach 2	Reach 2	1054	100-year	11.90	236.65	238.45	237.62	238.51	0.001011	1.13	15.69	24.89	0.29
Reach 2	Reach 2	1054	Regional	24.36	236.65	239.64	238.10	239.66	0.000246	0.81	77.79	78.24	0.16
Reach 2	Reach 2	1027		Culvert									
Reach 2	Reach 2	1018	2-year	2.70	236.60	236.98	236.98	237.17	0.020679	1.92	1.40	3.74	1.00
Reach 2	Reach 2	1018	5-year	4.20	236.60	237.11	237.11	237.36	0.020007	2.22	1.89	3.78	1.00
Reach 2	Reach 2	1018	10-year	7.20	236.60	237.33	237.33	237.69	0.019547	2.64	2.73	3.86	1.00
Reach 2	Reach 2	1018	25-year	9.20	236.60	237.46	237.46	237.87	0.019599	2.85	3.22	3.91	1.00
Reach 2	Reach 2	1018	50-year	10.60	236.60	237.55	237.55	238.00	0.019332	2.97	3.57	3.94	1.00
Reach 2	Reach 2	1018	100-year	11.90	236.60	237.62	237.62	238.10	0.019480	3.08	3.86	3.97	1.00
Reach 2	Reach 2	1018	Regional	24.36	236.60	238.83	238.22	239.21	0.008110	2.73	8.91	4.40	0.61
Reach 2	Reach 2	1008	2-year	2.70	235.58	236.28	235.99	236.34	0.003993	1.14	2.37	3.49	0.44
Reach 2	Reach 2	1008	5-year	4.20	235.58	236.51	236.13	236.60	0.004007	1.31	3.21	3.56	0.44
Reach 2	Reach 2	1008	10-year	7.20	235.58	236.90	236.36	237.03	0.004232	1.56	4.61	3.67	0.44
Reach 2	Reach 2	1008	25-year	9.20	235.58	237.13	236.50	237.28	0.004359	1.69	5.46	3.73	0.45
Reach 2	Reach 2	1008	50-year	10.60	235.58	237.28	236.58	237.44	0.004426	1.76	6.02	3.77	0.44
Reach 2	Reach 2	1008	100-year	11.90	235.58	237.42	236.66	237.59	0.004460	1.82	6.55	3.81	0.44
Reach 2	Reach 2	1008	Regional	24.36	235.58	238.86	237.31	239.06	0.003608	1.98	12.32	4.21	0.37
Reach 2	Reach 2	1005	2-year	2.70	235.57	236.27	235.96	236.33	0.003108	1.03	2.62	3.84	0.40
Reach 2	Reach 2	1005	5-year	4.20	235.57	236.51	236.09	236.59	0.003084	1.18	3.55	3.92	0.40
Reach 2	Reach 2	1005	10-year	7.20	235.57	236.91	236.30	237.01	0.003199	1.41	5.12	4.05	0.40
Reach 2	Reach 2	1005	25-year	9.20	235.57	237.14	236.43	237.26	0.003270	1.52	6.07	4.13	0.40
Reach 2	Reach 2	1005	50-year	10.60	235.57	237.29	236.51	237.42	0.003304	1.58	6.70	4.18	0.40
Reach 2	Reach 2	1005	100-year	11.90	235.57	237.43	236.59	237.57	0.003317	1.63	7.29	4.23	0.40
Reach 2	Reach 2	1005	Regional	24.36	235.57	238.85	237.19	239.05	0.005832	1.98	12.33		0.35
Reach 2	Reach 2	999	2-year	2.70	235.55	236.20	235.98	236.30	0.004185	1.39	1.95	3.63	0.55
Reach 2	Reach 2	999	5-year	4.20	235.55	236.42	236.13	236.55	0.003864	1.61	2.60	3.64	0.55
Reach 2	Reach 2	999	10-year	7.20	235.55	236.76	236.38	236.96	0.003715	1.98	3.64	3.66	0.57
Reach 2	Reach 2	999	25-year	9.20	235.55	236.96	236.54	237.20	0.003660	2.17	4.23	3.67	0.58
Reach 2	Reach 2	999	50-year	10.60	235.55	237.09	236.63	237.36	0.003609	2.29	4.63	3.67	0.59
Reach 2	Reach 2	999	100-year	11.90	235.55	237.21	236.72	237.50	0.003532	2.38	4.99	3.68	0.59
Reach 2	Reach 2	999	Regional	24.36	235.55	238.59	237.44	238.97	0.005227	2.71	9.00		0.50
Reach 2	Reach 2	951		Culvert									
Reach 2	Reach 2	666	2-year	2.70	234.65	235.28	235.14	235.40	0.005954	1.54	1.75	15.62	0.64
Reach 2	Reach 2	666	5-year	4.20	234.65	235.34	235.28	235.58	0.010790	2.20	1.91	16.10	0.88
Reach 2	Reach 2	666	10-year	7.20	234.65	235.54	235.54	235.96	0.012759	2.87	2.51	17.69	1.00
Reach 2	Reach 2	666	25-year	9.20	234.65	235.68	235.68	236.18	0.012154	3.12	2.95	18.72	1.00
Reach 2	Reach 2	666	50-year	10.60	234.65	235.79	235.79	236.32	0.011572	3.25	3.26	19.40	1.00
Reach 2	Reach 2	666	100-year	11.90	234.65	235.87	235.87	236.45	0.011489	3.40	3.50	19.87	1.00
Reach 2	Reach 2	666	Regional	24.36	234.65	236.59	236.59	237.53	0.009737	4.30	5.66	24.40	1.00
Reach 2	Reach 2	661	2-year	2.70	234.62	235.34		235.34	0.000186	0.30	10.59	19.02	0.12
Reach 2	Reach 2	661	5-year	4.20	234.62	235.45		235.46	0.000266	0.40	12.74	19.84	0.14
Reach 2	Reach 2	661	10-year	7.20	234.62	235.63		235.64	0.000384	0.55	16.37	20.74	0.18
Reach 2	Reach 2	661	25-year	9.20	234.62	235.73		235.75	0.000446	0.63	18.46	21.29	0.19
Reach 2	Reach 2	661	50-year	10.60	234.62	235.79		235.81	0.000482	0.69	19.84	21.65	0.20
Reach 2	Reach 2	661	100-year	11.90	234.62	235.85		235.87	0.000513	0.73	21.07	21.99	0.21
Reach 2	Reach 2	661	Regional	25.34	234.62	236.32		236.37	0.000720	1.08	32.29	25.38	0.27
Reach 2	Reach 2	656	2-year	2.70	234.66	235.34		235.34	0.000206	0.31	10.24	19.21	0.12
Reach 2	Reach 2	656	5-year	4.20	234.66	235.45		235.46	0.000291	0.41	12.41	20.23	0.15
Reach 2	Reach 2	656	10-year	7.20	234.66	235.63		235.64	0.000412	0.56	16.14	21.58	0.18
Reach 2	Reach 2	656	25-year	9.20	234.66	235.72		235.74	0.000472	0.64	18.30	22.09	0.20

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Reach 2	Reach 2	656	50-year	10.60	234.66	235.79		235.81	0.000507	0.69	19.73	22.41	0.21
Reach 2	Reach 2	656	100-year	11.90	234.66	235.84		235.87	0.000536	0.74	21.00	22.70	0.22
Reach 2	Reach 2	656	Regional	25.34	234.66	236.31		236.37	0.000736	1.08	32.36	25.96	0.27
Reach 2	Reach 2	604	2-year	2.70	234.65	235.30		235.32	0.001811	0.58	5.44	19.33	0.32
Reach 2	Reach 2	604	5-year	4.20	234.65	235.40		235.42	0.001726	0.68	7.44	20.11	0.33
Reach 2	Reach 2	604	10-year	7.20	234.65	235.57		235.60	0.001616	0.82	10.93	21.37	0.34
Reach 2	Reach 2	604	25-year	9.20	234.65	235.66		235.70	0.001588	0.89	12.98	22.09	0.34
Reach 2	Reach 2	604	50-year	10.60	234.65	235.73		235.77	0.001570	0.94	14.35	22.60	0.34
Reach 2	Reach 2	604	100-year	11.90	234.65	235.78		235.82	0.001555	0.98	15.59	23.05	0.35
Reach 2	Reach 2	604	Regional	25.34	234.65	236.24		236.31	0.001466	1.28	26.91	26.06	0.36
Reach 2	Reach 2	498	2-year	2.70	234.51	235.11		235.12	0.001845	0.62	5.46	18.95	0.33
Reach 2	Reach 2	498	5-year	4.20	234.51	235.22		235.24	0.001741	0.72	7.57	19.91	0.33
Reach 2	Reach 2	498	10-year	7.20	234.51	235.39		235.42	0.001640	0.86	11.23	21.48	0.34
Reach 2	Reach 2	498	25-year	9.20	234.51	235.49		235.53	0.001604	0.94	13.41	22.24	0.35
Reach 2	Reach 2	498	50-year	10.60	234.51	235.56		235.60	0.001587	0.98	14.85	22.67	0.35
Reach 2	Reach 2	498	100-year	11.90	234.51	235.61		235.66	0.001575	1.03	16.13	23.05	0.35
Reach 2	Reach 2	498	Regional	25.34	234.51	236.07		236.15	0.001547	1.35	27.55	26.25	0.37
Reach 2	Reach 2	388	2-year	2.70	234.38	234.91		234.93	0.001683	0.66	6.04	19.82	0.32
Reach 2	Reach 2	388	5-year	4.20	234.38	235.03		235.05	0.001603	0.76	8.42	20.57	0.33
Reach 2	Reach 2	388	10-year	7.20	234.38	235.21		235.24	0.001604	0.92	12.26	21.70	0.35
Reach 2	Reach 2	388	25-year	9.20	234.38	235.31		235.35	0.001628	1.01	14.44	22.28	0.36
Reach 2	Reach 2	388	50-year	10.60	234.38	235.37		235.42	0.001643	1.06	15.87	22.63	0.36
Reach 2	Reach 2	388	100-year	11.90	234.38	235.43		235.48	0.001659	1.11	17.13	22.94	0.37
Reach 2	Reach 2	388	Regional	25.34	234.38	235.88		235.96	0.001828	1.52	28.07	25.88	0.41
Reach 2	Reach 2	307	2-year	2.70	234.11	234.81		234.82	0.000940	0.56	6.78	19.25	0.25
Reach 2	Reach 2	307	5-year	4.20	234.11	234.92		234.94	0.001057	0.68	9.02	20.11	0.27
Reach 2	Reach 2	307	10-year	7.20	234.11	235.10		235.13	0.001249	0.86	12.55	21.24	0.31
Reach 2	Reach 2	307	25-year	9.20	234.11	235.19		235.23	0.001347	0.97	14.56	21.84	0.33
Reach 2	Reach 2	307	50-year	10.60	234.11	235.25		235.29	0.001403	1.03	15.88	22.24	0.34
Reach 2	Reach 2	307	100-year	11.90	234.11	235.30		235.35	0.001449	1.09	17.06	22.60	0.35
Reach 2	Reach 2	307	Regional	25.34	234.11	235.73		235.81	0.001766	1.52	27.37	25.76	0.41
Reach 2	Reach 2	213	2-year	2.70	233.98	234.74		234.75	0.000654	0.51	7.19	19.23	0.21
Reach 2	Reach 2	213	5-year	4.20	233.98	234.83		234.85	0.000885	0.65	9.06	19.97	0.25
Reach 2	Reach 2	213	10-year	7.20	233.98	234.97		235.01	0.001269	0.89	11.89	20.70	0.31
Reach 2	Reach 2	213	25-year	9.20	233.98	235.05		235.09	0.001475	1.01	13.49	21.09	0.34
Reach 2	Reach 2	213	50-year	10.60	233.98	235.10		235.15	0.001590	1.09	14.56	21.33	0.36
Reach 2	Reach 2	213	100-year	11.90	233.98	235.14		235.20	0.001686	1.16	15.50	21.54	0.37
Reach 2	Reach 2	213	Regional	25.34	233.98	235.51		235.62	0.002379	1.69	23.65	23.64	0.46
Reach 2	Reach 2	172	2-year	2.70	234.11	234.57	234.57	234.66	0.022460	1.36	1.99	11.00	1.02
Reach 2	Reach 2	172	5-year	4.20	234.11	234.64	234.64	234.74	0.019808	1.41	3.00	15.29	0.98
Reach 2	Reach 2	172	10-year	7.20	234.11	234.77	234.73	234.88	0.010983	1.45	5.30	18.62	0.79
Reach 2	Reach 2	172	25-year	9.20	234.11	234.86	234.79	234.96	0.008423	1.47	6.87	19.26	0.72
Reach 2	Reach 2	172	50-year	10.60	234.11	234.91	234.82	235.02	0.007493	1.50	7.88	19.64	0.69
Reach 2	Reach 2	172	100-year	11.90	234.11	234.95	234.85	235.07	0.006941	1.53	8.75	19.96	0.68
Reach 2	Reach 2	172	Regional	25.34	234.11	235.31	235.10	235.47	0.005108	1.86	16.35	22.74	0.63
Reach 2	Reach 2	117	2-year	2.70	233.80	234.47	234.11	234.48	0.000541	0.42	7.18	18.24	0.19
Reach 2	Reach 2	117	5-year	4.20	233.80	234.56	234.18	234.57	0.000739	0.55	8.88	19.45	0.23
Reach 2	Reach 2	117	10-year	7.20	233.80	234.69	234.28	234.72	0.001035	0.74	11.67	20.90	0.28
Reach 2	Reach 2	117	25-year	9.20	233.80	234.77	234.34	234.80	0.001203	0.85	13.22	21.54	0.30
Reach 2	Reach 2	117	50-year	10.60	233.80	234.81	234.36	234.85	0.001302	0.92	14.24	21.81	0.32
Reach 2	Reach 2	117	100-year	11.90	233.80	234.85	234.42	234.90	0.001390	0.98	15.12	21.99	0.33
Reach 2	Reach 2	117	Regional	25.34	233.80	235.19	234.70	235.28	0.002004	1.46	22.74	23.60	0.42
Reach 2	Reach 2	85	2-year	2.70	233.83	234.41	234.30	234.44	0.003722	0.68	4.26	18.74	0.44
Reach 2	Reach 2	85	5-year	4.20	233.83	234.49	234.36	234.52	0.003485	0.79	5.78	19.59	0.44
Reach 2	Reach 2	85	10-year	7.20	233.83	234.62	234.44	234.66	0.003411	0.97	8.27	20.73	0.46
Reach 2	Reach 2	85	25-year	9.20	233.83	234.68	234.49	234.74	0.003525	1.08	9.61	21.13	0.48
Reach 2	Reach 2	85	50-year	10.60	233.83	234.72	234.52	234.79	0.003564	1.15	10.51	21.39	0.49
Reach 2	Reach 2	85	100-year	11.90	233.83	234.76	234.54	234.83	0.003641	1.21	11.26	21.60	0.50
Reach 2	Reach 2	85	Regional	25.34	233.83	235.06	234.78	235.19	0.003927	1.66	18.10	23.25	0.56
Reach 2	Reach 2	63	2-year	2.70	233.87	234.25	234.20	234.30	0.011769	1.07	2.54	12.73	0.75
Reach 2	Reach 2	63	5-year	4.20	233.87	234.30	234.27	234.39	0.013717	1.26	3.36	15.05	0.83
Reach 2	Reach 2	63	10-year	7.20	233.87	234.37	234.37	234.51	0.017378	1.67	4.51	18.54	0.98
Reach 2	Reach 2	63	25-year	9.20	233.87	234.43	234.43	234.59	0.015914	1.78	5.56	19.45	0.96
Reach 2	Reach 2	63	50-year	10.60	233.87	234.46	234.46	234.63	0.015374	1.86	6.22	19.76	0.96
Reach 2	Reach 2	63	100-year	11.90	233.87	234.49	234.49	234.67	0.014732	1.92	6.84	19.99	0.95
Reach 2	Reach 2	63	Regional	25.34	233.87	234.73	234.73	235.03	0.013556	2.49	11.86	21.82	0.98
Reach 2	Reach 2	45	2-year	2.70	233.72	233.93	233.93	233.99	0.032869	1.49	3.78	32.03	1.21
Reach 2	Reach 2	45	5-year	4.20	233.72	233.97	233.97	234.04	0.033008	1.69	5.14	35.00	1.25
Reach 2	Reach 2	45	10-year	7.20	233.72	234.05	234.05	234.13	0.027207	1.87	8.59	49.37	1.19
Reach 2	Reach 2	45	25-year	9.20	233.72	234.17		234.22	0.010790	1.52	15.10	65.22	0.80
Reach 2	Reach 2	45	50-year	10.60	233.72	234.26		234.29	0.005546	1.25	20.65	66.89	0.59
Reach 2	Reach 2	45	100-year	11.90	233.72	234.35		234.37	0.003144	1.06	26.82	68.74	0.46
Reach 2	Reach 2	45	Regional	25.34	233.72	234.53		234.57	0.004319	1.51	39.47	71.31	0.57
Gore Road Trib	Reach2	1450.572 41.08-05	2-year	0.60	237.54	237.83		237.86	0.007462	0.83	0.72	3.65	0.59
Gore Road Trib	Reach2	1450.572 41.08-05	5-year	1.10	237.54	237.93		237.98	0.007252	0.98	1.13	4.35	0.61
Gore Road Trib	Reach2	1450.572 41.08-05	10-year	2.46	237.54	238.07		238.17	0.009274	1.35	1.82	5.16	0.72
Gore Road Trib	Reach2	1450.572 41.08-05	25-year	3.14	237.54	238.15		238.25	0.008960	1.41	2.23	5.75	0.72
Gore Road Trib	Reach2	1450.572 41.08-05	50-year	3.66	237.54	238.19		238.30	0.009182	1.47	2.49	6.15	0.74
Gore Road Trib	Reach2	1450.572 41.08-05	100-year	4.17	237.54	238.25		238.36	0.008860	1.45	2.87	7.03	0.73
Gore Road Trib	Reach2	1450.572 41.08-05	Regional	10.74	237.54	238.48	238.48	238.73	0.015495	2.22	4.87	10.47	1.00
Gore Road Trib	Reach2	1450.428 41.08-04	2-year	0.60	235.83	236.10	236.09	236.19	0.020742	1.30	0.46	2.52	0.97
Gore Road Trib	Reach2	1450.428 41.08-04	5-year	1.10	235.83	236.21	236.21	236.30	0.021754	1.33	0.83	4.58	1.00
Gore Road Trib	Reach2	1450.428 41.08-04	10-year	2.46	235.83	236.36	236.34	236.48	0.015625	1.49	1.65	5.95	0.91
Gore Road Trib	Reach2	1450.428 41.08-04	25-year	3.14	235.83	236.40	236.39	236.54	0.016222	1.66	1.90	6.60	0.94
Gore Road Trib	Reach2	1450.428 41.08-04	50-year	3.66	235.83	236.43	236.42	236.59	0.016133	1.76	2.12	7.31	0.96

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Gore Road Trib	Reach2	1450.428 41.08-04	100-year	4.17	235.83	236.46	236.46	236.64	0.017187	1.89	2.27	7.90	1.00
Gore Road Trib	Reach2	1450.428 41.08-04	Regional	10.74	235.83	236.82	236.82	236.99	0.007948	2.02	9.50	33.15	0.76
Gore Road Trib	Reach2	1450.284 41.08-03	2-year	0.60	234.78	234.98		234.99	0.004357	0.42	2.16	18.45	0.33
Gore Road Trib	Reach2	1450.284 41.08-03	5-year	1.10	234.78	235.04		235.05	0.004585	0.52	3.46	25.20	0.35
Gore Road Trib	Reach2	1450.284 41.08-03	10-year	2.46	234.78	235.12		235.14	0.005990	0.74	5.77	29.76	0.43
Gore Road Trib	Reach2	1450.284 41.08-03	25-year	3.14	234.78	235.16		235.17	0.006053	0.80	6.80	30.52	0.44
Gore Road Trib	Reach2	1450.284 41.08-03	50-year	3.66	234.78	235.18		235.20	0.006121	0.84	7.53	31.09	0.45
Gore Road Trib	Reach2	1450.284 41.08-03	100-year	4.17	234.78	235.20		235.22	0.006000	0.87	8.31	32.34	0.45
Gore Road Trib	Reach2	1450.284 41.08-03	Regional	10.74	234.78	235.41		235.45	0.006470	1.21	16.83	48.74	0.50
Gore Road Trib	Reach2	1450.168 41.08-02	2-year	0.60	233.73	233.89	233.89	233.95	0.026227	1.08	0.55	4.84	1.03
Gore Road Trib	Reach2	1450.168 41.08-02	5-year	1.10	233.73	233.96	233.96	234.03	0.022025	1.22	0.92	7.50	0.99
Gore Road Trib	Reach2	1450.168 41.08-02	10-year	2.46	233.73	234.08	234.08	234.17	0.012383	1.36	2.68	21.96	0.82
Gore Road Trib	Reach2	1450.168 41.08-02	25-year	3.14	233.73	234.12	234.12	234.21	0.011997	1.45	3.51	24.04	0.82
Gore Road Trib	Reach2	1450.168 41.08-02	50-year	3.66	233.73	234.14	234.14	234.24	0.011680	1.51	4.15	26.00	0.82
Gore Road Trib	Reach2	1450.168 41.08-02	100-year	4.17	233.73	234.16	234.16	234.26	0.011772	1.57	4.69	27.37	0.83
Gore Road Trib	Reach2	1450.168 41.08-02	Regional	10.74	233.73	234.36	234.36	234.49	0.010983	2.02	12.17	47.05	0.87
Gore Road Trib	Reach2	1450.000 41.08-01	2-year	0.60	233.28	233.49		233.49	0.000277	0.13	8.58	59.69	0.11
Gore Road Trib	Reach2	1450.000 41.08-01	5-year	1.10	233.28	233.57		233.57	0.000288	0.18	13.65	73.52	0.12
Gore Road Trib	Reach2	1450.000 41.08-01	10-year	2.46	233.28	233.69		233.69	0.000282	0.24	23.71	86.85	0.13
Gore Road Trib	Reach2	1450.000 41.08-01	25-year	3.14	233.28	233.74		233.74	0.000280	0.26	28.13	89.05	0.13
Gore Road Trib	Reach2	1450.000 41.08-01	50-year	3.66	233.28	233.78		233.78	0.000279	0.27	31.17	90.37	0.13
Gore Road Trib	Reach2	1450.000 41.08-01	100-year	4.17	233.28	233.81		233.81	0.000276	0.28	34.04	90.95	0.13
Gore Road Trib	Reach2	1450.000 41.08-01	Regional	10.74	233.28	234.14		234.14	0.000243	0.38	65.24	98.64	0.14
Gore Road Trib	Reach1	1416.798 41.07-06	2-year	1.73	232.98	233.27	233.15	233.28	0.008542	0.44	4.83	36.11	0.29
Gore Road Trib	Reach1	1416.798 41.07-06	5-year	3.22	232.98	233.33	233.21	233.34	0.009215	0.52	7.27	40.72	0.31
Gore Road Trib	Reach1	1416.798 41.07-06	10-year	7.16	232.98	233.45		233.46	0.010067	0.65	12.12	45.41	0.33
Gore Road Trib	Reach1	1416.798 41.07-06	25-year	9.17	232.98	233.49		233.51	0.010136	0.70	14.29	47.01	0.34
Gore Road Trib	Reach1	1416.798 41.07-06	50-year	10.70	232.98	233.53		233.55	0.010121	0.73	15.84	47.83	0.35
Gore Road Trib	Reach1	1416.798 41.07-06	100-year	12.23	232.98	233.56		233.59	0.009633	0.75	17.52	48.22	0.34
Gore Road Trib	Reach1	1416.798 41.07-06	Regional	31.51	232.98	233.91		233.95	0.007724	0.96	35.37	56.49	0.33
Gore Road Trib	Reach1	1416.721 41.07-05	2-year	1.73	232.59	232.75		232.76	0.005845	0.26	6.70	47.71	0.22
Gore Road Trib	Reach1	1416.721 41.07-05	5-year	3.22	232.59	232.82		232.83	0.005117	0.32	10.15	48.02	0.22
Gore Road Trib	Reach1	1416.721 41.07-05	10-year	7.16	232.59	232.97		232.98	0.004348	0.41	17.30	48.37	0.22
Gore Road Trib	Reach1	1416.721 41.07-05	25-year	9.17	232.59	233.04		233.05	0.004037	0.45	20.55	48.51	0.22
Gore Road Trib	Reach1	1416.721 41.07-05	50-year	10.70	232.59	233.09		233.10	0.003894	0.47	22.80	48.62	0.22
Gore Road Trib	Reach1	1416.721 41.07-05	100-year	12.23	232.59	233.12		233.13	0.004071	0.50	24.38	48.72	0.23
Gore Road Trib	Reach1	1416.721 41.07-05	Regional	31.51	232.59	233.49		233.52	0.004238	0.74	43.04	51.62	0.25
Gore Road Trib	Reach1	1416.598 41.07-04	2-year	1.73	231.99	232.27		232.28	0.002922	0.59	7.50	45.46	0.39
Gore Road Trib	Reach1	1416.598 41.07-04	5-year	3.22	231.99	232.35		232.36	0.003053	0.73	10.98	46.73	0.41
Gore Road Trib	Reach1	1416.598 41.07-04	10-year	7.16	231.99	232.47		232.49	0.003921	1.03	17.51	54.18	0.50
Gore Road Trib	Reach1	1416.598 41.07-04	25-year	9.17	231.99	232.51		232.53	0.004523	1.17	19.66	55.21	0.54
Gore Road Trib	Reach1	1416.598 41.07-04	50-year	10.70	231.99	232.54		232.57	0.004777	1.26	21.42	56.38	0.56
Gore Road Trib	Reach1	1416.598 41.07-04	100-year	12.23	231.99	232.58		232.60	0.004840	1.32	23.31	58.51	0.57
Gore Road Trib	Reach1	1416.598 41.07-04	Regional	31.51	231.99	232.88		232.93	0.005700	1.93	43.82	74.13	0.67
Gore Road Trib	Reach1	1416.398 41.07-03	2-year	1.73	230.73	231.05		231.07	0.018642	0.68	2.99	28.13	0.43
Gore Road Trib	Reach1	1416.398 41.07-03	5-year	3.22	230.73	231.11	231.06	231.14	0.017697	0.77	5.03	34.20	0.44
Gore Road Trib	Reach1	1416.398 41.07-03	10-year	7.16	230.73	231.26		231.29	0.010346	0.76	10.97	42.60	0.36
Gore Road Trib	Reach1	1416.398 41.07-03	25-year	9.17	230.73	231.34		231.36	0.007867	0.74	14.29	44.97	0.32
Gore Road Trib	Reach1	1416.398 41.07-03	50-year	10.70	230.73	231.38		231.41	0.007196	0.74	16.37	46.30	0.31
Gore Road Trib	Reach1	1416.398 41.07-03	100-year	12.23	230.73	231.42		231.45	0.007035	0.77	18.06	47.30	0.31
Gore Road Trib	Reach1	1416.398 41.07-03	Regional	31.51	230.73	231.81		231.85	0.005112	0.90	38.25	56.27	0.29
Gore Road Trib	Reach1	1416.261 41.07-02	2-year	1.73	229.56	230.17	230.01	230.18	0.003249	0.74	5.06	29.02	0.42
Gore Road Trib	Reach1	1416.261 41.07-02	5-year	3.22	229.56	230.27	230.15	230.29	0.003161	0.83	8.16	30.91	0.43
Gore Road Trib	Reach1	1416.261 41.07-02	10-year	7.16	229.56	230.43		230.46	0.003974	1.11	13.49	41.76	0.50
Gore Road Trib	Reach1	1416.261 41.07-02	25-year	9.17	229.56	230.48		230.53	0.004835	1.32	16.11	46.59	0.56
Gore Road Trib	Reach1	1416.261 41.07-02	50-year	10.70	229.56	230.51		230.56	0.005315	1.43	17.45	48.63	0.59
Gore Road Trib	Reach1	1416.261 41.07-02	100-year	12.23	229.56	230.54		230.59	0.005497	1.50	18.98	50.35	0.61
Gore Road Trib	Reach1	1416.261 41.07-02	Regional	31.51	229.56	230.78		230.91	0.009619	2.47	32.95	68.96	0.85
Gore Road Trib	Reach1	1416.193 41.07-01	2-year	1.73	229.05	229.49	229.49	229.58	0.067558	1.43	1.37	8.17	0.83
Gore Road Trib	Reach1	1416.193 41.07-01	5-year	3.22	229.05	229.60	229.60	229.71	0.058640	1.64	2.52	13.15	0.82
Gore Road Trib	Reach1	1416.193 41.07-01	10-year	7.16	229.05	229.79	229.79	229.86	0.031938	1.56	8.07	44.03	0.64
Gore Road Trib	Reach1	1416.193 41.07-01	25-year	9.17	229.05	229.86		229.91	0.022666	1.42	11.18	46.75	0.55
Gore Road Trib	Reach1	1416.193 41.07-01	50-year	10.70	229.05	229.91		229.95	0.018578	1.34	13.50	49.66	0.51
Gore Road Trib	Reach1	1416.193 41.07-01	100-year	12.23	229.05	229.94		229.99	0.017033	1.33	15.36	55.86	0.49
Gore Road Trib	Reach1	1416.193 41.07-01	Regional	31.51	229.05	230.30		230.33	0.006818	1.09	44.81	90.19	0.33
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	2-year	1.92	228.39	228.77		228.77	0.001468	0.41	5.73	27.68	0.27
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	5-year	3.71	228.39	228.86		228.87	0.001748	0.55	8.52	31.85	0.31
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	10-year	8.60	228.39	229.02		229.05	0.002378	0.83	14.23	42.80	0.39
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	25-year	11.11	228.39	229.08		229.11	0.002539	0.93	16.98	45.65	0.41
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	50-year	13.08	228.39	229.12		229.16	0.002715	1.00	18.78	47.97	0.43
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	100-year	15.08	228.39	229.16		229.21	0.002782	1.07	20.81	49.99	0.44
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	Regional	40.85	228.39	229.49		229.60	0.003878	1.69	39.64	62.06	0.56
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	2-year	1.92	228.33	228.58		228.59	0.009817	0.44	5.20	45.31	0.31
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	5-year	3.71	228.33	228.63	228.56	228.64	0.013762	0.59	7.19	47.26	0.37
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	10-year	8.60	228.33	228.71		228.74	0.019155	0.84	11.38	53.10	0.46
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	25-year	11.11	228.33	228.75		228.78	0.020439	0.93	13.24	54.84	0.48
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	50-year	13.08	228.33	228.77		228.81	0.021443	0.99	14.52	55.68	0.50
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	100-year	15.08	228.33	228.79		228.84	0.022460	1.05	15.71	56.33	0.52
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	Regional	40.85	228.33	229.02		229.12	0.024935	1.48	29.85	66.74	0.59
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	2-year	1.92	227.40	227.78		227.81	0.010325	0.92	2.84	20.67	0.69
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	5-year	3.71	227.40	227.88		227.91	0.006583	0.98	5.06	23.80	0.59
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	10-year	8.60	227.40	228.05	227.90	228.09	0.004726	1.15	10.86	42.79	0.54
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	25-year	11.11	227.40	228.11	227.98	228.15	0.004298	1.19	13.73	47.83	0.53
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	50-year	13.08	227.40	228.16		228.20	0.004029	1.22	16.12	53.98	0.52
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	100-year	15.08	227.40	228.20		228.24	0.003791	1.24	18.34	55.35	0.51

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	Regional	40.85	227.40	228.58		228.64	0.002642	1.44	41.99	67.10	0.46
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	2-year	1.92	226.47	227.19	227.04	227.21	0.003358	0.84	3.79	16.73	0.43
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	5-year	3.71	226.47	227.33	227.16	227.36	0.003815	0.93	7.01	24.83	0.47
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	10-year	8.60	226.47	227.53	227.36	227.58	0.004534	1.28	12.61	36.99	0.54
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	25-year	11.11	226.47	227.60	227.40	227.66	0.004540	1.40	15.59	40.69	0.56
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	50-year	13.08	226.47	227.65	227.45	227.72	0.004788	1.50	17.52	44.13	0.58
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	100-year	15.08	226.47	227.70	227.49	227.77	0.004860	1.58	19.66	46.61	0.59
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	Regional	40.85	226.47	228.11	227.87	228.23	0.005317	2.23	42.04	61.60	0.66
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	2-year	1.92	226.47	226.95		226.97	0.003286	0.77	4.98	26.72	0.43
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	5-year	3.71	226.47	227.06		227.09	0.003675	0.99	8.65	40.81	0.48
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	10-year	8.60	226.47	227.24		227.28	0.003832	1.26	17.02	52.13	0.51
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	25-year	11.11	226.47	227.30		227.35	0.003928	1.37	20.51	55.01	0.53
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	50-year	13.08	226.47	227.36		227.40	0.003733	1.41	23.75	58.07	0.52
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	100-year	15.08	226.47	227.41		227.45	0.003813	1.48	26.38	61.01	0.53
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	Regional	40.85	226.47	227.79		227.87	0.004384	2.07	52.93	78.81	0.61
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	2-year	1.92	225.93	226.43		226.44	0.005157	0.42	6.07	32.01	0.24
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	5-year	3.71	225.93	226.54		226.55	0.004641	0.49	10.10	41.24	0.23
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	10-year	8.60	225.93	226.73		226.74	0.004309	0.59	19.84	64.01	0.24
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	25-year	11.11	225.93	226.80		226.81	0.004168	0.62	24.47	69.46	0.24
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	50-year	13.08	225.93	226.86		226.87	0.004329	0.67	29.10	78.97	0.25
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	100-year	15.08	225.93	226.90		226.91	0.004366	0.70	32.27	82.01	0.25
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	Regional	40.85	225.93	227.27		227.29	0.004121	0.88	65.42	99.36	0.26
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	2-year	1.92	225.78	226.12		226.13	0.003441	0.59	5.46	35.06	0.41
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	5-year	3.71	225.78	226.20		226.22	0.004241	0.81	8.41	41.47	0.48
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	10-year	8.60	225.78	226.32		226.36	0.005976	1.21	13.78	50.39	0.61
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	25-year	11.11	225.78	226.37		226.42	0.006427	1.35	16.46	54.60	0.64
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	50-year	13.08	225.78	226.40		226.46	0.006814	1.47	18.48	57.83	0.67
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	100-year	15.08	225.78	226.43		226.50	0.007104	1.56	20.22	60.28	0.69
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	Regional	40.85	225.78	226.71		226.84	0.008798	2.30	39.09	72.86	0.82
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	2-year	1.92	225.06	225.38	225.31	225.39	0.006520	0.36	5.86	55.28	0.25
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	5-year	3.71	225.06	225.46		225.47	0.004911	0.35	10.47	66.57	0.22
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	10-year	8.60	225.06	225.60		225.61	0.003623	0.40	21.31	84.68	0.20
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	25-year	11.11	225.06	225.66		225.67	0.003434	0.43	26.05	92.72	0.20
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	50-year	13.08	225.06	225.69		225.71	0.003315	0.44	29.93	100.99	0.20
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	100-year	15.08	225.06	225.73		225.74	0.003233	0.46	33.55	104.44	0.20
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	Regional	40.85	225.06	226.08		226.10	0.002606	0.58	71.17	111.60	0.20
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	2-year	1.92	224.34	224.75		224.76	0.002612	0.63	6.92	37.94	0.38
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	5-year	3.71	224.34	224.84		224.85	0.003086	0.82	10.80	48.60	0.43
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	10-year	8.60	224.34	224.98		225.01	0.004100	1.17	18.70	61.10	0.52
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	25-year	11.11	224.34	225.04		225.07	0.004266	1.28	22.13	62.23	0.54
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	50-year	13.08	224.34	225.08		225.11	0.004300	1.35	24.77	63.18	0.55
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	100-year	15.08	224.34	225.12		225.15	0.004349	1.41	27.34	64.39	0.56
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	Regional	40.85	224.34	225.48		225.53	0.005014	2.02	51.73	73.34	0.64
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	2-year	1.92	223.77	224.02		224.03	0.014450	0.54	4.67	36.86	0.37
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	5-year	3.71	223.77	224.10		224.11	0.010247	0.56	8.58	56.83	0.33
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	10-year	8.60	223.77	224.25		224.26	0.006993	0.61	18.57	74.43	0.29
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	25-year	11.11	223.77	224.29		224.31	0.006903	0.64	22.14	77.06	0.29
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	50-year	13.08	223.77	224.33		224.34	0.006903	0.67	24.77	79.52	0.30
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	100-year	15.08	223.77	224.36		224.37	0.006964	0.70	27.20	81.28	0.30
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	Regional	40.85	223.77	224.66		224.69	0.006808	0.93	54.69	101.84	0.32
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	2-year	1.92	222.48	222.97	222.84	222.98	0.002857	0.33	9.62	70.71	0.18
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	5-year	3.71	222.48	223.03	222.89	223.04	0.003764	0.42	13.80	73.58	0.21
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	10-year	8.60	222.48	223.12		223.13	0.005691	0.59	20.76	74.94	0.27
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	25-year	11.11	222.48	223.17		223.18	0.005992	0.64	24.03	75.60	0.28
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	50-year	13.08	222.48	223.20		223.22	0.005999	0.67	26.65	76.23	0.28
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	100-year	15.08	222.48	223.24		223.25	0.005945	0.69	29.25	76.81	0.28
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	Regional	40.85	222.48	223.55		223.58	0.006198	0.93	54.10	81.22	0.31
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	2-year	1.92	221.55	221.76	221.76	221.84	0.022428	1.23	1.56	10.03	1.00
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	5-year	3.71	221.55	221.90		221.98	0.010311	1.22	3.04	11.08	0.74
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	10-year	8.60	221.55	222.19	222.03	222.26	0.004312	1.24	9.79	42.20	0.54
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	25-year	11.11	221.55	222.27	222.13	222.34	0.003852	1.29	13.88	54.66	0.52
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	50-year	13.08	221.55	222.32	222.19	222.40	0.003727	1.33	16.70	56.05	0.52
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	100-year	15.08	221.55	222.37		222.45	0.003661	1.38	19.30	57.08	0.52
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	Regional	40.85	221.55	222.90		222.98	0.002258	1.57	51.08	61.50	0.45
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	2-year	1.92	220.38	221.03		221.05	0.001389	0.61	3.17	7.20	0.29
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	5-year	3.71	220.38	221.22		221.25	0.001763	0.80	4.63	8.21	0.34
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	10-year	8.60	220.38	221.48		221.56	0.002956	1.24	6.92	9.30	0.46
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	25-year	11.11	220.38	221.63		221.72	0.002622	1.32	9.20	22.22	0.45
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	50-year	13.08	220.38	221.76		221.85	0.002151	1.31	13.18	37.64	0.41
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	100-year	15.08	220.38	221.90		221.97	0.001676	1.26	19.40	52.15	0.37
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	Regional	40.85	220.38	222.59		222.66	0.001237	1.47	61.46	74.84	0.35
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	2-year	1.92	220.38	220.85	220.62	220.87	0.001901	0.64	2.99	7.91	0.33
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	5-year	3.71	220.38	221.02	220.74	221.05	0.001936	0.78	6.34	34.52	0.35
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	10-year	8.60	220.38	221.41	221.02	221.42	0.000552	0.61	33.13	79.80	0.21
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	25-year	11.11	220.38	221.61	221.13	221.62	0.000323	0.54	49.65	86.20	0.16
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	50-year	13.08	220.38	221.76	221.17	221.77	0.000245	0.51	62.48	90.08	0.15
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	100-year	15.08	220.38	221.90	221.21	221.91	0.000198	0.49	75.44	95.49	0.13
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	Regional	40.85	220.38	222.58	221.46	222.59	0.000225	0.69	151.21	123.11	0.15
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	2-year	1.92	220.38	220.84	220.62	220.86	0.001798	0.61	3.19	20.61	0.32
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	5-year	3.71	220.38	221.01	220.74	221.04	0.001759	0.78	5.58	58.30	0.34
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	10-year	8.60	220.38	221.36	220.96	221.40	0.001409	0.98	11.87	75.48	0.33
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	25-year	11.11	220.38	221.55	221.05	221.60	0.001110	0.99	15.41	82.16	0.31
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	50-year	13.08	220.38	221.70	221.11	221.74	0.000972	1.01	17.98	86.50	0.29
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	100-year	15.08	220.38	221.84	221.16	221.88	0.000874	1.03	20.47	89.47	0.28
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	Regional	40.85	220.38	222.58	221.65	222.59	0.000208	0.67	151.62	132.40	0.15

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Gore Road Trib	Reach1-DS-0	1414.268 x-124 (41.06-01)		Culvert									
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	2-year	1.75	220.41	220.79	220.68	220.82	0.004865	0.80	2.20	37.88	0.50
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	5-year	3.72	220.41	220.90	220.80	220.97	0.006617	1.13	3.36	52.33	0.62
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	10-year	8.70	220.41	221.04	221.02	221.21	0.010900	1.82	5.54	73.44	0.84
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	25-year	11.46	220.41	221.11	221.11	221.31	0.011934	2.07	6.70	77.82	0.89
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	50-year	13.44	220.41	221.15	221.15	221.38	0.012215	2.21	7.52	78.57	0.92
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	100-year	15.53	220.41	221.20	221.20	221.45	0.011992	2.31	8.44	79.48	0.92
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	Regional	39.90	220.41	221.65	221.65	222.10	0.011501	3.21	16.47	88.84	0.98
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	2-year	1.75	220.32	220.76		220.77	0.003846	0.30	7.34	44.01	0.19
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	5-year	3.72	220.32	220.89		220.89	0.002726	0.32	15.52	77.46	0.17
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	10-year	8.70	220.32	221.05		221.05	0.002592	0.39	27.98	84.95	0.18
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	25-year	11.46	220.32	221.11		221.12	0.002553	0.43	33.81	88.00	0.18
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	50-year	13.44	220.32	221.15		221.16	0.002664	0.45	37.07	89.63	0.19
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	100-year	15.53	220.32	221.19		221.20	0.002625	0.47	40.92	91.10	0.19
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	Regional	39.90	220.32	221.55		221.57	0.002518	0.62	75.54	98.29	0.20
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	2-year	1.75	219.93	220.42	220.37	220.51	0.009584	1.30	1.59	9.13	0.73
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	5-year	3.72	219.93	220.57	220.56	220.69	0.009125	1.63	3.99	25.31	0.76
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	10-year	8.70	219.93	220.78	220.77	220.88	0.006895	1.81	12.93	52.25	0.70
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	25-year	11.46	219.93	220.84	220.81	220.94	0.006998	1.93	16.27	54.65	0.72
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	50-year	13.44	219.93	220.89		220.99	0.006831	1.98	18.73	56.23	0.71
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	100-year	15.53	219.93	220.93		221.03	0.006616	2.02	21.20	57.16	0.71
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	Regional	39.90	219.93	221.31		221.42	0.005758	2.43	44.54	65.48	0.71

APPENDIX B-4

SCE PROPOSED CONDITION HEC-RAS MODEL RESULTS

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
HDF-3	1	1002	2-year	0.29	242.73	242.98	242.90	243.00	0.003992	0.65	0.46	3.69	0.49		0.08	0.62	3.21
HDF-3	1	1002	5-year	0.54	242.73	243.07	242.98	243.09	0.003304	0.72	1.07	13.28	0.47	0.08	0.16	0.51	5.02
HDF-3	1	1002	10-year	0.74	242.73	243.11	243.03	243.13	0.002848	0.74	1.67	16.91	0.45	0.13	0.21	0.45	6.22
HDF-3	1	1002	25-year	1.02	242.73	243.14	243.09	243.16	0.002939	0.81	2.21	17.13	0.46	0.19	0.26	0.46	7.96
HDF-3	1	1002	50-year	1.24	242.73	243.16	243.12	243.19	0.003080	0.87	2.56	17.27	0.48	0.23	0.29	0.48	9.11
HDF-3	1	1002	100-year	1.46	242.73	243.18	243.13	243.21	0.003188	0.92	2.89	17.40	0.49	0.26	0.32	0.51	10.94
HDF-3	1	1002	Regional	3.79	242.73	243.32	243.24	243.37	0.003717	1.25	5.49	18.41	0.56	0.48	0.52	0.69	24.26
HDF-3	1	1001	2-year	0.29	242.68	242.93	242.85	242.95	0.003928	0.64	0.45	2.54	0.49			0.64	3.21
HDF-3	1	1001	5-year	0.54	242.68	243.01	242.91	243.04	0.004204	0.80	0.76	8.86	0.53	0.08	0.08	0.71	5.01
HDF-3	1	1001	10-year	0.74	242.68	243.04	242.96	243.08	0.004872	0.93	1.10	15.33	0.58	0.13	0.13	0.67	6.20
HDF-3	1	1001	25-year	1.02	242.68	243.08	243.05	243.12	0.004253	0.96	1.82	18.75	0.56	0.19	0.21	0.56	7.93
HDF-3	1	1001	50-year	1.24	242.68	243.10	243.08	243.14	0.003983	0.98	2.28	19.00	0.55	0.23	0.25	0.54	9.07
HDF-3	1	1001	100-year	1.46	242.68	243.12	243.09	243.16	0.003988	1.02	2.65	19.20	0.55	0.27	0.28	0.55	10.91
HDF-3	1	1001	Regional	3.79	242.68	243.27	243.20	243.32	0.003709	1.25	5.71	20.74	0.57	0.47	0.47	0.66	24.19
HDF-3	1	1000	2-year	0.29	242.51	242.79	242.68	242.81	0.002535	0.55	0.52	2.70	0.40			0.55	3.19
HDF-3	1	1000	5-year	0.54	242.51	242.87	242.76	242.90	0.002451	0.67	1.13	14.83	0.41	0.10	0.10	0.48	4.97
HDF-3	1	1000	10-year	0.74	242.51	242.92	242.80	242.94	0.002145	0.69	1.84	18.35	0.40	0.14	0.15	0.40	6.14
HDF-3	1	1000	25-year	1.02	242.51	242.93	242.89	242.96	0.002826	0.82	2.20	18.48	0.46	0.19	0.21	0.46	7.84
HDF-3	1	1000	50-year	1.24	242.51	242.95	242.92	242.98	0.003201	0.90	2.48	18.57	0.49	0.23	0.24	0.50	8.97
HDF-3	1	1000	100-year	1.46	242.51	242.97	242.93	243.00	0.003064	0.92	2.92	18.72	0.49	0.26	0.27	0.50	10.78
HDF-3	1	1000	Regional	3.79	242.51	243.13	243.04	243.17	0.003018	1.17	6.00	19.75	0.51	0.45	0.46	0.63	23.93
HDF-3	1	999.4	2-year	0.29	242.32	242.49	242.49	242.55	0.017316	1.09	0.26	2.08	0.98			1.09	3.17
HDF-3	1	999.4	5-year	0.54	242.32	242.57	242.57	242.65	0.015503	1.25	0.43	2.54	0.97			1.25	4.93
HDF-3	1	999.4	10-year	0.74	242.32	242.61	242.61	242.70	0.015553	1.37	0.54	2.79	0.99			1.37	6.08
HDF-3	1	999.4	25-year	1.02	242.32	242.70	242.70	242.76	0.006430	1.12	1.41	17.76	0.68	0.20	0.18	0.72	7.75
HDF-3	1	999.4	50-year	1.24	242.32	242.72	242.72	242.78	0.006054	1.15	1.84	18.72	0.66	0.25	0.23	0.67	8.86
HDF-3	1	999.4	100-year	1.46	242.32	242.74	242.74	242.80	0.006502	1.22	2.10	18.80	0.69	0.30	0.27	0.70	10.66
HDF-3	1	999.4	Regional	3.79	242.32	242.84	242.84	242.93	0.008794	1.72	4.11	19.45	0.85	0.60	0.57	0.92	23.68
HDF-3	1	999	2-year	0.29	241.91	242.07	242.00	242.08	0.001673	0.36	1.13	13.63	0.31	0.13	0.10	0.25	3.14
HDF-3	1	999	5-year	0.54	241.91	242.12		242.13	0.001947	0.47	1.81	17.22	0.35	0.17	0.15	0.30	4.89
HDF-3	1	999	10-year	0.74	241.91	242.14		242.15	0.002073	0.53	2.29	19.38	0.37	0.19	0.17	0.32	6.02
HDF-3	1	999	25-year	1.02	241.91	242.17		242.18	0.002401	0.62	2.79	21.37	0.41	0.22	0.20	0.36	7.67
HDF-3	1	999	50-year	1.24	241.91	242.19		242.20	0.002583	0.67	3.18	22.80	0.43	0.24	0.22	0.39	8.77
HDF-3	1	999	100-year	1.46	241.91	242.21		242.23	0.002299	0.68	3.82	24.99	0.41	0.25	0.23	0.38	10.55
HDF-3	1	999	Regional	3.79	241.91	242.35		242.37	0.002587	0.94	7.93	36.08	0.47	0.35	0.33	0.48	23.45
HDF-3	1	998	2-year	0.29	241.84	241.88	241.88	241.91	0.029392	0.74	0.47	11.84	1.09	0.34	0.33	0.61	3.11
HDF-3	1	998	5-year	0.54	241.84	241.91	241.91	241.94	0.022530	0.87	0.80	13.70	1.03	0.39	0.36	0.68	4.84
HDF-3	1	998	10-year	0.74	241.84	241.92	241.92	241.96	0.022286	0.97	1.00	14.55	1.06	0.43	0.41	0.75	5.97
HDF-3	1	998	25-year	1.02	241.84	241.95	241.95	241.99	0.014440	0.95	1.45	16.43	0.89	0.41	0.40	0.70	7.60
HDF-3	1	998	50-year	1.24	241.84	241.97	241.97	242.01	0.013307	0.99	1.72	17.54	0.88	0.42	0.41	0.72	8.68
HDF-3	1	998	100-year	1.46	241.84	241.97	241.97	242.02	0.017998	1.16	1.74	17.61	1.02	0.50	0.48	0.84	10.45
HDF-3	1	998	Regional	3.79	241.84	242.07	242.07	242.15	0.014489	1.52	3.83	24.25	1.00	0.62	0.61	0.99	23.25
HDF-3	1	997	2-year	0.29	240.98	241.25		241.26	0.001363	0.44	0.81	5.66	0.30	0.14	0.11	0.35	3.07
HDF-3	1	997	5-year	0.54	240.98	241.32		241.33	0.001708	0.59	1.24	6.97	0.36	0.20	0.17	0.44	4.78
HDF-3	1	997	10-year	0.74	240.98	241.35		241.37	0.001917	0.68	1.53	7.81	0.38	0.23	0.19	0.48	5.88
HDF-3	1	997	25-year	1.02	240.98	241.40		241.42	0.002160	0.79	1.89	8.67	0.42	0.27	0.23	0.54	7.49
HDF-3	1	997	50-year	1.24	240.98	241.43		241.46	0.002289	0.86	2.17	9.27	0.43	0.30	0.26	0.57	8.55
HDF-3	1	997	100-year	1.46	240.98	241.46		241.49	0.002417	0.92	2.43	9.82	0.45	0.32	0.29	0.60	10.31
HDF-3	1	997	Regional	3.79	240.98	241.65		241.71	0.003422	1.40	4.62	13.42	0.57	0.50	0.47	0.82	22.97
HDF-3	1	996.5	2-year	0.29	240.96	241.13	241.10	241.15	0.003976	0.58	0.69	7.88	0.49	0.19	0.19	0.41	3.03
HDF-3	1	996.5	5-year	0.54	240.96	241.17	241.13	241.20	0.004929	0.77	1.08	9.83	0.57	0.26	0.26	0.50	4.72
HDF-3	1	996.5	10-year	0.74	240.96	241.20	241.16	241.23	0.005127	0.86	1.38	11.15	0.59	0.30	0.29	0.54	5.81
HDF-3	1	996.5	25-year	1.02	240.96	241.24	241.19	241.27	0.004626	0.92	1.87	13.07	0.58	0.32	0.31	0.54	7.40
HDF-3	1	996.5	50-year	1.24	240.96	241.26	241.21	241.30	0.005054	1.00	2.12	13.89	0.61	0.35	0.35	0.58	8.45
HDF-3	1	996.5	100-year	1.46	240.96	241.28	241.23	241.32	0.005320	1.08	2.38	14.75	0.63	0.38	0.37	0.61	10.19
HDF-3	1	996.5	Regional	3.79	240.96	241.41	241.37	241.48	0.006966	1.57	4.67	20.77	0.77	0.56	0.55	0.81	22.74
HDF-3	1	996	2-year	0.29	240.55	240.67	240.67	240.70	0.023440	0.82	0.35	5.44	1.03			0.82	3.01
HDF-3	1	996	5-year	0.54	240.55	240.72	240.72	240.75	0.015702	0.83	0.66	7.49	0.89			0.83	4.67
HDF-3	1	996	10-year	0.74	240.55	240.74	240.74	240.78	0.015202	0.88	0.84	8.43	0.89			0.88	5.75
HDF-3	1	996	25-year	1.02	240.55	240.76	240.76	240.81	0.018874	1.07	0.96	9.27	1.01	0.08	0.10	1.06	7.32
HDF-3	1	996	50-year	1.24	240.55	240.77	240.77	240.84	0.016431	1.10	1.15	10.66	0.97	0.15	0.17	1.08	8.36
HDF-3	1	996	100-year	1.46	240.55	240.79	240.79	240.86	0.015223	1.15	1.33	11.85	0.95	0.19	0.21	1.09	10.09
HDF-3	1	996	Regional	3.79	240.55	240.92	240.92	241.01	0.010611	1.45	3.40	21.03	0.88	0.40	0.40	1.11	22.52
HDF-3	1	995.2	2-year	0.29	240.21	240.33		240.33	0.000891	0.21	1.73	17.51	0.19	0.06	0.06	0.17	2.94
HDF-3	1	995.2	5-year	0.54	240.21	240.40		240.40	0.000651	0.24	3.19	23.70	0.18	0.07	0.06	0.17	4.55
HDF-3	1	995.2	10-year	0.74	240.21	240.45		240.45	0.000501	0.25	4.47	26.09	0.16	0.07	0.07	0.17	5.59
HDF-3	1	995.2	25-year	1.02	240.21	240.49		240.50	0.000510	0.28	5.63	28.03	0.17	0.08	0.08	0.18	7.12
HDF-3	1	995.2	50-year	1.24	240.21	240.52		240.52	0.000544	0.30	6.36	29.20	0.17	0.09	0.09	0.19	8.13
HDF-3	1	995.2	100-year	1.46	240.21	240.54		240.54	0.000604	0.33	6.93	30.05	0.19	0.10	0.10	0.21	9.84
HDF-3	1	995.2	Regional	3.79	240.21	240.71		240.72	0.000833	0.52	12.71	37.56	0.23	0.15	0.16	0.30	22.02
HDF-3	1	994.82	2-year	0.29	239.94	240.15	240.11	240.18	0.011076	0.83	0.34	2.28	0.69			0.83	2.88
HDF-3	1	994.82	5-year	0.54	239.94	240.22	240.18	240.27	0.012091	1.03	0.53	2.73	0.75			1.03	4.44
HDF-3	1	994.82	10-year	0.74	239.94	240.26	240.22	240.33	0.013366	1.16	0.68	7.20	0.80	0.07	0.06	1.10	5.43
HDF-3	1	994.82	25-year	1.02	239.94	240.31	240.31	240.38	0.010195	1.18	1.38	18.91	0.72	0.14	0.14	0.74	6.90
HDF-3	1	994.82	50-year	1.24	239.94	240.34	240.34	240.40	0.009147	1.20	2.01	25.11	0.70	0.16	0.17	0.61	7.87
HDF-3	1	994.82	100-year	1.46	239.94	240.37	240.37	240.42	0.008018	1.18	2.70	27.98	0.66	0.20	0.18	0.54	9.54
HDF-3	1	994.82	Regional	3.79	239.94	240.47	240.47	240.55	0.010727	1.64	5.63	28.90	0.80	0.40	0.39	0.67	21.45
HDF-3	1	993.82	2-year	0.29	239.69	239.97	239.86	239.98	0.002619	0.56	0.51	2.68	0.40			0.56	2.86
HDF-3	1	993.82	5-year	0.54	239.69	240.05	239.93	240.07	0.002588	0.68	1.12	15.35	0.42	0.10	0.10	0.49	4.41
HDF-3	1	993.82	10-year	0.74	239.69	240.09	239.97	240.11	0.002525	0.73	1.80	23.11	0.43	0.13	0.13	0.41	5.38
HDF-3	1	993.82	25-year	1.02	239.69	240.12	240.06	240.14	0.002411	0.77	2.71	28.10	0.43	0.17	0.16	0.38	6.82
HDF-3	1	993.82	50-year	1.24	239.69	240.14	240.09	240.16	0.002343	0.79	3.30	28.22	0.42	0.20	0.19	0.38	7.77
HDF-3	1	993.82	100-year	1.46	239.69	240.16	240.12	240.18	0.002293	0.81	3.84	28.34	0.42	0.22	0.21	0.38	9.42
HDF-3	1	993.82	Regional	3.79	239.69	240.31	240.20	240.33	0.001928	0.93	8.27	29.26	0.41	0.36	0.35	0.46	21.19
HDF-3	1	993.63	2-year	0.29	239.57	239.86	239.74	239.87	0.003252	0.54	0.53	2.71	0.39			0.54	2.84
HDF-3	1	993.63	5-year	0.54	239.57	239.94	239.82	239.96	0.003314	0.67	1.23	17.36	0.41	0.07	0.07	0.44	4.36
HDF-3	1	993.63	10-year	0.74	239.57	239.98	239.86	240.00	0.003405	0.74	1.96	24.64	0.43	0.10	0.10	0.38	5.31
HDF-3	1	993.63	25-year	1.02	239.57	240.01	239.95	240.04	0.003212	0.78	3.01	28.13	0.42	0.13	0.13	0.34	6.72
HDF-3	1	993.63	50-year	1.24	239.57	240.04	239.97	240.06	0.003202	0.81	3.64	28.27	0.43	0.15	0.16	0.34	7.64
HDF-3	1	993.63	100-year	1.46	239.57	240.06	240.01	240.08	0.002942	0.81	4.39	28.43	0.41	0.17	0.17	0.33	9.26
HDF-3	1	993.63	Regional	3.79	239.57	240.22	240.10	240.24	0.003128	1.05	8.89	29.36	0.45	0.30	0.30	0.43	20.88
HDF-3	1	993.52	2-year	0.29	239.39	239.68	239.56	239.69	0.003137	0.53	0.54	2.79	0.38			0.53	2.81
HDF-3	1	993.52	5-year	0.54	239.39	239.77	239.63	239.79	0.002809	0.61	1.38	18.55	0.38	0.07	0.07	0.39	4.29
HDF-3	1	993.52	10-year	0.74	239.39	239.81	239.68	239.83	0.002609	0.65	2.29	25.76	0.37	0.09	0.10	0.32	5.19
HDF-3	1	993.52	25-year	1.02	239.39	239.83	239.76	239.86	0.003226	0.76	2.92	27.66	0.42	0.12	0.14	0.35	6.55
HDF-3	1	993.52	50-year	1.24	239.39	239.86	239.80	239.88	0.003204	0.79	3.55	27.73	0.43	0.14	0.16	0.35	7.43
HDF-3	1	993.52	100-year	1.46	239.39	239.87	239.81	239.90	0.003318	0.83	4.07	27.80	0.44	0.17	0.18	0.36	9.02
HDF-3	1	993.52	Regional	3.79	239.39	240.03	239.92	240.06	0.003260	1.05	8.55	28.35	0.46	0.30	0.30	0.44	20.38
HDF-3	1	993.36	2-year	0.29	239.15	239.41	239.32	239.43	0.003652	0.63	0.46	2.55	0.47			0.63	2.77
HDF-3	1	993.36	5-year	0.54	239.15	239.49	239.39	239.52	0.004194	0.76	0.84	10.46	0.52	0.09	0.09	0.65	4.20
HDF-3	1	993.36	10-year	0.74	239.15	239.52	239.44	239.56	0.004612	0.86	1.22	16.50	0.56	0.13	0.14	0.61	5.05
HDF-3	1	993.36	25-year	1.02	239.15	239.56	239.53	239.59	0.003726	0.86	1.97	18.22	0.52	0.20	0.21	0.52	6.36
HDF-3	1	993.36	50-year	1.24	239.15	239.58	239.56	239.61	0.003733	0.90	2.35	18.34	0.52	0.24	0.25	0.53	7.21
HDF-3	1	993.36	100-year	1.46	239.15	239.61	239.57	239.64	0.003561	0.93	2.76	18.47	0.52	0.27	0.28	0.53	8.76
HDF-3	1	993.36	Regional	3.79	239.15	239.77	239.67	239.80	0.003231	1.15	5.81	19.44	0.53	0.46	0.46	0.65	19.82
HDF-3	1	992.97	2-year	0.29	238.95	239.25	239.12	239.26	0.001908	0.50	0.58	3.14	0.35	0.01	0.01	0.50	2.74
HDF-3	1	992.97	5-year	0.54	238.95	239.33	239.19	239.34	0.001843	0.60	1.43	18.03	0.36	0.11	0.10	0.38	4.13

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
HDF-3	1	992.97	10-year	0.74	238.95	239.37	239.23	239.38	0.001579	0.61	2.17	18.27	0.34	0.15	0.15	0.34	4.94
HDF-3	1	992.97	25-year	1.02	238.95	239.38	239.33	239.40	0.002345	0.76	2.42	18.36	0.42	0.20	0.20	0.42	6.22
HDF-3	1	992.97	50-year	1.24	238.95	239.41	239.35	239.43	0.002182	0.78	2.94	18.53	0.41	0.23	0.23	0.42	7.03
HDF-3	1	992.97	100-year	1.46	238.95	239.43	239.36	239.45	0.002357	0.83	3.26	18.63	0.43	0.26	0.26	0.45	8.56
HDF-3	1	992.97	Regional	3.79	238.95	239.60	239.47	239.63	0.002375	1.07	6.51	19.65	0.46	0.43	0.43	0.58	19.42
HDF-3	1	992.79	2-year	0.29	238.76	238.93	238.93	239.00	0.018710	1.12	0.25	2.01	1.01			1.12	2.71
HDF-3	1	992.79	5-year	0.54	238.76	239.01	239.01	239.09	0.016093	1.28	0.42	2.48	0.99			1.28	4.08
HDF-3	1	992.79	10-year	0.74	238.76	239.05	239.05	239.15	0.016886	1.42	0.52	2.70	1.03			1.42	4.86
HDF-3	1	992.79	25-year	1.02	238.76	239.15	239.15	239.20	0.005644	1.07	1.57	18.09	0.64	0.21	0.19	0.65	6.10
HDF-3	1	992.79	50-year	1.24	238.76	239.16	239.16	239.22	0.006342	1.17	1.82	18.17	0.68	0.26	0.24	0.68	6.89
HDF-3	1	992.79	100-year	1.46	238.76	239.18	239.18	239.24	0.005932	1.18	2.21	18.30	0.66	0.30	0.29	0.66	8.40
HDF-3	1	992.79	Regional	3.79	238.76	239.28	239.28	239.37	0.008871	1.73	4.08	18.90	0.85	0.61	0.59	0.93	19.11
HDF-3	1	992.56	2-year	0.29	238.50	238.62	238.55	238.63	0.000694	0.17	2.77	34.17	0.17	0.07	0.04	0.10	2.65
HDF-3	1	992.56	5-year	0.54	238.50	238.72	238.57	238.72	0.000226	0.15	6.50	41.49	0.11	0.06	0.04	0.08	3.93
HDF-3	1	992.56	10-year	0.74	238.50	238.77	238.58	238.77	0.000204	0.16	8.43	44.81	0.10	0.07	0.05	0.09	4.67
HDF-3	1	992.56	25-year	1.02	238.50	238.80	238.59	238.80	0.000230	0.19	10.11	47.52	0.11	0.08	0.06	0.10	5.85
HDF-3	1	992.56	50-year	1.24	238.50	238.83	238.61	238.83	0.000253	0.21	11.25	49.27	0.12	0.09	0.06	0.11	6.61
HDF-3	1	992.56	100-year	1.46	238.50	238.85	238.62	238.85	0.000272	0.23	12.37	50.70	0.13	0.09	0.07	0.12	8.09
HDF-3	1	992.56	Regional	3.79	238.50	239.03	238.67	239.03	0.000361	0.35	22.62	65.25	0.16	0.14	0.10	0.17	18.53
HDF-3	1	992.13	2-year	0.29	238.28	238.62	238.34	238.62	0.000020	0.06	8.62	36.89	0.03	0.02	0.01	0.03	2.31
HDF-3	1	992.13	5-year	0.54	238.28	238.72	238.36	238.72	0.000026	0.08	12.43	40.61	0.04	0.03	0.02	0.04	3.36
HDF-3	1	992.13	10-year	0.74	238.28	238.76	238.37	238.76	0.000033	0.09	14.27	42.84	0.05	0.04	0.03	0.05	3.99
HDF-3	1	992.13	25-year	1.02	238.28	238.80	238.39	238.80	0.000046	0.12	15.81	44.64	0.05	0.05	0.03	0.06	5.07
HDF-3	1	992.13	50-year	1.24	238.28	238.82	238.40	238.82	0.000058	0.13	16.83	45.78	0.06	0.06	0.04	0.07	5.77
HDF-3	1	992.13	100-year	1.46	238.28	238.84	238.41	238.84	0.000069	0.15	17.82	46.87	0.07	0.06	0.04	0.08	7.18
HDF-3	1	992.13	Regional	3.79	238.28	239.02	238.48	239.02	0.000156	0.28	26.71	54.41	0.11	0.11	0.08	0.14	17.05
HDF-3	1	991.9	2-year	0.29	238.35	238.59	238.52	238.62	0.004865	0.69	0.41	2.43	0.54			0.69	2.17
HDF-3	1	991.9	5-year	0.54	238.35	238.68	238.60	238.71	0.004823	0.84	0.69	7.45	0.56	0.07	0.07	0.78	3.15
HDF-3	1	991.9	10-year	0.74	238.35	238.71	238.64	238.76	0.004786	0.93	1.13	15.94	0.58	0.13	0.13	0.66	3.75
HDF-3	1	991.9	25-year	1.02	238.35	238.74	238.74	238.79	0.005119	1.03	1.64	18.16	0.61	0.20	0.20	0.62	4.79
HDF-3	1	991.9	50-year	1.24	238.35	238.77	238.75	238.81	0.004761	1.05	2.09	18.31	0.59	0.25	0.25	0.59	5.47
HDF-3	1	991.9	100-year	1.46	238.35	238.79	238.77	238.83	0.004495	1.07	2.50	18.44	0.58	0.29	0.28	0.58	6.86
HDF-3	1	991.9	Regional	3.79	238.35	238.96	238.87	239.00	0.003464	1.23	5.71	19.47	0.55	0.48	0.47	0.66	16.55
HDF-3	1	991.6	2-year	0.29	238.13	238.39	238.30	238.41	0.004618	0.61	0.47	2.58	0.46			0.61	2.15
HDF-3	1	991.6	5-year	0.54	238.13	238.48	238.38	238.50	0.004542	0.75	0.94	13.18	0.48	0.07	0.07	0.58	3.12
HDF-3	1	991.6	10-year	0.74	238.13	238.51	238.42	238.54	0.004736	0.83	1.50	18.22	0.50	0.10	0.11	0.49	3.69
HDF-3	1	991.6	25-year	1.02	238.13	238.56	238.50	238.59	0.003981	0.84	2.37	18.50	0.47	0.16	0.16	0.43	4.70
HDF-3	1	991.6	50-year	1.24	238.13	238.58	238.53	238.61	0.004300	0.91	2.75	18.62	0.49	0.19	0.19	0.45	5.36
HDF-3	1	991.6	100-year	1.46	238.13	238.60	238.54	238.63	0.004480	0.97	3.13	18.75	0.51	0.21	0.22	0.47	6.73
HDF-3	1	991.6	Regional	3.79	238.13	238.77	238.67	238.81	0.004828	1.29	6.37	19.77	0.56	0.37	0.38	0.59	16.27
HDF-3	1	991	2-year	0.29	237.69	237.94	237.86	237.96	0.005388	0.65	0.45	2.56	0.49			0.65	2.10
HDF-3	1	991	5-year	0.59	237.69	238.03	237.93	238.06	0.005211	0.80	0.94	12.51	0.51	0.08	0.07	0.62	3.03
HDF-3	1	991	10-year	0.71	237.69	238.05	237.96	238.09	0.005402	0.86	1.25	16.78	0.53	0.10	0.10	0.57	3.57
HDF-3	1	991	25-year	0.97	237.69	238.08	238.05	238.12	0.006606	1.01	1.69	18.44	0.59	0.15	0.14	0.58	4.52
HDF-3	1	991	50-year	1.19	237.69	238.11	238.09	238.15	0.006086	1.03	2.22	18.62	0.58	0.19	0.18	0.54	5.14
HDF-3	1	991	100-year	1.42	237.69	238.13	238.10	238.18	0.005783	1.05	2.70	18.77	0.57	0.22	0.21	0.53	6.47
HDF-3	1	991	Regional	3.83	237.69	238.32	238.23	238.37	0.004941	1.30	6.37	19.94	0.57	0.38	0.37	0.60	15.69
HDF-3	1	990	2-year	0.29	236.97	237.21	237.13	237.24	0.004706	0.69	0.43	2.48	0.53			0.69	2.04
HDF-3	1	990	5-year	0.59	236.97	237.30	237.22	237.34	0.004673	0.86	0.80	10.22	0.56	0.09	0.09	0.73	2.90
HDF-3	1	990	10-year	0.71	236.97	237.33	237.25	237.36	0.004469	0.90	1.12	15.75	0.56	0.13	0.13	0.63	3.39
HDF-3	1	990	25-year	0.97	236.97	237.37	237.34	237.40	0.003853	0.91	1.84	18.19	0.53	0.19	0.21	0.53	4.26
HDF-3	1	990	50-year	1.19	236.97	237.38	237.36	237.42	0.004229	0.99	2.13	18.29	0.56	0.23	0.25	0.56	4.82
HDF-3	1	990	100-year	1.42	236.97	237.40	237.38	237.44	0.004500	1.06	2.43	18.38	0.58	0.27	0.29	0.58	6.10
HDF-3	1	990	Regional	3.83	236.97	237.53	237.49	237.59	0.005688	1.47	4.83	19.15	0.69	0.54	0.55	0.79	14.88
HDF-3	1	989.68	2-year	0.29	236.25	236.49	236.42	236.52	0.005099	0.71	0.41	2.44	0.55			0.71	1.98
HDF-3	1	989.68	5-year	0.59	236.25	236.58	236.51	236.62	0.005247	0.89	0.74	9.01	0.59	0.08	0.09	0.79	2.79
HDF-3	1	989.68	10-year	0.71	236.25	236.60	236.53	236.64	0.005376	0.96	0.97	13.25	0.61	0.13	0.13	0.73	3.24
HDF-3	1	989.68	25-year	0.97	236.25	236.62	236.62	236.68	0.006472	1.12	1.36	17.69	0.68	0.17	0.20	0.72	4.03
HDF-3	1	989.68	50-year	1.19	236.25	236.65	236.65	236.70	0.005761	1.12	1.83	18.20	0.65	0.23	0.25	0.65	4.53
HDF-3	1	989.68	100-year	1.42	236.25	236.67	236.66	236.72	0.005400	1.13	2.24	18.33	0.63	0.28	0.29	0.63	5.76
HDF-3	1	989.68	Regional	3.83	236.25	236.84	236.78	236.89	0.003983	1.29	5.49	19.37	0.58	0.49	0.50	0.70	14.13
HDF-3	1	989.5	2-year	0.29	235.94	236.21	236.11	236.23	0.004148	0.59	0.50	2.70	0.43			0.59	1.95
HDF-3	1	989.5	5-year	0.59	235.94	236.30	236.19	236.33	0.004003	0.73	1.17	16.16	0.45	0.08	0.08	0.50	2.73
HDF-3	1	989.5	10-year	0.71	235.94	236.32	236.21	236.35	0.004008	0.77	1.57	18.70	0.46	0.11	0.10	0.45	3.16
HDF-3	1	989.5	25-year	0.97	235.94	236.38	236.29	236.40	0.003134	0.76	2.55	19.02	0.42	0.15	0.14	0.38	3.91
HDF-3	1	989.5	50-year	1.19	235.94	236.40	236.34	236.42	0.003253	0.81	3.01	19.17	0.43	0.18	0.17	0.39	4.38
HDF-3	1	989.5	100-year	1.42	235.94	236.42	236.36	236.45	0.003396	0.86	3.44	19.31	0.44	0.20	0.19	0.41	5.58
HDF-3	1	989.5	Regional	3.83	235.94	236.61	236.48	236.65	0.003680	1.17	7.13	20.47	0.49	0.35	0.34	0.54	13.73
HDF-3	1	989.4	2-year	0.29	235.65	235.88	235.82	235.91	0.007633	0.73	0.40	2.49	0.58			0.73	1.92
HDF-3	1	989.4	5-year	0.59	235.65	235.97	235.90	236.01	0.007441	0.89	0.70	7.58	0.60	0.05	0.05	0.83	2.68
HDF-3	1	989.4	10-year	0.71	235.65	236.00	235.93	236.05	0.006890	0.93	1.02	14.48	0.59	0.09	0.09	0.70	3.08
HDF-3	1	989.4	25-year	0.97	235.65	236.02	236.00	236.08	0.009790	1.15	1.28	17.37	0.71	0.12	0.14	0.76	3.80
HDF-3	1	989.4	50-year	1.19	235.65	236.04	236.04	236.11	0.009473	1.20	1.74	19.10	0.71	0.16	0.19	0.68	4.24
HDF-3	1	989.4	100-year	1.42	235.65	236.07	236.07	236.13	0.008790	1.22	2.21	19.26	0.69	0.20	0.23	0.64	5.41
HDF-3	1	989.4	Regional	3.83	235.65	236.22	236.19	236.30	0.009060	1.60	5.15	20.20	0.75	0.42	0.44	0.74	13.37
HDF-3	1	989.3	2-year	0.29	235.18	235.39	235.35	235.43	0.008567	0.86	0.34	2.26	0.71			0.86	1.90
HDF-3	1	989.3	5-year	0.59	235.18	235.48	235.44	235.53	0.008593	1.04	0.56	2.80	0.74			1.04	2.64
HDF-3	1	989.3	10-year	0.71	235.18	235.50	235.46	235.56	0.009048	1.14	0.66	6.72	0.77	0.09	0.08	1.08	3.03
HDF-3	1	989.3	25-year	0.97	235.18	235.55	235.55	235.61	0.006425	1.11	1.36	17.58	0.67	0.19	0.18	0.72	3.72
HDF-3	1	989.3	50-year	1.19	235.18	235.58	235.58	235.63	0.006077	1.14	1.78	18.16	0.66	0.25	0.23	0.67	4.14
HDF-3	1	989.3	100-year	1.42	235.18	235.59	235.59	235.65	0.006744	1.24	2.02	18.24	0.70	0.30	0.28	0.70	5.29
HDF-3	1	989.3	Regional	3.83	235.18	235.72	235.70	235.80	0.007659	1.65	4.33	18.99	0.79	0.59	0.57	0.88	13.09
HDF-3	1	989.2	2-year	0.29	234.58	234.82	234.75	234.84	0.007167	0.72	0.41	2.47	0.56			0.72	1.87
HDF-3	1	989.2	5-year	0.59	234.58	234.91	234.83	234.95	0.006803	0.87	0.77	9.90	0.58	0.06	0.06	0.76	2.59
HDF-3	1	989.2	10-year	0.71	234.58	234.94	234.86	234.98	0.006510	0.91	1.10	15.29	0.57	0.09	0.10	0.65	2.97
HDF-3	1	989.2	25-year	0.97	234.58	234.98	234.95	235.02	0.006031	0.97	1.81	18.59	0.57	0.14	0.16	0.54	3.60
HDF-3	1	989.2	50-year	1.19	234.58	234.99	234.98	235.04	0.006564	1.05	2.15	18.70	0.60	0.18	0.19	0.55	3.99
HDF-3	1	989.2	100-year	1.42	234.58	235.02	234.99	235.06	0.006644	1.11	2.55	18.83	0.61	0.21	0.23	0.56	5.12
HDF-3	1	989.2	Regional	3.83	234.58	235.18	235.12	235.24	0.007022	1.47	5.62	19.81	0.67	0.41	0.42	0.68	12.72
HDF-3	1	989.1	2-year	0.29	234.14	234.37	234.33	234.41	0.008854	0.79	0.37	2.28	0.62			0.79	1.85
HDF-3	1	989.1	5-year	0.59	234.14	234.46	234.40	234.51	0.009407	0.99	0.63	6.93	0.67	0.05	0.05	0.93	2.55
HDF-3	1	989.1	10-year	0.71	234.14	234.48	234.43	234.54	0.009845	1.07	0.83	11.88	0.70	0.09	0.09	0.86	2.92
HDF-3	1	989.1	25-year	0.97	234.14	234.52	234.52	234.58	0.009890	1.18	1.37	17.38	0.71	0.17	0.14	0.71	3.51
HDF-3	1	989.1	50-year	1.19	234.14	234.54	234.54	234.61	0.009308	1.21	1.82	17.56	0.70	0.21	0.19	0.65	3.88
HDF-3	1	989.1	100-year	1.42	234.14	234.57	234.57	234.63	0.009005	1.25	2.22	17.69	0.70	0.25	0.23	0.64	4.98
HDF-3	1	989.1	Regional	3.83	234.14	234.72	234.69	234.80	0.008966	1.63	5.09	18.63	0.75	0.46	0.45	0.75	12.42
HDF-3	1	989	2-year	0.34	233.72	233.95	233.91	233.99	0.007236	0.84	0.40	2.41	0.66			0.84	1.83
HDF-3	1	989	5-year	0.60	233.72	234.02	233.99	234.07	0.007645	0.99	0.80	10.73	0.70	0.16		0.76	2.51
HDF-3	1	989	10-year	0.75	233.72	234.04	234.04	234.09	0.007156	1.03	1.14	18.20	0.69	0.19	0.09	0.66	2.86
HDF-3	1	989	25-year	1.00	233.72	234.08	234.08	234.12	0.005944	1.03	1.76	19.22	0.64	0.25	0.19	0.57	3.43
HDF-3	1	989	50-year	1.21	233.72	234.08	234.08	234.13	0.007623	1.18	1.87	19.25	0.73	0.30	0.23	0.65	3.78
HDF-3	1	989	100-year	1.43	233.72	234.10	234.10	234.15	0.006636	1.16	2.31	19.39	0.69	0.34	0.28	0.62	4.86
HDF-3	1	989	Regional	7.29	233.72	234.38	234.29	234.45	0.005809	1.69	7.81	21.08	0.72	0.76	0.66	0.93	12.08
HDF-3	1	987.5	2-year	0.34	233.31	233.46	233.46	233.52	0.017836	1.03	0.33	2.94	0.98			1.03	1.82
HDF-3	1	987.5	5-year	0.60	233.31	233.52	233.52	233.59	0.017017	1.20	0.51	3.46	1.00			1.20	2.48
HDF-3	1	987.5	10-year	0.75	233.31	233.56	233.56	233.62	0.018456	1.09	0.69	5.82	1.01			1.09	2.82
HDF-3	1	987.5	25-year	1.00	233.31	233.59	233.59	233.65	0.021034	1.10	0.92	8.70	1.06	0.18		1.09	3.37

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
HDF-3	1	987.5	50-year	1.21	233.31	233.62	233.62	233.68	0.015583	1.07	1.14	9.08	0.94	0.23		1.06	3.72
HDF-3	1	987.5	100-year	1.43	233.31	233.64	233.64	233.70	0.013395	1.09	1.34	9.46	0.90	0.27		1.07	4.79
HDF-3	1	987.5	Regional	7.29	233.31	233.89	233.89	234.06	0.011358	1.85	4.33	15.03	0.96	0.75	0.32	1.68	11.82
HDF-3	1	987	2-year	0.34	232.30	232.42		232.42	0.006138	0.44	0.94	14.92	0.53	0.25	0.19	0.36	1.75
HDF-3	1	987	5-year	0.60	232.30	232.53		232.53	0.000622	0.26	2.98	19.57	0.20	0.14	0.11	0.20	2.30
HDF-3	1	987	10-year	0.75	232.30	232.58		232.58	0.000387	0.24	4.02	20.87	0.16	0.13	0.10	0.19	2.57
HDF-3	1	987	25-year	1.00	232.30	232.66		232.66	0.000240	0.23	5.74	22.83	0.13	0.12	0.10	0.17	3.01
HDF-3	1	987	50-year	1.21	232.30	232.70		232.71	0.000215	0.24	6.77	23.94	0.13	0.12	0.10	0.18	3.29
HDF-3	1	987	100-year	1.43	232.30	232.85		232.85	0.000087	0.19	10.48	27.56	0.09	0.09	0.08	0.14	4.14
HDF-3	1	987	Regional	7.29	232.30	233.58		233.59	0.000074	0.33	35.79	41.90	0.09	0.14	0.14	0.20	9.64
HDF-3	1	986	2-year	0.34	231.90	232.42		232.42	0.000006	0.05	10.18	27.94	0.02	0.02	0.02	0.03	1.29
HDF-3	1	986	5-year	0.60	231.90	232.53		232.53	0.000009	0.07	13.37	30.15	0.03	0.03	0.03	0.05	1.62
HDF-3	1	986	10-year	0.75	231.90	232.58		232.58	0.000010	0.08	14.94	30.91	0.03	0.04	0.04	0.05	1.78
HDF-3	1	986	25-year	1.00	231.90	232.66		232.66	0.000011	0.09	17.40	32.04	0.03	0.04	0.04	0.06	2.05
HDF-3	1	986	50-year	1.21	231.90	232.70		232.70	0.000013	0.10	18.83	32.72	0.04	0.05	0.05	0.06	2.23
HDF-3	1	986	100-year	1.43	231.90	232.85		232.85	0.000009	0.09	23.70	34.67	0.03	0.04	0.04	0.06	2.73
HDF-3	1	986	Regional	7.29	231.90	233.58		233.58	0.000025	0.23	52.75	44.91	0.06	0.10	0.11	0.14	5.96
HDF-3	1	985	2-year	0.34	231.75	232.42		232.42	0.000001	0.02	18.29	31.54	0.01	0.01	0.01	0.02	0.30
HDF-3	1	985	5-year	0.60	231.75	232.53		232.53	0.000002	0.03	21.82	32.78	0.01	0.01	0.02	0.03	0.40
HDF-3	1	985	10-year	0.75	231.75	232.58		232.58	0.000002	0.04	23.52	33.54	0.01	0.02	0.02	0.03	0.45
HDF-3	1	985	25-year	1.00	231.75	232.66		232.66	0.000002	0.05	26.18	34.19	0.02	0.02	0.02	0.04	0.53
HDF-3	1	985	50-year	1.21	231.75	232.70		232.70	0.000003	0.06	27.68	34.50	0.02	0.02	0.03	0.04	0.61
HDF-3	1	985	100-year	1.43	231.75	232.85		232.85	0.000003	0.06	32.75	35.46	0.02	0.02	0.03	0.04	0.76
HDF-3	1	985	Regional	7.29	231.75	233.58		233.58	0.000011	0.16	60.81	48.60	0.04	0.07	0.08	0.12	2.02
HDF-3	1	984	2-year	0.34	232.05	232.32	232.32	232.38	0.017161	1.13	0.30	2.17	0.97			1.13	0.08
HDF-3	1	984	5-year	0.60	232.05	232.38	232.38	232.47	0.016843	1.35	0.45	2.41	1.00			1.35	0.14
HDF-3	1	984	10-year	0.75	232.05	232.41	232.41	232.52	0.016096	1.45	0.52	2.56	1.00	0.07	0.15	1.44	0.17
HDF-3	1	984	25-year	1.00	232.05	232.46	232.46	232.58	0.014560	1.57	0.65	2.83	0.98	0.21	0.27	1.54	0.23
HDF-3	1	984	50-year	1.21	232.05	232.53	232.49	232.64	0.008717	1.45	0.88	3.26	0.79	0.29	0.33	1.37	0.28
HDF-3	1	984	100-year	1.43	232.05	232.78	232.53	232.82	0.001671	0.92	1.90	7.08	0.38	0.23	0.28	0.75	0.37
HDF-3	1	984	Regional	7.29	232.05	233.16	233.08	233.42	0.006535	2.51	4.29	41.10	0.82	0.80	0.68	1.70	1.22
HDF-3	1	983	2-year	0.34	231.24	231.80	231.39	231.80	0.000091	0.19	1.77	14.78	0.09			0.19	0.07
HDF-3	1	983	5-year	0.60	231.24	232.03	231.45	232.03	0.000077	0.23	2.65	21.25	0.09			0.23	0.11
HDF-3	1	983	10-year	0.75	231.24	232.15	231.47	232.15	0.000070	0.24	3.11	24.41	0.09			0.24	0.13
HDF-3	1	983	25-year	1.00	231.24	232.36	231.52	232.37	0.000058	0.26	3.91	29.31	0.08			0.26	0.17
HDF-3	1	983	50-year	1.21	231.24	232.55	231.55	232.56	0.000048	0.26	4.64	33.83	0.08			0.26	0.20
HDF-3	1	983	100-year	1.43	231.24	232.79	231.58	232.79	0.000037	0.26	5.54	58.24	0.07			0.26	0.24
HDF-3	1	983	Regional	7.29	231.24	233.21	232.05	233.21	0.000027	0.26	62.86	82.56	0.06	0.09	0.08	0.12	0.97
HDF-3	1	982.58		Culvert													
HDF-3	1	982	2-year	0.34	230.86	231.20	231.14	231.24	0.008550	0.89	0.38	4.33	0.63			0.89	0.07
HDF-3	1	982	5-year	0.60	230.86	231.25	231.22	231.33	0.014525	1.28	0.47	4.84	0.84			1.28	0.10
HDF-3	1	982	10-year	0.75	230.86	231.27	231.26	231.38	0.017557	1.46	0.52	5.08	0.94			1.46	0.12
HDF-3	1	982	25-year	1.00	230.86	231.33	231.32	231.45	0.016815	1.56	0.64	9.97	0.94			1.56	0.15
HDF-3	1	982	50-year	1.21	230.86	231.36	231.36	231.51	0.018322	1.70	0.71	13.35	0.99			1.70	0.17
HDF-3	1	982	100-year	1.43	230.86	231.40	231.40	231.56	0.017364	1.78	0.81	17.13	0.98	0.09		1.76	0.20
HDF-3	1	982	Regional	7.29	230.86	232.01	232.01	232.46	0.012718	3.04	2.65	38.21	1.00	1.03		2.75	0.73
HDF-3	1	981	2-year	0.34	230.86	231.08	231.06	231.09	0.009595	0.63	0.98	16.82	0.61	0.18	0.13	0.34	0.05
HDF-3	1	981	5-year	0.60	230.86	231.11	231.09	231.13	0.008487	0.72	1.65	19.40	0.60	0.23	0.17	0.37	0.08
HDF-3	1	981	10-year	0.75	230.86	231.13	231.09	231.15	0.008182	0.76	2.00	22.45	0.60	0.25	0.17	0.37	0.10
HDF-3	1	981	25-year	1.00	230.86	231.13	231.12	231.16	0.016363	1.06	1.91	21.27	0.85	0.34	0.24	0.53	0.12
HDF-3	1	981	50-year	1.21	230.86	231.16	231.12	231.19	0.011963	1.01	2.64	28.66	0.75	0.34	0.20	0.46	0.14
HDF-3	1	981	100-year	1.43	230.86	231.17	231.15	231.20	0.010854	1.02	3.15	29.36	0.72	0.35	0.23	0.45	0.16
HDF-3	1	981	Regional	7.29	230.86	231.39	231.32	231.45	0.010639	1.65	10.43	36.76	0.81	0.58	0.51	0.70	0.52
HDF-3	1	980	2-year	0.34	230.22	230.27	230.27	230.28	0.023646	0.57	0.94	29.24	0.84	0.19	0.14	0.36	
HDF-3	1	980	5-year	0.60	230.22	230.28	230.28	230.31	0.030456	0.76	1.31	30.20	0.99	0.27	0.21	0.46	
HDF-3	1	980	10-year	0.75	230.22	230.29	230.29	230.32	0.034615	0.85	1.46	30.55	1.07	0.30	0.25	0.52	
HDF-3	1	980	25-year	1.00	230.22	230.32	230.32	230.34	0.012870	0.68	2.50	32.85	0.70	0.25	0.22	0.40	
HDF-3	1	980	50-year	1.21	230.22	230.32	230.32	230.35	0.018699	0.82	2.50	32.85	0.85	0.30	0.27	0.48	
HDF-3	1	980	100-year	1.43	230.22	230.33	230.33	230.36	0.022284	0.93	2.65	33.20	0.93	0.34	0.30	0.54	
HDF-3	1	980	Regional	7.29	230.22	230.46	230.46	230.55	0.024829	1.73	8.04	45.12	1.13	0.61	0.57	0.91	
HDF-8	1	30	2-year	0.36	226.13	226.25		226.25	0.003703	0.40	1.01	15.82	0.43	0.12	0.08	0.36	0.42
HDF-8	1	30	5-year	0.61	226.13	226.28		226.29	0.003329	0.46	1.64	21.60	0.43	0.16	0.12	0.37	0.67
HDF-8	1	30	10-year	1.29	226.13	226.32		226.34	0.004360	0.65	2.64	24.23	0.52	0.25	0.22	0.49	1.61
HDF-8	1	30	25-year	1.61	226.13	226.34		226.36	0.004069	0.69	3.20	25.59	0.51	0.26	0.24	0.50	2.63
HDF-8	1	30	50-year	1.85	226.13	226.36	226.30	226.38	0.004137	0.73	3.53	26.35	0.52	0.28	0.26	0.52	3.84
HDF-8	1	30	100-year	2.09	226.13	226.36	226.31	226.38	0.005161	0.81	3.56	26.42	0.58	0.31	0.30	0.59	5.53
HDF-8	1	30	Regional	5.15	226.13	226.46		226.51	0.005894	1.15	6.79	34.48	0.67	0.44	0.44	0.76	10.22
HDF-8	1	29	2-year	0.36	225.72	225.78	225.78	225.79	0.015952	0.56	0.84	21.24	0.81	0.24	0.26	0.43	0.35
HDF-8	1	29	5-year	0.61	225.72	225.79	225.79	225.81	0.024707	0.78	1.03	22.05	1.04	0.34	0.37	0.59	0.58
HDF-8	1	29	10-year	1.29	225.72	225.83	225.83	225.86	0.013062	0.84	2.14	26.04	0.83	0.38	0.39	0.60	1.44
HDF-8	1	29	25-year	1.61	225.72	225.84	225.84	225.88	0.015533	0.96	2.34	26.59	0.92	0.44	0.44	0.69	2.44
HDF-8	1	29	50-year	1.85	225.72	225.85	225.84	225.89	0.016419	1.03	2.53	27.00	0.96	0.47	0.48	0.73	3.64
HDF-8	1	29	100-year	2.09	225.72	225.87		225.90	0.010728	0.94	3.18	28.38	0.80	0.42	0.45	0.66	5.30
HDF-8	1	29	Regional	5.15	225.72	225.97	225.93	226.02	0.009556	1.25	6.20	34.37	0.82	0.55	0.59	0.83	9.78
HDF-8	1	28	2-year	0.36	224.75	224.88		224.89	0.004693	0.52	0.69	6.30	0.50			0.52	0.29
HDF-8	1	28	5-year	0.61	224.75	224.93		224.94	0.004770	0.62	0.99	7.12	0.53	0.03		0.62	0.49
HDF-8	1	28	10-year	1.29	224.75	225.02		225.05	0.005416	0.75	1.78	13.56	0.58	0.20	0.05	0.73	1.27
HDF-8	1	28	25-year	1.61	224.75	225.04		225.07	0.005411	0.82	2.11	15.13	0.59	0.23	0.12	0.76	2.25
HDF-8	1	28	50-year	1.85	224.75	225.05		225.09	0.005692	0.87	2.31	16.00	0.62	0.26	0.15	0.80	3.42
HDF-8	1	28	100-year	2.09	224.75	225.05		225.10	0.007717	1.01	2.25	15.77	0.72	0.29	0.17	0.93	5.06
HDF-8	1	28	Regional	5.15	224.75	225.18	225.15	225.26	0.007482	1.38	4.84	24.50	0.76	0.46	0.37	1.06	9.29
HDF-8	1	27	2-year	0.36	224.49	224.59		224.59	0.004358	0.42	0.94	13.43	0.46	0.05	0.15	0.38	0.23
HDF-8	1	27	5-year	0.61	224.49	224.61		224.62	0.004766	0.52	1.32	15.09	0.51	0.10	0.19	0.46	0.41
HDF-8	1	27	10-year	1.29	224.49	224.66		224.69	0.005179	0.71	2.20	18.73	0.57	0.19	0.25	0.59	1.13
HDF-8	1	27	25-year	1.61	224.49	224.68		224.71	0.005284	0.78	2.59	20.08	0.58	0.21	0.28	0.62	2.08
HDF-8	1	27	50-year	1.85	224.49	224.70		224.73	0.004733	0.79	2.99	21.09	0.56	0.23	0.29	0.62	3.24
HDF-8	1	27	100-year	2.09	224.49	224.73	224.66	224.76	0.003514	0.74	3.67	22.67	0.49	0.22	0.28	0.57	4.86
HDF-8	1	27	Regional	5.15	224.49	224.87	224.77	224.91	0.003622	1.03	7.24	29.51	0.54	0.34	0.41	0.71	8.88
HDF-8	1	26	2-year	0.36	224.16	224.24	224.22	224.25	0.005962	0.44	1.08	27.05	0.53	0.08	0.16	0.33	0.16
HDF-8	1	26	5-year	0.61	224.16	224.26	224.24	224.27	0.005681	0.51	1.70	29.21	0.54	0.15	0.21	0.36	0.31
HDF-8	1	26	10-year	1.29	224.16	224.30	224.27	224.32	0.005780	0.65	2.85	29.51	0.58	0.26	0.31	0.45	0.97
HDF-8	1	26	25-year	1.61	224.16	224.32		224.34	0.005852	0.71	3.29	29.62	0.59	0.29	0.34	0.49	1.89
HDF-8	1	26	50-year	1.85	224.16	224.32		224.34	0.006939	0.78	3.41	29.65	0.65	0.33	0.38	0.54	3.03
HDF-8	1	26	100-year	2.09	224.16	224.31	224.31	224.35	0.012761	1.00	3.02	29.55	0.86	0.40	0.48	0.69	4.64
HDF-8	1	26	Regional	5.15	224.16	224.37	224.37	224.45	0.017087	1.50	4.95	30.04	1.07	0.70	0.76	1.04	8.47
HDF-8	1	25	2-year	0.36	223.00	223.16	223.16	223.20	0.020281	0.91	0.39	4.67	1.00			0.91	0.09
HDF-8	1	25	5-year	0.61	223.00	223.19	223.19	223.25	0.020723	1.06	0.58	5.52	1.05			1.06	0.19
HDF-8	1	25	10-year	1.29	223.00	223.27	223.27	223.34	0.017071	1.22	1.05	7.05	1.01			1.22	0.76
HDF-8	1	25	25-year	1.61	223.00	223.29	223.29	223.38	0.015826	1.29	1.25	7.25	0.99	0.03		1.29	1.65
HDF-8	1	25	50-year	1.85	223.00	223.32	223.32	223.40	0.012133	1.26	1.47	7.49	0.89	0.14		1.26	2.77
HDF-8	1	25	100-year	2.09	223.00	223.81		223.82	0.000242	0.38	5.97	10.80	0.15	0.13		0.35	4.16
HDF-8	1	25	Regional	5.15	223.00	224.30		224.32	0.000219	0.50	11.99	13.98	0.15	0.19		0.43	7.58
HDF-8	1	24	2-year	0.36	221.76	222.09	222.09	222.17	0.018259	1.26	0.29	1.79	1.01			1.26	0.07
HDF-8	1	24	5-year	0.61	221.76	222.17	222.17	222.27	0.017177	1.40	0.43	2.23	1.01			1.40	0.17
HDF-8	1	24	10-year	1.29	221.76	222.30	222.30	222.44	0.015569	1.63	0.79	3.04	1.02			1.63	0.72
HDF-8	1	24	25-year	1.61	221.76	222.75		222.77	0.000926	0.56	2.88	6.98	0.27		0.02	0.56	1.57

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
HDF-8	1	24	50-year	1.85	221.76	223.27		223.27	0.000082	0.26	8.00	11.37	0.09		0.10	0.23	2.58
HDF-8	1	24	100-year	2.09	221.76	223.82		223.82	0.000020	0.16	15.33	15.24	0.05	0.01	0.07	0.14	3.73
HDF-8	1	24	Regional	5.15	221.76	224.31		224.31	0.000034	0.26	25.52	25.55	0.06	0.05	0.12	0.20	6.81
HDF-8	1	23.6	2-year	0.36	221.20	221.61	221.52	221.65	0.005080	0.83	0.43	1.93	0.56			0.83	0.06
HDF-8	1	23.6	5-year	0.61	221.20	221.79	221.60	221.82	0.002362	0.71	0.86	2.67	0.40			0.71	0.15
HDF-8	1	23.6	10-year	1.29	221.20	222.28	221.75	222.29	0.000331	0.40	3.25	47.07	0.17			0.40	0.60
HDF-8	1	23.6	25-year	1.61	221.20	222.76	221.81	222.76	0.000074	0.27	6.07	72.69	0.09			0.27	0.93
HDF-8	1	23.6	50-year	1.85	221.20	223.26	221.87	223.27	0.000027	0.20	9.39	76.44	0.05			0.20	1.31
HDF-8	1	23.6	100-year	2.09	221.20	223.82	221.92	223.82	0.000011	0.16	13.23	83.97	0.04			0.16	1.69
HDF-8	1	23.6	Regional	5.15	221.20	224.31	222.14	224.31	0.000001	0.05	153.78	89.65	0.01	0.03		0.03	3.98
HDF-8	1	23.3		Culvert													
HDF-8	1	23	2-year	0.36	220.91	221.29	221.17	221.31	0.002167	0.52	0.70	3.63	0.37			0.52	0.05
HDF-8	1	23	5-year	0.61	220.91	221.24	221.23	221.31	0.013616	1.16	0.53	3.15	0.91			1.16	0.13
HDF-8	1	23	10-year	1.29	220.91	221.37	221.34	221.46	0.009079	1.31	0.98	5.02	0.80			1.31	0.56
HDF-8	1	23	25-year	1.61	220.91	221.46	221.37	221.54	0.005589	1.24	1.30	9.81	0.66			1.24	0.79
HDF-8	1	23	50-year	1.85	220.91	221.55	221.40	221.62	0.003479	1.14	1.63	18.21	0.54			1.14	1.05
HDF-8	1	23	100-year	2.09	220.91	221.63	221.42	221.69	0.002646	1.10	1.90	22.69	0.48			1.10	1.30
HDF-8	1	23	Regional	5.15	220.91	222.17	221.69	222.26	0.001505	1.33	3.87	43.92	0.41			1.33	3.24
HDF-8	1	22	2-year	0.36	220.99	221.05		221.06	0.012816	0.52	0.91	20.29	0.73	0.27		0.39	
HDF-8	1	22	5-year	0.61	220.99	221.16		221.16	0.000600	0.24	4.01	37.37	0.19	0.10		0.15	
HDF-8	1	22	10-year	1.29	220.99	221.38		221.38	0.000059	0.13	18.18	76.43	0.07	0.06	0.03	0.07	
HDF-8	1	22	25-year	1.61	220.99	221.47		221.47	0.000034	0.12	25.26	81.78	0.05	0.05	0.03	0.06	
HDF-8	1	22	50-year	1.85	220.99	221.56		221.56	0.000022	0.11	33.11	90.25	0.05	0.05	0.03	0.06	
HDF-8	1	22	100-year	2.09	220.99	221.64		221.64	0.000015	0.10	40.01	90.35	0.04	0.04	0.03	0.05	
HDF-8	1	22	Regional	5.15	220.99	222.19		222.19	0.000007	0.10	90.43	91.66	0.03	0.05	0.03	0.06	
Clarkway Trib A	Reach1	1597	2-year	7.90	241.79	243.48	242.32	243.48	0.000053	0.27	52.84	105.94	0.07	0.09	0.06	0.15	26.06
Clarkway Trib A	Reach1	1597	5-year	13.09	241.79	243.61	242.49	243.61	0.000063	0.32	93.00	113.06	0.08	0.09	0.07	0.14	38.68
Clarkway Trib A	Reach1	1597	10-year	16.36	241.79	243.75	242.58	243.75	0.000067	0.35	108.91	120.15	0.08	0.10	0.08	0.15	46.67
Clarkway Trib A	Reach1	1597	25-year	20.55	241.79	243.66	242.69	243.67	0.000135	0.47	99.00	115.26	0.12	0.14	0.11	0.21	55.15
Clarkway Trib A	Reach1	1597	50-year	23.72	241.79	243.69	242.78	243.70	0.000165	0.53	102.54	116.14	0.13	0.16	0.12	0.23	61.26
Clarkway Trib A	Reach1	1597	100-year	26.87	241.79	243.72	242.85	243.73	0.000198	0.59	105.36	118.09	0.14	0.17	0.14	0.26	67.20
Clarkway Trib A	Reach1	1597	Regional	26.12	241.79	243.72	242.84	243.73	0.000187	0.57	105.26	118.04	0.14	0.17	0.13	0.25	68.07
Clarkway Trib A	Reach1	1594		Culvert													
Clarkway Trib A	Reach1	1591	2-year	7.90	241.48	242.61	242.61	243.01	0.014470	2.78	2.84	68.34	1.00			2.78	25.62
Clarkway Trib A	Reach1	1591	5-year	13.09	241.48	242.93	242.93	243.48	0.012874	3.29	3.98	79.49	1.00			3.29	37.99
Clarkway Trib A	Reach1	1591	10-year	16.36	241.48	243.11	243.11	243.75	0.012235	3.54	4.62	83.21	1.00			3.54	45.64
Clarkway Trib A	Reach1	1591	25-year	20.55	241.48	243.19	243.19	243.20	0.000516	0.69	66.25	84.83	0.21	0.22	0.24	0.31	54.31
Clarkway Trib A	Reach1	1591	50-year	23.72	241.48	243.19	243.19	243.21	0.000687	0.80	66.25	84.83	0.24	0.25	0.28	0.36	60.35
Clarkway Trib A	Reach1	1591	100-year	26.87	241.48	243.19	243.19	243.21	0.000882	0.91	66.25	84.83	0.27	0.28	0.31	0.41	66.22
Clarkway Trib A	Reach1	1591	Regional	26.12	241.48	243.19	243.19	243.21	0.000833	0.88	66.25	84.83	0.26	0.28	0.30	0.39	67.11
Clarkway Trib A	Reach1	1583	2-year	7.90	241.24	242.36	242.20	242.41	0.003414	1.12	12.16	45.43	0.48	0.22	0.27	0.65	25.23
Clarkway Trib A	Reach1	1583	5-year	13.09	241.24	242.47	242.34	242.54	0.004074	1.39	17.68	50.63	0.54	0.31	0.38	0.74	37.26
Clarkway Trib A	Reach1	1583	10-year	16.36	241.24	242.53	242.39	242.62	0.004286	1.51	20.99	53.80	0.56	0.36	0.42	0.78	44.69
Clarkway Trib A	Reach1	1583	25-year	20.55	241.24	242.60	242.45	242.70	0.004638	1.66	24.66	57.12	0.59	0.40	0.48	0.83	53.25
Clarkway Trib A	Reach1	1583	50-year	23.72	241.24	242.66	242.50	242.76	0.004602	1.73	27.93	59.97	0.59	0.43	0.51	0.85	59.24
Clarkway Trib A	Reach1	1583	100-year	26.87	241.24	242.69	242.54	242.81	0.004898	1.84	30.21	61.94	0.62	0.46	0.55	0.89	65.09
Clarkway Trib A	Reach1	1583	Regional	26.12	241.24	242.68	242.53	242.79	0.004955	1.83	29.35	61.22	0.62	0.46	0.54	0.89	65.99
Clarkway Trib A	Reach1	1561.698	2-year	7.90	241.38	241.93	241.93	242.01	0.014072	1.99	11.69	58.25	0.94	0.46	0.56	0.68	24.50
Clarkway Trib A	Reach1	1561.698	5-year	13.09	241.38	242.03	242.03	242.12	0.014148	2.27	18.52	79.83	0.97	0.50	0.65	0.71	36.14
Clarkway Trib A	Reach1	1561.698	10-year	16.36	241.38	242.06	242.06	242.16	0.015521	2.46	21.04	80.87	1.02	0.57	0.72	0.78	43.40
Clarkway Trib A	Reach1	1561.698	25-year	20.55	241.38	242.09	242.09	242.20	0.017038	2.68	23.91	81.90	1.08	0.66	0.80	0.86	51.75
Clarkway Trib A	Reach1	1561.698	50-year	23.72	241.38	242.12	242.12	242.24	0.018615	2.87	25.69	82.96	1.14	0.73	0.85	0.92	57.59
Clarkway Trib A	Reach1	1561.698	100-year	26.87	241.38	242.14	242.14	242.27	0.019049	2.98	27.85	84.17	1.16	0.78	0.88	0.97	63.30
Clarkway Trib A	Reach1	1561.698	Regional	26.12	241.38	242.14	242.14	242.26	0.018333	2.92	27.66	84.09	1.14	0.76	0.86	0.94	64.23
Clarkway Trib A	Reach1	1561.551	2-year	7.90	240.81	241.34		241.34	0.001679	0.53	35.44	143.91	0.29	0.20	0.20	0.22	21.12
Clarkway Trib A	Reach1	1561.551	5-year	13.09	240.81	241.43		241.44	0.001702	0.61	49.75	153.72	0.29	0.24	0.25	0.26	31.25
Clarkway Trib A	Reach1	1561.551	10-year	16.36	240.81	241.48		241.49	0.001685	0.64	57.77	157.22	0.29	0.26	0.26	0.28	37.75
Clarkway Trib A	Reach1	1561.551	25-year	20.55	240.81	241.54		241.55	0.001721	0.69	67.01	163.32	0.30	0.28	0.29	0.31	45.24
Clarkway Trib A	Reach1	1561.551	50-year	23.72	240.81	241.57		241.58	0.001807	0.73	72.32	164.67	0.31	0.30	0.31	0.33	50.57
Clarkway Trib A	Reach1	1561.551	100-year	26.87	240.81	241.61		241.62	0.001807	0.76	78.37	166.36	0.31	0.32	0.32	0.34	55.69
Clarkway Trib A	Reach1	1561.551	Regional	26.12	240.81	241.60		241.61	0.001801	0.75	77.02	165.91	0.31	0.31	0.32	0.34	56.73
Clarkway Trib A	Reach1	1561.404	2-year	7.90	239.94	240.84	240.84	240.92	0.005328	1.59	14.73	89.59	0.60	0.25	0.23	0.54	17.39
Clarkway Trib A	Reach1	1561.404	5-year	13.09	239.94	240.94	240.91	241.02	0.005507	1.76	24.05	102.78	0.63	0.34	0.27	0.54	25.76
Clarkway Trib A	Reach1	1561.404	10-year	16.36	239.94	240.98	240.94	241.06	0.005599	1.84	28.96	107.15	0.64	0.38	0.30	0.56	31.30
Clarkway Trib A	Reach1	1561.404	25-year	20.55	239.94	241.04		241.12	0.005596	1.92	35.48	118.36	0.64	0.42	0.30	0.58	37.61
Clarkway Trib A	Reach1	1561.404	50-year	23.72	239.94	241.08		241.15	0.005336	1.93	40.48	120.94	0.63	0.45	0.33	0.59	42.18
Clarkway Trib A	Reach1	1561.404	100-year	26.87	239.94	241.11		241.19	0.005420	1.99	44.29	126.57	0.64	0.47	0.35	0.61	46.57
Clarkway Trib A	Reach1	1561.404	Regional	26.12	239.94	241.10		241.18	0.005518	1.99	43.03	122.32	0.65	0.47	0.35	0.61	47.80
Clarkway Trib A	Reach1	1561.256	2-year	7.90	239.10	239.87	239.67	239.95	0.008085	1.65	10.38	41.82	0.72	0.20	0.53	0.76	15.52
Clarkway Trib A	Reach1	1561.256	5-year	13.09	239.10	240.02	239.92	240.10	0.006911	1.80	17.69	54.06	0.69	0.32	0.59	0.74	22.66
Clarkway Trib A	Reach1	1561.256	10-year	16.36	239.10	240.09	239.99	240.17	0.006481	1.87	22.04	59.83	0.68	0.36	0.62	0.74	27.51
Clarkway Trib A	Reach1	1561.256	25-year	20.55	239.10	240.18	240.04	240.26	0.005989	1.93	27.55	65.70	0.67	0.41	0.64	0.75	32.93
Clarkway Trib A	Reach1	1561.256	50-year	23.72	239.10	240.24	240.08	240.32	0.005807	1.99	31.46	70.05	0.67	0.43	0.66	0.75	36.83
Clarkway Trib A	Reach1	1561.256	100-year	26.87	239.10	240.29	240.11	240.38	0.005542	2.02	35.47	73.53	0.66	0.45	0.68	0.76	40.64
Clarkway Trib A	Reach1	1561.256	Regional	26.12	239.10	240.28	240.09	240.37	0.005500	2.00	34.74	72.64	0.65	0.44	0.67	0.75	42.02
Clarkway Trib A	Reach1	1561.120	2-year	7.90	238.71	239.37	239.16	239.40	0.002420	0.83	13.01	36.64	0.39	0.15	0.29	0.61	14.02
Clarkway Trib A	Reach1	1561.120	5-year	13.09	238.71	239.50	239.26	239.55	0.002687	1.03	18.06	40.54	0.43	0.22	0.35	0.72	20.32
Clarkway Trib A	Reach1	1561.120	10-year	16.36	238.71	239.57	239.31	239.63	0.002798	1.14	20.95	42.90	0.45	0.25	0.39	0.78	24.67
Clarkway Trib A	Reach1	1561.120	25-year	20.55	238.71	239.65	239.38	239.71	0.002966	1.26	24.29	45.06	0.47	0.28	0.43	0.85	29.48
Clarkway Trib A	Reach1	1561.120	50-year	23.72	238.71	239.70	239.42	239.78	0.003073	1.34	26.77	47.83	0.48	0.29	0.45	0.89	32.94
Clarkway Trib A	Reach1	1561.120	100-year	26.87	238.71	239.75	239.45	239.83	0.003176	1.42	29.10	49.61	0.50	0.31	0.48	0.92	36.31
Clarkway Trib A	Reach1	1561.120	Regional	26.12	238.71	239.74	239.45	239.82	0.003205	1.41	28.37	49.11	0.50	0.31	0.47	0.92	37.79
Clarkway Trib A	Reach1	1560.977	2-year	7.90	238.53	238.89	238.73	238.91	0.005066	0.95	16.23	59.71	0.51	0.37	0.35	0.49	11.92
Clarkway Trib A	Reach1	1560.977	5-year	13.09	238.53	239.00	238.81	239.03	0.005172	1.15	23.04	67.05	0.54	0.44	0.41	0.57	17.38
Clarkway Trib A	Reach1	1560.977	10-year	16.36	238.53	239.06	238.85	239.09	0.005146	1.24	27.22	72.01	0.55	0.46	0.43	0.60	21.22
Clarkway Trib A	Reach1	1560.977	25-year	20.55	238.53	239.12	238.90	239.17	0.005032	1.33	32.27	76.01	0.56	0.50	0.46	0.64	25.43
Clarkway Trib A	Reach1	1560.977	50-year	23.72	238.53	239.17	238.93	239.21	0.005055	1.40	35.70	78.62	0.56	0.52	0.48	0.66	28.47
Clarkway Trib A	Reach1	1560.977	100-year	26.87	238.53	239.21	238.96	239.26	0.005026	1.46	39.12	81.13	0.57	0.55	0.49	0.69	31.42
Clarkway Trib A	Reach1	1560.977	Regional	26.12	238.53	239.22	238.95	239.26	0.004631	1.41	39.47	81.38	0.55	0.53	0.47	0.66	32.94
Clarkway Trib A	Reach1	1560.88	2-year	8.25	237.95	238.49	238.32	238.52	0.003035	0.97	19.81	90.85	0.45	0.29	0.20	0.42	10.08
Clarkway Trib A	Reach1	1560.88	5-year	13.58	237.95	238.60	238.47	238.63	0.003114	1.12	29.73	100.28	0.47	0.33	0.27	0.46	14.68
Clarkway Trib A	Reach1	1560.88	10-year	16.99	237.95	238.64	238.50	238.68	0.003334	1.22	34.59	104.59	0.49	0.36	0.31	0.49	18.07
Clarkway Trib A	Reach1	1560.88	25-year	21.49	237.95	238.70	238.55	238.74	0.003541	1.33	40.52	108.76	0.51	0.39	0.35	0.53	21.71
Clarkway Trib A	Reach1	1560.88	50-year	24.90	237.95	238.74	238.58	238.78	0.003595	1.39	45.03	111.50	0.52	0.40	0.38	0.55	24.34
Clarkway Trib A	Reach1	1560.88	100-year	28.31	237.95	238.77	238.60	238.82	0.003726	1.46	48.94	114.00	0.53	0.42	0.41	0.58	26.92
Clarkway Trib A	Reach1	1560.88	Regional	29.74	237.95	238.79	238.61	238.84	0.003755	1.49	50.62	115.05	0.54	0.43	0.42	0.59	28.33
Clarkway Trib A	Reach1	1560.685	2-year	8.25	236.78	237.11	237.11	237.19	0.019340	1.33	6.37	35.16	0.96	0.27		1.30	7.29
Clarkway Trib A	Reach1	1560.685	5-year	13.58	236.78	237.18	237.18	237.30	0.017679	1.54	9.76	56.87	0.97	0.22		1.39	10.47
Clarkway Trib A	Reach1	1560.685	10-year	16.99	236.78	237.23	237.23	237.35	0.015155	1.59	12.88	72.12	0.92	0.26		1.32	13.01
Clarkway Trib A	Reach1	1560.685	25-year	21.49	236.78	237.28	237.28	237.41	0.013401	1.66	17.13	89.11	0.89	0.30	0.09	1.25	15.57
Clarkway Trib A	Reach1	1560.685	50-year	24.90	236.78	237.31	237.31	237.45	0.013146	1.73	19.97	98.95	0.89	0.32	0.14	1.25	17.42
Clarkway Trib A	Reach1	1560.685	100-year	28.31	236.78	237.35	237.35	237.49	0.012346	1.77	23.38	109.58	0.88	0.34	0.18	1.21	19.22
Clarkway Trib A	Reach1	1560.685	Regional	29.74	236.78	237.36	237.36	237.50	0.012205	1.80	24.68	113.27	0.87	0.35	0.19	1.21	20.31
Clarkway Trib A	Reach1	1560.6	2-year	8.25	236.23	236.67		236.68	0.002020	0.65	23.70	81.18	0.35	0.25	0.17	0.35	6.58
Clarkway Trib A	Reach1	1560.6	5-year	13.58	236.23	236.80		236.82	0.001751	0.75	34.66	85.76	0.34	0.28	0.22	0.39	9.42

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
Clarkway Trib A	Reach1	1560.6	10-year	16.99	236.23	236.87		236.89	0.001692	0.80	40.74	88.39	0.34	0.31	0.24	0.42	11.74
Clarkway Trib A	Reach1	1560.6	25-year	21.49	236.23	236.96		236.98	0.001582	0.85	48.84	91.78	0.34	0.32	0.26	0.44	14.01
Clarkway Trib A	Reach1	1560.6	50-year	24.90	236.23	237.03		237.05	0.001518	0.89	54.76	94.43	0.34	0.34	0.27	0.45	15.65
Clarkway Trib A	Reach1	1560.6	100-year	28.31	236.23	237.09		237.11	0.001463	0.92	60.60	97.24	0.33	0.35	0.28	0.47	17.23
Clarkway Trib A	Reach1	1560.6	Regional	29.74	236.23	237.11		237.13	0.001445	0.94	62.97	98.36	0.33	0.35	0.28	0.47	18.23
Clarkway Trib A	Reach1	1560.57	2-year	8.25	235.97	236.36	236.35	236.48	0.014364	1.73	7.46	29.19	0.92	0.42	0.55	1.11	5.87
Clarkway Trib A	Reach1	1560.57	5-year	13.58	235.97	236.49	236.46	236.64	0.012069	1.96	11.60	33.93	0.89	0.49	0.62	1.17	8.36
Clarkway Trib A	Reach1	1560.57	10-year	16.99	235.97	236.57	236.52	236.72	0.010893	2.04	14.23	35.76	0.87	0.54	0.66	1.19	10.48
Clarkway Trib A	Reach1	1560.57	25-year	21.49	235.97	236.66		236.82	0.009914	2.15	17.50	37.55	0.85	0.59	0.70	1.23	12.49
Clarkway Trib A	Reach1	1560.57	50-year	24.90	235.97	236.72		236.89	0.009485	2.23	19.80	38.80	0.84	0.63	0.73	1.26	13.94
Clarkway Trib A	Reach1	1560.57	100-year	28.31	235.97	236.78		236.96	0.009047	2.29	22.14	40.11	0.83	0.64	0.76	1.28	15.33
Clarkway Trib A	Reach1	1560.57	Regional	29.74	235.97	236.80		236.98	0.009000	2.33	22.99	40.53	0.83	0.65	0.78	1.29	16.26
Clarkway Trib A	Reach1	1560.5	2-year	8.25	235.24	235.77	235.57	235.81	0.003459	1.07	12.74	32.53	0.48	0.28	0.41	0.65	4.82
Clarkway Trib A	Reach1	1560.5	5-year	13.58	235.24	235.91	235.68	235.97	0.003833	1.32	17.37	34.29	0.52	0.38	0.51	0.78	6.85
Clarkway Trib A	Reach1	1560.5	10-year	16.99	235.24	235.98	235.74	236.05	0.004018	1.45	19.95	35.21	0.55	0.43	0.57	0.85	8.70
Clarkway Trib A	Reach1	1560.5	25-year	21.49	235.24	236.07	235.82	236.15	0.004240	1.61	23.00	36.07	0.57	0.48	0.63	0.93	10.38
Clarkway Trib A	Reach1	1560.5	50-year	24.90	235.24	236.13	235.86	236.23	0.004341	1.71	25.23	36.64	0.59	0.52	0.67	0.99	11.60
Clarkway Trib A	Reach1	1560.5	100-year	28.31	235.24	236.19	235.91	236.29	0.004426	1.80	27.37	37.20	0.60	0.55	0.71	1.03	12.76
Clarkway Trib A	Reach1	1560.5	Regional	29.74	235.24	236.21	235.93	236.32	0.004426	1.83	28.31	37.45	0.60	0.56	0.72	1.05	13.60
Clarkway Trib A	Reach1	1519.898	2-year	8.25	234.49	234.97	234.92	235.05	0.008625	1.45	9.80	37.50	0.73	0.45	0.39	0.84	3.15
Clarkway Trib A	Reach1	1519.898	5-year	13.58	234.49	235.11	235.02	235.20	0.007301	1.62	15.15	40.95	0.70	0.51	0.48	0.90	4.45
Clarkway Trib A	Reach1	1519.898	10-year	16.99	234.49	235.17	235.07	235.27	0.007348	1.75	17.80	42.38	0.72	0.56	0.53	0.95	5.92
Clarkway Trib A	Reach1	1519.898	25-year	21.49	234.49	235.26	235.13	235.37	0.006869	1.85	21.64	44.39	0.71	0.60	0.58	0.99	7.09
Clarkway Trib A	Reach1	1519.898	50-year	24.90	234.49	235.32	235.18	235.44	0.006752	1.94	24.24	45.74	0.71	0.63	0.61	1.03	7.95
Clarkway Trib A	Reach1	1519.898	100-year	28.31	234.49	235.37	235.22	235.50	0.006781	2.03	26.64	47.36	0.72	0.66	0.64	1.06	8.77
Clarkway Trib A	Reach1	1519.898	Regional	29.74	234.49	235.38	235.23	235.52	0.006908	2.07	27.40	47.62	0.73	0.67	0.66	1.09	9.49
Clarkway Trib A	Reach1	1430.348	2-year	8.25	234.00	234.51		234.56	0.004135	1.13	13.45	38.99	0.52	0.37	0.16	0.61	2.18
Clarkway Trib A	Reach1	1430.348	5-year	13.58	234.00	234.62		234.69	0.005136	1.44	17.81	41.82	0.60	0.48	0.26	0.76	3.07
Clarkway Trib A	Reach1	1430.348	10-year	16.99	234.00	234.72		234.78	0.004564	1.50	21.83	44.14	0.58	0.50	0.30	0.78	4.25
Clarkway Trib A	Reach1	1430.348	25-year	21.49	234.00	234.80		234.88	0.004766	1.66	25.89	48.95	0.60	0.53	0.35	0.83	5.09
Clarkway Trib A	Reach1	1430.348	50-year	24.90	234.00	234.86		234.95	0.004791	1.75	28.95	51.44	0.61	0.55	0.38	0.86	5.72
Clarkway Trib A	Reach1	1430.348	100-year	28.31	234.00	234.92		235.02	0.004676	1.81	32.10	53.03	0.61	0.58	0.40	0.88	6.31
Clarkway Trib A	Reach1	1430.348	Regional	29.74	234.00	234.97		235.06	0.004176	1.77	34.69	54.28	0.58	0.57	0.39	0.86	6.88
Clarkway Trib A	Reach1-DS-0	1651	2-year	10.86	233.59	233.88		233.90	0.006221	0.98	21.02	70.12	0.58	0.44	0.45	0.52	54.42
Clarkway Trib A	Reach1-DS-0	1651	5-year	17.72	233.59	234.02		234.04	0.004953	1.13	30.78	74.32	0.56	0.49	0.48	0.58	74.62
Clarkway Trib A	Reach1-DS-0	1651	10-year	29.77	233.59	234.21		234.24	0.004027	1.31	45.49	77.79	0.53	0.56	0.53	0.65	106.66
Clarkway Trib A	Reach1-DS-0	1651	25-year	37.92	233.59	234.33		234.37	0.003648	1.40	54.73	79.76	0.52	0.60	0.56	0.69	127.51
Clarkway Trib A	Reach1-DS-0	1651	50-year	44.13	233.59	234.41		234.45	0.003421	1.46	61.52	81.11	0.52	0.62	0.58	0.72	143.25
Clarkway Trib A	Reach1-DS-0	1651	100-year	50.35	233.59	234.49		234.53	0.003290	1.52	67.78	82.33	0.51	0.64	0.60	0.74	159.00
Clarkway Trib A	Reach1-DS-0	1651	Regional	56.84	233.59	234.57		234.61	0.003146	1.57	74.22	83.12	0.51	0.66	0.62	0.77	193.89
Clarkway Trib A	Reach1-DS-0	1580	2-year	10.86	232.98	233.50		233.54	0.005495	1.22	15.22	37.18	0.59	0.15	0.51	0.71	53.30
Clarkway Trib A	Reach1-DS-0	1580	5-year	17.72	232.98	233.64		233.71	0.005826	1.51	20.58	39.92	0.63	0.25	0.61	0.86	73.03
Clarkway Trib A	Reach1-DS-0	1580	10-year	29.77	232.98	233.84		233.94	0.005893	1.86	29.03	43.61	0.67	0.37	0.73	1.03	104.35
Clarkway Trib A	Reach1-DS-0	1580	25-year	37.92	232.98	233.96		234.08	0.005853	2.03	34.27	45.47	0.68	0.43	0.79	1.11	124.75
Clarkway Trib A	Reach1-DS-0	1580	50-year	44.13	232.98	234.04		234.17	0.005847	2.15	37.92	46.35	0.69	0.47	0.84	1.16	140.16
Clarkway Trib A	Reach1-DS-0	1580	100-year	50.35	232.98	234.11		234.26	0.005836	2.25	41.43	47.17	0.70	0.50	0.88	1.22	155.61
Clarkway Trib A	Reach1-DS-0	1580	Regional	56.84	232.98	234.19		234.34	0.005820	2.36	45.04	48.18	0.71	0.53	0.92	1.26	190.19
Clarkway Trib A	Reach1-DS-0	1573	2-year	10.86	232.49	232.89	232.89	233.05	0.028567	2.17	7.68	26.64	1.26	0.22	0.93	1.41	52.78
Clarkway Trib A	Reach1-DS-0	1573	5-year	17.72	232.49	233.02	233.02	233.23	0.021906	2.44	11.68	30.90	1.18	0.40	0.98	1.52	72.29
Clarkway Trib A	Reach1-DS-0	1573	10-year	29.77	232.49	233.20	233.20	233.47	0.019719	2.89	17.23	34.01	1.18	0.60	1.13	1.73	103.30
Clarkway Trib A	Reach1-DS-0	1573	25-year	37.92	232.49	233.30	233.30	233.61	0.018433	3.10	20.83	35.75	1.17	0.69	1.21	1.82	123.49
Clarkway Trib A	Reach1-DS-0	1573	50-year	44.13	232.49	233.37	233.37	233.71	0.017841	3.25	23.41	36.91	1.17	0.75	1.26	1.89	138.76
Clarkway Trib A	Reach1-DS-0	1573	100-year	50.35	232.49	233.44	233.44	233.80	0.017299	3.38	25.94	37.96	1.17	0.80	1.30	1.94	154.08
Clarkway Trib A	Reach1-DS-0	1573	Regional	56.84	232.49	233.50	233.50	233.90	0.016930	3.51	28.46	38.98	1.17	0.85	1.34	2.00	188.52
Clarkway Trib A	Reach1-DS-0	1534	2-year	10.86	230.44	231.57		231.59	0.000504	0.60	31.85	61.36	0.20	0.18	0.12	0.34	49.30
Clarkway Trib A	Reach1-DS-0	1534	5-year	17.72	230.44	231.81		231.82	0.000540	0.72	48.44	78.00	0.22	0.19	0.17	0.37	67.01
Clarkway Trib A	Reach1-DS-0	1534	10-year	29.77	230.44	232.09		232.11	0.000566	0.86	72.22	88.17	0.23	0.24	0.23	0.41	95.44
Clarkway Trib A	Reach1-DS-0	1534	25-year	37.92	230.44	232.28		232.30	0.000541	0.91	89.74	102.87	0.23	0.26	0.25	0.42	113.78
Clarkway Trib A	Reach1-DS-0	1534	50-year	44.13	230.44	232.40		232.43	0.000552	0.97	103.59	111.63	0.23	0.25	0.26	0.43	127.61
Clarkway Trib A	Reach1-DS-0	1534	100-year	50.35	230.44	232.53		232.55	0.000513	0.98	117.63	113.50	0.23	0.26	0.27	0.43	141.46
Clarkway Trib A	Reach1-DS-0	1534	Regional	56.84	230.44	232.63		232.66	0.000500	1.00	129.86	114.85	0.23	0.28	0.28	0.44	174.61
Clarkway Trib A	Reach1-DS-0	1528	2-year	10.86	229.70	231.53		231.57	0.001512	0.95	17.67	28.72	0.33	0.13	0.32	0.61	48.76
Clarkway Trib A	Reach1-DS-0	1528	5-year	17.72	229.70	231.75		231.80	0.001767	1.19	24.39	34.27	0.37	0.19	0.39	0.73	66.21
Clarkway Trib A	Reach1-DS-0	1528	10-year	29.77	229.70	232.01		232.09	0.002122	1.51	33.78	37.96	0.42	0.30	0.52	0.88	94.27
Clarkway Trib A	Reach1-DS-0	1528	25-year	37.92	229.70	232.18		232.27	0.002174	1.65	40.66	41.96	0.43	0.34	0.56	0.93	112.34
Clarkway Trib A	Reach1-DS-0	1528	50-year	44.13	229.70	232.30		232.40	0.002180	1.74	45.86	44.28	0.44	0.38	0.58	0.96	125.96
Clarkway Trib A	Reach1-DS-0	1528	100-year	50.35	229.70	232.42		232.53	0.002138	1.81	51.22	46.38	0.44	0.40	0.61	0.98	139.60
Clarkway Trib A	Reach1-DS-0	1528	Regional	56.84	229.70	232.51		232.63	0.002196	1.90	55.83	48.37	0.45	0.42	0.64	1.02	172.56
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	2-year	15.16	230.28	231.46		231.49	0.002874	0.63	23.10	40.45	0.21	0.34	0.77	0.66	48.03
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	5-year	23.59	230.28	231.68		231.71	0.002847	0.72	32.37	43.92	0.21	0.43	0.84	0.73	65.19
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	10-year	36.11	230.28	231.95		231.99	0.002778	0.82	44.58	47.44	0.22	0.53	0.93	0.81	92.87
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	25-year	45.61	230.28	232.13		232.17	0.002701	0.87	53.24	49.47	0.22	0.58	0.98	0.86	110.66
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	50-year	52.72	230.28	232.25		232.30	0.002636	0.91	59.52	50.78	0.22	0.61	1.01	0.89	124.08
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	100-year	60.09	230.28	232.38		232.42	0.002582	0.94	65.83	52.17	0.22	0.64	1.04	0.91	137.51
Clarkway Trib A	Reach1-DS-0	1516.384 43.06-11	Regional	66.56	230.28	232.48		232.53	0.002536	0.96	71.24	53.24	0.22	0.66	1.06	0.93	170.29
Clarkway Trib A	Reach1-DS-0	1516.312	2-year	15.16	230.49	231.36		231.41	0.001565	1.00	22.38	40.68	0.35	0.27	0.23	0.68	47.15
Clarkway Trib A	Reach1-DS-0	1516.312	5-year	23.59	230.49	231.57		231.63	0.001572	1.16	31.34	43.73	0.36	0.34	0.29	0.75	63.96
Clarkway Trib A	Reach1-DS-0	1516.312	10-year	36.11	230.49	231.83		231.90	0.001577	1.35	43.12	47.62	0.38	0.42	0.34	0.84	91.17
Clarkway Trib A	Reach1-DS-0	1516.312	25-year	45.61	230.49	232.01		232.09	0.001557	1.46	51.64	50.26	0.38	0.46	0.37	0.88	108.64
Clarkway Trib A	Reach1-DS-0	1516.312	50-year	52.72	230.49	232.13		232.22	0.001521	1.52	57.93	51.43	0.38	0.49	0.40	0.91	121.80
Clarkway Trib A	Reach1-DS-0	1516.312	100-year	60.09	230.49	232.25		232.34	0.001494	1.58	64.22	52.77	0.39	0.51	0.42	0.94	135.00
Clarkway Trib A	Reach1-DS-0	1516.312	Regional	66.56	230.49	232.35		232.45	0.001475	1.63	69.59	54.00	0.39	0.53	0.44	0.96	167.57
Clarkway Trib A	Reach1-DS-0	1516.276	2-year	15.16	230.20	230.99	230.99	231.21	0.015025	2.82	11.64	45.06	1.03	0.95	0.76	1.30	46.33
Clarkway Trib A	Reach1-DS-0	1516.276	5-year	23.59	230.20	231.15	231.15	231.42	0.015628	3.26	15.67	47.63	1.09	1.17	0.95	1.51	62.81
Clarkway Trib A	Reach1-DS-0	1516.276	10-year	36.11	230.20	231.34	231.34	231.68	0.016331	3.77	20.53	50.67	1.15	1.42	1.19	1.76	89.60
Clarkway Trib A	Reach1-DS-0	1516.276	25-year	45.61	230.20	231.45	231.45	231.85	0.017016	4.11	23.57	52.61	1.19	1.58	1.36	1.94	106.77
Clarkway Trib A	Reach1-DS-0	1516.276	50-year	52.72	230.20	231.53	231.53	231.96	0.017714	4.36	25.53	53.75	1.23	1.69	1.48	2.06	119.73
Clarkway Trib A	Reach1-DS-0	1516.276	100-year	60.09	230.20	231.61	231.61	232.08	0.018076	4.58	27.57	54.82	1.25	1.79	1.58	2.18	132.71
Clarkway Trib A	Reach1-DS-0	1516.276	Regional	66.56	230.20	231.68	231.68	232.18	0.018198	4.75	29.36	55.78	1.26	1.87	1.67	2.27	165.10
Clarkway Trib A	Reach1-DS-0	1516.245		Culvert													
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	2-year	15.16	229.48	230.52	230.37	230.63	0.005210	1.64	13.47	54.50	0.62	0.57	0.46	1.13	45.58
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	5-year	23.59	229.48	230.64	230.51	230.82	0.007163	2.13	16.34	59.99	0.74	0.77	0.65	1.44	61.86
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	10-year	36.11	229.48	230.81	230.70	231.07	0.008287	2.59	20.66	64.99	0.82	0.99	0.85	1.75	88.36
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	25-year	45.61	229.48	230.92	230.82	231.24	0.009088	2.91	23.34	67.24	0.88	1.13	0.99	1.95	105.34
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	50-year	52.72	229.48	230.99	230.90	231.36	0.009683	3.13	25.10	68.88	0.91	1.23	1.09	2.10	118.17
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	100-year	60.09	229.48	231.06	230.98	231.48	0.010079	3.32	26.96	71.31	0.94	1.32	1.17	2.23	131.02
Clarkway Trib A	Reach1-DS-0	1516.214 43.06-10	Regional	66.56	229.48	231.13	231.06	231.58	0.010249	3.47	28.62	73.49	0.96	1.39	1.24	2.33	163.29
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	2-year	15.16	229.11	230.12	230.01	230.29	0.007192	2.11	15.68	51.37	0.74	0.34	0.44	0.97	44.56
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	5-year	23.59	229.11	230.32	230.25	230.46	0.005567	2.14	26.49	58.28	0.67	0.46	0.52	0.89	60.36
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	10-year	36.11	229.11	230.48	230.39	230.65	0.006106	2.47	36.17	62.69	0.72	0.59	0.64	1.00	86.31
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	25-year	45.61	229.11	230.60	230.47	230.78	0.005978	2.61	44.15	67.29	0.73	0.66	0.69	1.03	102.88
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	50-year	52.72	229.11	230.69	230.53	230.87	0.005774	2.68	50.48	71.38	0.72	0.70	0.71	1.04	115.41
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	100-year	60.09	229.11	230.78	230.59	230.96	0.005758	2.78	57.12	82.25	0.73	0.75	0.70	1.05	127.94
Clarkway Trib A	Reach1-DS-0	1516.156 43.06-09	Regional	66.56	229.11	230.85	230.61	231.05	0.005872	2.90	63.25	89.05	0.74	0.79	0.68	1.05	159.92
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	2-year	15.16	228.87	229.98		230.04	0.002670	1.40	25.75	60.43	0.46	0.38	0.27	0.59	43.46
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	5-year	23.59	228.87	230.21		230.26	0.002035	1.42	40.60	65.46	0.42	0.43	0.33	0.58	58.59

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	10-year	36.11	228.87	230.30		230.39	0.003353	1.91	46.36	67.30	0.54	0.60	0.46	0.78	84.13
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	25-year	45.61	228.87	230.42		230.52	0.003392	2.04	54.76	69.12	0.55	0.66	0.52	0.83	100.27
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	50-year	52.72	228.87	230.52		230.62	0.003302	2.11	61.59	71.53	0.55	0.70	0.55	0.86	112.46
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	100-year	60.09	228.87	230.62		230.72	0.003179	2.16	68.57	72.89	0.55	0.73	0.58	0.88	124.63
Clarkway Trib A	Reach1-DS-0	1516.103 43.06-08	Regional	66.56	228.87	230.70		230.80	0.003092	2.20	74.46	73.94	0.54	0.75	0.60	0.89	156.29
Clarkway Trib A	Reach1-DS-0	1516.043	2-year	15.16	228.72	229.93		229.96	0.000666	0.79	35.22	55.31	0.24	0.15	0.21	0.43	41.68
Clarkway Trib A	Reach1-DS-0	1516.043	5-year	23.59	228.72	230.16		230.19	0.000718	0.93	48.31	59.33	0.26	0.18	0.27	0.49	55.99
Clarkway Trib A	Reach1-DS-0	1516.043	10-year	36.11	228.72	230.19		230.25	0.001554	1.38	49.82	59.79	0.38	0.26	0.41	0.72	81.32
Clarkway Trib A	Reach1-DS-0	1516.043	25-year	45.61	228.72	230.29		230.37	0.001807	1.56	56.14	61.15	0.41	0.31	0.47	0.81	97.03
Clarkway Trib A	Reach1-DS-0	1516.043	50-year	52.72	228.72	230.39		230.47	0.001855	1.65	61.94	62.36	0.42	0.34	0.51	0.85	108.84
Clarkway Trib A	Reach1-DS-0	1516.043	100-year	60.09	228.72	230.48		230.58	0.001882	1.73	67.87	63.42	0.43	0.37	0.55	0.89	120.64
Clarkway Trib A	Reach1-DS-0	1516.043	Regional	66.56	228.72	230.56		230.66	0.001901	1.79	72.87	64.26	0.43	0.39	0.57	0.91	151.98
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	2-year	15.16	228.60	229.60	229.60	229.84	0.010295	2.63	12.10	46.12	0.90	0.65	0.69	1.25	40.04
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	5-year	23.59	228.60	229.79	229.79	230.06	0.010306	3.00	17.51	51.39	0.93	0.80	0.76	1.35	53.69
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	10-year	36.11	228.60	230.00	230.00	230.10	0.004640	2.27	41.75	57.11	0.64	0.64	0.68	0.86	78.65
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	25-year	45.61	228.60	230.05	230.00	230.19	0.006255	2.70	44.35	57.91	0.75	0.76	0.82	1.03	94.10
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	50-year	52.72	228.60	230.16	230.00	230.29	0.005684	2.71	50.76	59.37	0.72	0.78	0.85	1.04	105.55
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	100-year	60.09	228.60	230.26	230.00	230.40	0.005398	2.76	56.88	61.58	0.71	0.79	0.88	1.06	116.99
Clarkway Trib A	Reach1-DS-0	1515.984 43.06-07	Regional	66.56	228.60	230.34	230.03	230.48	0.005217	2.81	62.04	63.48	0.71	0.79	0.91	1.07	148.04
Clarkway Trib A	Reach1-DS-0	1515.899	2-year	15.16	228.23	229.12		229.19	0.002572	1.28	18.59	33.28	0.45	0.25	0.36	0.82	38.36
Clarkway Trib A	Reach1-DS-0	1515.899	5-year	23.59	228.23	229.34		229.42	0.002557	1.49	25.95	36.19	0.46	0.26	0.46	0.91	51.33
Clarkway Trib A	Reach1-DS-0	1515.899	10-year	36.11	228.23	229.52		229.65	0.003205	1.85	32.92	39.67	0.53	0.31	0.59	1.10	75.50
Clarkway Trib A	Reach1-DS-0	1515.899	25-year	45.61	228.23	229.65		229.81	0.003441	2.06	38.29	42.10	0.56	0.36	0.66	1.19	90.62
Clarkway Trib A	Reach1-DS-0	1515.899	50-year	52.72	228.23	229.75		229.92	0.003565	2.19	42.37	45.84	0.58	0.34	0.71	1.24	101.63
Clarkway Trib A	Reach1-DS-0	1515.899	100-year	60.09	228.23	229.83		230.02	0.003670	2.31	46.67	50.07	0.59	0.34	0.76	1.29	112.63
Clarkway Trib A	Reach1-DS-0	1515.899	Regional	66.56	228.23	229.90		230.11	0.003764	2.41	50.27	52.30	0.60	0.37	0.80	1.32	143.31
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	2-year	15.16	227.73	228.88		228.89	0.002401	0.58	33.08	53.86	0.19	0.29	0.45	0.46	35.41
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	5-year	23.59	227.73	229.12		229.13	0.002173	0.65	46.68	60.30	0.19	0.35	0.50	0.51	47.17
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	10-year	36.11	227.73	229.16		229.19	0.004383	0.94	49.32	61.74	0.27	0.52	0.72	0.73	70.80
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	25-year	45.61	227.73	229.30		229.33	0.004341	1.00	57.94	64.51	0.27	0.56	0.78	0.79	85.11
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	50-year	52.72	227.73	229.39		229.43	0.004318	1.05	64.41	67.28	0.28	0.60	0.82	0.82	95.52
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	100-year	60.09	227.73	229.49		229.52	0.004276	1.08	70.60	68.85	0.28	0.63	0.85	0.85	105.92
Clarkway Trib A	Reach1-DS-0	1515.784 43.06-06	Regional	66.56	227.73	229.56		229.60	0.004299	1.12	75.52	70.12	0.28	0.66	0.88	0.88	136.11
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	2-year	15.16	226.41	228.23	227.32	228.27	0.004344	0.87	17.50	59.72	0.26	0.09	0.15	0.87	28.34
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	5-year	23.59	226.41	228.15	227.55	228.26	0.013265	1.46	16.19	56.25	0.45	0.09	0.15	1.46	39.24
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	10-year	36.11	226.41	228.45	227.84	228.47	0.003218	0.85	54.16	63.62	0.23	0.56	0.26	0.67	60.91
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	25-year	45.61	226.41	228.58	228.03	228.61	0.003285	0.91	62.71	64.67	0.24	0.63	0.32	0.73	73.60
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	50-year	52.72	226.41	228.66	228.16	228.69	0.003462	0.97	67.80	65.38	0.25	0.68	0.36	0.78	82.91
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	100-year	60.09	226.41	228.74	228.23	228.77	0.003606	1.02	72.95	66.21	0.25	0.73	0.40	0.82	92.23
Clarkway Trib A	Reach1-DS-0	1515.584 43.06-05	Regional	66.56	226.41	228.80	228.23	228.84	0.003712	1.06	77.33	66.91	0.26	0.77	0.43	0.86	121.54
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	2-year	15.16	226.38	226.89		226.95	0.013191	1.98	18.09	48.78	0.92	0.63	0.78	0.84	22.87
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	5-year	23.59	226.38	226.97	226.86	227.07	0.016625	2.48	22.30	49.87	1.06	0.81	1.00	1.06	33.81
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	10-year	36.11	226.38	227.06	226.98	227.21	0.022733	3.19	26.61	51.62	1.27	1.04	1.29	1.36	53.43
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	25-year	45.61	226.38	227.14	227.04	227.32	0.023498	3.50	30.68	53.02	1.32	1.14	1.43	1.49	64.95
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	50-year	52.72	226.38	227.23	227.11	227.41	0.019462	3.46	35.76	53.83	1.22	1.15	1.42	1.47	73.33
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	100-year	60.09	226.38	227.31	227.16	227.49	0.017743	3.52	40.09	54.69	1.19	1.18	1.44	1.50	81.79
Clarkway Trib A	Reach1-DS-0	1515.386 43.06-04	Regional	66.56	226.38	227.38	227.20	227.56	0.016690	3.58	43.69	55.39	1.17	1.21	1.47	1.52	110.37
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	2-year	15.16	224.64	225.91		225.98	0.002821	1.30	22.69	69.94	0.46	0.24	0.29	0.67	19.29
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	5-year	23.59	224.64	226.11		226.17	0.002261	1.35	36.99	73.44	0.43	0.33	0.34	0.64	28.64
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	10-year	36.11	224.64	226.39		226.44	0.001670	1.36	58.15	79.05	0.38	0.39	0.36	0.62	46.08
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	25-year	45.61	224.64	226.58		226.63	0.001416	1.37	73.30	81.75	0.36	0.42	0.38	0.62	55.96
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	50-year	52.72	224.64	226.65		226.71	0.001534	1.47	79.05	82.76	0.38	0.46	0.41	0.67	63.42
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	100-year	60.09	224.64	226.74		226.80	0.001543	1.54	86.72	84.34	0.38	0.49	0.43	0.69	70.86
Clarkway Trib A	Reach1-DS-0	1515.185 43.06-03	Regional	66.56	224.64	226.82		226.88	0.001538	1.58	93.45	85.62	0.39	0.51	0.45	0.71	98.56
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	2-year	15.16	224.37	225.73		225.77	0.001479	1.18	30.98	69.32	0.35	0.23	0.28	0.49	16.58
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	5-year	23.59	224.37	225.96		226.00	0.001304	1.25	47.30	73.30	0.34	0.30	0.32	0.50	24.39
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	10-year	36.11	224.37	226.25		226.30	0.001200	1.37	71.34	93.46	0.34	0.32	0.38	0.51	39.55
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	25-year	45.61	224.37	226.46		226.51	0.001022	1.36	91.61	100.93	0.32	0.34	0.38	0.50	47.65
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	50-year	52.72	224.37	226.52		226.57	0.001180	1.49	97.29	105.50	0.34	0.37	0.42	0.54	54.53
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	100-year	60.09	224.37	226.61		226.66	0.001211	1.56	106.93	107.90	0.35	0.39	0.45	0.56	61.10
Clarkway Trib A	Reach1-DS-0	1515.084 43.06-02	Regional	66.56	224.37	226.68		226.74	0.001280	1.64	115.35	118.46	0.36	0.40	0.47	0.58	88.03
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	2-year	15.16	224.01	225.33	225.24	225.50	0.006677	2.17	13.75	26.81	0.71	0.59	0.53	1.10	14.37
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	5-year	23.59	224.01	225.51	225.41	225.73	0.007551	2.59	18.95	30.65	0.77	0.71	0.69	1.24	21.11
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	10-year	36.11	224.01	225.70	225.58	226.01	0.009427	3.20	25.49	39.26	0.89	0.78	0.90	1.42	34.76
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	25-year	45.61	224.01	225.77	225.69	226.22	0.012760	3.85	28.64	49.07	1.04	0.82	1.11	1.59	41.69
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	50-year	52.72	224.01	225.95	225.95	226.29	0.008959	3.50	38.11	55.58	0.89	0.78	1.06	1.38	47.83
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	100-year	60.09	224.01	226.03	226.03	226.37	0.008938	3.61	42.60	57.73	0.90	0.83	1.11	1.41	53.70
Clarkway Trib A	Reach1-DS-0	1514.985 43.06-01	Regional	66.56	224.01	226.28		226.50	0.005202	3.03	57.70	63.76	0.70	0.75	0.96	1.15	79.46
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	2-year	11.92	224.10	224.79	224.79	224.94	0.009921	2.03	11.56	39.53	0.83	0.48	0.43	1.03	13.51
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	5-year	18.93	224.10	224.89	224.89	225.09	0.011528	2.44	15.95	41.31	0.92	0.64	0.59	1.19	19.94
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	10-year	32.69	224.10	225.14		225.34	0.009134	2.64	26.48	45.02	0.86	0.78	0.75	1.23	33.02
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	25-year	40.74	224.10	225.31	225.16	225.49	0.007002	2.57	34.39	47.88	0.77	0.79	0.76	1.18	39.59
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	50-year	47.33	224.10	225.38		225.58	0.007436	2.75	37.68	49.48	0.80	0.85	0.82	1.26	45.31
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	100-year	54.35	224.10	225.43		225.66	0.008004	2.95	40.57	50.34	0.84	0.92	0.89	1.34	50.93
Clarkway Trib A	Reach1-DS-0	1514.912 43.04-11	Regional	85.95	224.10	225.67	225.55	225.99	0.009660	3.63	52.82	53.73	0.95	1.17	1.11	1.63	75.80
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	2-year	11.92	223.95	224.29		224.30	0.003145	0.33	28.87	66.07	0.18	0.33	0.45	0.41	11.34
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	5-year	18.93	223.95	224.45		224.46	0.002917	0.41	39.49	67.12	0.19	0.41	0.51	0.48	16.95
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	10-year	32.69	223.95	224.59		224.61	0.004286	0.60	49.24	67.99	0.24	0.58	0.70	0.66	28.91
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	25-year	40.74	223.95	224.52		224.56	0.009307	0.81	44.37	67.57	0.35	0.80	0.97	0.92	35.29
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	50-year	47.33	223.95	224.60		224.65	0.008684	0.85	49.77	68.04	0.34	0.84	1.00	0.95	40.53
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	100-year	54.35	223.95	224.70		224.75	0.007533	0.88	56.68	68.58	0.33	0.85	1.00	0.96	45.63
Clarkway Trib A	Reach1-DS-0	1514.788 43.04-10	Regional	85.95	223.95	225.16		225.21	0.004430	0.94	89.02	71.04	0.27	0.89	1.00	0.97	68.09
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	2-year	11.92	222.72	223.34	223.34	223.54	0.021150	2.67	9.16	26.48	1.18	0.89	0.84	1.30	9.29
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	5-year	18.93	222.72	223.47	223.47	223.73	0.022029	3.16	13.66	82.49	1.25	1.10	0.88	1.39	13.95
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	10-year	32.69	222.72	223.88	223.72	224.01	0.007089	2.48	31.87	94.78	0.77	0.87	0.77	1.03	23.43
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	25-year	40.74	222.72	224.13	223.80	224.16	0.001920	1.49	77.66	102.39	0.42	0.41	0.49	0.52	28.71
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	50-year	47.33	222.72	224.29	223.86	224.32	0.001465	1.41	94.27	105.70	0.37	0.41	0.47	0.50	32.77
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	100-year	54.35	222.72	224.45	223.92	224.47	0.001196	1.36	111.05	109.37	0.34	0.40	0.46	0.49	36.59
Clarkway Trib A	Reach1-DS-0	1514.658 43.04-09	Regional	85.95	222.72	225.02	223.97	225.04	0.000750	1.32	175.67	117.45	0.28	0.43	0.46	0.49	53.82
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	2-year	11.92	221.73	223.08		223.10	0.001563	1.17	28.90	54.36	0.36	0.36	0.29	0.41	8.10
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	5-year	18.93	221.73	223.38		223.40	0.001081	1.14	46.26	60.26	0.31	0.36	0.32	0.41	12.00
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	10-year	32.69	221.73	223.84		223.86	0.000800	1.19	78.03	73.93	0.28	0.39	0.35	0.42	19.30
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	25-year	40.74	221.73	224.07		224.09	0.000698	1.20	95.38	77.43	0.26	0.39	0.36	0.43	23.21
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	50-year	47.33	221.73	224.24		224.26	0.000648	1.22	108.45	79.50	0.26	0.40	0.38	0.44	26.31
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	100-year	54.35	221.73	224.40		224.42	0.000611	1.24	121.34	81.02	0.25	0.41	0.39	0.45	29.16
Clarkway Trib A	Reach1-DS-0	1514.585 43.04-08	Regional	85.95	221.73	224.97		225.00	0.000565	1.37	169.83	86.75	0.25	0.45	0.46	0.51	42.73
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	2-year	11.92	221.43	222.78		222.91	0.003782	1.59	7.49	8.03	0.53			1.59	6.66
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	5-year	18.93	221.43	223.02		223.22	0.005038	1.99	9.52	9.05	0.62			1.99	9.79
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	10-year	32.69	221.43	223.35		223.69	0.006430	2.57	12.84	11.06	0.72		0.24	2.55	15.70
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	25-year	40.74	221.43	223.51	223.25	223.92	0.007037	2.85	14.93	16.11	0.77		0.24	2.73	18.84
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	50-year	47.33	221.43	223.62	223.39	224.09	0.007594	3.05	16.90	19.94	0.80		0.32	2.80	21.34
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	100-year	54.35	221.43	223.72	223.60	224.25	0.007933	3.25	18.95	22.32	0.83	0.14	0.40	2.87	23.60
Clarkway Trib A	Reach1-DS-0	1514.506 43.04-07	Regional	85.95	221.43	224.17	224.17	224.82	0.007419	3.72	32.32	36.23	0.84	0.41	0.67	2.66	34.72
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	2-year	11.92	220.83	222.38		222.42	0.006966	1.06	14.86	28.70	0.33	0.35	0.49	0.80	5.62
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	5-year	18.93	220.83	222.65		222.69	0.005497	1.10	23.22	33.00	0.30	0.42	0.60	0.82	8.28
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	10-year	32.69	220.83	223.13		223.17	0.003498	1.08	40.87	39.91	0.25	0.47	0.67	0.80	13.21
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	25-year	40.74	220.83	223.35		223.39	0.003164	1.10	49.95	43.45	0.25	0.50	0.70	0.82	15.84

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	50-year	47.33	220.83	223.49		223.53	0.003144	1.15	56.00	45.73	0.25	0.54	0.73	0.85	17.97
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	100-year	54.35	220.83	223.61		223.66	0.003201	1.20	61.93	48.34	0.25	0.57	0.77	0.88	19.87
Clarkway Trib A	Reach1-DS-0	1514.414 43.04-06	Regional	85.95	220.83	223.96		224.03	0.004273	1.52	80.06	57.38	0.30	0.77	0.94	1.07	29.53
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	2-year	11.92	220.80	222.17	221.73	222.19	0.002828	0.68	25.86	50.45	0.21	0.41	0.27	0.46	4.59
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	5-year	18.93	220.80	222.54	221.88	222.55	0.001343	0.57	46.48	61.24	0.15	0.40	0.25	0.41	6.53
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	10-year	32.69	220.80	223.08	222.05	223.09	0.000775	0.54	82.07	71.74	0.12	0.41	0.28	0.40	10.10
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	25-year	40.74	220.80	223.30	222.12	223.31	0.000720	0.55	98.69	76.78	0.12	0.42	0.30	0.41	12.05
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	50-year	47.33	220.80	223.44	222.16	223.45	0.000735	0.58	109.37	80.02	0.12	0.45	0.32	0.43	13.75
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	100-year	54.35	220.80	223.57	222.21	223.58	0.000750	0.61	119.62	82.77	0.12	0.47	0.34	0.45	15.22
Clarkway Trib A	Reach1-DS-0	1514.353 43.04-05	Regional	85.95	220.80	223.90	222.39	223.91	0.001012	0.77	148.02	88.65	0.15	0.61	0.44	0.58	23.64
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	2-year	11.92	220.68	222.06	221.61	222.12	0.007759	1.30	11.66	53.05	0.37	0.94	0.60	1.02	4.41
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	5-year	18.93	220.68	222.43	221.81	222.50	0.005917	1.34	17.29	71.09	0.33	1.06	0.81	1.09	6.18
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	10-year	32.69	220.68	223.07	222.14	223.08	0.000754	0.60	78.31	95.39	0.13	0.39	0.43	0.42	9.41
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	25-year	40.74	220.68	223.30	222.27	223.31	0.000529	0.53	111.86	107.52	0.11	0.36	0.32	0.36	11.22
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	50-year	47.33	220.68	223.43	222.36	223.44	0.000496	0.53	133.00	111.99	0.10	0.36	0.30	0.36	12.81
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	100-year	54.35	220.68	223.56	222.46	223.57	0.000496	0.55	145.09	116.25	0.11	0.38	0.32	0.37	14.19
Clarkway Trib A	Reach1-DS-0	1514.345 43.04-04	Regional	85.95	220.68	223.89	222.84	223.90	0.000648	0.68	191.11	135.02	0.12	0.49	0.36	0.45	22.35
Clarkway Trib A	Reach1-DS-0	1514.331 x-80 (43.04-03)		Culvert													
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	2-year	11.92	220.59	221.73	221.73	222.10	0.012502	2.80	5.31	71.96	0.95	0.73	0.21	2.25	3.97
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	5-year	18.93	220.59	222.07	222.07	222.44	0.008851	2.93	9.93	89.37	0.85	0.79	0.51	1.91	5.61
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	10-year	32.69	220.59	222.41	222.41	222.90	0.009376	3.54	15.04	97.96	0.91	1.11	0.88	2.17	8.54
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	25-year	40.74	220.59	222.58	222.58	223.13	0.009489	3.82	17.60	101.57	0.93	1.26	1.04	2.31	9.89
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	50-year	47.33	220.59	222.70	222.70	223.30	0.009712	4.04	19.42	103.83	0.95	1.36	1.15	2.44	11.14
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	100-year	54.35	220.59	222.81	222.81	223.48	0.009957	4.27	21.21	105.86	0.97	1.47	1.27	2.56	12.15
Clarkway Trib A	Reach1-DS-0	1514.312 43.04-02	Regional	85.95	220.59	223.10	223.10	223.89	0.011460	5.02	36.13	113.94	1.07	1.30	1.60	2.38	19.20
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	2-year	11.92	220.50	221.68		221.71	0.012206	1.33	18.62	75.34	0.43	0.53	0.52	0.64	3.87
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	5-year	18.93	220.50	221.80		221.83	0.010455	1.33	28.25	82.81	0.40	0.61	0.59	0.67	5.40
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	10-year	32.69	220.50	221.98		222.02	0.008095	1.30	44.11	86.39	0.36	0.67	0.69	0.74	8.19
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	25-year	40.74	220.50	222.08		222.11	0.007602	1.32	52.45	90.28	0.36	0.71	0.74	0.78	9.47
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	50-year	47.33	220.50	222.15		222.19	0.007056	1.31	59.33	92.14	0.35	0.73	0.76	0.80	10.66
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	100-year	54.35	220.50	222.22		222.26	0.006838	1.33	65.79	94.25	0.34	0.76	0.80	0.83	11.62
Clarkway Trib A	Reach1-DS-0	1514.306 43.04-01	Regional	85.95	220.50	222.62		222.66	0.004127	1.21	105.07	106.05	0.28	0.74	0.81	0.82	18.46
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	2-year	11.92	220.38	221.44		221.45	0.002638	0.64	33.34	85.13	0.20	0.35	0.33	0.36	2.53
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	5-year	18.93	220.38	221.55		221.56	0.002973	0.73	43.02	85.86	0.22	0.43	0.41	0.44	3.57
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	10-year	32.69	220.38	221.76		221.78	0.002855	0.81	61.22	86.92	0.22	0.51	0.52	0.53	5.49
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	25-year	40.74	220.38	221.86		221.88	0.002945	0.86	69.48	87.31	0.23	0.55	0.57	0.59	6.35
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	50-year	47.33	220.38	221.95		221.97	0.002838	0.87	77.09	87.65	0.23	0.57	0.60	0.61	7.17
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	100-year	54.35	220.38	222.01		222.04	0.002954	0.92	82.92	87.92	0.23	0.61	0.64	0.66	7.82
Clarkway Trib A	Reach1-DS-0	1514.247 43.02-13	Regional	85.95	220.38	222.49		222.51	0.001962	0.89	125.45	91.34	0.20	0.57	0.68	0.69	12.57
Reach 2	Reach 2	1105	2-year	2.70	237.49	238.27		238.32	0.003433	0.98	2.81	8.27	0.49	0.13	0.17	0.96	4.39
Reach 2	Reach 2	1105	5-year	4.20	237.49	238.39	238.20	238.46	0.003412	1.16	3.99	13.37	0.51	0.25	0.21	1.05	5.88
Reach 2	Reach 2	1105	10-year	7.20	237.49	238.57	238.36	238.65	0.003113	1.34	6.61	16.94	0.52	0.25	0.45	1.09	8.51
Reach 2	Reach 2	1105	25-year	9.20	237.49	238.67	238.47	238.76	0.002823	1.41	8.75	25.43	0.50	0.30	0.51	1.05	10.10
Reach 2	Reach 2	1105	50-year	10.60	237.49	238.72	238.51	238.82	0.002928	1.49	10.10	29.16	0.52	0.29	0.53	1.05	11.19
Reach 2	Reach 2	1105	100-year	11.90	237.49	238.77	238.57	238.87	0.002757	1.51	11.66	31.48	0.51	0.34	0.55	1.02	12.18
Reach 2	Reach 2	1105	Regional	24.36	237.49	239.66		239.68	0.000359	0.86	51.95	60.00	0.21	0.38	0.32	0.47	22.93
Reach 2	Reach 2	1068	2-year	2.70	237.41	237.90	237.90	238.05	0.018963	1.70	1.59	5.48	1.01			1.70	4.31
Reach 2	Reach 2	1068	5-year	4.20	237.41	238.01	238.01	238.19	0.017913	1.89	2.22	6.42	1.01	0.11		1.89	5.77
Reach 2	Reach 2	1068	10-year	7.20	237.41	238.18	238.18	238.41	0.015359	2.15	3.47	8.93	0.99	0.33	0.18	2.08	8.33
Reach 2	Reach 2	1068	25-year	9.20	237.41	238.26	238.26	238.53	0.014979	2.35	4.23	10.69	1.00	0.40	0.27	2.17	9.86
Reach 2	Reach 2	1068	50-year	10.60	237.41	238.36	238.36	238.61	0.011151	2.26	5.56	16.87	0.89	0.41	0.25	1.91	10.90
Reach 2	Reach 2	1068	100-year	11.90	237.41	238.41	238.41	238.67	0.010668	2.32	6.42	17.81	0.88	0.43	0.32	1.85	11.84
Reach 2	Reach 2	1068	Regional	24.36	237.41	239.64		239.67	0.000456	0.94	61.82	67.55	0.21	0.21	0.26	0.39	20.80
Reach 2	Reach 2	1054	2-year	2.70	236.65	237.29	237.02	237.34	0.003069	1.00	2.70	4.78	0.43			1.00	4.28
Reach 2	Reach 2	1054	5-year	4.20	236.65	237.52	237.14	237.58	0.002861	1.09	3.86	5.71	0.42			1.09	5.72
Reach 2	Reach 2	1054	10-year	7.20	236.65	237.92	237.34	237.98	0.001744	1.13	7.02	10.11	0.35	0.18	0.17	1.03	8.25
Reach 2	Reach 2	1054	25-year	9.20	236.65	238.15	237.47	238.22	0.001370	1.15	9.86	14.35	0.32	0.19	0.19	0.93	9.76
Reach 2	Reach 2	1054	50-year	10.60	236.65	238.31	237.56	238.37	0.001180	1.15	12.49	20.19	0.31	0.16	0.20	0.85	10.77
Reach 2	Reach 2	1054	100-year	11.90	236.65	238.45	237.62	238.51	0.001011	1.13	15.69	24.89	0.29	0.18	0.20	0.76	11.69
Reach 2	Reach 2	1054	Regional	24.36	236.65	239.64	238.10	239.66	0.000246	0.81	77.79	78.24	0.16	0.16	0.19	0.31	19.82
Reach 2	Reach 2	1027		Culvert													
Reach 2	Reach 2	1018	2-year	2.70	236.60	236.98	236.98	237.17	0.020679	1.92	1.40	3.74	1.00			1.92	4.19
Reach 2	Reach 2	1018	5-year	4.20	236.60	237.11	237.11	237.36	0.020007	2.22	1.89	3.78	1.00			2.22	5.60
Reach 2	Reach 2	1018	10-year	7.20	236.60	237.33	237.33	237.69	0.019547	2.64	2.73	3.86	1.00			2.64	8.05
Reach 2	Reach 2	1018	25-year	9.20	236.60	237.46	237.46	237.87	0.019599	2.85	3.22	3.91	1.00			2.85	9.50
Reach 2	Reach 2	1018	50-year	10.60	236.60	237.55	237.55	238.00	0.019332	2.97	3.57	3.94	1.00			2.97	10.46
Reach 2	Reach 2	1018	100-year	11.90	236.60	237.62	237.62	238.10	0.019480	3.08	3.86	3.97	1.00			3.08	11.32
Reach 2	Reach 2	1018	Regional	24.36	236.60	238.83	238.22	239.21	0.008110	2.73	8.91	4.40	0.61			2.73	18.39
Reach 2	Reach 2	1008	2-year	2.70	235.58	236.28	235.99	236.34	0.003993	1.14	2.37	3.49	0.44			1.14	4.17
Reach 2	Reach 2	1008	5-year	4.20	235.58	236.51	236.13	236.60	0.004007	1.31	3.21	3.56	0.44			1.31	5.57
Reach 2	Reach 2	1008	10-year	7.20	235.58	236.90	236.36	237.03	0.004232	1.56	4.61	3.67	0.44			1.56	8.01
Reach 2	Reach 2	1008	25-year	9.20	235.58	237.13	236.50	237.28	0.004359	1.69	5.46	3.73	0.45			1.69	9.45
Reach 2	Reach 2	1008	50-year	10.60	235.58	237.28	236.58	237.44	0.004426	1.76	6.02	3.77	0.44			1.76	10.41
Reach 2	Reach 2	1008	100-year	11.90	235.58	237.42	236.66	237.59	0.004460	1.82	6.55	3.81	0.44			1.82	11.26
Reach 2	Reach 2	1008	Regional	24.36	235.58	238.86	237.31	239.06	0.003608	1.98	12.32	4.21	0.37			1.98	18.28
Reach 2	Reach 2	1005	2-year	2.70	235.57	236.27	235.96	236.33	0.003108	1.03	2.62	3.84	0.40			1.03	4.16
Reach 2	Reach 2	1005	5-year	4.20	235.57	236.51	236.09	236.59	0.003084	1.18	3.55	3.92	0.40			1.18	5.56
Reach 2	Reach 2	1005	10-year	7.20	235.57	236.91	236.30	237.01	0.003199	1.41	5.12	4.05	0.40			1.41	8.00
Reach 2	Reach 2	1005	25-year	9.20	235.57	237.14	236.43	237.26	0.003270	1.52	6.07	4.13	0.40			1.52	9.44
Reach 2	Reach 2	1005	50-year	10.60	235.57	237.29	236.51	237.42	0.003304	1.58	6.70	4.18	0.40			1.58	10.39
Reach 2	Reach 2	1005	100-year	11.90	235.57	237.43	236.59	237.57	0.003317	1.63	7.29	4.23	0.40			1.63	11.24
Reach 2	Reach 2	1005	Regional	24.36	235.57	238.85	237.19	239.05	0.005832	1.98	12.33		0.35			1.98	18.24
Reach 2	Reach 2	999	2-year	2.70	235.55	236.20	235.98	236.30	0.004185	1.39	1.95	3.63	0.55			1.39	4.15
Reach 2	Reach 2	999	5-year	4.20	235.55	236.42	236.13	236.55	0.003864	1.61	2.60	3.64	0.55			1.61	5.55
Reach 2	Reach 2	999	10-year	7.20	235.55	236.76	236.38	236.96	0.003715	1.98	3.64	3.66	0.57			1.98	7.98
Reach 2	Reach 2	999	25-year	9.20	235.55	236.96	236.54	237.20	0.003660	2.17	4.23	3.67	0.58			2.17	9.41
Reach 2	Reach 2	999	50-year	10.60	235.55	237.09	236.63	237.36	0.003609	2.29	4.63	3.67	0.59			2.29	10.36
Reach 2	Reach 2	999	100-year	11.90	235.55	237.21	236.72	237.50	0.003532	2.38	4.99	3.68	0.59			2.38	11.21
Reach 2	Reach 2	999	Regional	24.36	235.55	238.59	237.44	238.97	0.005227	2.71	9.00		0.50			2.71	18.18
Reach 2	Reach 2	951		Culvert													
Reach 2	Reach 2	666	2-year	2.70	234.65	235.28	235.14	235.40	0.005954	1.54	1.75	15.62	0.64			1.54	3.68
Reach 2	Reach 2	666	5-year	4.20	234.65	235.34	235.28	235.58	0.010790	2.20	1.91	16.10	0.88			2.20	4.91
Reach 2	Reach 2	666	10-year	7.20	234.65	235.54	235.54	235.96	0.012759	2.87	2.51	17.69	1.00			2.87	7.04
Reach 2	Reach 2	666	25-year	9.20	234.65	235.68	235.68	236.18	0.012154	3.12	2.95	18.72	1.00			3.12	8.29
Reach 2	Reach 2	666	50-year	10.60	234.65	235.79	235.79	236.32	0.011572	3.25	3.26	19.40	1.00			3.25	9.12
Reach 2	Reach 2	666	100-year	11.90	234.65	235.87	235.87	236.45	0.011489	3.40	3.50	19.87	1.00			3.40	9.86
Reach 2	Reach 2	666	Regional	24.36	234.65	236.59	236.59	237.53	0.009737	4.30	5.66	24.40	1.00			4.30	15.99
Reach 2	Reach 2	661	2-year	2.70	234.62	235.34		235.34	0.000186	0.30	10.59	19.02	0.12	0.08	0.08	0.25	3.64
Reach 2	Reach 2	661	5-year	4.20	234.62	235.45		235.46	0.000266	0.40	12.74	19.84	0.14	0.11	0.11	0.33	4.86
Reach 2	Reach 2	661	10-year	7.20	234.62	235.63		235.64	0.000384	0.55	16.37	20.74	0.18	0.16	0.15	0.44	6.96
Reach 2	Reach 2	661	25-year	9.20	234.62	235.73		235.75	0.000446	0.63	18.46	21.29	0.19	0.19	0.17	0.50	8.20
Reach 2	Reach 2	661	50-year	10.60	234.62	235.79		235.81	0.000482	0.69	19.84	21.65	0.20	0.21	0.18	0.53	9.03
Reach 2	Reach 2	661	100-year	11.90	234.62	235.85		235.87	0.000513	0.73	21.07	21.99	0.21	0.22	0.20	0.56	9.76
Reach 2	Reach 2	661	Regional	25.34	234.62	236.32		236.37	0.000720	1.08	32.29	25.38	0.27	0.33	0.28	0.78	15.82

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
Reach 2	Reach 2	656	2-year	2.70	234.66	235.34		235.34	0.000206	0.31	10.24	19.21	0.12	0.08	0.08	0.26	3.59
Reach 2	Reach 2	656	5-year	4.20	234.66	235.45		235.46	0.000291	0.41	12.41	20.23	0.15	0.11	0.11	0.34	4.80
Reach 2	Reach 2	656	10-year	7.20	234.66	235.63		235.64	0.000412	0.56	16.14	21.58	0.18	0.15	0.15	0.45	6.89
Reach 2	Reach 2	656	25-year	9.20	234.66	235.72		235.74	0.000472	0.64	18.30	22.09	0.20	0.18	0.18	0.50	8.12
Reach 2	Reach 2	656	50-year	10.60	234.66	235.79		235.81	0.000507	0.69	19.73	22.41	0.21	0.20	0.20	0.54	8.93
Reach 2	Reach 2	656	100-year	11.90	234.66	235.84		235.87	0.000536	0.74	21.00	22.70	0.22	0.21	0.21	0.57	9.66
Reach 2	Reach 2	656	Regional	25.34	234.66	236.31		236.37	0.000736	1.08	32.36	25.96	0.27	0.32	0.30	0.78	15.67
Reach 2	Reach 2	604	2-year	2.70	234.65	235.30		235.32	0.001811	0.58	5.44	19.33	0.32	0.17	0.04	0.50	3.17
Reach 2	Reach 2	604	5-year	4.20	234.65	235.40		235.42	0.001726	0.68	7.44	20.11	0.33	0.22	0.09	0.56	4.27
Reach 2	Reach 2	604	10-year	7.20	234.65	235.57		235.60	0.001616	0.82	10.93	21.37	0.34	0.28	0.15	0.66	6.17
Reach 2	Reach 2	604	25-year	9.20	234.65	235.66		235.70	0.001588	0.89	12.98	22.09	0.34	0.31	0.17	0.71	7.29
Reach 2	Reach 2	604	50-year	10.60	234.65	235.73		235.77	0.001570	0.94	14.35	22.60	0.34	0.32	0.18	0.74	8.03
Reach 2	Reach 2	604	100-year	11.90	234.65	235.78		235.82	0.001555	0.98	15.59	23.05	0.35	0.34	0.20	0.76	8.69
Reach 2	Reach 2	604	Regional	25.34	234.65	236.24		236.31	0.001466	1.28	26.91	26.06	0.36	0.44	0.32	0.94	14.10
Reach 2	Reach 2	498	2-year	2.70	234.51	235.11		235.12	0.001845	0.62	5.46	18.95	0.33	0.18	0.10	0.49	2.59
Reach 2	Reach 2	498	5-year	4.20	234.51	235.22		235.24	0.001741	0.72	7.57	19.91	0.33	0.23	0.13	0.55	3.47
Reach 2	Reach 2	498	10-year	7.20	234.51	235.39		235.42	0.001640	0.86	11.23	21.48	0.34	0.29	0.18	0.64	4.99
Reach 2	Reach 2	498	25-year	9.20	234.51	235.49		235.53	0.001604	0.94	13.41	22.24	0.35	0.32	0.20	0.69	5.88
Reach 2	Reach 2	498	50-year	10.60	234.51	235.56		235.60	0.001587	0.98	14.85	22.67	0.35	0.34	0.22	0.71	6.47
Reach 2	Reach 2	498	100-year	11.90	234.51	235.61		235.66	0.001575	1.03	16.13	23.05	0.35	0.36	0.23	0.74	7.00
Reach 2	Reach 2	498	Regional	25.34	234.51	236.07		236.15	0.001547	1.35	27.55	26.25	0.37	0.48	0.33	0.92	11.18
Reach 2	Reach 2	388	2-year	2.70	234.38	234.91		234.93	0.001683	0.66	6.04	19.82	0.32	0.19	0.19	0.45	1.95
Reach 2	Reach 2	388	5-year	4.20	234.38	235.03		235.05	0.001603	0.76	8.42	20.57	0.33	0.24	0.24	0.50	2.58
Reach 2	Reach 2	388	10-year	7.20	234.38	235.21		235.24	0.001604	0.92	12.26	21.70	0.35	0.30	0.31	0.59	3.68
Reach 2	Reach 2	388	25-year	9.20	234.38	235.31		235.35	0.001628	1.01	14.44	22.28	0.36	0.33	0.34	0.64	4.32
Reach 2	Reach 2	388	50-year	10.60	234.38	235.37		235.42	0.001643	1.06	15.87	22.63	0.36	0.35	0.37	0.67	4.76
Reach 2	Reach 2	388	100-year	11.90	234.38	235.43		235.48	0.001659	1.11	17.13	22.94	0.37	0.36	0.38	0.69	5.14
Reach 2	Reach 2	388	Regional	25.34	234.38	235.88		235.96	0.001828	1.52	28.07	25.88	0.41	0.49	0.52	0.90	8.08
Reach 2	Reach 2	307	2-year	2.70	234.11	234.81		234.82	0.000940	0.56	6.78	19.25	0.25	0.15	0.08	0.40	1.42
Reach 2	Reach 2	307	5-year	4.20	234.11	234.92		234.94	0.001057	0.68	9.02	20.11	0.27	0.20	0.11	0.47	1.86
Reach 2	Reach 2	307	10-year	7.20	234.11	235.10		235.13	0.001249	0.86	12.55	21.24	0.31	0.28	0.17	0.57	2.65
Reach 2	Reach 2	307	25-year	9.20	234.11	235.19		235.23	0.001347	0.97	14.56	21.84	0.33	0.32	0.20	0.63	3.13
Reach 2	Reach 2	307	50-year	10.60	234.11	235.25		235.29	0.001403	1.03	15.88	22.24	0.34	0.34	0.22	0.67	3.44
Reach 2	Reach 2	307	100-year	11.90	234.11	235.30		235.35	0.001449	1.09	17.06	22.60	0.35	0.36	0.24	0.70	3.73
Reach 2	Reach 2	307	Regional	25.34	234.11	235.73		235.81	0.001766	1.52	27.37	25.76	0.41	0.52	0.35	0.93	5.79
Reach 2	Reach 2	213	2-year	2.70	233.98	234.74		234.75	0.000654	0.51	7.19	19.23	0.21	0.12	0.08	0.38	0.76
Reach 2	Reach 2	213	5-year	4.20	233.98	234.83		234.85	0.000885	0.65	9.06	19.97	0.25	0.17	0.13	0.46	1.00
Reach 2	Reach 2	213	10-year	7.20	233.98	234.97		235.01	0.001269	0.89	11.89	20.70	0.31	0.26	0.20	0.61	1.50
Reach 2	Reach 2	213	25-year	9.20	233.98	235.05		235.09	0.001475	1.01	13.49	21.09	0.34	0.31	0.24	0.68	1.80
Reach 2	Reach 2	213	50-year	10.60	233.98	235.10		235.15	0.001590	1.09	14.56	21.33	0.36	0.33	0.26	0.73	2.01
Reach 2	Reach 2	213	100-year	11.90	233.98	235.14		235.20	0.001685	1.16	15.50	21.54	0.37	0.36	0.29	0.77	2.19
Reach 2	Reach 2	213	Regional	25.34	233.98	235.51		235.62	0.002379	1.69	23.65	23.64	0.46	0.56	0.43	1.07	3.38
Reach 2	Reach 2	172	2-year	2.70	234.11	234.57	234.57	234.66	0.022460	1.36	1.99	11.00	1.02			1.36	0.57
Reach 2	Reach 2	172	5-year	4.20	234.11	234.64	234.64	234.74	0.019808	1.41	3.00	15.29	0.98	0.17		1.40	0.75
Reach 2	Reach 2	172	10-year	7.20	234.11	234.78	234.73	234.88	0.010849	1.45	5.32	18.63	0.79	0.29	0.17	1.35	1.14
Reach 2	Reach 2	172	25-year	9.20	234.11	234.86	234.79	234.96	0.008409	1.47	6.87	19.26	0.72	0.36	0.22	1.34	1.38
Reach 2	Reach 2	172	50-year	10.60	234.11	234.91	234.82	235.02	0.007502	1.50	7.87	19.64	0.69	0.39	0.25	1.35	1.54
Reach 2	Reach 2	172	100-year	11.90	234.11	234.95	234.85	235.07	0.006929	1.53	8.75	19.96	0.68	0.41	0.27	1.36	1.69
Reach 2	Reach 2	172	Regional	25.34	234.11	235.31	235.10	235.47	0.005108	1.86	16.35	22.74	0.63	0.56	0.41	1.55	2.56
Reach 2	Reach 2	117	2-year	2.70	233.80	234.47	234.11	234.48	0.000541	0.42	7.18	18.24	0.19	0.08		0.38	0.32
Reach 2	Reach 2	117	5-year	4.20	233.80	234.56	234.18	234.57	0.000723	0.54	8.95	19.48	0.22	0.12	0.04	0.47	0.42
Reach 2	Reach 2	117	10-year	7.20	233.80	234.70	234.28	234.72	0.001023	0.74	11.72	20.92	0.28	0.18	0.08	0.61	0.67
Reach 2	Reach 2	117	25-year	9.20	233.80	234.77	234.34	234.80	0.001201	0.85	13.23	21.54	0.30	0.22	0.11	0.70	0.82
Reach 2	Reach 2	117	50-year	10.60	233.80	234.81	234.36	234.85	0.001304	0.92	14.24	21.81	0.32	0.25	0.12	0.74	0.93
Reach 2	Reach 2	117	100-year	11.90	233.80	234.86	234.42	234.90	0.001387	0.98	15.13	22.00	0.33	0.27	0.14	0.79	1.03
Reach 2	Reach 2	117	Regional	25.34	233.80	235.19	234.70	235.28	0.002004	1.46	22.73	23.60	0.42	0.44	0.24	1.11	1.47
Reach 2	Reach 2	85	2-year	2.70	233.83	234.41	234.30	234.44	0.003722	0.68	4.26	18.74	0.44	0.24	0.09	0.63	0.13
Reach 2	Reach 2	85	5-year	4.20	233.83	234.50	234.36	234.53	0.003268	0.78	5.90	19.65	0.43	0.26	0.15	0.71	0.18
Reach 2	Reach 2	85	10-year	7.20	233.83	234.62	234.44	234.67	0.003303	0.96	8.36	20.76	0.46	0.31	0.22	0.86	0.34
Reach 2	Reach 2	85	25-year	9.20	233.83	234.68	234.49	234.74	0.003506	1.08	9.63	21.13	0.48	0.35	0.26	0.96	0.45
Reach 2	Reach 2	85	50-year	10.60	233.83	234.72	234.52	234.79	0.003578	1.15	10.49	21.39	0.49	0.37	0.28	1.01	0.52
Reach 2	Reach 2	85	100-year	11.90	233.83	234.76	234.54	234.83	0.003620	1.20	11.28	21.60	0.50	0.40	0.30	1.05	0.59
Reach 2	Reach 2	85	Regional	25.34	233.83	235.06	234.78	235.19	0.003928	1.66	18.10	23.25	0.56	0.55	0.44	1.40	0.80
Reach 2	Reach 2	63	2-year	2.70	233.87	234.25	234.20	234.30	0.011769	1.07	2.54	12.73	0.75	0.09		1.06	0.05
Reach 2	Reach 2	63	5-year	4.20	233.87	234.28	234.27	234.38	0.018508	1.40	3.03	14.48	0.96	0.18		1.39	0.08
Reach 2	Reach 2	63	10-year	7.20	233.87	234.37	234.37	234.51	0.017646	1.68	4.49	18.51	0.98	0.24		1.61	0.20
Reach 2	Reach 2	63	25-year	9.20	233.87	234.43	234.43	234.59	0.015914	1.78	5.56	19.45	0.96	0.33	0.08	1.66	0.28
Reach 2	Reach 2	63	50-year	10.60	233.87	234.46	234.46	234.63	0.015374	1.86	6.22	19.76	0.96	0.39	0.14	1.71	0.34
Reach 2	Reach 2	63	100-year	11.90	233.87	234.49	234.49	234.67	0.014732	1.92	6.84	19.99	0.95	0.43	0.18	1.74	0.40
Reach 2	Reach 2	63	Regional	25.34	233.87	234.73	234.73	235.03	0.013556	2.49	11.86	21.82	0.98	0.71	0.42	2.14	0.47
Reach 2	Reach 2	45	2-year	2.70	233.72	233.93	233.93	233.99	0.032869	1.49	3.78	32.03	1.21	0.53	0.11	0.71	
Reach 2	Reach 2	45	5-year	4.20	233.72	234.01	233.97	234.05	0.018436	1.37	6.33	40.63	0.95	0.52	0.22	0.66	
Reach 2	Reach 2	45	10-year	7.20	233.72	234.23		234.25	0.003369	0.94	18.87	66.43	0.46	0.31	0.17	0.38	
Reach 2	Reach 2	45	25-year	9.20	233.72	234.36		234.37	0.001736	0.80	27.53	68.98	0.34	0.28	0.16	0.33	
Reach 2	Reach 2	45	50-year	10.60	233.72	234.45		234.46	0.001224	0.74	33.80	70.36	0.30	0.27	0.17	0.31	
Reach 2	Reach 2	45	100-year	11.90	233.72	234.53		234.54	0.000945	0.71	39.58	71.33	0.26	0.26	0.17	0.30	
Reach 2	Reach 2	45	Regional	25.34	233.72	234.59		234.62	0.003172	1.36	43.61	72.25	0.49	0.51	0.32	0.58	
Gore Road Trib	Reach2	1450.572 41.08-05	2-year	0.60	237.54	237.83		237.86	0.007462	0.83	0.72	3.65	0.59			0.83	1.96
Gore Road Trib	Reach2	1450.572 41.08-05	5-year	1.10	237.54	237.93		237.98	0.007252	0.98	1.13	4.35	0.61			0.98	3.10
Gore Road Trib	Reach2	1450.572 41.08-05	10-year	2.46	237.54	238.07		238.17	0.009274	1.35	1.82	5.16	0.72			1.35	5.45
Gore Road Trib	Reach2	1450.572 41.08-05	25-year	3.14	237.54	238.15		238.25	0.008960	1.41	2.23	5.75	0.72			1.41	6.48
Gore Road Trib	Reach2	1450.572 41.08-05	50-year	3.66	237.54	238.19		238.30	0.009182	1.47	2.49	6.15	0.74			1.47	7.21
Gore Road Trib	Reach2	1450.572 41.08-05	100-year	4.17	237.54	238.25		238.36	0.008860	1.45	2.87	7.03	0.73			1.45	7.92
Gore Road Trib	Reach2	1450.572 41.08-05	Regional	10.74	237.54	238.48	238.48	238.73	0.015495	2.22	4.87	10.47	1.00	0.14	0.14	2.21	16.45
Gore Road Trib	Reach2	1450.428 41.08-04	2-year	0.60	235.83	236.10	236.09	236.19	0.020742	1.30	0.46	2.52	0.97			1.30	1.87
Gore Road Trib	Reach2	1450.428 41.08-04	5-year	1.10	235.83	236.21	236.21	236.30	0.021754	1.33	0.83	4.58	1.00			1.33	2.96
Gore Road Trib	Reach2	1450.428 41.08-04	10-year	2.46	235.83	236.36	236.34	236.48	0.015625	1.49	1.65	5.95	0.91			1.49	5.20
Gore Road Trib	Reach2	1450.428 41.08-04	25-year	3.14	235.83	236.40	236.39	236.54	0.016222	1.66	1.90	6.60	0.94	0.10	0.10	1.65	6.19
Gore Road Trib	Reach2	1450.428 41.08-04	50-year	3.66	235.83	236.43	236.42	236.59	0.016133	1.76	2.12	7.31	0.96	0.16	0.14	1.73	6.88
Gore Road Trib	Reach2	1450.428 41.08-04	100-year	4.17	235.83	236.46	236.46	236.64	0.017187	1.89	2.27	7.90	1.00	0.20	0.15	1.83	7.55
Gore Road Trib	Reach2	1450.428 41.08-04	Regional	10.74	235.83	236.82	236.82	236.99	0.007948	2.02	9.50	33.15	0.76	0.34	0.41	1.13	15.41
Gore Road Trib	Reach2	1450.284 41.08-03	2-year	0.60	234.78	234.98		234.99	0.004357	0.42	2.16	18.45	0.33	0.18	0.22	0.28	1.69
Gore Road Trib	Reach2	1450.284 41.08-03	5-year	1.10	234.78	235.04		235.05	0.004585	0.52	3.46	25.20	0.35	0.21	0.32	0.32	2.65
Gore Road Trib	Reach2	1450.284 41.08-03	10-year	2.46	234.78	235.12		235.14	0.005990	0.74	5.77	29.76	0.43	0.30	0.53	0.43	4.67
Gore Road Trib	Reach2	1450.284 41.08-03	25-year	3.14	234.78	235.16		235.17	0.006053	0.80	6.80	30.52	0.44	0.33	0.56	0.46	5.56
Gore Road Trib	Reach2	1450.284 41.08-03	50-year	3.66	234.78	235.18		235.20	0.006121	0.84	7.53	31.09	0.45	0.36	0.57	0.49	6.19
Gore Road Trib	Reach2	1450.284 41.08-03	100-year	4.17	234.78	235.20		235.22	0.006000	0.87	8.31	32.34	0.45	0.38	0.57	0.50	6.80
Gore Road Trib	Reach2	1450.284 41.08-03	Regional	10.74	234.78	235.41		235.45	0.006470	1.21	16.83	48.74	0.50	0.51	0.42	0.64	13.53
Gore Road Trib	Reach2	1450.168 41.08-02	2-year	0.60	233.73	233.89	233.89	233.95	0.026227	1.08	0.55	4.84	1.03			1.08	1.53
Gore Road Trib	Reach2	1450.168 41.08-02	5-year	1.10	233.73	233.96	233.96	234.03	0.022025	1.22	0.92	7.50	0.99	0.14	0.07	1.20	2.40
Gore Road Trib	Reach2	1450.168 41.08-02	10-year	2.46	233.73	234.08	234.08	234.17	0.012383	1.36	2.68	21.96	0.82	0.22	0.23	0.92	4.18
Gore Road Trib	Reach2	1450.168 41.08-02	25-year	3.14	233.73	234.12	234.12	234.21	0.011997	1.45	3.51	24.04	0.82	0.27	0.30	0.89	4.96
Gore Road Trib	Reach2	1450.168 41.08-02	50-year	3.66	233.73	234.14	234.14	234.24	0.011680	1.51	4.15	26.00	0.82	0.29	0.33	0.88	5.51
Gore Road Trib	Reach2	1450.168 41.08-02	100-year	4.17	233.73	234.16	234.16	234.26	0.011772	1.57	4.69	27.37	0.83	0.32	0.36	0.89	6.04
Gore Road Trib	Reach2	1450.168 41.08-02	Regional	10.74	233.73	234.36	234.36	234.49	0.010983	2.02	12.17	47.05	0.87	0.47	0.49	0.88	11.85
Gore Road Trib	Reach2	1450.000 41.08-01	2-year	0.60	233.28	233.49		233.49	0.000277	0.13	8.58	59.69	0.11	0.07	0.04	0.07	0.78
Gore Road Trib	Reach2	1450.000 41.08-01	5-year	1.10	233.28	233.57		233.57	0.000288	0.18	13.65	73.52	0.12	0.08	0.05	0.08	1.21

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
Gore Road Trib	Reach2	1450.000 41.08-01	10-year	2.46	233.28	233.69		233.69	0.000282	0.24	23.71	86.85	0.13	0.10	0.07	0.10	2.08
Gore Road Trib	Reach2	1450.000 41.08-01	25-year	3.14	233.28	233.74		233.74	0.000280	0.26	28.12	89.04	0.13	0.11	0.08	0.11	2.46
Gore Road Trib	Reach2	1450.000 41.08-01	50-year	3.66	233.28	233.78		233.78	0.000279	0.27	31.17	90.37	0.13	0.12	0.08	0.12	2.72
Gore Road Trib	Reach2	1450.000 41.08-01	100-year	4.17	233.28	233.81		233.81	0.000276	0.28	34.04	90.95	0.13	0.12	0.09	0.12	2.99
Gore Road Trib	Reach2	1450.000 41.08-01	Regional	10.74	233.28	234.14		234.14	0.000243	0.38	65.24	98.64	0.14	0.16	0.13	0.16	5.83
Gore Road Trib	Reach1	1416.798 41.07-06	2-year	1.73	232.98	233.27	233.15	233.28	0.008542	0.44	4.83	36.11	0.29	0.34	0.35	0.36	3.65
Gore Road Trib	Reach1	1416.798 41.07-06	5-year	3.22	232.98	233.33	233.21	233.34	0.009215	0.52	7.27	40.72	0.31	0.40	0.45	0.44	5.64
Gore Road Trib	Reach1	1416.798 41.07-06	10-year	7.16	232.98	233.45		233.46	0.010067	0.65	12.12	45.41	0.33	0.54	0.61	0.59	10.16
Gore Road Trib	Reach1	1416.798 41.07-06	25-year	9.17	232.98	233.49		233.51	0.010136	0.70	14.29	47.01	0.34	0.58	0.66	0.64	12.29
Gore Road Trib	Reach1	1416.798 41.07-06	50-year	10.70	232.98	233.53		233.55	0.010121	0.73	15.84	47.83	0.35	0.60	0.70	0.68	13.73
Gore Road Trib	Reach1	1416.798 41.07-06	100-year	12.23	232.98	233.56		233.59	0.009633	0.75	17.52	48.22	0.34	0.62	0.73	0.70	15.05
Gore Road Trib	Reach1	1416.798 41.07-06	Regional	31.51	232.98	233.91		233.95	0.007724	0.96	35.37	56.49	0.33	0.71	0.97	0.89	30.32
Gore Road Trib	Reach1	1416.721 41.07-05	2-year	1.73	232.59	232.75		232.76	0.005845	0.26	6.70	47.71	0.22			0.26	3.21
Gore Road Trib	Reach1	1416.721 41.07-05	5-year	3.22	232.59	232.82		232.83	0.005117	0.32	10.15	48.02	0.22			0.32	4.98
Gore Road Trib	Reach1	1416.721 41.07-05	10-year	7.16	232.59	232.97		232.98	0.004348	0.41	17.30	48.37	0.22			0.41	9.04
Gore Road Trib	Reach1	1416.721 41.07-05	25-year	9.17	232.59	233.04		233.05	0.004037	0.45	20.55	48.51	0.22		0.07	0.45	10.96
Gore Road Trib	Reach1	1416.721 41.07-05	50-year	10.70	232.59	233.09		233.10	0.003894	0.47	22.80	48.62	0.22		0.10	0.47	12.26
Gore Road Trib	Reach1	1416.721 41.07-05	100-year	12.23	232.59	233.12		233.13	0.004071	0.50	24.38	48.72	0.23		0.12	0.50	13.46
Gore Road Trib	Reach1	1416.721 41.07-05	Regional	31.51	232.59	233.49		233.52	0.004238	0.74	43.04	51.62	0.25	0.14	0.30	0.73	27.35
Gore Road Trib	Reach1	1416.598 41.07-04	2-year	1.73	231.99	232.27		232.28	0.002922	0.59	7.50	45.46	0.39	0.20	0.20	0.23	2.35
Gore Road Trib	Reach1	1416.598 41.07-04	5-year	3.22	231.99	232.35		232.36	0.003053	0.73	10.98	46.73	0.41	0.25	0.26	0.29	3.70
Gore Road Trib	Reach1	1416.598 41.07-04	10-year	7.16	231.99	232.47		232.49	0.003921	1.03	17.51	54.18	0.50	0.33	0.39	0.41	6.93
Gore Road Trib	Reach1	1416.598 41.07-04	25-year	9.17	231.99	232.51		232.53	0.004523	1.17	19.66	55.21	0.54	0.38	0.45	0.47	8.52
Gore Road Trib	Reach1	1416.598 41.07-04	50-year	10.70	231.99	232.54		232.57	0.004777	1.26	21.42	56.38	0.56	0.41	0.48	0.50	9.57
Gore Road Trib	Reach1	1416.598 41.07-04	100-year	12.23	231.99	232.58		232.60	0.004840	1.32	23.31	58.51	0.57	0.43	0.51	0.52	10.56
Gore Road Trib	Reach1	1416.598 41.07-04	Regional	31.51	231.99	232.88		232.93	0.005700	1.93	43.82	74.13	0.67	0.67	0.65	0.72	22.07
Gore Road Trib	Reach1	1416.398 41.07-03	2-year	1.73	230.73	231.05		231.07	0.018642	0.68	2.99	28.13	0.43	0.17	0.39	0.58	1.30
Gore Road Trib	Reach1	1416.398 41.07-03	5-year	3.22	230.73	231.11	231.06	231.14	0.017697	0.77	5.03	34.20	0.44	0.31	0.55	0.64	2.10
Gore Road Trib	Reach1	1416.398 41.07-03	10-year	7.16	230.73	231.26		231.29	0.010346	0.76	10.97	42.60	0.36	0.43	0.65	0.65	4.09
Gore Road Trib	Reach1	1416.398 41.07-03	25-year	9.17	230.73	231.34		231.36	0.007867	0.74	14.29	44.97	0.32	0.43	0.66	0.64	5.13
Gore Road Trib	Reach1	1416.398 41.07-03	50-year	10.70	230.73	231.38		231.41	0.007196	0.74	16.37	46.30	0.31	0.45	0.68	0.65	5.80
Gore Road Trib	Reach1	1416.398 41.07-03	100-year	12.23	230.73	231.42		231.45	0.007035	0.77	18.06	47.30	0.31	0.48	0.71	0.68	6.43
Gore Road Trib	Reach1	1416.398 41.07-03	Regional	31.51	230.73	231.81		231.85	0.005112	0.90	38.25	56.27	0.29	0.61	0.88	0.82	13.88
Gore Road Trib	Reach1	1416.261 41.07-02	2-year	1.73	229.56	230.17	230.01	230.18	0.003249	0.74	5.06	29.02	0.42	0.20		0.34	0.75
Gore Road Trib	Reach1	1416.261 41.07-02	5-year	3.22	229.56	230.27	230.15	230.29	0.003161	0.83	8.16	30.91	0.43	0.27		0.39	1.19
Gore Road Trib	Reach1	1416.261 41.07-02	10-year	7.16	229.56	230.43		230.46	0.003974	1.11	13.49	41.76	0.50	0.40	0.07	0.53	2.41
Gore Road Trib	Reach1	1416.261 41.07-02	25-year	9.17	229.56	230.48		230.53	0.004835	1.32	16.11	46.59	0.56	0.41	0.11	0.57	3.05
Gore Road Trib	Reach1	1416.261 41.07-02	50-year	10.70	229.56	230.51		230.56	0.005315	1.43	17.45	48.63	0.59	0.45	0.11	0.61	3.49
Gore Road Trib	Reach1	1416.261 41.07-02	100-year	12.23	229.56	230.54		230.59	0.005497	1.50	18.98	50.35	0.61	0.48	0.13	0.64	3.89
Gore Road Trib	Reach1	1416.261 41.07-02	Regional	31.51	229.56	230.78		230.91	0.009619	2.47	32.95	68.96	0.85	0.74	0.43	0.96	9.01
Gore Road Trib	Reach1	1416.193 41.07-01	2-year	1.73	229.05	229.49	229.49	229.58	0.067558	1.43	1.37	8.17	0.83	0.23	0.52	1.27	0.54
Gore Road Trib	Reach1	1416.193 41.07-01	5-year	3.22	229.05	229.60	229.60	229.71	0.058640	1.64	2.52	13.15	0.82	0.52	0.71	1.28	0.83
Gore Road Trib	Reach1	1416.193 41.07-01	10-year	7.16	229.05	229.79	229.79	229.86	0.031938	1.56	8.07	44.03	0.64	0.67	0.62	0.89	1.69
Gore Road Trib	Reach1	1416.193 41.07-01	25-year	9.17	229.05	229.86		229.91	0.022666	1.42	11.18	46.75	0.55	0.63	0.65	0.82	2.13
Gore Road Trib	Reach1	1416.193 41.07-01	50-year	10.70	229.05	229.91		229.95	0.018578	1.34	13.50	49.66	0.51	0.42	0.67	0.79	2.44
Gore Road Trib	Reach1	1416.193 41.07-01	100-year	12.23	229.05	229.94		229.99	0.017033	1.33	15.36	55.86	0.49	0.35	0.70	0.80	2.73
Gore Road Trib	Reach1	1416.193 41.07-01	Regional	31.51	229.05	230.30		230.33	0.006818	1.09	44.81	90.19	0.33	0.47	0.76	0.70	6.38
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	2-year	1.92	228.39	228.77		228.77	0.001468	0.41	5.73	27.68	0.27		0.14	0.34	88.25
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	5-year	3.71	228.39	228.86		228.87	0.001748	0.55	8.52	31.85	0.31	0.04	0.19	0.44	143.31
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	10-year	8.60	228.39	229.02		229.05	0.002378	0.83	14.23	42.80	0.39	0.11	0.27	0.60	351.16
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	25-year	11.11	228.39	229.08		229.11	0.002539	0.93	16.98	45.65	0.41	0.16	0.30	0.65	464.75
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	50-year	13.08	228.39	229.12		229.16	0.002715	1.00	18.78	47.97	0.43	0.18	0.33	0.70	547.12
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	100-year	15.08	228.39	229.16		229.21	0.002782	1.07	20.81	49.99	0.44	0.21	0.34	0.72	625.20
Gore Road Trib	Reach1-DS-0	1416.041 41.06-16	Regional	40.85	228.39	229.49		229.60	0.003878	1.69	39.64	62.06	0.56	0.42	0.54	1.03	1980.04
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	2-year	1.92	228.33	228.58		228.59	0.009817	0.44	5.20	45.31	0.31	0.27	0.38	0.37	87.92
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	5-year	3.71	228.33	228.63	228.56	228.64	0.013762	0.59	7.19	47.26	0.37	0.38	0.54	0.52	142.85
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	10-year	8.60	228.33	228.71		228.74	0.019155	0.84	11.38	53.10	0.46	0.53	0.82	0.76	350.41
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	25-year	11.11	228.33	228.75		228.78	0.020439	0.93	13.24	54.84	0.48	0.61	0.91	0.84	463.85
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	50-year	13.08	228.33	228.77		228.81	0.021443	0.99	14.52	55.68	0.50	0.66	0.97	0.90	546.13
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	100-year	15.08	228.33	228.79		228.84	0.022460	1.05	15.71	56.33	0.52	0.72	1.04	0.96	624.12
Gore Road Trib	Reach1-DS-0	1415.982 41.06-15	Regional	40.85	228.33	229.02		229.12	0.024935	1.48	29.85	66.74	0.59	1.09	1.47	1.37	1977.98
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	2-year	1.92	227.40	227.78		227.81	0.010325	0.92	2.84	20.67	0.69		0.52	0.68	87.61
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	5-year	3.71	227.40	227.88		227.91	0.006583	0.98	5.06	23.80	0.59	0.23	0.61	0.73	142.37
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	10-year	8.60	227.40	228.05	227.90	228.09	0.004726	1.15	10.86	42.79	0.54	0.35	0.71	0.79	349.54
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	25-year	11.11	227.40	228.11	227.98	228.15	0.004298	1.19	13.73	47.83	0.53	0.45	0.75	0.81	462.80
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	50-year	13.08	227.40	228.16		228.20	0.004029	1.22	16.12	53.98	0.52	0.45	0.77	0.81	544.94
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	100-year	15.08	227.40	228.20		228.24	0.003791	1.24	18.34	55.35	0.51	0.51	0.78	0.82	622.80
Gore Road Trib	Reach1-DS-0	1415.904 41.06-14	Regional	40.85	227.40	228.58		228.64	0.002642	1.44	41.99	67.10	0.46	0.89	0.89	0.97	1975.21
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	2-year	1.92	226.47	227.19	227.04	227.21	0.003358	0.84	3.79	16.73	0.43	0.22		0.51	87.24
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	5-year	3.71	226.47	227.33	227.16	227.36	0.003815	0.93	7.01	24.83	0.47	0.30		0.53	141.70
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	10-year	8.60	226.47	227.53	227.36	227.58	0.004534	1.28	12.61	36.99	0.54	0.43	0.09	0.68	348.25
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	25-year	11.11	226.47	227.60	227.40	227.66	0.004540	1.40	15.59	40.69	0.56	0.47	0.17	0.71	461.19
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	50-year	13.08	226.47	227.65	227.45	227.72	0.004788	1.50	17.52	44.13	0.58	0.50	0.20	0.75	543.09
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	100-year	15.08	226.47	227.70	227.49	227.77	0.004860	1.58	19.66	46.61	0.59	0.53	0.24	0.77	620.71
Gore Road Trib	Reach1-DS-0	1415.793 41.06-13	Regional	40.85	226.47	228.11	227.87	228.23	0.005317	2.23	42.04	61.60	0.66	0.74	0.52	0.97	1970.59
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	2-year	1.92	226.47	226.95		226.97	0.003286	0.77	4.98	26.72	0.43	0.20	0.21	0.39	86.92
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	5-year	3.71	226.47	227.06		227.09	0.003675	0.99	8.65	40.81	0.48	0.21	0.28	0.43	141.13
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	10-year	8.60	226.47	227.24		227.28	0.003832	1.26	17.02	52.13	0.51	0.32	0.37	0.51	347.16
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	25-year	11.11	226.47	227.30		227.35	0.003928	1.37	20.51	55.01	0.53	0.36	0.41	0.54	459.87
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	50-year	13.08	226.47	227.36		227.40	0.003733	1.41	23.75	58.07	0.52	0.38	0.42	0.55	541.58
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	100-year	15.08	226.47	227.41		227.45	0.003813	1.48	26.38	61.01	0.53	0.40	0.44	0.57	619.03
Gore Road Trib	Reach1-DS-0	1415.720 41.06-12	Regional	40.85	226.47	227.79		227.87	0.004384	2.07	52.93	78.81	0.61	0.57	0.67	0.77	1967.12
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	2-year	1.92	225.93	226.43		226.44	0.005157	0.42	6.07	32.01	0.24	0.26	0.05	0.32	86.20
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	5-year	3.71	225.93	226.54		226.55	0.004641	0.49	10.10	41.24	0.23	0.33	0.12	0.37	139.90
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	10-year	8.60	225.93	226.73		226.74	0.004309	0.59	19.84	64.01	0.24	0.42	0.23	0.43	344.76
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	25-year	11.11	225.93	226.80		226.81	0.004168	0.62	24.47	69.46	0.24	0.44	0.28	0.45	456.93
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	50-year	13.08	225.93	226.86		226.87	0.004329	0.67	29.10	78.97	0.25	0.43	0.31	0.45	538.13
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	100-year	15.08	225.93	226.90		226.91	0.004366	0.70	32.27	82.01	0.25	0.44	0.34	0.47	615.20
Gore Road Trib	Reach1-DS-0	1415.590 41.06-11	Regional	40.85	225.93	227.27		227.29	0.004121	0.88	65.42	99.36	0.26	0.62	0.50	0.62	1959.40
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	2-year	1.92	225.78	226.12		226.13	0.003441	0.59	5.46	35.06	0.41	0.22	0.05	0.35	85.77
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	5-year	3.71	225.78	226.20		226.22	0.004241	0.81	8.41	41.47	0.48	0.27	0.11	0.44	139.21
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	10-year	8.60	225.78	226.32		226.36	0.005976	1.21	13.78	50.39	0.61	0.41	0.21	0.62	343.49
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	25-year	11.11	225.78	226.37		226.42	0.006427	1.35	16.46	54.60	0.64	0.44	0.25	0.67	455.40
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	50-year	13.08	225.78	226.40		226.46	0.006814	1.47	18.48	57.83	0.67	0.46	0.28	0.71	536.35
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	100-year	15.08	225.78	226.43		226.50	0.007104	1.56	20.22	60.28	0.69	0.49	0.31	0.75	613.23
Gore Road Trib	Reach1-DS-0	1415.515 41.06-10	Regional	40.85	225.78	226.71		226.84	0.008798	2.30	39.09	72.86	0.82	0.77	0.52	1.05	1955.47
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	2-year	1.92	225.06	225.38	225.31	225.39	0.006520	0.36	5.86	55.28	0.25	0.32		0.33	84.85
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	5-year	3.71	225.06	225.46		225.47	0.004911	0.35	10.47	66.57	0.22	0.36	0.04	0.35	137.68
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	10-year	8.60	225.06	225.60		225.61	0.003623	0.40	21.31	84.68	0.20	0.42	0.15	0.40	340.65
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	25-year	11.11	225.06	225.66		225.67	0.003434	0.43	26.05	92.72	0.20	0.45	0.17	0.43	451.95
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	50-year	13.08	225.06	225.69		225.71	0.003315	0.44	29.93	100.99	0.20	0.47	0.17	0.44	532.42
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	100-year	15.08	225.06	225.73		225.74	0.003233	0.46	33.55	104.44	0.20	0.49	0.19	0.45	608.87
Gore Road Trib	Reach1-DS-0	1415.353 41.06-09	Regional	40.85	225.06	226.08		226.10	0.002606	0.58	71.17	111.60	0.20	0.64	0.37	0.57	1946.54
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	2-year	1.92	224.34	224.75		224.76	0.002612	0.63	6.92	37.94	0.38	0.23	0.11	0.28	83.83
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	5-year	3.71	224.34	224.84		224.85	0.003086	0.82	10.80	48.60	0.43	0.31	0.17	0.34	135.98
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	10-year	8.60	224.34	224.98		225.01	0.004100	1.17	18.70	61.10	0.52	0.45	0.26	0.46	337.48
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	25-year	11.11	224.34	225.04		225.07	0.004266	1.28	22.13	62.23	0.54	0.49	0.32	0.50	448.13

HEC-RAS Plan: SCE Proposed FLoodplain_June 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	50-year	13.08	224.34	225.08		225.11	0.004300	1.35	24.77	63.18	0.55	0.52	0.35	0.53	528.09
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	100-year	15.08	224.34	225.12		225.15	0.004349	1.41	27.34	64.39	0.56	0.54	0.38	0.55	604.05
Gore Road Trib	Reach1-DS-0	1415.201 41.06-08	Regional	40.85	224.34	225.48		225.53	0.005014	2.02	51.73	73.34	0.64	0.77	0.63	0.79	1936.85
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	2-year	1.92	223.77	224.02		224.03	0.014450	0.54	4.67	36.86	0.37	0.35	0.41	0.41	83.00
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	5-year	3.71	223.77	224.10		224.11	0.010247	0.56	8.58	56.83	0.33	0.39	0.43	0.43	134.60
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	10-year	8.60	223.77	224.25		224.26	0.006993	0.61	18.57	74.43	0.29	0.39	0.50	0.46	334.82
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	25-year	11.11	223.77	224.29		224.31	0.006903	0.64	22.14	77.06	0.29	0.42	0.54	0.50	444.98
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	50-year	13.08	223.77	224.33		224.34	0.006903	0.67	24.77	79.52	0.30	0.44	0.58	0.53	524.56
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	100-year	15.08	223.77	224.36		224.37	0.006964	0.70	27.20	81.28	0.30	0.47	0.61	0.55	600.17
Gore Road Trib	Reach1-DS-0	1415.055 41.06-07	Regional	40.85	223.77	224.66		224.69	0.006808	0.93	54.69	101.84	0.32	0.61	0.85	0.75	1929.29
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	2-year	1.92	222.48	222.97	222.84	222.98	0.002857	0.33	9.62	70.71	0.18	0.17	0.15	0.20	81.70
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	5-year	3.71	222.48	223.03	222.89	223.04	0.003764	0.42	13.80	73.58	0.21	0.25	0.22	0.27	132.61
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	10-year	8.60	222.48	223.12		223.13	0.005691	0.59	20.76	74.94	0.27	0.40	0.36	0.41	331.42
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	25-year	11.11	222.48	223.17		223.18	0.005992	0.64	24.03	75.60	0.28	0.45	0.41	0.46	441.01
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	50-year	13.08	222.48	223.20		223.22	0.005999	0.67	26.65	76.23	0.28	0.48	0.44	0.49	520.15
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	100-year	15.08	222.48	223.24		223.25	0.005945	0.69	29.25	76.81	0.28	0.51	0.47	0.52	595.34
Gore Road Trib	Reach1-DS-0	1414.792 41.06-06	Regional	40.85	222.48	223.55		223.58	0.006198	0.93	54.10	81.22	0.31	0.76	0.71	0.76	1920.12
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	2-year	1.92	221.55	221.76	221.76	221.84	0.022428	1.23	1.56	10.03	1.00			1.23	80.75
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	5-year	3.71	221.55	221.90		221.98	0.010311	1.22	3.04	11.08	0.74			1.22	131.19
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	10-year	8.60	221.55	222.19	222.03	222.26	0.004312	1.24	9.79	42.20	0.54	0.21	0.15	0.88	328.84
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	25-year	11.11	221.55	222.27	222.13	222.34	0.003852	1.29	13.88	54.66	0.52	0.27	0.15	0.80	437.82
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	50-year	13.08	221.55	222.32	222.19	222.40	0.003727	1.33	16.70	56.05	0.52	0.31	0.20	0.78	516.52
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	100-year	15.08	221.55	222.37		222.45	0.003661	1.38	19.30	57.08	0.52	0.34	0.23	0.78	591.29
Gore Road Trib	Reach1-DS-0	1414.601 41.06-05	Regional	40.85	221.55	222.90		222.98	0.002258	1.57	51.08	61.50	0.45	0.51	0.45	0.80	1911.45
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	2-year	1.92	220.38	221.03		221.05	0.001389	0.61	3.17	7.20	0.29			0.61	80.28
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	5-year	3.71	220.38	221.22		221.25	0.001763	0.80	4.63	8.21	0.34			0.80	130.42
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	10-year	8.60	220.38	221.48		221.56	0.002956	1.24	6.92	9.30	0.46			1.24	327.19
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	25-year	11.11	220.38	221.63		221.72	0.002622	1.32	9.20	22.22	0.45	0.06	0.12	1.21	435.56
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	50-year	13.08	220.38	221.76		221.85	0.002151	1.31	13.18	37.64	0.41	0.13	0.17	0.99	513.62
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	100-year	15.08	220.38	221.90		221.97	0.001676	1.26	19.40	52.15	0.37	0.17	0.18	0.78	587.55
Gore Road Trib	Reach1-DS-0	1414.401 41.06-04	Regional	40.85	220.38	222.59		222.66	0.001237	1.47	61.46	74.84	0.35	0.33	0.36	0.66	1900.74
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	2-year	1.92	220.38	220.85	220.62	220.87	0.001901	0.64	2.99	7.91	0.33			0.64	79.94
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	5-year	3.71	220.38	221.02	220.74	221.05	0.001936	0.78	6.34	34.52	0.35	0.11	0.10	0.59	129.82
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	10-year	8.60	220.38	221.41	221.02	221.42	0.000552	0.61	33.13	79.80	0.21	0.16	0.14	0.26	325.01
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	25-year	11.11	220.38	221.61	221.13	221.62	0.000323	0.54	49.65	86.20	0.16	0.15	0.14	0.22	432.35
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	50-year	13.08	220.38	221.76	221.17	221.77	0.000245	0.51	62.48	90.08	0.15	0.15	0.14	0.21	509.49
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	100-year	15.08	220.38	221.90	221.21	221.91	0.000198	0.49	75.44	95.49	0.13	0.15	0.13	0.20	582.37
Gore Road Trib	Reach1-DS-0	1414.292 41.06-03	Regional	40.85	220.38	222.58	221.46	222.59	0.000225	0.69	151.21	123.11	0.15	0.24	0.19	0.27	1889.13
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	2-year	1.92	220.38	220.84	220.62	220.86	0.001798	0.61	3.19	20.61	0.32	0.06	0.01	0.60	79.92
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	5-year	3.71	220.38	221.01	220.74	221.04	0.001759	0.78	5.58	58.30	0.34	0.16	0.08	0.67	129.76
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	10-year	8.60	220.38	221.36	220.96	221.40	0.001409	0.98	11.87	75.48	0.33	0.30	0.25	0.72	324.75
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	25-year	11.11	220.38	221.55	221.05	221.60	0.001110	0.99	15.41	82.16	0.31	0.33	0.29	0.72	431.97
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	50-year	13.08	220.38	221.70	221.11	221.74	0.000972	1.01	17.98	86.50	0.29	0.35	0.32	0.73	509.02
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	100-year	15.08	220.38	221.84	221.16	221.88	0.000874	1.03	20.47	89.47	0.28	0.37	0.34	0.74	581.81
Gore Road Trib	Reach1-DS-0	1414.284 41.06-02	Regional	40.85	220.38	222.58	221.65	222.59	0.000208	0.67	151.62	132.40	0.15	0.24	0.20	0.27	1887.97
Gore Road Trib	Reach1-DS-0	1414.268 x-124 (41.06-01)		Culvert													
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	2-year	1.75	220.41	220.79	220.68	220.82	0.004865	0.80	2.20	37.88	0.50			0.80	79.82
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	5-year	3.72	220.41	220.90	220.80	220.97	0.006617	1.13	3.36	52.33	0.62	0.09	0.10	1.11	129.60
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	10-year	8.70	220.41	221.04	221.02	221.21	0.010900	1.82	5.54	73.44	0.84	0.36	0.18	1.57	324.41
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	25-year	11.46	220.41	221.11	221.11	221.31	0.011934	2.07	6.70	77.82	0.89	0.48	0.32	1.71	431.52
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	50-year	13.44	220.41	221.15	221.15	221.38	0.012215	2.21	7.52	78.57	0.92	0.55	0.41	1.79	508.48
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	100-year	15.53	220.41	221.20	221.20	221.45	0.011992	2.31	8.44	79.48	0.92	0.62	0.49	1.84	581.18
Gore Road Trib	Reach1-DS-0	1414.253 41.05-13	Regional	39.90	220.41	221.65	221.65	222.10	0.011501	3.21	16.47	88.84	0.98	1.10	1.01	2.42	1886.27
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	2-year	1.75	220.32	220.76		220.77	0.003846	0.30	7.34	44.01	0.19		0.22	0.24	79.78
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	5-year	3.72	220.32	220.89		220.89	0.002726	0.32	15.52	77.46	0.17	0.12	0.24	0.24	129.52
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	10-year	8.70	220.32	221.05		221.05	0.002592	0.39	27.98	84.95	0.18	0.23	0.31	0.31	324.27
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	25-year	11.46	220.32	221.11		221.12	0.002553	0.43	33.81	88.00	0.18	0.27	0.34	0.34	431.34
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	50-year	13.44	220.32	221.15		221.16	0.002664	0.45	37.07	89.63	0.19	0.30	0.36	0.36	508.28
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	100-year	15.53	220.32	221.19		221.20	0.002625	0.47	40.92	91.10	0.19	0.32	0.38	0.38	580.96
Gore Road Trib	Reach1-DS-0	1414.247 41.05-12	Regional	39.90	220.32	221.55		221.57	0.002518	0.62	75.54	98.29	0.20	0.48	0.53	0.53	1885.82
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	2-year	1.75	219.93	220.42	220.37	220.51	0.009584	1.30	1.59	9.13	0.73	0.24	0.13	1.10	79.62
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	5-year	3.72	219.93	220.57	220.56	220.69	0.009125	1.63	3.99	25.31	0.76	0.31	0.26	0.93	129.17
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	10-year	8.70	219.93	220.78	220.77	220.88	0.006895	1.81	12.93	52.25	0.70	0.36	0.38	0.67	323.53
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	25-year	11.46	219.93	220.84	220.81	220.94	0.006998	1.93	16.27	54.65	0.72	0.42	0.44	0.70	430.44
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	50-year	13.44	219.93	220.89		220.99	0.006831	1.98	18.73	56.23	0.71	0.46	0.46	0.72	507.28
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	100-year	15.53	219.93	220.93		221.03	0.006616	2.02	21.20	57.16	0.71	0.49	0.49	0.73	579.84
Gore Road Trib	Reach1-DS-0	1414.191 41.05-11	Regional	39.90	219.93	221.31		221.42	0.005758	2.43	44.54	65.48	0.71	0.71	0.71	0.90	1883.67

Date: July 2024

Table: SCE Existing and Proposed Conditions HEC-RAS Analysis Results Comparison

Existing												Proposed												Difference (Proposed - Existing)										Remarks
River	Reach	River	Peak Flows** (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	River	Reach	River Sta	Peak Flows** (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	River	Peak Flows (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	
			Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)				Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)		Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)	
HDF-3	1	1002	4.16	1.63	242.78	243.23	243.09	1.64	0.59	0.65	0.9	HDF-3	1	1002	3.79	1.46	242.73	243.32	243.18	1.25	0.48	0.52	0.69	0	-0.37	-0.17	-0.05	0.09	0.09	-0.39	-0.11	-0.13	-0.21	Drainage Realignment
HDF-3	1	1001	4.16	1.63	242.72	243.16	243.03	1.25	0.43	0.43	0.79	HDF-3	1	1001	3.79	1.46	242.68	243.27	243.12	1.25	0.47	0.47	0.66	0	`	-0.17	-0.04	0.11	0.09	0	0.04	0.04	-0.13	
HDF-3	1	1000	4.16	1.63	242.49	242.85	242.72	1.61	0.45	0.57	1.11	HDF-3	1	1000	3.79	1.46	242.51	243.13	242.97	1.17	0.45	0.46	0.63	0	-0.37	-0.17	0.02	0.28	0.25	-0.44	0	-0.11	-0.48	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	999.4	3.79	1.46	242.32	242.84	242.74	1.72	0.6	0.57	0.92	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-3	1	999	4.16	1.63	241.92	242.34	242.21	0.96	0.34	0.33	0.55	HDF-3	1	999	3.79	1.46	241.91	242.35	242.21	0.94	0.35	0.33	0.48	0	-0.37	-0.17	-0.01	0.01	0	-0.02	0.01	0	-0.07	
HDF-3	1	998	4.16	1.63	241.84	242.08	241.97	1.49	0.58	0.59	1.02	HDF-3	1	998	3.79	1.46	241.84	242.07	241.97	1.52	0.62	0.61	0.99	0	-0.37	-0.17	0	-0.01	0	0.03	0.04	0.02	-0.03	
HDF-3	1	997	4.16	1.63	240.98	241.67	241.48	1.31	0.46	0.41	0.84	HDF-3	1	997	3.79	1.46	240.98	241.65	241.46	1.4	0.5	0.47	0.82	0	-0.37	-0.17	0	-0.02	-0.02	0.09	0.04	0.06	-0.02	
HDF-3	1	996.5	4.16	1.63	240.96	241.37	241.23	1.71	0.58	0.55	1.1	HDF-3	1	996.5	3.79	1.46	240.96	241.41	241.28	1.57	0.56	0.55	0.81	0	-0.37	-0.17	0	0.04	0.05	-0.14	-0.02	0	-0.29	
HDF-3	1	996	4.16	1.63	240.55	240.99	240.86	1.11	0.29	0.34	0.84	HDF-3	1	996	3.79	1.46	240.55	240.92	240.79	1.45	0.4	0.4	1.11	0	-0.37	-0.17	0	-0.07	-0.07	0.34	0.11	0.06	0.27	
HDF-3	1	995	4.16	1.63	240.22	240.68	240.52	1.02	0.36	0.35	0.61	HDF-3	1	995.2	3.79	1.46	240.21	240.71	240.54	0.52	0.15	0.16	0.3	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-3	1	994	4.16	1.63	239.74	240.13	240	1.56	0.58	0.57	1	HDF-3	1	994.82	3.79	1.46	239.94	240.47	240.37	1.64	0.4	0.39	0.67	0.82	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Drainage Realignment
HDF-3	1	993	4.16	1.63	238.99	239.18	239.1	0.71	0.39	0.35	0.44	HDF-3	1	993.82	3.79	1.46	239.69	240.31	240.16	0.93	0.36	0.35	0.46	0.82	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-3	1	992	4.16	1.63	238.18	238.4	238.31	0.99	0.42	0.54	0.65	HDF-3	1	993.63	3.79	1.46	239.57	240.22	240.06	1.05	0.3	0.3	0.43	1.63	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	993.52	3.79	1.46	239.39	240.03	239.87	1.05	0.3	0.3	0.44	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	993.36	3.79	1.46	239.15	239.77	239.61	1.15	0.46	0.46	0.65	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	992.97	3.79	1.46	238.95	239.6	239.43	1.07	0.43	0.43	0.58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	992.79	3.79	1.46	238.76	239.28	239.18	1.73	0.61	0.59	0.93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	992.56	3.79	1.46	238.5	239.03	238.85	0.35	0.14	0.1	0.17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	992.13	3.79	1.46	238.28	239.02	238.84	0.28	0.11	0.08	0.14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	991.9	3.79	1.46	238.35	238.96	238.79	1.23	0.48	0.47	0.66	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	991.6	3.79	1.46	238.13	238.77	238.6	1.29	0.37	0.38	0.59	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-3	1	991	5.69	2.23	237.1	237.56	237.42	1.24	0.41	0.38	0.9	HDF-3	1	991	3.83	1.42	237.69	238.32	238.13	1.3	0.38	0.37	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-3	1	990	5.69	2.23	236.39	236.64	236.55	1.28	0.67	0.53	0.85	HDF-3	1	990	3.83	1.42	236.97	237.53	237.4	1.47	0.54	0.55	0.79	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	989.68	3.83	1.42	236.25	236.84	236.67	1.29	0.49	0.5	0.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	989.5	3.83	1.42	235.94	236.61	236.42	1.17	0.35	0.34	0.54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	989.4	3.83	1.42	235.65	236.22	236.07	1.6	0.42	0.44	0.74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	989.3	3.83	1.42	235.18	235.72	235.59	1.65	0.59	0.57	0.88	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	989.2	3.83	1.42	234.58	235.18	235.02	1.47	0.41	0.42	0.68	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	HDF-3	1	989.1	3.83	1.42	234.14	234.72	234.57	1.63	0.46	0.45	0.75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-3	1	989	5.69	2.23	235.2	235.6	235.47	1.17	0.38	0.26	0.85	HDF-3	1	989	7.29	1.43	233.72	234.38	234.1	1.69	0.76	0.66	0.93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-3	1	988	5.69	2.23	234.1	234.63	234.49	1.25	0.33	0.54	0.85	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-3	1	987.5	5.69	2.23	233.34	233.81	233.66	1.7	0.38	0.38	1.58	HDF-3	1	987.5	7.29	1.43	233.31	233.89	233.64	1.85	0.75	0.32	1.68	0	1.6	-0.8	-0.03	0.08	-0.02	0.15	0.37	-0.06	0.1	
HDF-3	1	987	5.69	2.23	232.3	233.42	233.12	0.3	0.13	0.13	0.2	HDF-3	1	987	7.29	1.43	232.3	233.58	232.85	0.33	0.14	0.14	0.2	0	1.6	-0.8	0	0.16	-0.27	0.03	0.01	0.01	0	
HDF-3	1	986	5.69	2.23	231.93	233.41	233.12	0.2	0.08	0.1	0.13	HDF-3	1	986	7.29	1.43	231.9	233.58	232.85	0.23	0.1	0.11	0.14	0	1.6	-0.8	-0.03	0.17	-0.27	0.03	0.02	0.01	0.01	
HDF-3	1	985	5.69	2.23	231.75	233.41	233.12	0.14	0.08	0.07	0.09	HDF-3	1	985	7.29	1.43	231.75	233.58	232.85	0.16	0.07	0.08	0.12	0	1.6	-0.8	0	0.17	-0.27	0.02	-0.01	0.01	0.03	
HDF-3	1	984	5.69	2.23	232.05	233.14	233.06	2	0.63	0.54	1.37	HDF-3	1	984	7.29	1.43	232.05	233.16	232.78	2.51	0.8	0.68	1.7	0	1.6	-0.8	0	0.02	-0.28	0.51	0.17	0.14	0.33	
HDF-3	1	983	5.69	2.23	231.24	233.18	233.07	0.2	0.07	0.06	0.09	HDF-3	1	983	7.29	1.43	231.24	233.21	232.79	0.26	0.09	0.08	0.12	0	1.6	-0.8	0	0.03	-0.28	0.06	0.02	0.02	0.03	
HDF-3	1	982.58	(Existing Culvert @ Humber Station Rd)									HDF-3	1	982.58	(Existing Culvert @ Humber Station Rd)									Culvert	(Existing Culvert @ Humber Station Rd)									
HDF-3	1	982	5.69	2.23	230.86	231.88	231.51	2.78	0.89	0	2.53	HDF-3	1	982	7.29	1.43	230.86	232.01	231.4	3.04	1.03	0	2.75	0	1.6	-0.8	0	0.13	-0.11	0.26	0.14	0	0.22	
HDF-3	1	981	5.69	2.23	230.86	231.35	231.23	1.5	0.53	0.46	0.64	HDF-3	1	981	7.29	1.43	230.86	231.39	231.17	1.65	0.58	0.51	0.7	0	1.6	-0.8	0	0.04	-0.06	0.15	0.05	0.05	0.06	
HDF-3	1	980	5.69	2.23	230.22	230.43	230.34	1.61	0.56	0.53	0.86	HDF-3	1	980	7.29	1.43	230.22	230.46	230.33	1.73	0.61	0.57	0.91	0	1.6	-0.8	0	0.03	-0.01	0.12	0.05	0.04	0.05	
HDF-8	1	36	4.25	1.73	229.5	229.78	229.65	1.41	0.36	0.41	1.09	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Drainage feature eliminated
HDF-8	1	35	4.25	1.73	228.5	228.85	228.72	0.85	0.27	0.33	0.54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-8	1	34	4.25	1.73	228.24	228.62	228.49	0.9	0.29	0.38	0.66	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-8	1	33	4.25	1.73	227.98	228.2	228.1	1.49	0.58	0.7	1.14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-8	1	32	4.25	1.73	227.25	227.69	227.56	1.09	0.29	0.29	0.95	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-8	1	31	5.15	2.1	226.96	227.22	227.11	1.47	0.65	0.53	1.05	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
HDF-8	1	30	5.15	2.1	226.13	226.46	226.36	1.15	0.44	0.44	0.76	HDF-8	1	30	5.15	2.09	226.13	226.46	226.36	1.15	0.44	0.44	0.76	0	0	-0.01	0	0	0	0	0	0	0	
HDF-8	1	29	5.15	2.1	225.72	225.97	225.87	1.25	0.55	0.59	0.83	HDF-8	1	29	5.15	2.09	225.72	225.97	225.87	1.25	0.55	0.59	0.83	0	0	-0.01	0	0	0	0	0	0	0	
HDF-8	1	28	5.15	2.1	224.75	225.18	225.05	1.38	0.46	0.37	1.06	HDF-8	1	28	5.15	2.09	224.75	225.18	225.05	1.38	0.46	0.37	1.06	0	0	-0.01	0	0	0	0	0	0	0	
HDF-8	1	27	5.15	2.1	224.49	224.87	224.73	1.03	0.34	0.41	0.71	HDF-8	1	27	5.15	2.09	224.49	224.87	224.73	1.03	0.34	0.41	0.71	0	0	-0.01	0	0	0	0	0	0	0	
HDF-8	1	26	5.15	2.1	224.16	224.37	224.31	1.5	0.7	0.76	1.04	HDF-8	1	26	5.15	2.09	224.16	224.37	224.31	1.5	0.7	0.76	1.04	0	0	-0.01	0	0	0	0	0	0	0	
HDF-8	1	25	5.15	2.1	223	224.3	223.83	0.5	0.19	0	0.43	HDF-8	1	25	5.15	2.09	223	224.3	223.81	0.5	0.19	0	0.43	0	0	-0.01	0	0	-0.02	0	0	0	0	
HDF-8	1	24	5.15	2.1	221.76	224.31	223.84	0.26	0.05	0.12	0.2	HDF-8	1	24	5.15	2.09	221.76	224.31	223.82	0.26	0.05	0.12	0.2	0	0	-0.01	0	0	-0.02	0	0	0	0	
HDF-8	1	23.6	5.15	2.1	221.2	224.31	223.84	0.05	0.03	0	0.03	HDF-8	1	23.6	5.15	2.09	221.2	224.31	223.82	0.05	0.03	0	0.03	0	0	-0.01	0	0	-0.02	0	0	0	0	
HDF-8	1	23.3	(Existing Culvert @ Mayfield Rd)									HDF-8	1	23.3	(Existing Culvert @ Mayfield Rd)									Culvert	(Existing Culvert @ Mayfield Rd)									
HDF-8	1	23	5.15	2.1	220.91	222.17	221.63	1.33	0	0	1.33	HDF-8	1	23	5.15	2.09	220.91	222.17	221.63	1.33	0	0	1.33	0	0	-0.01	0	0	0	0	0	0	0	
HDF-8	1	22	5.15	2.1	220.99	222.19	221.64	0.1	0.05	0.03	0.06	HDF-8	1	22	5.15	2.09	220.99	222.19	221.64	0.1	0.05	0.03	0.06	0	0	-0.01	0	0	0	0	0	0	0	
Clarkway Trib A	Reach1	1597	24.21	30.2	241.79	243.7	243.74	0.54	0.16	0.12	0.24	Clarkway Trib A	Reach1	1597	26.12	26.87	241.79	243.72	243.72	0.57	0.17	0.13	0.25	0	1.91	-3.33	0	0.02	-0.02	0.03	0.01	0.01	0.01	
Clarkway Trib A	Reach1	1594	(Existing Culvert @ Healey Rd)									Clarkway Trib A	Reach1	1594	(Existing Culvert @ Healey Rd)									Culvert	(Existing Culvert @ Healey Rd)									
Clarkway Trib A	Reach1	1591	24.21	30.2	241.48	243.19	243.19	0.82	0.26	0.28	0.37	Clarkway Trib A	Reach1	1591	26.12	26.87	241.48	243.19	243.19	0.88	0.28	0.3	0.39	0	1.91	-3.33	0	0	0	0.06	0.02	0.02	0.02	
Clarkway Trib A	Reach1	1583	24.21	30.2	241.24	242.66	242.73	1.75	0.43	0.52	0.86	Clarkway Trib A	Reach1	1583	26.12	26.87	241.24	242.68	242.69	1.83	0.46	0.54	0.89	0	1.91	-3.33	0	0.02	-0.04	0.08	0.03	0.02	0.03	
Clarkway Trib A	Reach1	1561.698	24.21	30.2	241.38	242.12	242.17	2.89	0.73	0.85	0.93	Clarkway Trib A	Reach1	1561.698	26.12	26.87	241.38	242.14	242.14	2.92	0.76	0.86	0.94	0	1.91	-3.33	0	0.02	-0.03	0.03	0.03	0.01	0.01	
Clarkway Trib A	Reach1	1561.551	24.21	30.2	240.81	241.58	241.65	0.73	0.31	0.31	0.33	Clarkway Trib A	Reach1	1561.551	26.12	26.87	240.81	241.6	241.61	0.75	0.31	0.32	0.34	0	1.91	-3.33	0	0.02	-0.04	0.02	0	0.01	0.01	
Clarkway Trib A	Reach1	1561.404	24.21	30.2	239.94	241.08	241.15	1.96	0.45	0.33	0.6	Clarkway Trib A	Reach1	1561.404	26.12	26.87	239.94	241.1	241.11	1.99	0.47	0.35	0.61	0	1.91	-3.33	0	0.02	-0.04	0.03	0.02	0.02	0.01	
Clarkway Trib A	Reach1	1561.256	24.21	30.2	239.1	240.25	240.35	1.99	0.43	0.66	0.75	Clarkway Trib A	Reach1	1561.256	26.12	26.87	239.1	240.28	240.29	2	0.44	0.67	0.75	0	1.91	-3.33	0	0.03	-0.06	0.01	0.01	0.01	0	
Clarkway Trib A	Reach1	1561.12	24.21	30.2	238.71	239.71	239.8	1.35	0.3	0.46	0.89	Clarkway Trib A	Reach1	1561.12	26.12	26.87	238.71	239.74	239.75	1.41	0.31	0.47	0.92	0	1.91	-3.33	0	0.03	-0.05	0.06	0.01	0.01	0.03	
Clarkway Trib A	Reach1	1560.977	24.21	30.2	238.53	239.17	239.24	1.43	0.54	0.49	0.68	Clarkway Trib A	Reach1	1560.977	26.12	26.87	238.53	239.22	239.21	1.41	0.53	0.47	0.66	0	1.91	-3.33	0	0.05	-0.03	-0.02	-0.01	-0.02	-0.02	
Clarkway Trib A	Reach1	1560.88	24.21	30.2	237.95	238.73	238.79	1.38	0.4	0.37	0.55	Clarkway Trib A	Reach1	1560.88	29.74	28.31	237.95	238.79	238.77	1.49	0.43	0.42	0.59	0	5.53	-1.89	0	0.06	-0.02	0.11	0.03	0.05	0.04	
Clarkway Trib A	Reach1	1560.685	24.21	30.2	236.78	237.31	237.36	1.72	0.32	0.13	1.25	Clarkway Trib A	Reach1	1560.685	29.74	28.31	236.78	237.36	237.35	1.8	0.35	0.19	1.21	0	5.53	-1.89	0	0.05	-0.01	0.08	0.03	0.06	-0.04	
Clarkway Trib A	Reach1	1560.6	24.21	30.2	236.23	237.01	237.12	0.88	0.33	0.27	0.45	Clarkway Trib A	Reach1	1560.6	29.74	28.31	236.23	237.11	237.09	0.94	0.35	0.28	0.47	0	5.53	-1.89	0	0.1	-0.03	0.06	0.02	0.01	0.02	
Clarkway Trib A	Reach1	1560.57	24.21	30.2	235.97	236.71	236.81	2.22	0.62	0.73	1.26	Clarkway Trib A	Reach1	1560.57	29.74	28.31	235.97	236.8	236.78	2.33	0.65	0.78	1.29	0	5.53	-1.89	0	0.09	-0.03	0.11	0.03	0.05	0.03	
Clarkway Trib A	Reach1	1560.5	24.21	30.2	235.24	236.12	236.21	1.68	0.51	0.66	0.97	Clarkway Trib A	Reach1	1560.5	29.74	28.31	235.24	236.21	236.19	1.83	0.56	0.72	1.05	0	5.53	-1.89	0	0.09	-0.02	0.15	0.05	0.06	0.08	
Clarkway Trib A	Reach1	1519.898	24.21	30.2	234.49	235.29	235.42	1.97	0.64	0.62	1.05	Clarkway Trib A	Reach1	1519.898	29.74	28.31	234.49	235.38	235.37	2.07	0.67	0.66	1.09	0	5.53	-1.89	0	0.09	-0.05	0.1	0.03	0.04	0.04	
Clarkway Trib A	Reach1	1430.348	24.21	30.2	234	234.92	234.86	1.56	0.5	0.34	0.76	Clarkway Trib A	Reach1	1430.348	29.74	28.31	234	234.97	234.92	1.77	0.57	0.39	0.86	0	5.53	-1.89	0	0.05	0.06	0.21	0.07	0.05	0.1	

Existing												Proposed												Difference (Proposed - Existing)										Remarks
River	Reach	River	Peak Flows** (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	River	Reach	River Sta	Peak Flows** (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	River	Peak Flows (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	
			Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)				Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)		Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)	
Clarkway Trib A	Reach1-DS-0	1651	52.86	37.88	233.59	234.52	234.33	1.54	0.65	0.61	0.75	Clarkway Trib A	Reach1-DS-0	1651	56.84	50.35	233.59	234.57	234.49	1.57	0.66	0.62	0.77	0	3.98	12.47	0	0.05	0.16	0.03	0.01	0.01	0.02	
Clarkway Trib A	Reach1-DS-0	1580	52.86	37.88	232.98	234.14	233.96	2.3	0.51	0.9	1.24	Clarkway Trib A	Reach1-DS-0	1580	56.84	50.35	232.98	234.19	234.11	2.36	0.53	0.92	1.26	0	3.98	12.47	0	0.05	0.15	0.06	0.02	0.02	0.02	
Clarkway Trib A	Reach1-DS-0	1573	52.86	37.88	232.49	233.46	233.3	3.42	0.82	1.31	1.96	Clarkway Trib A	Reach1-DS-0	1573	56.84	50.35	232.49	233.5	233.44	3.51	0.85	1.34	2	0	3.98	12.47	0	0.04	0.14	0.09	0.03	0.03	0.04	
Clarkway Trib A	Reach1-DS-0	1534	52.86	37.88	230.44	232.37	232.12	1.19	0.3	0.33	0.53	Clarkway Trib A	Reach1-DS-0	1534	56.84	50.35	230.44	232.63	232.53	1	0.28	0.28	0.44	0	3.98	12.47	0	0.26	0.41	-0.19	-0.02	-0.05	-0.09	
Clarkway Trib A	Reach1-DS-0	1528	52.86	37.88	229.7	232.19	231.97	2.29	0.47	0.77	1.29	Clarkway Trib A	Reach1-DS-0	1528	56.84	50.35	229.7	232.51	232.42	1.9	0.42	0.64	1.02	0	3.98	12.47	0	0.32	0.45	-0.39	-0.05	-0.13	-0.27	
Clarkway Trib A	Reach1-DS-0	1516.384	54.06	37.88	230.28	232.06	231.85	2.5	0.72	0.87	1.08	Clarkway Trib A	Reach1-DS-0	1516.384	66.56	60.09	230.28	232.48	232.38	0.96	0.66	1.06	0.93	0	12.5	22.21	0	0.42	0.53	-1.54	-0.06	0.19	-0.15	
Clarkway Trib A	Reach1-DS-0	1516.312	54.06	37.88	230.52	231.76	231.59	2.77	0.96	0.7	1.36	Clarkway Trib A	Reach1-DS-0	1516.312	66.56	60.09	230.49	232.35	232.25	1.63	0.53	0.44	0.96	0	12.5	22.21	-0.03	0.59	0.66	-1.14	-0.43	-0.26	-0.4	
Clarkway Trib A	Reach1-DS-0	1516.276	54.06	37.88	230.46	231.48	231.29	2.54	0.98	0.64	1.32	Clarkway Trib A	Reach1-DS-0	1516.276	66.56	60.09	230.2	231.68	231.61	4.75	1.87	1.67	2.27	0	12.5	22.21	-0.26	0.2	0.32	2.21	0.89	1.03	0.95	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Clarkway Trib A	Reach1-DS-0	1516.245	(Proposed Culvert @ George Bolton Pkwy)									Culvert	(Proposed Culvert @ George Bolton Pkwy)									
Clarkway Trib A	Reach1-DS-0	1516.214	54.06	37.88	229.35	231.05	230.83	2.09	0.58	0.55	0.94	Clarkway Trib A	Reach1-DS-0	1516.214	66.56	60.09	229.48	231.13	231.06	3.47	1.39	1.24	2.33	0	12.5	22.21	0.13	0.08	0.23	1.38	0.81	0.69	1.39	
Clarkway Trib A	Reach1-DS-0	1516.156	54.06	37.88	229.11	230.88	230.65	1.3	0.81	0.71	0.82	Clarkway Trib A	Reach1-DS-0	1516.156	66.56	60.09	229.11	230.85	230.78	2.9	0.79	0.68	1.05	0	12.5	22.21	0	-0.03	0.13	1.6	-0.02	-0.03	0.23	
Clarkway Trib A	Reach1-DS-0	1516.103	54.06	37.88	228.87	230.66	230.44	1.86	0.63	0.5	0.75	Clarkway Trib A	Reach1-DS-0	1516.103	66.56	60.09	228.87	230.7	230.62	2.2	0.75	0.6	0.89	0	12.5	22.21	0	0.04	0.18	0.34	0.12	0.1	0.14	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Clarkway Trib A	Reach1-DS-0	1516.043	66.56	60.09	228.72	230.56	230.48	1.79	0.39	0.57	0.91	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Clarkway Trib A	Reach1-DS-0	1515.984	54.06	37.88	228.6	230.25	230.04	2.51	0.72	0.8	0.96	Clarkway Trib A	Reach1-DS-0	1515.984	66.56	60.09	228.6	230.34	230.26	2.81	0.79	0.91	1.07	0	12.5	22.21	0	0.09	0.22	0.3	0.07	0.11	0.11	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Clarkway Trib A	Reach1-DS-0	1515.899	66.56	60.09	228.23	229.9	229.83	2.41	0.37	0.8	1.32	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Clarkway Trib A	Reach1-DS-0	1515.784	54.06	37.88	227.73	229.41	229.19	1.06	0.61	0.83	0.83	Clarkway Trib A	Reach1-DS-0	1515.784	66.56	60.09	227.73	229.56	229.49	1.12	0.66	0.88	0.88	0	12.5	22.21	0	0.15	0.3	0.06	0.05	0.05	0.05	
Clarkway Trib A	Reach1-DS-0	1515.584	54.06	37.88	226.41	228.67	228.48	0.98	0.69	0.37	0.79	Clarkway Trib A	Reach1-DS-0	1515.584	66.56	60.09	226.41	228.8	228.74	1.06	0.77	0.43	0.86	0	12.5	22.21	0	0.13	0.26	0.08	0.08	0.06	0.07	
Clarkway Trib A	Reach1-DS-0	1515.386	54.06	37.88	226.38	227.25	227.06	3.45	1.15	1.41	1.47	Clarkway Trib A	Reach1-DS-0	1515.386	66.56	60.09	226.38	227.38	227.31	3.58	1.21	1.47	1.52	0	12.5	22.21	0	0.13	0.25	0.13	0.06	0.06	0.05	
Clarkway Trib A	Reach1-DS-0	1515.185	54.06	37.88	224.64	226.66	226.44	1.5	0.47	0.42	0.68	Clarkway Trib A	Reach1-DS-0	1515.185	66.56	60.09	224.64	226.82	226.74	1.58	0.51	0.45	0.71	0	12.5	22.21	0	0.16	0.3	0.08	0.04	0.03	0.03	
Clarkway Trib A	Reach1-DS-0	1515.084	54.06	37.88	224.37	226.52	226.32	1.52	0.38	0.43	0.55	Clarkway Trib A	Reach1-DS-0	1515.084	66.56	60.09	224.37	226.68	226.61	1.64	0.4	0.47	0.58	0	12.5	22.21	0	0.16	0.29	0.12	0.02	0.04	0.03	
Clarkway Trib A	Reach1-DS-0	1514.985	54.06	37.88	224.01	226.07	225.74	3.12	0.72	0.96	1.21	Clarkway Trib A	Reach1-DS-0	1514.985	66.56	60.09	224.01	226.28	226.03	3.03	0.75	0.96	1.15	0	12.5	22.21	0	0.21	0.29	-0.09	0.03	0	-0.06	
Clarkway Trib A	Reach1-DS-0	1514.912	65.98	39.34	224.1	225.52	225.29	3.24	1.02	0.98	1.46	Clarkway Trib A	Reach1-DS-0	1514.912	85.95	54.35	224.1	225.67	225.43	3.63	1.17	1.11	1.63	0	19.97	15.01	0	0.15	0.14	0.39	0.15	0.13	0.17	
Clarkway Trib A	Reach1-DS-0	1514.788	65.98	39.34	223.95	224.87	224.5	0.9	0.87	1	0.96	Clarkway Trib A	Reach1-DS-0	1514.788	85.95	54.35	223.95	225.16	224.7	0.94	0.89	1	0.97	0	19.97	15.01	0	0.29	0.2	0.04	0.02	0	0.01	
Clarkway Trib A	Reach1-DS-0	1514.658	65.98	39.34	222.72	224.68	224.1	1.31	0.41	0.45	0.48	Clarkway Trib A	Reach1-DS-0	1514.658	85.95	54.35	222.72	225.02	224.45	1.32	0.43	0.46	0.49	0	19.97	15.01	0	0.34	0.35	0.01	0.02	0.01	0.01	
Clarkway Trib A	Reach1-DS-0	1514.585	65.98	39.34	221.73	224.64	224.03	1.28	0.42	0.42	0.47	Clarkway Trib A	Reach1-DS-0	1514.585	85.95	54.35	221.73	224.97	224.4	1.37	0.45	0.46	0.51	0	19.97	15.01	0	0.33	0.37	0.09	0.03	0.04	0.04	
Clarkway Trib A	Reach1-DS-0	1514.506	65.98	39.34	221.43	223.87	223.49	3.54	0.17	0.52	2.92	Clarkway Trib A	Reach1-DS-0	1514.506	85.95	54.35	221.43	224.17	223.72	3.72	0.41	0.67	2.66	0	19.97	15.01	0	0.3	0.23	0.18	0.24	0.15	-0.26	
Clarkway Trib A	Reach1-DS-0	1514.414	65.98	39.34	220.83	223.81	223.32	1.28	0.63	0.81	0.92	Clarkway Trib A	Reach1-DS-0	1514.414	85.95	54.35	220.83	223.96	223.61	1.52	0.77	0.94	1.07	0	19.97	15.01	0	0.15	0.29	0.24	0.14	0.13	0.15	
Clarkway Trib A	Reach1-DS-0	1514.353	65.98	39.34	220.8	223.76	223.27	0.65	0.51	0.36	0.49	Clarkway Trib A	Reach1-DS-0	1514.353	85.95	54.35	220.8	223.9	223.57	0.77	0.61	0.44	0.58	0	19.97	15.01	0	0.14	0.3	0.12	0.1	0.08	0.09	
Clarkway Trib A	Reach1-DS-0	1514.345	65.98	39.34	220.68	223.76	223.27	0.58	0.41	0.29	0.38	Clarkway Trib A	Reach1-DS-0	1514.345	85.95	54.35	220.68	223.89	223.56	0.68	0.49	0.36	0.45	0	19.97	15.01	0	0.13	0.29	0.1	0.08	0.07	0.07	
Clarkway Trib A	Reach1-DS-0	1514.331	(Existing Culvert @ Healey Rd)									Clarkway Trib A	Reach1-DS-0	1514.331	(Existing Culvert @ Healey Rd)									Culvert	(Existing Culvert @ Healey Rd)									
Clarkway Trib A	Reach1-DS-0	1514.312	65.98	39.34	220.59	223	222.54	4.59	1.63	1.43	2.75	Clarkway Trib A	Reach1-DS-0	1514.312	85.95	54.35	220.59	223.1	222.81	5.02	1.3	1.6	2.38	0	19.97	15.01	0	0.1	0.27	0.43	-0.33	0.17	-0.37	
Clarkway Trib A	Reach1-DS-0	1514.306	65.98	39.34	220.5	222.53	222.1	1.03	0.63	0.67	0.69	Clarkway Trib A	Reach1-DS-0	1514.306	85.95	54.35	220.5	222.62	222.22	1.21	0.74	0.81	0.82	0	19.97	15.01	0	0.09	0.12	0.18	0.11	0.14	0.13	
Clarkway Trib A	Reach1-DS-0	1514.247	65.98	39.34	220.38	222.44	221.95	0.71	0.45	0.54	0.54	Clarkway Trib A	Reach1-DS-0	1514.247	85.95	54.35	220.38	222.49	222.01	0.89	0.57	0.68	0.69	0	19.97	15.01	0	0.05	0.06	0.18	0.12	0.14	0.15	
Reach 2	Reach 2	1105	24.36	11.9	237.49	239.66	238.77	0.86	0.38	0.32	0.47	Reach 2	Reach 2	1105	24.36	11.9	237.49	239.66	238.77	0.86	0.38	0.32	0.47	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	1068	24.36	11.9	237.41	239.64	238.41	0.94	0.21	0.26	0.39	Reach 2	Reach 2	1068	24.36	11.9	237.41	239.64	238.41	0.94	0.21	0.26	0.39	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	1054	24.36	11.9	236.65	239.64	238.45	0.81	0.16	0.19	0.31	Reach 2	Reach 2	1054	24.36	11.9	236.65	239.64	238.45	0.81	0.16	0.19	0.31	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	1027	(Existing Culvert @ Coleraine Rd)									Reach 2	Reach 2	1027	(Existing Culvert @ Coleraine Rd)									Culvert	(Existing Culvert @ Coleraine Rd)									
Reach 2	Reach 2	1018	24.36	11.9	236.6	238.83	237.62	2.73	0	0	2.73	Reach 2	Reach 2	1018	24.36	11.9	236.6	238.83	237.62	2.73	0	0	2.73	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	1008	24.36	11.9	235.58	238.86	237.42	1.98	0	0	1.98	Reach 2	Reach 2	1008	24.36	11.9	235.58	238.86	237.42	1.98	0	0	1.98	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	1005	24.36	11.9	235.57	238.85	237.43	1.98	0	0	1.98	Reach 2	Reach 2	1005	24.36	11.9	235.57	238.85	237.43	1.98	0	0	1.98	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	999	24.36	11.9	235.55	238.59	237.21	2.71	0	0	2.71	Reach 2	Reach 2	999	24.36	11.9	235.55	238.59	237.21	2.71	0	0	2.71	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	951	(Existing Culvert @ Coleraine Rd)									Reach 2	Reach 2	951	(Existing Culvert @ Coleraine Rd)									Culvert	(Existing Culvert @ Coleraine Rd)									
Reach 2	Reach 2	666	24.36	11.9	234.65	236.59	235.87	4.3	0	0	4.3	Reach 2	Reach 2	666	24.36	11.9	234.65	236.59	235.87	4.3	0	0	4.3	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	661	25.34	11.9	234.62	236.32	235.85	1.08	0.33	0.28	0.78	Reach 2	Reach 2	661	25.34	11.9	234.62	236.32	235.85	1.08	0.33	0.28	0.78	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	656	25.34	11.9	234.66	236.31	235.84	1.08	0.32	0.3	0.78	Reach 2	Reach 2	656	25.34	11.9	234.66	236.31	235.84	1.08	0.32	0.3	0.78	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	604	25.34	11.9	234.65	236.24	235.78	1.28	0.44	0.32	0.94	Reach 2	Reach 2	604	25.34	11.9	234.65	236.24	235.78	1.28	0.44	0.32	0.94	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	498	25.34	11.9	234.51	236.07	235.61	1.35	0.48	0.33	0.92	Reach 2	Reach 2	498	25.34	11.9	234.51	236.07	235.61	1.35	0.48	0.33	0.92	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	388	25.34	11.9	234.38	235.88	235.43	1.52	0.49	0.52	0.9	Reach 2	Reach 2	388	25.34	11.9	234.38	235.88	235.43	1.52	0.49	0.52	0.9	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	307	25.34	11.9	234.11	235.73	235.3	1.52	0.52	0.35	0.93	Reach 2	Reach 2	307	25.34	11.9	234.11	235.73	235.3	1.52	0.52	0.35	0.93	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	213	25.34	11.9	233.98	235.51	235.14	1.69	0.56	0.43	1.07	Reach 2	Reach 2	213	25.34	11.9	233.98	235.51	235.14	1.69	0.56	0.43	1.07	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	172	25.34	11.9	234.11	235.31	234.95	1.86	0.56	0.41	1.55	Reach 2	Reach 2	172	25.34	11.9	234.11	235.31	234.95	1.86	0.56	0.41	1.55	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	117	25.34	11.9	233.8	235.19	234.85	1.46	0.44	0.24	1.11	Reach 2	Reach 2	117	25.34	11.9	233.8	235.19	234.86	1.46	0.44	0.24	1.11	0	0	0	0	0	0.01	0	0	0	0	
Reach 2	Reach 2	85	25.34	11.9	233.83	235.06	234.76	1.66	0.55	0.44	1.4	Reach 2	Reach 2	85	25.34	11.9	233.83	235.06	234.76	1.66	0.55	0.44	1.4	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	63	25.34	11.9	233.87	234.73	234.49	2.49	0.71	0.42	2.14	Reach 2	Reach 2	63	25.34	11.9	233.87	234.73	234.49	2.49	0.71	0.42	2.14	0	0	0	0	0	0	0	0	0	0	
Reach 2	Reach 2	45	25.34	11.9	233.72	234.53	234.35	1.51	0.56	0.36	0.64	Reach 2	Reach 2	45	25.34	11.9	233.72	234.59	234.53	1.36	0.51	0.32	0.58	0	0	0	0	0.06	0.18	-0.15	-0.05	-0.04	-0.06	
Gore Road Trib	Reach2	1450.572	10.74	4.17	237.54	238.48	238.25	2.22	0.14	0.14	2.21	Gore Road Trib	Reach2	1450.572	10.74	4.17	237.54	238.48	238.25	2.22	0.14	0.14	2.21	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach2	1450.428	10.74	4.17	235.83	236.82	236.46	2.02	0.34	0.41	1.13	Gore Road Trib	Reach2	1450.428	10.74	4.17	235.83	236.82	236.46	2.02	0.34	0.41	1.13	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach2	1450.284	10.74	4.17	234.78	235.41	235.2	1.21	0.51	0.42	0.64	Gore Road Trib	Reach2	1450.284	10.74	4.17	234.78	235.41	235.2	1.21	0.51	0.42	0.64	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach2	1450.168	10.74	4.17	233.73	234.36	234.16	2.02	0.47	0.49	0.88	Gore Road Trib	Reach2	1450.168	10.74	4.17	233.73	234.36	234.16	2.02	0.47	0.49	0.88	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach2	1450	10.74	4.17	233.28	234.14	233.81	0.38	0.16	0.13	0.16	Gore Road Trib	Reach2	1450	10.74	4.17	233.28	234.14	233.81	0.38	0.16	0.13	0.16	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1	1416.798	31.51	12.23	232.98	233.91	233.56	0.96	0.71	0.97	0.89	Gore Road Trib	Reach1	1416.798	31.51	12.23	232.98	233.91	233.56	0.96	0.71	0.97	0.89	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1	1416.721	31.51	12.23	232.59	233.49	233.12	0.74	0.14	0.3	0.73	Gore Road Trib	Reach1	1416.721	31.51	12.23	232.59	233.49	233.12	0.74	0.14	0.3	0.73	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1	1416.598	31.51	12.23	231.99	232.88	232.58	1.93	0.67	0.65	0.72	Gore Road Trib	Reach1	1416.598	31.51	12.23	231.99	232.88	232.58	1.93	0.67	0.65	0.72	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1	1416.398	31.51	12.23	230.73	231.81	231.42	0.9	0.61	0.88	0.82	Gore Road Trib	Reach1	1416.398	31.51	12.23	230.73	231.81	231.42	0.9	0.61	0.88	0.82	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1	1416.261	31.51	12.23	229.56	230.78	230.54	2.47	0.74	0.43	0.96	Gore Road Trib	Reach1	1416.261	31.51	12.23	229.56	230.78	230.54	2.47	0.74	0.43	0.96	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1	1416.193	31.51	12.23	229.05	230.3	229.94	1.09	0.47	0.76	0.7	Gore Road Trib	Reach1	1416.193	31.51	12.23	229.05	230.3	229.94	1.09	0.47	0.76	0.7	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1416.041	40.85	15.08	228.39	229.49	229.16	1.69	0.42	0.54	1.03	Gore Road Trib	Reach1-DS-0	1416.041	40.85	15.08	228.39	229.49	229.16	1.69	0.42	0.54	1.03	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.982	40.85	15.08	228.33	229.02	228.79	1.48	1.09	1.47	1.37	Gore Road Trib	Reach1-DS-0	1415.982	40.85	15.08	228.33	229.02	228.79	1.48	1.09	1.47	1.37	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.904	40.85	15.08	227.4	228.58	228.2	1.44	0.89	0.89	0.97	Gore Road Trib	Reach1-DS-0	1415.904	40.85	15.08	227.4	228.58	228.2	1.44	0.89	0.89	0.97	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.793	40.85	15.08	226.47	228.11	227.7	2.23	0.74	0.52	0.97	Gore Road Trib	Reach1-DS-0	1415.793	40.85	15.08	226.47	228.11	227.7	2.23	0.74	0.52	0.97	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.72	40.85	15.08	226.47	227.79	227.41	2.07	0.57	0.67	0.77	Gore Road Trib	Reach1-DS-0	1415.72	40.85	15.08	226.47	227.79	227.41	2.07	0.57	0.67	0.77	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.59	40.85	15.08	225.93	227.27	226.9	0.88	0.62	0.5	0.62	Gore Road Trib	Reach1-DS-0	1415.59	40.85	15.08	225.93	227.27	226.9	0.88	0.62	0.5	0.62	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.515	40.85	15.08	225.78	226.71	226.43	2.3	0.77	0.52	1.05	Gore Road Trib	Reach1-DS-0	1415.515	40.85	15.08	225.78	226.71	226.43	2.3	0.77	0.52	1.05	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.353	40.85	15.08	225.06	226.08	225.73	0.58	0.64	0.37	0.57	Gore Road Trib	Reach1-DS-0	1415.353	40.85	15.08	225.06	226.08	225.73	0.58	0.64	0.37	0.57	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.201	40.85	15.08	224.34	225.48	225.12	2.02	0.77	0.63	0.79	Gore Road Trib	Reach1-DS-0	1415.201	40.85	15.08	224.34	225.48	225.12	2.02	0.77	0.63	0.79	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1415.055	40.85	15.08	223.77	224.66	224.36	0.93	0.61	0.85	0.75	Gore Road Trib	Reach1-DS-0	1415.055	40.85	15.08	223.77	224.66	224.36	0.93	0.61	0.85	0.75	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1414.792	40.85	15.08	222.48	223.55	223.24	0.93	0.76	0.71	0.76	Gore Road Trib	Reach1-DS-0	1414.792	40.85	15.08	222.48	223.55	223.24	0.93	0.76	0.71	0.76	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1414.601	40.85	15.08	221.55	222.9	222.37	1.57	0.51	0.45	0.8	Gore Road Trib	Reach1-DS-0	1414.601	40.85	15.08	221.55	222.9	222.37	1.57	0.51	0.45	0.8	0	0	0	0	0	0	0	0	0	0	

Existing												Proposed												Difference (Proposed - Existing)										Remarks
River	Reach	River	Peak Flows** (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	River	Reach	River Sta	Peak Flows** (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	River	Peak Flows (m^3/s)		Min Ch El	W.S. Elev		Vel Chnl*	Vel Left*	Vel Right*	Vel Total*	
			Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)				Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)		Regional	100Year	(m)	Regional	100Year	(m/s)	(m/s)	(m/s)	(m/s)	
Gore Road Trib	Reach1-DS-0	1414.401	40.85	15.08	220.38	222.59	221.9	1.47	0.33	0.36	0.66	Gore Road Trib	Reach1-DS-0	1414.401	40.85	15.08	220.38	222.59	221.9	1.47	0.33	0.36	0.66	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1414.292	40.85	15.08	220.38	222.58	221.9	0.69	0.24	0.19	0.27	Gore Road Trib	Reach1-DS-0	1414.292	40.85	15.08	220.38	222.58	221.9	0.69	0.24	0.19	0.27	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1414.284	40.85	15.08	220.38	222.58	221.84	0.67	0.24	0.2	0.27	Gore Road Trib	Reach1-DS-0	1414.284	40.85	15.08	220.38	222.58	221.84	0.67	0.24	0.2	0.27	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1414.268	(Existing Culvert @ Mayfield Rd)									Gore Road Trib	Reach1-DS-0	1414.268	(Existing Culvert @ Mayfield Rd)									Culvert	(Existing Culvert @ Mayfield Rd)									
Gore Road Trib	Reach1-DS-0	1414.253	39.9	15.53	220.41	221.65	221.2	3.21	1.1	1.01	2.42	Gore Road Trib	Reach1-DS-0	1414.253	39.9	15.53	220.41	221.65	221.2	3.21	1.1	1.01	2.42	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1414.247	39.9	15.53	220.32	221.55	221.19	0.62	0.48	0.53	0.53	Gore Road Trib	Reach1-DS-0	1414.247	39.9	15.53	220.32	221.55	221.19	0.62	0.48	0.53	0.53	0	0	0	0	0	0	0	0	0	0	
Gore Road Trib	Reach1-DS-0	1414.191	39.9	15.53	219.93	221.31	220.93	2.43	0.71	0.71	0.9	Gore Road Trib	Reach1-DS-0	1414.191	39.9	15.53	219.93	221.31	220.93	2.43	0.71	0.71	0.9	0	0	0	0	0	0	0	0	0	0	

Note:

** Velocity corresponding to the regulatory (i.e., Regional Flow).*

*** Existing Condition Peakflows for HDF-3 and HDF-8 has been estimated based on the Sce revised VO Model (Appendix A)*

Existing Condition Peakflows for Clarkway Trib A, Reach 2, and Gore Road Trib has been adopted from the Peakflows defined in the TRCA Approved HEC-RAS Model

Proposed Condition Condition Peakflows for Clarkway Trib A, HDF-3, and HDF-8 has been estimated based on the SCE Revised Proposed condition VO Model (See Appendix A)

APPENDIX B-5

HDF-3 HEC-RAS MODEL RESULTS FOR CUT AND FILL ANALYSIS

- **Required Volume Calculated based on:**

Existing Channel Geometry + Existing Condition Flows

- **Provided Volume Calculated based on:**

Proposed Channel Geometry + Existing Condition Flows

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
HDF-3	1	1002	2-year	0.27	242.78	242.93		242.95	0.005220	0.60	0.58	7.24	0.54
HDF-3	1	1002	5-year	0.47	242.78	242.97		242.99	0.005763	0.75	0.87	8.70	0.60
HDF-3	1	1002	10-year	0.98	242.78	243.03		243.07	0.006491	0.99	1.53	11.54	0.67
HDF-3	1	1002	25-year	1.24	242.78	243.06		243.10	0.006630	1.08	1.83	12.50	0.69
HDF-3	1	1002	50-year	1.43	242.78	243.08		243.12	0.006690	1.13	2.05	13.12	0.70
HDF-3	1	1002	100-year	1.63	242.78	243.09		243.14	0.006768	1.18	2.26	13.71	0.71
HDF-3	1	1002	Regional	4.16	242.78	243.23		243.32	0.007611	1.64	4.60	19.19	0.80
HDF-3	1	1001	2-year	0.27	242.72	242.88	242.83	242.89	0.003248	0.43	0.69	8.52	0.42
HDF-3	1	1001	5-year	0.47	242.72	242.91	242.86	242.93	0.003550	0.54	1.02	10.33	0.46
HDF-3	1	1001	10-year	0.98	242.72	242.97	242.91	243.00	0.004335	0.74	1.69	13.37	0.53
HDF-3	1	1001	25-year	1.24	242.72	242.99	242.94	243.02	0.004509	0.82	2.02	14.65	0.56
HDF-3	1	1001	50-year	1.43	242.72	243.01	242.95	243.04	0.004368	0.85	2.30	15.65	0.55
HDF-3	1	1001	100-year	1.63	242.72	243.03	242.97	243.06	0.004493	0.90	2.53	16.48	0.57
HDF-3	1	1001	Regional	4.16	242.72	243.16	243.10	243.22	0.004954	1.25	5.30	23.71	0.64
HDF-3	1	1000	2-year	0.27	242.49	242.59	242.59	242.62	0.027135	0.81	0.34	6.54	1.09
HDF-3	1	1000	5-year	0.47	242.49	242.62	242.62	242.66	0.022528	0.93	0.54	7.94	1.05
HDF-3	1	1000	10-year	0.98	242.49	242.67	242.67	242.73	0.015221	1.07	1.05	10.68	0.94
HDF-3	1	1000	25-year	1.24	242.49	242.69	242.69	242.76	0.014311	1.15	1.29	11.72	0.93
HDF-3	1	1000	50-year	1.43	242.49	242.71	242.71	242.77	0.014146	1.21	1.44	12.33	0.94
HDF-3	1	1000	100-year	1.63	242.49	242.72	242.72	242.79	0.013424	1.24	1.63	13.04	0.93
HDF-3	1	1000	Regional	4.16	242.49	242.85	242.85	242.96	0.011025	1.61	3.76	20.00	0.92
HDF-3	1	999	2-year	0.27	241.92	242.06	242.01	242.07	0.001744	0.33	0.99	12.77	0.31
HDF-3	1	999	5-year	0.47	241.92	242.09	242.03	242.10	0.002175	0.43	1.41	15.21	0.36
HDF-3	1	999	10-year	0.98	241.92	242.15	242.08	242.17	0.002351	0.56	2.50	20.25	0.40
HDF-3	1	999	25-year	1.24	241.92	242.17	242.11	242.19	0.002761	0.64	2.84	21.54	0.43
HDF-3	1	999	50-year	1.43	241.92	242.19	242.11	242.21	0.002521	0.65	3.32	23.30	0.42
HDF-3	1	999	100-year	1.63	241.92	242.21		242.23	0.002491	0.68	3.71	24.70	0.42
HDF-3	1	999	Regional	4.16	241.92	242.34		242.37	0.002923	0.96	7.55	35.21	0.49
HDF-3	1	998	2-year	0.27	241.84	241.88	241.88	241.90	0.026524	0.68	0.45	11.84	1.03
HDF-3	1	998	5-year	0.47	241.84	241.91	241.91	241.93	0.017293	0.74	0.76	13.37	0.90
HDF-3	1	998	10-year	0.98	241.84	241.94	241.94	241.98	0.018326	0.99	1.24	15.59	0.99
HDF-3	1	998	25-year	1.24	241.84	241.97	241.97	242.01	0.012757	0.96	1.68	17.36	0.85
HDF-3	1	998	50-year	1.43	241.84	241.96	241.96	242.02	0.017654	1.12	1.66	17.27	1.00
HDF-3	1	998	100-year	1.63	241.84	241.97	241.97	242.03	0.019178	1.21	1.77	17.65	1.05
HDF-3	1	998	Regional	4.16	241.84	242.08	242.08	242.16	0.013281	1.49	4.08	24.72	0.97
HDF-3	1	997	2-year	0.27	240.98	241.24		241.25	0.001312	0.39	0.78	5.57	0.29
HDF-3	1	997	5-year	0.47	240.98	241.30		241.31	0.001391	0.48	1.16	6.78	0.31
HDF-3	1	997	10-year	0.98	240.98	241.39		241.42	0.001793	0.68	1.87	8.51	0.37
HDF-3	1	997	25-year	1.24	240.98	241.43		241.46	0.001868	0.75	2.22	9.34	0.39
HDF-3	1	997	50-year	1.43	240.98	241.46		241.48	0.001993	0.80	2.43	9.78	0.41
HDF-3	1	997	100-year	1.63	240.98	241.48		241.51	0.002076	0.85	2.66	10.25	0.42
HDF-3	1	997	Regional	4.16	240.98	241.67		241.73	0.003004	1.31	4.95	13.87	0.54
HDF-3	1	996.5	2-year	0.27	240.96	241.10		241.12	0.009042	0.62	0.45	6.37	0.67
HDF-3	1	996.5	5-year	0.47	240.96	241.12	241.12	241.16	0.011039	0.82	0.63	7.47	0.78
HDF-3	1	996.5	10-year	0.98	240.96	241.18	241.17	241.23	0.011138	1.07	1.12	10.04	0.83
HDF-3	1	996.5	25-year	1.24	240.96	241.20	241.19	241.26	0.012170	1.20	1.30	10.81	0.89
HDF-3	1	996.5	50-year	1.43	240.96	241.21	241.21	241.28	0.012533	1.27	1.45	11.39	0.91
HDF-3	1	996.5	100-year	1.63	240.96	241.23	241.23	241.30	0.012132	1.32	1.63	12.16	0.91
HDF-3	1	996.5	Regional	4.16	240.96	241.37	241.37	241.48	0.010458	1.71	3.79	18.76	0.92
HDF-3	1	996	2-year	0.27	240.55	240.71		240.72	0.005916	0.48	0.56	6.98	0.54
HDF-3	1	996	5-year	0.47	240.55	240.75		240.76	0.004974	0.52	0.90	8.68	0.51
HDF-3	1	996	10-year	0.98	240.55	240.81		240.83	0.004981	0.66	1.54	12.29	0.55
HDF-3	1	996	25-year	1.24	240.55	240.83		240.86	0.004920	0.72	1.83	13.92	0.56
HDF-3	1	996	50-year	1.43	240.55	240.85		240.88	0.004632	0.74	2.09	15.17	0.55
HDF-3	1	996	100-year	1.63	240.55	240.86		240.89	0.004694	0.78	2.30	16.18	0.56
HDF-3	1	996	Regional	4.16	240.55	240.99		241.05	0.004864	1.11	4.95	25.47	0.62
HDF-3	1	995	2-year	0.27	240.22	240.36		240.37	0.003098	0.41	0.72	9.23	0.41
HDF-3	1	995	5-year	0.47	240.22	240.40		240.41	0.003560	0.52	1.05	11.15	0.45
HDF-3	1	995	10-year	0.98	240.22	240.46		240.48	0.003546	0.68	1.89	15.00	0.48
HDF-3	1	995	25-year	1.24	240.22	240.49		240.51	0.003316	0.72	2.36	16.80	0.48
HDF-3	1	995	50-year	1.43	240.22	240.50		240.53	0.003486	0.77	2.60	17.63	0.50
HDF-3	1	995	100-year	1.63	240.22	240.52		240.55	0.003497	0.80	2.89	18.61	0.50
HDF-3	1	995	Regional	4.16	240.22	240.68		240.72	0.002946	1.02	6.77	28.46	0.50
HDF-3	1	994	2-year	0.27	239.74	239.84	239.82	239.85	0.007647	0.59	0.53	7.44	0.62
HDF-3	1	994	5-year	0.47	239.74	239.88		239.90	0.006195	0.67	0.86	8.68	0.60
HDF-3	1	994	10-year	0.98	239.74	239.94	239.90	239.97	0.006481	0.89	1.45	10.63	0.65
HDF-3	1	994	25-year	1.24	239.74	239.96	239.92	240.00	0.006501	0.97	1.73	11.41	0.67
HDF-3	1	994	50-year	1.43	239.74	239.98		240.02	0.006323	1.01	1.95	11.99	0.67
HDF-3	1	994	100-year	1.63	239.74	240.00		240.05	0.006245	1.06	2.16	12.56	0.67
HDF-3	1	994	Regional	4.16	239.74	240.13	240.09	240.22	0.007712	1.56	4.17	17.39	0.80
HDF-3	1	993	2-year	0.27	238.99	239.03	239.01	239.04	0.003088	0.21	1.84	46.93	0.34
HDF-3	1	993	5-year	0.47	238.99	239.05		239.05	0.003763	0.28	2.44	48.09	0.40
HDF-3	1	993	10-year	0.98	238.99	239.07		239.08	0.003937	0.39	3.82	50.77	0.44
HDF-3	1	993	25-year	1.24	238.99	239.09		239.09	0.004090	0.43	4.38	51.61	0.46
HDF-3	1	993	50-year	1.43	238.99	239.09		239.10	0.004315	0.46	4.72	52.33	0.47
HDF-3	1	993	100-year	1.63	238.99	239.10		239.11	0.004559	0.49	5.05	52.93	0.49
HDF-3	1	993	Regional	4.16	238.99	239.18		239.19	0.004447	0.71	9.42	60.64	0.53
HDF-3	1	992	2-year	0.27	238.18	238.22		238.23	0.014291	0.46	0.78	23.99	0.74
HDF-3	1	992	5-year	0.47	238.18	238.24	238.23	238.25	0.009726	0.50	1.29	25.87	0.66
HDF-3	1	992	10-year	0.98	238.18	238.27		238.29	0.008707	0.63	2.17	28.04	0.67
HDF-3	1	992	25-year	1.24	238.18	238.29		238.30	0.008018	0.67	2.60	28.81	0.66
HDF-3	1	992	50-year	1.43	238.18	238.30		238.32	0.007604	0.70	2.91	29.36	0.65
HDF-3	1	992	100-year	1.63	238.18	238.31		238.33	0.007021	0.71	3.26	30.03	0.63
HDF-3	1	992	Regional	4.16	238.18	238.40		238.44	0.006448	0.99	6.36	36.02	0.67
HDF-3	1	991	2-year	0.37	237.10	237.29		237.30	0.004606	0.42	0.89	11.77	0.47

HEC-RAS Plan: SCE Existing July 2024 Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
HDF-3	1	991	5-year	0.64	237.10	237.31		237.33	0.005361	0.55	1.21	13.14	0.54
HDF-3	1	991	10-year	1.34	237.10	237.37	237.33	237.40	0.005476	0.73	2.03	16.42	0.58
HDF-3	1	991	25-year	1.70	237.10	237.39	237.34	237.42	0.005529	0.80	2.42	17.83	0.60
HDF-3	1	991	50-year	1.96	237.10	237.41	237.36	237.44	0.005682	0.85	2.67	18.71	0.61
HDF-3	1	991	100-year	2.23	237.10	237.42	237.37	237.46	0.005860	0.90	2.91	19.55	0.63
HDF-3	1	991	Regional	5.69	237.10	237.56		237.62	0.005600	1.24	6.32	29.29	0.67
HDF-3	1	990	2-year	0.37	236.39	236.46		236.46	0.010497	0.46	1.06	24.17	0.66
HDF-3	1	990	5-year	0.64	236.39	236.48		236.49	0.008919	0.54	1.61	26.30	0.65
HDF-3	1	990	10-year	1.34	236.39	236.51		236.53	0.008943	0.72	2.64	29.04	0.70
HDF-3	1	990	25-year	1.70	236.39	236.53	236.51	236.55	0.009241	0.79	3.06	30.06	0.72
HDF-3	1	990	50-year	1.96	236.39	236.54	236.51	236.56	0.008931	0.83	3.41	30.93	0.72
HDF-3	1	990	100-year	2.23	236.39	236.55	236.51	236.58	0.008836	0.86	3.74	31.89	0.73
HDF-3	1	990	Regional	5.69	236.39	236.64	236.60	236.69	0.010523	1.28	6.68	36.62	0.85
HDF-3	1	989	2-year	0.37	235.20	235.34		235.35	0.006965	0.49	0.76	10.23	0.57
HDF-3	1	989	5-year	0.64	235.20	235.36	235.33	235.38	0.007979	0.61	1.06	11.47	0.64
HDF-3	1	989	10-year	1.34	235.20	235.42		235.45	0.007659	0.78	1.73	13.82	0.67
HDF-3	1	989	25-year	1.70	235.20	235.44		235.48	0.007288	0.83	2.12	18.35	0.67
HDF-3	1	989	50-year	1.96	235.20	235.46		235.50	0.007462	0.87	2.39	21.01	0.68
HDF-3	1	989	100-year	2.23	235.20	235.47	235.43	235.51	0.007480	0.91	2.69	23.73	0.69
HDF-3	1	989	Regional	5.69	235.20	235.60	235.56	235.66	0.005999	1.17	6.68	37.71	0.68
HDF-3	1	988	2-year	0.37	234.10	234.31	234.27	234.33	0.004950	0.54	0.72	9.70	0.52
HDF-3	1	988	5-year	0.64	234.10	234.36	234.31	234.38	0.004273	0.60	1.30	14.07	0.50
HDF-3	1	988	10-year	1.34	234.10	234.43	234.37	234.45	0.004377	0.72	2.38	17.01	0.53
HDF-3	1	988	25-year	1.70	234.10	234.45	234.40	234.48	0.004425	0.79	2.82	18.32	0.55
HDF-3	1	988	50-year	1.96	234.10	234.47	234.41	234.50	0.004425	0.83	3.13	19.16	0.55
HDF-3	1	988	100-year	2.23	234.10	234.49	234.42	234.52	0.004427	0.87	3.44	19.82	0.56
HDF-3	1	988	Regional	5.69	234.10	234.63		234.69	0.004982	1.25	6.67	25.63	0.64
HDF-3	1	987.5	2-year	0.37	233.34	233.49	233.49	233.52	0.014692	0.79	0.47	5.33	0.86
HDF-3	1	987.5	5-year	0.64	233.34	233.52	233.52	233.57	0.018760	1.00	0.64	6.19	1.00
HDF-3	1	987.5	10-year	1.34	233.34	233.59	233.59	233.66	0.016989	1.17	1.15	8.19	1.00
HDF-3	1	987.5	25-year	1.70	233.34	233.62	233.62	233.70	0.016413	1.23	1.39	9.00	1.00
HDF-3	1	987.5	50-year	1.96	233.34	233.64	233.64	233.72	0.016102	1.26	1.55	9.51	1.00
HDF-3	1	987.5	100-year	2.23	233.34	233.66	233.66	233.74	0.015734	1.30	1.72	10.06	1.00
HDF-3	1	987.5	Regional	5.69	233.34	233.81	233.81	233.96	0.011563	1.70	3.61	14.47	0.95
HDF-3	1	987	2-year	0.37	232.30	232.44		232.44	0.003493	0.36	1.25	16.95	0.41
HDF-3	1	987	5-year	0.64	232.30	232.54		232.55	0.000522	0.25	3.27	19.91	0.18
HDF-3	1	987	10-year	1.34	232.30	232.77		232.77	0.000141	0.22	8.41	25.59	0.11
HDF-3	1	987	25-year	1.70	232.30	233.05		233.05	0.000034	0.15	16.51	31.45	0.06
HDF-3	1	987	50-year	1.96	232.30	233.09		233.09	0.000036	0.16	17.76	32.15	0.06
HDF-3	1	987	100-year	2.23	232.30	233.12		233.12	0.000042	0.18	18.56	32.59	0.07
HDF-3	1	987	Regional	5.69	232.30	233.42		233.42	0.000077	0.30	29.09	37.96	0.09
HDF-3	1	986	2-year	0.37	231.93	232.44		232.44	0.000006	0.05	10.55	28.34	0.02
HDF-3	1	986	5-year	0.64	231.93	232.54		232.54	0.000009	0.07	13.70	30.23	0.03
HDF-3	1	986	10-year	1.34	231.93	232.77		232.77	0.000011	0.10	20.92	33.63	0.03
HDF-3	1	986	25-year	1.70	231.93	233.05		233.05	0.000006	0.08	30.89	37.05	0.03
HDF-3	1	986	50-year	1.96	231.93	233.09		233.09	0.000007	0.09	32.36	37.59	0.03
HDF-3	1	986	100-year	2.23	231.93	233.12		233.12	0.000008	0.10	33.28	37.99	0.03
HDF-3	1	986	Regional	5.69	231.93	233.41		233.41	0.000022	0.20	45.39	43.54	0.05
HDF-3	1	985	2-year	0.37	231.75	232.44		232.44	0.000001	0.02	19.93	34.12	0.01
HDF-3	1	985	5-year	0.64	231.75	232.54		232.54	0.000002	0.04	23.67	35.45	0.01
HDF-3	1	985	10-year	1.34	231.75	232.77		232.77	0.000003	0.06	31.92	37.85	0.02
HDF-3	1	985	25-year	1.70	231.75	233.05		233.05	0.000002	0.06	43.58	43.63	0.02
HDF-3	1	985	50-year	1.96	231.75	233.09		233.09	0.000003	0.06	45.30	44.13	0.02
HDF-3	1	985	100-year	2.23	231.75	233.12		233.12	0.000003	0.07	46.38	44.44	0.02
HDF-3	1	985	Regional	5.69	231.75	233.41		233.41	0.000010	0.14	60.15	48.12	0.03
HDF-3	1	984	2-year	0.37	232.05	232.32	232.32	232.39	0.018530	1.19	0.31	2.19	1.01
HDF-3	1	984	5-year	0.64	232.05	232.39	232.39	232.48	0.017423	1.39	0.46	2.43	1.02
HDF-3	1	984	10-year	1.34	232.05	232.68	232.51	232.73	0.003063	1.08	1.41	4.41	0.50
HDF-3	1	984	25-year	1.70	232.05	233.02	232.57	233.04	0.000657	0.72	3.23	19.68	0.25
HDF-3	1	984	50-year	1.96	232.05	233.05	232.60	233.07	0.000750	0.79	3.45	25.45	0.27
HDF-3	1	984	100-year	2.23	232.05	233.06	232.64	233.10	0.000908	0.87	3.55	28.58	0.30
HDF-3	1	984	Regional	5.69	232.05	233.14	232.99	233.31	0.004220	2.00	4.17	40.06	0.66
HDF-3	1	983	2-year	0.37	231.24	231.83	231.40	231.83	0.000089	0.20	1.89	15.61	0.09
HDF-3	1	983	5-year	0.64	231.24	232.06	231.46	232.06	0.000075	0.23	2.76	22.06	0.09
HDF-3	1	983	10-year	1.34	231.24	232.69	231.57	232.69	0.000041	0.26	5.15	55.33	0.07
HDF-3	1	983	25-year	1.70	231.24	233.02	231.61	233.02	0.000003	0.07	48.41	70.69	0.02
HDF-3	1	983	50-year	1.96	231.24	233.05	231.63	233.05	0.000003	0.08	50.80	72.82	0.02
HDF-3	1	983	100-year	2.23	231.24	233.07	231.66	233.07	0.000004	0.09	51.95	73.96	0.02
HDF-3	1	983	Regional	5.69	231.24	233.18	231.95	233.18	0.000018	0.20	60.22	80.48	0.05
HDF-3	1	982.58		Culvert									
HDF-3	1	982	2-year	0.37	230.86	231.21	231.15	231.26	0.009083	0.94	0.40	4.41	0.65
HDF-3	1	982	5-year	0.64	230.86	231.26	231.23	231.35	0.015070	1.32	0.49	4.87	0.86
HDF-3	1	982	10-year	1.34	230.86	231.38	231.38	231.54	0.018857	1.78	0.75	14.58	1.01
HDF-3	1	982	25-year	1.70	230.86	231.44	231.44	231.62	0.016996	1.89	0.93	18.73	0.99
HDF-3	1	982	50-year	1.96	230.86	231.48	231.48	231.67	0.015992	1.96	1.05	20.11	0.97
HDF-3	1	982	100-year	2.23	230.86	231.51	231.51	231.72	0.015337	2.04	1.16	21.29	0.97
HDF-3	1	982	Regional	5.69	230.86	231.88	231.88	232.26	0.013030	2.78	2.25	33.25	0.98
HDF-3	1	981	2-year	0.37	230.86	231.08	231.07	231.10	0.009796	0.65	1.05	17.15	0.62
HDF-3	1	981	5-year	0.64	230.86	231.12	231.09	231.14	0.008526	0.73	1.73	19.83	0.61
HDF-3	1	981	10-year	1.34	230.86	231.17	231.14	231.20	0.010655	1.00	3.01	29.28	0.71
HDF-3	1	981	25-year	1.70	230.86	231.20	231.16	231.23	0.007783	0.95	4.08	30.36	0.63
HDF-3	1	981	50-year	1.96	230.86	231.21	231.18	231.24	0.008804	1.03	4.33	30.57	0.67
HDF-3	1	981	100-year	2.23	230.86	231.23	231.18	231.26	0.008972	1.08	4.73	30.97	0.68
HDF-3	1	981	Regional	5.69	230.86	231.35	231.28	231.40	0.010119	1.50	8.90	35.33	0.77

HEC-RAS Plan: SCE Proposed July 2024 Volume Calc Locations: User Defined

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
HDF-3	1	1002	2-year	0.27	242.73	242.97	242.90	242.99	0.004007	0.64	0.43	3.41	0.49		0.07	0.62	3.35
HDF-3	1	1002	5-year	0.47	242.73	243.05	242.96	243.07	0.003476	0.70	0.84	10.41	0.48	0.05	0.15	0.56	5.01
HDF-3	1	1002	10-year	0.98	242.73	243.13	243.09	243.16	0.002940	0.81	2.14	17.10	0.46	0.18	0.25	0.46	9.30
HDF-3	1	1002	25-year	1.24	242.73	243.16	243.12	243.19	0.003083	0.87	2.56	17.27	0.48	0.23	0.29	0.48	12.53
HDF-3	1	1002	50-year	1.43	242.73	243.18	243.13	243.20	0.003174	0.91	2.84	17.38	0.49	0.26	0.32	0.50	13.58
HDF-3	1	1002	100-year	1.63	242.73	243.19	243.14	243.22	0.003231	0.95	3.13	17.49	0.50	0.28	0.34	0.52	14.49
HDF-3	1	1002	Regional	4.16	242.73	243.34	243.25	243.39	0.003760	1.29	5.84	18.54	0.57	0.50	0.54	0.71	24.37
HDF-3	1	1001	2-year	0.27	242.68	242.92	242.84	242.94	0.003919	0.63	0.43	2.50	0.49			0.63	3.35
HDF-3	1	1001	5-year	0.47	242.68	242.99	242.90	243.02	0.004044	0.75	0.65	6.05	0.51	0.05	0.05	0.73	5.00
HDF-3	1	1001	10-year	0.98	242.68	243.08	243.05	243.11	0.004072	0.94	1.79	18.74	0.54	0.18	0.20	0.55	9.28
HDF-3	1	1001	25-year	1.24	242.68	243.10	243.08	243.14	0.003986	0.98	2.29	19.00	0.55	0.23	0.25	0.54	12.50
HDF-3	1	1001	50-year	1.43	242.68	243.12	243.09	243.16	0.003980	1.01	2.61	19.17	0.55	0.26	0.28	0.55	13.54
HDF-3	1	1001	100-year	1.63	242.68	243.14	243.11	243.17	0.003681	1.01	3.01	19.38	0.53	0.29	0.30	0.54	14.45
HDF-3	1	1001	Regional	4.16	242.68	243.29	243.21	243.34	0.003691	1.28	6.12	20.94	0.57	0.49	0.49	0.68	24.29
HDF-3	1	1000	2-year	0.27	242.51	242.78	242.67	242.80	0.002572	0.54	0.50	2.65	0.40			0.54	3.33
HDF-3	1	1000	5-year	0.47	242.51	242.86	242.73	242.88	0.002534	0.65	0.88	11.08	0.42	0.08	0.08	0.53	4.97
HDF-3	1	1000	10-year	0.98	242.51	242.92	242.87	242.95	0.003149	0.85	2.01	18.41	0.48	0.19	0.20	0.49	9.19
HDF-3	1	1000	25-year	1.24	242.51	242.95	242.92	242.98	0.003189	0.90	2.50	18.58	0.49	0.23	0.24	0.50	12.39
HDF-3	1	1000	50-year	1.43	242.51	242.97	242.92	243.00	0.003102	0.92	2.86	18.70	0.49	0.26	0.27	0.50	13.42
HDF-3	1	1000	100-year	1.63	242.51	242.99	242.94	243.02	0.003061	0.95	3.20	18.82	0.49	0.28	0.29	0.51	14.31
HDF-3	1	1000	Regional	4.16	242.51	243.15	243.05	243.19	0.003067	1.21	6.37	19.87	0.52	0.47	0.48	0.65	24.02
HDF-3	1	999.4	2-year	0.27	242.32	242.49	242.49	242.55	0.016554	1.05	0.26	2.06	0.95			1.05	3.31
HDF-3	1	999.4	5-year	0.47	242.32	242.54	242.54	242.62	0.017077	1.25	0.38	2.40	1.00			1.25	4.94
HDF-3	1	999.4	10-year	0.98	242.32	242.70	242.70	242.75	0.006222	1.10	1.37	17.53	0.66	0.19	0.17	0.72	9.11
HDF-3	1	999.4	25-year	1.24	242.32	242.72	242.72	242.78	0.006093	1.15	1.84	18.72	0.67	0.26	0.23	0.67	12.28
HDF-3	1	999.4	50-year	1.43	242.32	242.74	242.74	242.79	0.006373	1.21	2.08	18.79	0.69	0.29	0.27	0.69	13.30
HDF-3	1	999.4	100-year	1.63	242.32	242.75	242.75	242.81	0.006578	1.26	2.32	18.87	0.70	0.33	0.30	0.70	14.18
HDF-3	1	999.4	Regional	4.16	242.32	242.86	242.86	242.95	0.008875	1.77	4.39	19.54	0.85	0.63	0.61	0.95	23.76
HDF-3	1	999	2-year	0.27	241.91	242.07		242.08	0.001717	0.36	1.07	13.27	0.31	0.13	0.10	0.25	3.28
HDF-3	1	999	5-year	0.47	241.91	242.11		242.12	0.001867	0.44	1.64	16.40	0.34	0.16	0.14	0.29	4.90
HDF-3	1	999	10-year	0.98	241.91	242.16		242.18	0.002421	0.61	2.70	21.00	0.41	0.22	0.20	0.36	9.03
HDF-3	1	999	25-year	1.24	241.91	242.19		242.20	0.002626	0.67	3.17	22.75	0.43	0.25	0.22	0.39	12.19
HDF-3	1	999	50-year	1.43	241.91	242.21		242.23	0.002293	0.67	3.76	24.79	0.41	0.25	0.22	0.38	13.19
HDF-3	1	999	100-year	1.63	241.91	242.23		242.24	0.002283	0.70	4.20	26.21	0.41	0.26	0.24	0.39	14.06
HDF-3	1	999	Regional	4.16	241.91	242.36		242.39	0.002598	0.96	8.54	37.43	0.47	0.36	0.34	0.49	23.51
HDF-3	1	998	2-year	0.27	241.84	241.88	241.88	241.90	0.029322	0.72	0.45	11.75	1.09	0.33	0.32	0.59	3.26
HDF-3	1	998	5-year	0.47	241.84	241.90	241.90	241.93	0.028652	0.89	0.67	12.94	1.13	0.40	0.38	0.71	4.86
HDF-3	1	998	10-year	0.98	241.84	241.95	241.95	241.99	0.013993	0.93	1.43	16.33	0.88	0.40	0.39	0.69	8.96
HDF-3	1	998	25-year	1.24	241.84	241.97	241.97	242.01	0.012856	0.98	1.75	17.64	0.86	0.42	0.40	0.71	12.10
HDF-3	1	998	50-year	1.43	241.84	241.97	241.97	242.02	0.018027	1.15	1.71	17.51	1.02	0.49	0.47	0.83	13.09
HDF-3	1	998	100-year	1.63	241.84	241.98	241.98	242.03	0.018736	1.23	1.86	18.06	1.05	0.52	0.50	0.88	13.95
HDF-3	1	998	Regional	4.16	241.84	242.08	242.08	242.17	0.014591	1.57	4.10	24.87	1.02	0.64	0.63	1.01	23.29
HDF-3	1	997	2-year	0.27	240.98	241.24		241.25	0.001425	0.44	0.76	5.50	0.31	0.14	0.11	0.35	3.22
HDF-3	1	997	5-year	0.47	240.98	241.30		241.31	0.001611	0.55	1.13	6.65	0.34	0.18	0.15	0.42	4.80
HDF-3	1	997	10-year	0.98	240.98	241.39		241.42	0.002142	0.78	1.84	8.55	0.41	0.27	0.23	0.53	8.85
HDF-3	1	997	25-year	1.24	240.98	241.43		241.46	0.002291	0.86	2.17	9.28	0.44	0.30	0.26	0.57	11.97
HDF-3	1	997	50-year	1.43	240.98	241.45		241.49	0.002402	0.91	2.40	9.75	0.45	0.32	0.28	0.60	12.96
HDF-3	1	997	100-year	1.63	240.98	241.48		241.51	0.002503	0.97	2.63	10.18	0.46	0.34	0.30	0.62	13.80
HDF-3	1	997	Regional	4.16	240.98	241.67		241.74	0.003581	1.47	4.90	13.85	0.59	0.53	0.49	0.85	22.99
HDF-3	1	996.5	2-year	0.27	240.96	241.13	241.09	241.14	0.004012	0.57	0.66	7.69	0.49	0.18	0.19	0.41	3.18
HDF-3	1	996.5	5-year	0.47	240.96	241.16	241.11	241.18	0.005064	0.74	0.95	9.22	0.57	0.25	0.25	0.50	4.75
HDF-3	1	996.5	10-year	0.98	240.96	241.24	241.19	241.27	0.004485	0.90	1.84	12.94	0.57	0.31	0.31	0.53	8.76
HDF-3	1	996.5	25-year	1.24	240.96	241.26	241.21	241.30	0.005057	1.01	2.12	13.91	0.61	0.35	0.35	0.58	11.87
HDF-3	1	996.5	50-year	1.43	240.96	241.28	241.23	241.32	0.005273	1.07	2.35	14.64	0.63	0.37	0.37	0.61	12.84
HDF-3	1	996.5	100-year	1.63	240.96	241.29	241.24	241.33	0.005532	1.13	2.57	15.32	0.65	0.40	0.39	0.63	13.67
HDF-3	1	996.5	Regional	4.16	240.96	241.43	241.38	241.50	0.006964	1.61	5.05	21.62	0.77	0.58	0.57	0.82	22.75
HDF-3	1	996	2-year	0.27	240.55	240.67	240.67	240.70	0.022931	0.80	0.34	5.36	1.02			0.80	3.16
HDF-3	1	996	5-year	0.47	240.55	240.71	240.71	240.74	0.014766	0.78	0.60	7.18	0.86			0.78	4.70
HDF-3	1	996	10-year	0.98	240.55	240.75	240.75	240.81	0.020194	1.07	0.92	8.93	1.04	0.05	0.07	1.07	8.69
HDF-3	1	996	25-year	1.24	240.55	240.77	240.77	240.84	0.016410	1.10	1.15	10.68	0.97	0.15	0.17	1.08	11.78
HDF-3	1	996	50-year	1.43	240.55	240.79	240.79	240.85	0.015396	1.14	1.31	11.70	0.96	0.19	0.20	1.09	12.74
HDF-3	1	996	100-year	1.63	240.55	240.80	240.80	240.87	0.014334	1.18	1.49	12.77	0.94	0.22	0.24	1.10	13.56
HDF-3	1	996	Regional	4.16	240.55	240.93	240.93	241.03	0.010668	1.49	3.68	22.01	0.89	0.42	0.43	1.13	22.51
HDF-3	1	995.2	2-year	0.27	240.21	240.33		240.33	0.000844	0.20	1.69	17.25	0.19	0.06	0.06	0.16	3.09
HDF-3	1	995.2	5-year	0.47	240.21	240.38		240.38	0.000703	0.23	2.78	22.55	0.18	0.07	0.06	0.17	4.60
HDF-3	1	995.2	10-year	0.98	240.21	240.49		240.49	0.000495	0.27	5.53	27.87	0.16	0.08	0.08	0.18	8.49
HDF-3	1	995.2	25-year	1.24	240.21	240.52		240.52	0.000543	0.31	6.38	29.23	0.17	0.09	0.09	0.19	11.55
HDF-3	1	995.2	50-year	1.43	240.21	240.53		240.54	0.000608	0.33	6.81	29.87	0.19	0.10	0.10	0.21	12.49
HDF-3	1	995.2	100-year	1.63	240.21	240.55		240.56	0.000637	0.35	7.39	30.72	0.19	0.10	0.11	0.22	13.29
HDF-3	1	995.2	Regional	4.16	240.21	240.73		240.74	0.000867	0.54	13.46	38.45	0.24	0.16	0.16	0.31	21.98
HDF-3	1	994.82	2-year	0.27	239.94	240.14	240.10	240.17	0.011196	0.82	0.33	2.24	0.69			0.82	3.03
HDF-3	1	994.82	5-year	0.47	239.94	240.20	240.16	240.25	0.011451	0.97	0.48	2.63	0.72			0.97	4.50
HDF-3	1	994.82	10-year	0.98	239.94	240.30	240.30	240.37	0.011212	1.21	1.20	16.75	0.76	0.13	0.13	0.82	8.28
HDF-3	1	994.82	25-year	1.24	239.94	240.34	240.34	240.40	0.009206	1.20	2.01	25.11	0.70	0.16	0.17	0.62	11.28
HDF-3	1	994.82	50-year	1.43	239.94	240.37	240.37	240.42	0.007692	1.16	2.70	27.98	0.65	0.19	0.18	0.53	12.19
HDF-3	1	994.82	100-year	1.63	239.94	240.38	240.38	240.43	0.007910	1.21	3.07	28.36	0.66	0.22	0.20	0.53	12.96
HDF-3	1	994.82	Regional	4.16	239.94	240.48	240.48	240.56	0.010979	1.69	6.00	28.98	0.82	0.43	0.41	0.69	21.37
HDF-3	1	993.82	2-year	0.27	239.69	239.96	239.86	239.98	0.002620	0.55	0.49	2.63	0.40			0.55	3.01
HDF-3	1	993.82	5-year	0.47	239.69	240.03	239.91	240.05	0.002604	0.66	0.89	11.72	0.42	0.08	0.08	0.53	4.47
HDF-3	1	993.82	10-year	0.98	239.69	240.12	240.06	240.14	0.002434	0.77	2.60	28.08	0.43	0.17	0.16	0.38	8.21
HDF-3	1	993.82	25-year	1.24	239.69	240.14	240.09	240.16	0.002341	0.79	3.31	28.23	0.42	0.20	0.19	0.37	11.19
HDF-3	1	993.82	50-year	1.43	239.69	240.16	240.11	240.18	0.002285	0.81	3.78	28.33	0.42	0.22	0.21	0.38	12.07
HDF-3	1	993.82	100-year	1.63	239.69	240.17	240.13	240.19	0.002238	0.82	4.24	28.42	0.42	0.24	0.23	0.38	12.83
HDF-3	1	993.82	Regional	4.16	239.69	240.34	240.21	240.36	0.001880	0.95	8.89	29.39	0.41	0.37	0.36	0.47	21.10
HDF-3	1	993.63	2-year	0.27	239.57	239.85	239.74	239.87	0.003261	0.53	0.51	2.67	0.39			0.53	3.00
HDF-3	1	993.63	5-year	0.47	239.57	239.92	239.79	239.94	0.003272	0.64	0.97	13.59	0.41	0.06	0.06	0.49	4.44
HDF-3	1	993.63	10-year	0.98	239.57	240.01	239.94	240.03	0.003319	0.78	2.84	28.10	0.43	0.13	0.13	0.35	8.11
HDF-3	1	993.63	25-year	1.24	239.57	240.04	239.98	240.06	0.003207	0.81	3.65	28.27	0.43	0.16	0.16	0.34	11.06
HDF-3	1	993.63	50-year	1.43	239.57	240.06	240.00	240.08	0.003169	0.83	4.17	28.38	0.43	0.17	0.17	0.34	11.92

HEC-RAS Plan: SCE Proposed July 2024 Volume Calc Locations: User Defined (Continued)

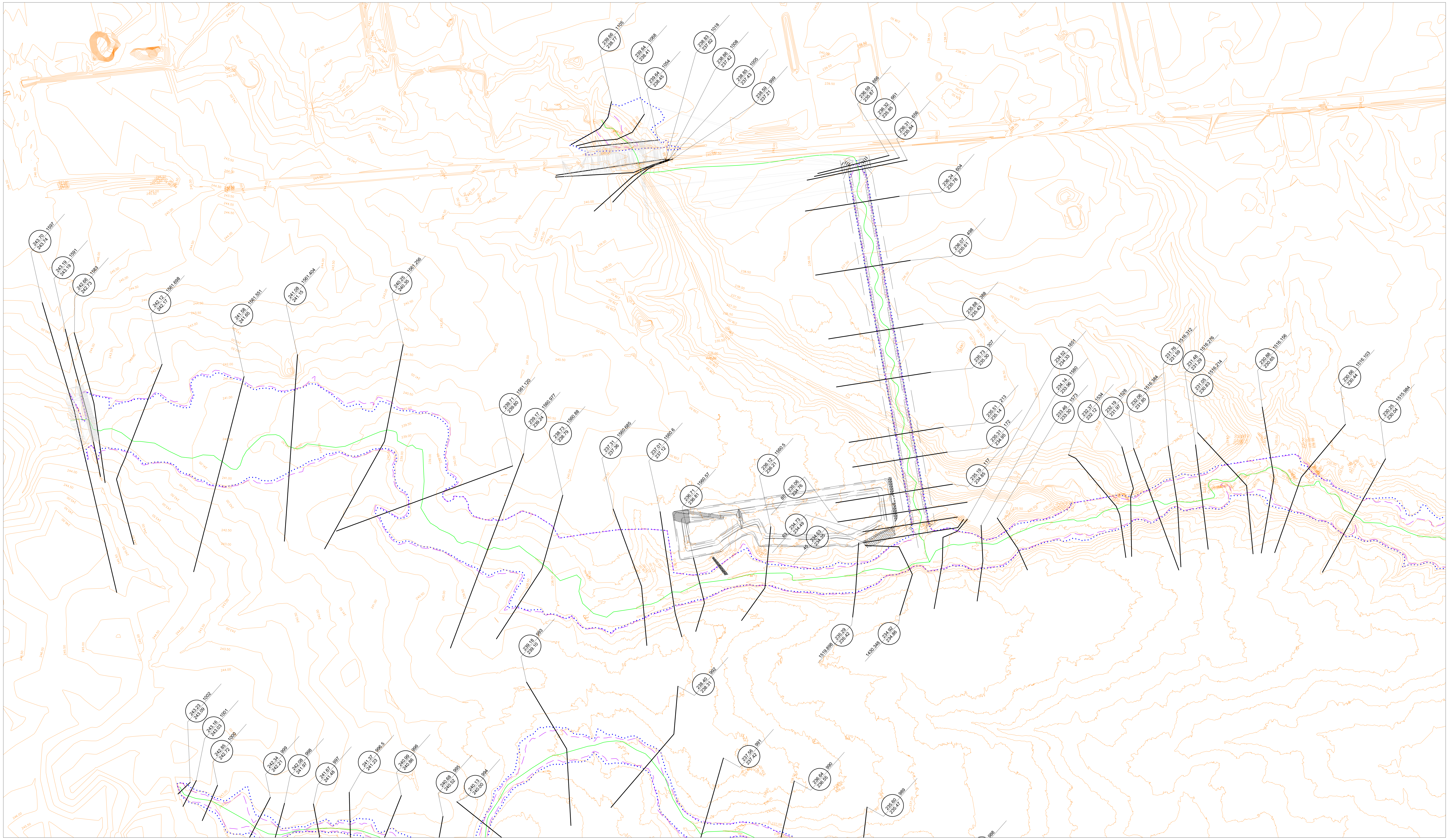
River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
HDF-3	1	993.63	100-year	1.63	239.57	240.08	240.01	240.10	0.002983	0.84	4.79	28.51	0.42	0.19	0.19	0.34	12.66
HDF-3	1	993.63	Regional	4.16	239.57	240.24	240.11	240.27	0.003037	1.06	9.60	29.51	0.45	0.31	0.31	0.43	20.76
HDF-3	1	993.52	2-year	0.27	239.39	239.67	239.55	239.69	0.003100	0.52	0.52	2.75	0.38			0.52	2.97
HDF-3	1	993.52	5-year	0.47	239.39	239.75	239.62	239.77	0.002874	0.59	1.08	14.62	0.38	0.06	0.06	0.44	4.38
HDF-3	1	993.52	10-year	0.98	239.39	239.83	239.75	239.85	0.003055	0.74	2.89	27.65	0.41	0.12	0.13	0.34	7.94
HDF-3	1	993.52	25-year	1.24	239.39	239.86	239.80	239.88	0.003196	0.79	3.57	27.74	0.42	0.14	0.16	0.35	10.85
HDF-3	1	993.52	50-year	1.43	239.39	239.87	239.82	239.90	0.003217	0.82	4.05	27.80	0.43	0.16	0.18	0.35	11.69
HDF-3	1	993.52	100-year	1.63	239.39	239.89	239.84	239.91	0.003272	0.85	4.50	27.85	0.44	0.18	0.19	0.36	12.40
HDF-3	1	993.52	Regional	4.16	239.39	240.05	239.93	240.08	0.003399	1.09	9.00	28.40	0.47	0.31	0.32	0.46	20.22
HDF-3	1	993.36	2-year	0.27	239.15	239.40	239.31	239.42	0.003719	0.62	0.44	2.50	0.47			0.62	2.93
HDF-3	1	993.36	5-year	0.47	239.15	239.48	239.38	239.50	0.004071	0.71	0.71	7.75	0.51	0.06	0.07	0.66	4.31
HDF-3	1	993.36	10-year	0.98	239.15	239.56	239.52	239.59	0.003959	0.87	1.84	18.18	0.53	0.20	0.20	0.53	7.76
HDF-3	1	993.36	25-year	1.24	239.15	239.58	239.56	239.61	0.003746	0.91	2.36	18.34	0.52	0.24	0.25	0.53	10.62
HDF-3	1	993.36	50-year	1.43	239.15	239.60	239.57	239.63	0.003692	0.93	2.68	18.45	0.53	0.27	0.27	0.53	11.43
HDF-3	1	993.36	100-year	1.63	239.15	239.62	239.58	239.65	0.003588	0.95	3.01	18.55	0.52	0.30	0.30	0.54	12.10
HDF-3	1	993.36	Regional	4.16	239.15	239.79	239.68	239.83	0.003100	1.17	6.29	19.59	0.52	0.48	0.48	0.66	19.63
HDF-3	1	992.97	2-year	0.27	238.95	239.24	239.12	239.25	0.001956	0.49	0.55	2.75	0.35			0.49	2.90
HDF-3	1	992.97	5-year	0.47	238.95	239.31	239.17	239.33	0.001909	0.59	1.13	15.46	0.36	0.09	0.08	0.42	4.25
HDF-3	1	992.97	10-year	0.98	238.95	239.39	239.33	239.41	0.002052	0.72	2.48	18.38	0.39	0.20	0.19	0.40	7.62
HDF-3	1	992.97	25-year	1.24	238.95	239.41	239.35	239.43	0.002158	0.78	2.96	18.53	0.41	0.23	0.23	0.42	10.45
HDF-3	1	992.97	50-year	1.43	238.95	239.43	239.37	239.45	0.002103	0.79	3.35	18.66	0.41	0.25	0.25	0.43	11.23
HDF-3	1	992.97	100-year	1.63	238.95	239.45	239.38	239.47	0.002144	0.83	3.68	18.76	0.41	0.27	0.27	0.44	11.89
HDF-3	1	992.97	Regional	4.16	238.95	239.62	239.49	239.65	0.002356	1.09	6.96	19.79	0.46	0.45	0.45	0.60	19.20
HDF-3	1	992.79	2-year	0.27	238.76	238.93	238.93	238.99	0.016792	1.07	0.25	2.01	0.96			1.07	2.87
HDF-3	1	992.79	5-year	0.47	238.76	238.99	238.99	239.07	0.015571	1.21	0.39	2.38	0.96			1.21	4.21
HDF-3	1	992.79	10-year	0.98	238.76	239.14	239.14	239.19	0.006558	1.12	1.36	17.75	0.68	0.20	0.18	0.72	7.51
HDF-3	1	992.79	25-year	1.24	238.76	239.16	239.16	239.22	0.006425	1.18	1.81	18.17	0.68	0.26	0.24	0.68	10.31
HDF-3	1	992.79	50-year	1.43	238.76	239.17	239.17	239.23	0.006792	1.24	2.03	18.24	0.71	0.30	0.28	0.70	11.07
HDF-3	1	992.79	100-year	1.63	238.76	239.19	239.19	239.25	0.006980	1.29	2.27	18.32	0.72	0.34	0.32	0.72	11.71
HDF-3	1	992.79	Regional	4.16	238.76	239.29	239.29	239.39	0.009509	1.82	4.26	18.96	0.88	0.65	0.63	0.98	18.87
HDF-3	1	992.56	2-year	0.27	238.50	238.63	238.55	238.63	0.000590	0.16	2.83	34.29	0.15	0.06	0.04	0.10	2.81
HDF-3	1	992.56	5-year	0.47	238.50	238.71	238.57	238.72	0.000196	0.14	6.17	40.90	0.10	0.06	0.04	0.08	4.07
HDF-3	1	992.56	10-year	0.98	238.50	238.82	238.59	238.82	0.000171	0.17	10.97	48.84	0.10	0.07	0.05	0.09	7.24
HDF-3	1	992.56	25-year	1.24	238.50	238.85	238.61	238.85	0.000199	0.19	12.30	50.61	0.11	0.08	0.06	0.10	10.00
HDF-3	1	992.56	50-year	1.43	238.50	238.87	238.61	238.87	0.000217	0.21	13.21	51.75	0.11	0.09	0.06	0.11	10.75
HDF-3	1	992.56	100-year	1.63	238.50	238.88	238.62	238.89	0.000234	0.22	14.14	52.89	0.12	0.09	0.07	0.12	11.36
HDF-3	1	992.56	Regional	4.16	238.50	239.07	238.69	239.08	0.000315	0.34	25.57	68.52	0.15	0.14	0.10	0.16	18.23
HDF-3	1	992.13	2-year	0.27	238.28	238.62	238.34	238.62	0.000018	0.05	8.70	36.97	0.03	0.02	0.01	0.03	2.46
HDF-3	1	992.13	5-year	0.47	238.28	238.71	238.35	238.71	0.000021	0.07	12.13	40.27	0.04	0.03	0.02	0.04	3.52
HDF-3	1	992.13	10-year	0.98	238.28	238.82	238.39	238.82	0.000037	0.11	16.66	45.59	0.05	0.05	0.03	0.06	6.41
HDF-3	1	992.13	25-year	1.24	238.28	238.84	238.40	238.84	0.000050	0.13	17.85	46.90	0.06	0.05	0.04	0.07	9.10
HDF-3	1	992.13	50-year	1.43	238.28	238.86	238.41	238.86	0.000059	0.14	18.65	47.76	0.06	0.06	0.04	0.08	9.79
HDF-3	1	992.13	100-year	1.63	238.28	238.88	238.41	238.88	0.000068	0.16	19.48	48.63	0.07	0.07	0.04	0.08	10.35
HDF-3	1	992.13	Regional	4.16	238.28	239.06	238.49	239.06	0.000148	0.28	29.28	63.66	0.11	0.12	0.08	0.14	16.58
HDF-3	1	991.9	2-year	0.27	238.35	238.58	238.52	238.61	0.005242	0.70	0.38	2.37	0.56			0.70	2.32
HDF-3	1	991.9	5-year	0.47	238.35	238.66	238.57	238.69	0.005049	0.81	0.58	3.45	0.57	0.02	0.02	0.81	3.32
HDF-3	1	991.9	10-year	0.98	238.35	238.74	238.74	238.79	0.005346	1.04	1.53	18.12	0.62	0.19	0.19	0.64	6.13
HDF-3	1	991.9	25-year	1.24	238.35	238.77	238.76	238.81	0.005067	1.08	2.03	18.29	0.61	0.25	0.25	0.61	8.79
HDF-3	1	991.9	50-year	1.43	238.35	238.78	238.77	238.83	0.004789	1.09	2.38	18.40	0.60	0.28	0.28	0.60	9.46
HDF-3	1	991.9	100-year	1.63	238.35	238.80	238.79	238.85	0.004589	1.10	2.72	18.51	0.59	0.31	0.31	0.60	10.00
HDF-3	1	991.9	Regional	4.16	238.35	238.99	238.89	239.03	0.003254	1.23	6.24	19.63	0.54	0.49	0.49	0.67	16.03
HDF-3	1	991.6	2-year	0.27	238.13	238.40	238.29	238.41	0.003812	0.56	0.48	2.62	0.42			0.56	2.30
HDF-3	1	991.6	5-year	0.47	238.13	238.47	238.35	238.49	0.003637	0.66	0.89	12.16	0.43	0.06	0.06	0.53	3.28
HDF-3	1	991.6	10-year	0.98	238.13	238.56	238.50	238.59	0.003310	0.78	2.50	18.54	0.43	0.15	0.16	0.39	6.03
HDF-3	1	991.6	25-year	1.24	238.13	238.59	238.53	238.62	0.003547	0.85	3.00	18.71	0.45	0.18	0.19	0.41	8.67
HDF-3	1	991.6	50-year	1.43	238.13	238.61	238.54	238.64	0.003723	0.90	3.32	18.81	0.46	0.20	0.21	0.43	9.33
HDF-3	1	991.6	100-year	1.63	238.13	238.63	238.56	238.66	0.003740	0.93	3.70	18.93	0.47	0.22	0.23	0.44	9.86
HDF-3	1	991.6	Regional	4.16	238.13	238.84	238.68	238.87	0.003386	1.17	7.74	20.18	0.48	0.36	0.36	0.54	15.71
HDF-3	1	991	2-year	0.37	237.69	237.97	237.88	238.00	0.005293	0.68	0.54	2.77	0.49			0.68	2.25
HDF-3	1	991	5-year	0.64	237.69	238.04	237.95	238.07	0.005589	0.84	1.02	13.81	0.53	0.08	0.08	0.62	3.20
HDF-3	1	991	10-year	1.34	237.69	238.12	238.10	238.17	0.006011	1.05	2.51	18.71	0.58	0.21	0.20	0.53	5.81
HDF-3	1	991	25-year	1.70	237.69	238.16	238.12	238.20	0.005494	1.08	3.25	18.95	0.56	0.25	0.24	0.52	8.39
HDF-3	1	991	50-year	1.96	237.69	238.19	238.14	238.23	0.005093	1.09	3.78	19.13	0.55	0.27	0.26	0.52	9.01
HDF-3	1	991	100-year	2.23	237.69	238.21	238.15	238.25	0.004983	1.12	4.23	19.27	0.55	0.29	0.28	0.53	9.50
HDF-3	1	991	Regional	5.69	237.69	238.43	238.30	238.48	0.004941	1.46	8.46	20.58	0.58	0.46	0.45	0.67	14.97
HDF-3	1	990	2-year	0.37	236.97	237.24	237.16	237.27	0.004784	0.74	0.50	2.65	0.55			0.74	2.18
HDF-3	1	990	5-year	0.64	236.97	237.32	237.23	237.35	0.004378	0.86	0.97	13.38	0.55	0.11	0.11	0.66	3.05
HDF-3	1	990	10-year	1.34	236.97	237.40	237.38	237.43	0.004252	1.02	2.38	18.37	0.57	0.26	0.27	0.56	5.45
HDF-3	1	990	25-year	1.70	236.97	237.42	237.40	237.46	0.004620	1.12	2.81	18.51	0.60	0.32	0.33	0.60	7.95
HDF-3	1	990	50-year	1.96	236.97	237.43	237.41	237.48	0.005070	1.20	3.04	18.58	0.63	0.35	0.37	0.64	8.51
HDF-3	1	990	100-year	2.23	236.97	237.45	237.42	237.50	0.005244	1.25	3.33	18.67	0.64	0.39	0.40	0.67	8.94
HDF-3	1	990	Regional	5.69	236.97	237.60	237.55	237.68	0.006045	1.68	6.25	19.59	0.73	0.66	0.67	0.91	13.90
HDF-3	1	989.68	2-year	0.37	236.25	236.52	236.45	236.55	0.004986	0.75	0.49	2.63	0.56			0.75	2.11
HDF-3	1	989.68	5-year	0.64	236.25	236.58	236.52	236.63	0.005580	0.94	0.80	10.26	0.61	0.10	0.10	0.80	2.92
HDF-3	1	989.68	10-year	1.34	236.25	236.66	236.66	236.71	0.005753	1.15	2.07	18.27	0.65	0.26	0.28	0.65	5.13
HDF-3	1	989.68	25-year	1.70	236.25	236.70	236.69	236.74	0.005253	1.17	2.67	18.47	0.63	0.32	0.34	0.64	7.55
HDF-3	1	989.68	50-year	1.96	236.25	236.72	236.70	236.77	0.004870	1.18	3.09	18.61	0.62	0.35	0.36	0.63	8.07
HDF-3	1	989.68	100-year	2.23	236.25	236.74	236.70	236.79	0.004653	1.19	3.49	18.74	0.61	0.38	0.39	0.64	8.45
HDF-3	1	989.68	Regional	5.69	236.25	236.94	236.83	236.99	0.003656	1.40	7.43	19.96	0.58	0.58	0.59	0.77	12.91
HDF-3	1	989.5	2-year	0.37	235.94	236.24	236.14	236.26	0.004076	0.62	0.60	3.38	0.44	0.01		0.62	2.07
HDF-3	1	989.5	5-year	0.64	235.94	236.31	236.20	236.34	0.003979	0.74	1.36	17.83	0.45	0.09	0.08	0.47	2.86
HDF-3	1	989.5	10-year	1.34	235.94	236.42	236.35	236.44	0.003143	0.82	3.39	19.29	0.43	0.19	0.18	0.40	4.96
HDF-3	1	989.5	25-year	1.70	235.94	236.46	236.38	236.48	0.003129	0.88	4.13	19.53	0.43	0.22	0.21	0.41	7.34
HDF-3	1	989.5	50-year	1.96	235.94	236.48	236.39	236.50	0.003355	0.93	4.49	19.65	0.45	0.24	0.24	0.44	7.83
HDF-3	1	989.5	100-year	2.23	235.94	236.50	236.41	236.53	0.003364	0.97	4.95	19.79	0.46	0.26	0.26	0.45	8.19
HDF-3	1	989.5	Regional	5.69	235.94	236.70	236.55	236.75	0.004049	1.36	9.13	21.07	0.53	0.43	0.42	0.62	12.39
HDF-3	1	989.4	2-year	0.37	235.65	235.91	235.85	235.94	0.007591	0.77	0.48	2.68	0.59			0.77	2.04
HDF-3	1	989.4	5-year	0.64	235.65	235.99	235.91	236.03	0.007266	0.91	0.82	10.61	0.60	0.06	0.07	0.78	2.79

HEC-RAS Plan: SCE Proposed July 2024 Volume Calc Locations: User Defined (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Left	Vel Right	Vel Total	Volume
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)		(m/s)	(m/s)	(m/s)	(1000 m3)
HDF-3	1	989.4	10-year	1.34	235.65	236.06	236.06	236.12	0.009661	1.25	1.98	19.18	0.72	0.19	0.21	0.68	4.80
HDF-3	1	989.4	25-year	1.70	235.65	236.08	236.08	236.15	0.010155	1.35	2.47	19.35	0.75	0.24	0.27	0.69	7.14
HDF-3	1	989.4	50-year	1.96	235.65	236.11	236.10	236.18	0.009351	1.36	2.94	19.50	0.73	0.27	0.29	0.67	7.61
HDF-3	1	989.4	100-year	2.23	235.65	236.12	236.11	236.19	0.009582	1.41	3.26	19.60	0.74	0.30	0.32	0.68	7.95
HDF-3	1	989.4	Regional	5.69	235.65	236.31	236.25	236.40	0.008539	1.75	7.04	20.79	0.75	0.51	0.53	0.81	11.92
HDF-3	1	989.3	2-year	0.37	235.18	235.42	235.38	235.46	0.008566	0.92	0.40	2.42	0.72			0.92	2.01
HDF-3	1	989.3	5-year	0.64	235.18	235.49	235.45	235.55	0.008776	1.08	0.60	4.45	0.75	0.05	0.05	1.07	2.75
HDF-3	1	989.3	10-year	1.34	235.18	235.59	235.59	235.64	0.006069	1.17	2.01	18.24	0.67	0.28	0.26	0.67	4.68
HDF-3	1	989.3	25-year	1.70	235.18	235.62	235.62	235.67	0.006220	1.25	2.48	18.39	0.69	0.34	0.33	0.69	7.00
HDF-3	1	989.3	50-year	1.96	235.18	235.63	235.63	235.69	0.006698	1.33	2.71	18.47	0.72	0.38	0.37	0.72	7.44
HDF-3	1	989.3	100-year	2.23	235.18	235.64	235.64	235.71	0.006821	1.38	2.99	18.56	0.73	0.42	0.40	0.74	7.76
HDF-3	1	989.3	Regional	5.69	235.18	235.78	235.76	235.88	0.008719	1.91	5.50	19.36	0.87	0.74	0.73	1.03	11.54
HDF-3	1	989.2	2-year	0.37	234.58	234.85	234.78	234.88	0.006833	0.75	0.49	2.67	0.56			0.75	1.98
HDF-3	1	989.2	5-year	0.64	234.58	234.92	234.84	234.96	0.006741	0.89	0.89	12.25	0.58	0.08	0.08	0.72	2.69
HDF-3	1	989.2	10-year	1.34	234.58	235.01	234.99	235.06	0.006449	1.08	2.45	18.80	0.60	0.20	0.22	0.55	4.51
HDF-3	1	989.2	25-year	1.70	234.58	235.05	235.01	235.09	0.006159	1.13	3.11	19.02	0.59	0.24	0.26	0.55	6.79
HDF-3	1	989.2	50-year	1.96	234.58	235.07	235.03	235.12	0.005939	1.15	3.57	19.16	0.59	0.26	0.28	0.55	7.21
HDF-3	1	989.2	100-year	2.23	234.58	235.09	235.05	235.14	0.006140	1.21	3.91	19.27	0.60	0.29	0.30	0.57	7.50
HDF-3	1	989.2	Regional	5.69	234.58	235.31	235.19	235.37	0.005128	1.48	8.37	20.65	0.59	0.45	0.46	0.68	11.02
HDF-3	1	989.1	2-year	0.37	234.14	234.40	234.34	234.44	0.009640	0.87	0.43	2.41	0.66			0.87	1.95
HDF-3	1	989.1	5-year	0.64	234.14	234.47	234.42	234.52	0.009391	1.02	0.72	9.48	0.68	0.07	0.07	0.89	2.65
HDF-3	1	989.1	10-year	1.34	234.14	234.56	234.56	234.62	0.009503	1.26	2.05	17.63	0.72	0.24	0.22	0.65	4.39
HDF-3	1	989.1	25-year	1.70	234.14	234.58	234.58	234.65	0.010147	1.37	2.50	17.78	0.75	0.29	0.27	0.68	6.63
HDF-3	1	989.1	50-year	1.96	234.14	234.60	234.60	234.68	0.010080	1.42	2.85	17.90	0.75	0.32	0.30	0.69	7.03
HDF-3	1	989.1	100-year	2.23	234.14	234.62	234.61	234.70	0.010338	1.48	3.15	18.00	0.77	0.35	0.33	0.71	7.31
HDF-3	1	989.1	Regional	5.69	234.14	234.76	234.75	234.89	0.014107	2.14	5.77	18.84	0.95	0.63	0.61	0.99	10.63
HDF-3	1	989	2-year	0.37	233.72	233.97	233.92	234.00	0.007125	0.86	0.43	3.01	0.66	0.03		0.86	1.93
HDF-3	1	989	5-year	0.64	233.72	234.03	234.01	234.07	0.007642	1.01	0.86	12.54	0.70	0.17	0.04	0.74	2.61
HDF-3	1	989	10-year	1.34	233.72	234.09	234.09	234.14	0.007279	1.18	2.09	19.32	0.72	0.33	0.26	0.64	4.28
HDF-3	1	989	25-year	1.70	233.72	234.12	234.12	234.17	0.007230	1.25	2.56	19.47	0.72	0.38	0.32	0.66	6.50
HDF-3	1	989	50-year	1.96	233.72	234.13	234.13	234.19	0.007140	1.28	2.88	19.58	0.73	0.42	0.35	0.68	6.88
HDF-3	1	989	100-year	2.23	233.72	234.14	234.14	234.20	0.007932	1.38	3.06	19.63	0.77	0.46	0.39	0.73	7.14
HDF-3	1	989	Regional	5.69	233.72	234.32	234.25	234.38	0.005615	1.55	6.69	20.75	0.70	0.67	0.59	0.85	10.30
HDF-3	1	987.5	2-year	0.37	233.31	233.47	233.47	233.53	0.018263	1.06	0.35	3.00	1.00			1.06	1.92
HDF-3	1	987.5	5-year	0.64	233.31	233.52	233.52	233.60	0.016782	1.21	0.53	3.53	1.00			1.21	2.58
HDF-3	1	987.5	10-year	1.34	233.31	233.63	233.63	233.69	0.013096	1.06	1.29	9.33	0.88	0.25		1.04	4.21
HDF-3	1	987.5	25-year	1.70	233.31	233.65	233.65	233.72	0.015803	1.22	1.42	9.68	0.98	0.31		1.19	6.41
HDF-3	1	987.5	50-year	1.96	233.31	233.66	233.66	233.74	0.015251	1.26	1.59	9.98	0.97	0.36		1.23	6.78
HDF-3	1	987.5	100-year	2.23	233.31	233.69	233.69	233.77	0.012148	1.22	1.89	10.46	0.89	0.41		1.18	7.04
HDF-3	1	987.5	Regional	5.69	233.31	233.83	233.83	233.98	0.013062	1.75	3.45	12.74	1.00	0.70	0.28	1.65	10.08
HDF-3	1	987	2-year	0.37	232.30	232.44		232.44	0.003560	0.36	1.24	16.98	0.41	0.22	0.17	0.30	1.83
HDF-3	1	987	5-year	0.64	232.30	232.54		232.55	0.000525	0.25	3.27	19.94	0.18	0.14	0.11	0.20	2.37
HDF-3	1	987	10-year	1.34	232.30	232.77		232.77	0.000142	0.22	8.41	25.60	0.11	0.11	0.09	0.16	3.68
HDF-3	1	987	25-year	1.70	232.30	233.05		233.05	0.000034	0.15	16.51	31.48	0.06	0.07	0.06	0.10	5.44
HDF-3	1	987	50-year	1.96	232.30	233.09		233.09	0.000036	0.16	17.77	32.17	0.06	0.08	0.07	0.11	5.73
HDF-3	1	987	100-year	2.23	232.30	233.12		233.12	0.000042	0.18	18.56	32.61	0.07	0.08	0.08	0.12	5.92
HDF-3	1	987	Regional	5.69	232.30	233.42		233.42	0.000077	0.30	29.17	38.00	0.09	0.13	0.13	0.20	8.31
HDF-3	1	986	2-year	0.37	231.90	232.44		232.44	0.000006	0.05	10.66	28.35	0.02	0.02	0.02	0.03	1.33
HDF-3	1	986	5-year	0.64	231.90	232.54		232.54	0.000009	0.07	13.81	30.37	0.03	0.03	0.03	0.05	1.66
HDF-3	1	986	10-year	1.34	231.90	232.77		232.77	0.000011	0.10	21.03	33.63	0.03	0.05	0.05	0.06	2.46
HDF-3	1	986	25-year	1.70	231.90	233.05		233.05	0.000006	0.09	31.06	37.26	0.03	0.04	0.04	0.05	3.46
HDF-3	1	986	50-year	1.96	231.90	233.09		233.09	0.000007	0.10	32.53	37.70	0.03	0.04	0.05	0.06	3.64
HDF-3	1	986	100-year	2.23	231.90	233.12		233.12	0.000008	0.11	33.46	37.97	0.03	0.05	0.05	0.07	3.77
HDF-3	1	986	Regional	5.69	231.90	233.42		233.42	0.000023	0.21	45.50	42.57	0.05	0.09	0.10	0.13	5.21
HDF-3	1	985	2-year	0.37	231.75	232.44		232.44	0.000001	0.02	18.83	31.70	0.01	0.01	0.01	0.02	0.31
HDF-3	1	985	5-year	0.64	231.75	232.54		232.54	0.000002	0.04	22.30	33.00	0.01	0.02	0.02	0.03	0.41
HDF-3	1	985	10-year	1.34	231.75	232.77		232.77	0.000003	0.06	29.99	35.02	0.02	0.02	0.03	0.04	0.69
HDF-3	1	985	25-year	1.70	231.75	233.05		233.05	0.000002	0.06	40.09	36.45	0.02	0.02	0.03	0.04	0.99
HDF-3	1	985	50-year	1.96	231.75	233.09		233.09	0.000002	0.06	41.53	36.66	0.02	0.03	0.03	0.05	1.07
HDF-3	1	985	100-year	2.23	231.75	233.12		233.12	0.000003	0.07	42.43	36.78	0.02	0.03	0.03	0.05	1.13
HDF-3	1	985	Regional	5.69	231.75	233.41		233.42	0.000009	0.14	53.70	38.52	0.04	0.06	0.07	0.11	1.77
HDF-3	1	984	2-year	0.37	232.05	232.32	232.32	232.39	0.018530	1.19	0.31	2.19	1.01			1.19	0.09
HDF-3	1	984	5-year	0.64	232.05	232.39	232.39	232.48	0.017423	1.39	0.46	2.43	1.02		0.05	1.39	0.15
HDF-3	1	984	10-year	1.34	232.05	232.68	232.51	232.73	0.003063	1.08	1.41	4.41	0.50	0.26	0.31	0.95	0.33
HDF-3	1	984	25-year	1.70	232.05	233.02	232.57	233.04	0.000657	0.72	3.23	19.68	0.25	0.23	0.21	0.53	0.48
HDF-3	1	984	50-year	1.96	232.05	233.05	232.61	233.07	0.000750	0.79	3.45	25.45	0.27	0.25	0.23	0.57	0.54
HDF-3	1	984	100-year	2.23	232.05	233.06	232.64	233.10	0.000909	0.87	3.55	28.58	0.30	0.27	0.26	0.63	0.58
HDF-3	1	984	Regional	5.69	232.05	233.16	232.99	233.32	0.003992	1.96	4.28	41.04	0.64	0.62	0.53	1.33	1.05
HDF-3	1	983	2-year	0.37	231.24	231.83	231.39	231.83	0.000089	0.20	1.89	15.61	0.09			0.20	0.08
HDF-3	1	983	5-year	0.64	231.24	232.06	231.45	232.06	0.000075	0.23	2.76	22.06	0.09			0.23	0.12
HDF-3	1	983	10-year	1.34	231.24	232.69	231.56	232.69	0.000041	0.26	5.15	55.33	0.07			0.26	0.22
HDF-3	1	983	25-year	1.70	231.24	233.02	231.60	233.02	0.000003	0.07	48.41	70.69	0.02	0.03	0.02	0.04	0.29
HDF-3	1	983	50-year	1.96	231.24	233.05	231.63	233.05	0.000003	0.08	50.80	72.82	0.02	0.03	0.02	0.04	0.34
HDF-3	1	983	100-year	2.23	231.24	233.07	231.66	233.07	0.000004	0.09	51.95	73.96	0.02	0.03	0.03	0.04	0.38
HDF-3	1	983	Regional	5.69	231.24	233.19	231.94	233.19	0.000018	0.20	61.15	81.22	0.05	0.07	0.06	0.09	0.80
HDF-3	1	982.58		Culvert													

APPENDIX C

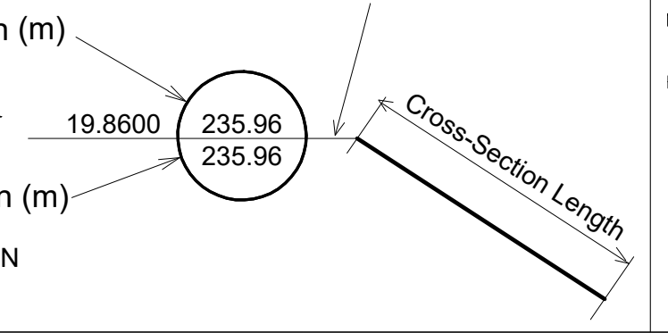
FLOODPLAIN MAPPING
&
CUT AND FILL ANALYSIS



REVISIONS

NO.	DESCRIPTION	BY	DATE

LEGEND



REGULATORY FLOOD ELEVATION
IS THE HIGHER OF THE TWO
ELEVATIONS DISPLAYED

LEGEND

Contour, Index
,Intermediate
,Supplementary
,Approximate
,Depression
Spot Elevation, Water Level
River, Stream, Canal
,Approximate Alignment
,Disappearing
,Split
Lake
Flooded Land
Marsh, Swamp
Ditch, Drain
Rapids
Reservoir
Falls
Building, Garage, Shed
,Under Construction, Foundation
,Ruins

Road, Hard Surface, with Median
,Driveway, or Loose Surface
,Farm Lane, Cart Track, Wagon Road
,Footpath, Trail
Bridge, Footbridge
Fence
Cliff, Cut and Fill
Culvert
Dam, Beaver Dam
Pipeline
Airport Runway
Power Transmission Line, with Poles, with Pylons
Railway
Wooded Area
Chimney
Hedge
Wall
Regional Flood Line
100 Year Flood Line

This map was compiled photogrammetrically from 1/10 000 aerial photograrhy exposed in April 1977.

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North American Datum 1927, U.T.M. 6° projection
Zone 17, Central Meridian 81° W.

Transformed to North American Datum 1983
Zone 17, Central Meridian 81° W. in 2007

Grid Interval 100 metres.

PLEASE NOTE:
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CHANGE DUE TO REVISED INFORMATION.

SCHAEFFERS
CONSULTING ENGINEERS

PLEASE NOTE:
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STAMP VERIFIES THE FLOOD
LINE AND ASSOCIATED DATA
NOT THE MAP DATA
UNLESS OTHERWISE NOTED

LICENSED PROFESSIONAL ENGINEER
K. SHAHBIKIAN
PROVINCE OF ONTARIO

FLOOD PLAIN
MAPPING PROGRAM

FLOODLINE APPROVED DATE: ____________________

TORONTO AND REGION
Conservation
for The Living City
5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

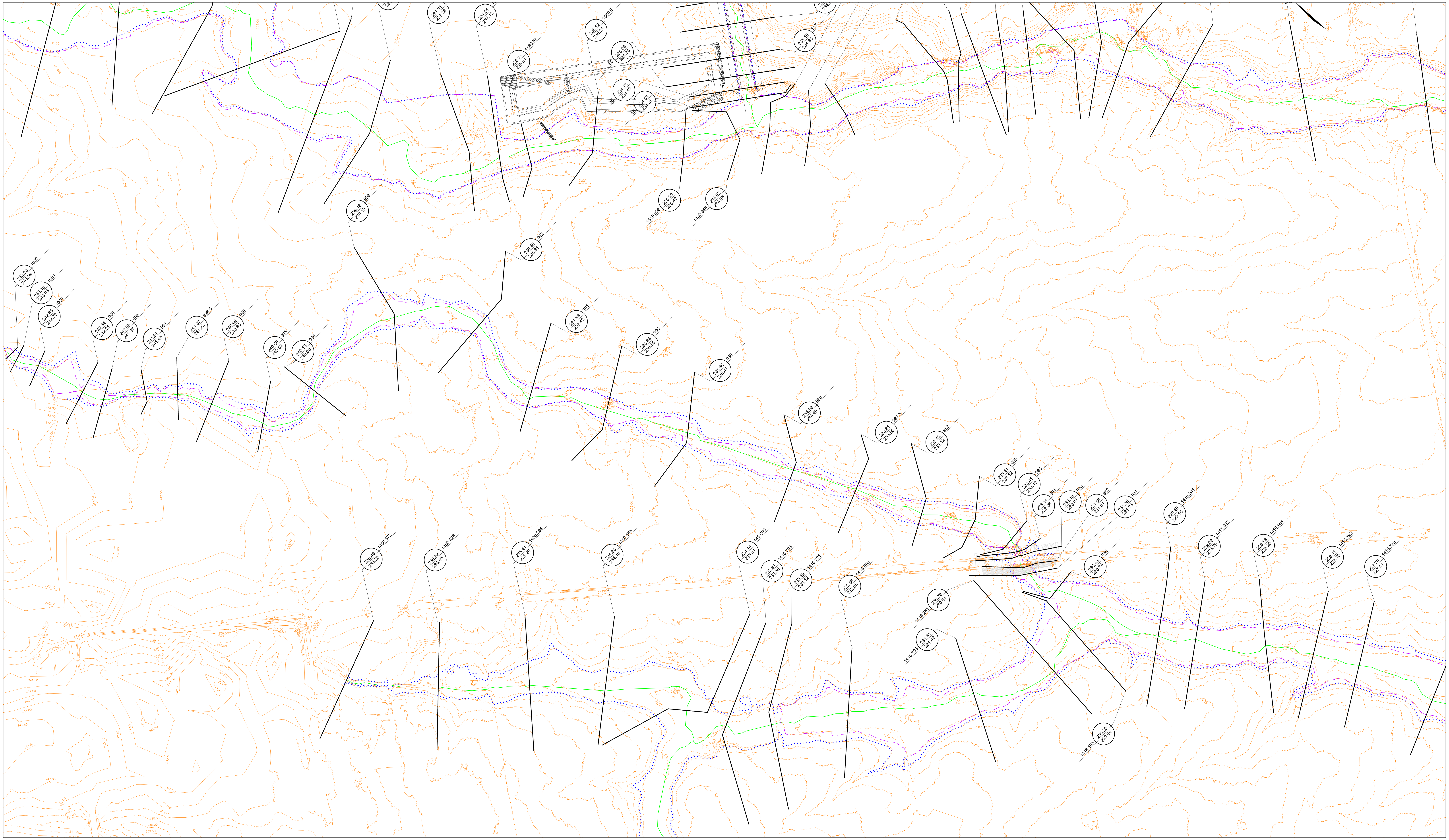
Scale 1:2000

100 Metres 0 100 200 Metres
200 Feet 0 200 400 600 800 1000 Feet

CONTOUR INTERVAL 1.0 METRES:

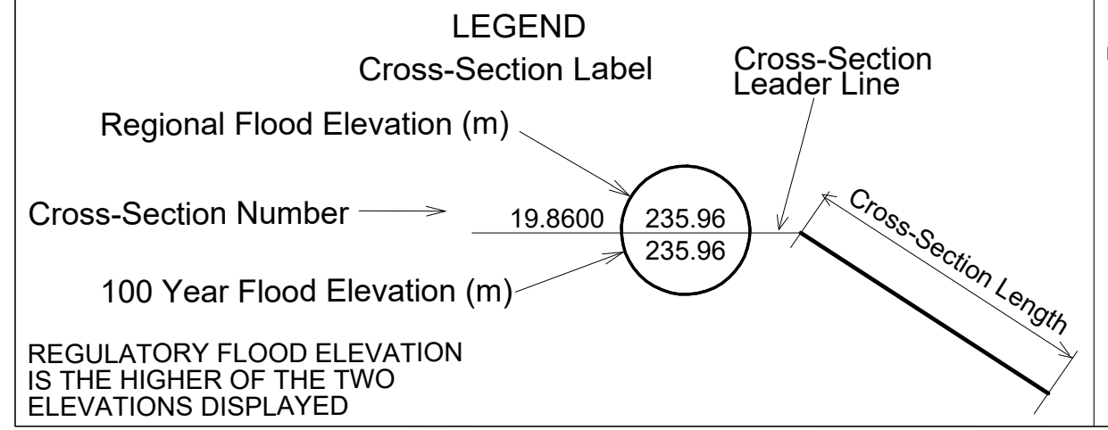
HUMBER RIVER

SHEET No. EX-1



NO.	DESCRIPTION	BY	DATE

LEGEND



REGULATORY FLOOD ELEVATION IS THE HIGHER OF THE TWO ELEVATIONS DISPLAYED

LEGEND

Contour, Index
,Intermediate
,Supplementary
,Approximate
,Depression
Spot Elevation, Water Level
River, Stream, Canal
,Approximate Alignment
,Disappearing
,Split
Lake
Flooded Land
Marsh, Swamp
Ditch, Drain
Rapids
Reservoir
Falls
Building, Garage, Shed
,Under Construction, Foundation
,Ruins

Road, Hard Surface, with Median
,Driveway, or Loose Surface
,Farm Lane, Cart Track, Wagon Road
,Footpath, Trail
Bridge, Footbridge
Fence
Cliff, Cut and Fill
Culvert
Dam, Beaver Dam
Pipeline
Airport Runway
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Hedge
Wall
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100 Year Flood Line

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CONSULTING ENGINEERS

K. SHAHBIKIAN

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FLOOD PLAIN MAPPING PROGRAM

FLOODLINE APPROVED DATE:

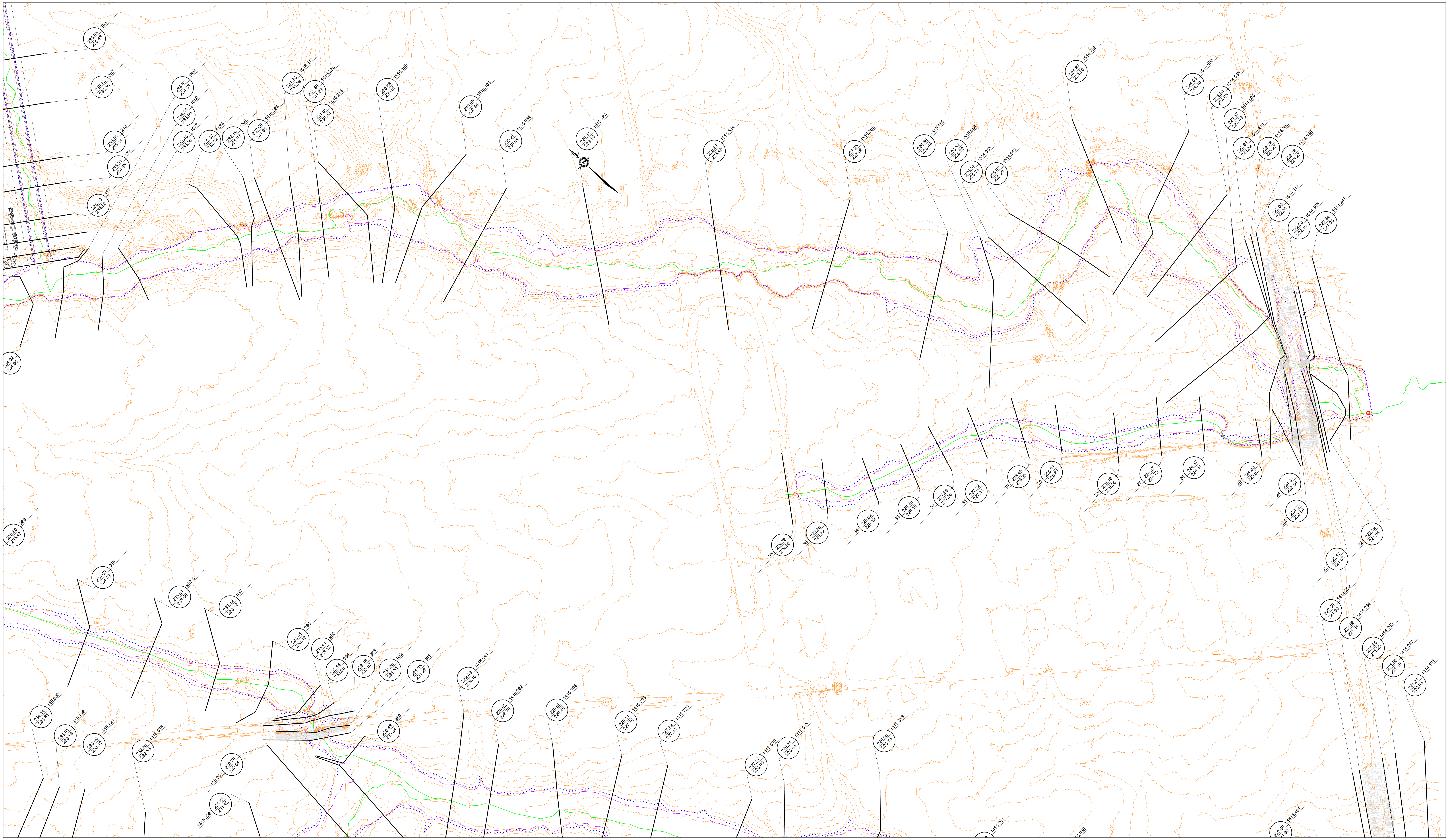
TORONTO AND REGION
Conservation
for The Living City
5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

Scale 1: 2000
100 Metres 0 100 200 Metres
200 Feet 0 200 400 600 800 1000 Feet

CONTOUR INTERVAL 1.0 METRES:

HUMBER RIVER

SHEET No. EX-2



R E V I S I O N S

NO.	DESCRIPTION	BY	DATE

LEGEND

Cross-Section Label

Cross-Section Leader Line

Regional Flood Elevation (m)

Cross-Section Number → 19.8600 235.96 235.96

100 Year Flood Elevation (m)

Cross-Section Length

REGULATORY FLOOD ELEVATION
IS THE HIGHER OF THE TWO
ELEVATIONS DISPLAYED

LEGEND

Contour, Index
,Intermediate
,Supplementary
,Approximate
,Depression
Spot Elevation, Water Level
River, Stream, Canal
,Approximate Alignment
,Disappearing
,Split
Lake
Flooded Land
Marsh, Swamp
Ditch, Drain
Rapids
Reservoir
Falls
Building, Garage, Shed
,Under Construction, Foundation
,Ruins

Road, Hard Surface, with Median
,Driveway, or Loose Surface
,Farm Lane, Cart Track, Wagon Road
,Footpath, Trail
Bridge, Footbridge
Fence
Cliff, Cut and Fill
Culvert
Dam, Beaver Dam
Pipeline
Airport Runway
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Hedge
Wall
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100 Year Flood Line

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Zone 17, Central Meridian 81° W. in 2007

Grid Interval 100 metres.

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FLOODLINE APPROVED DATE:

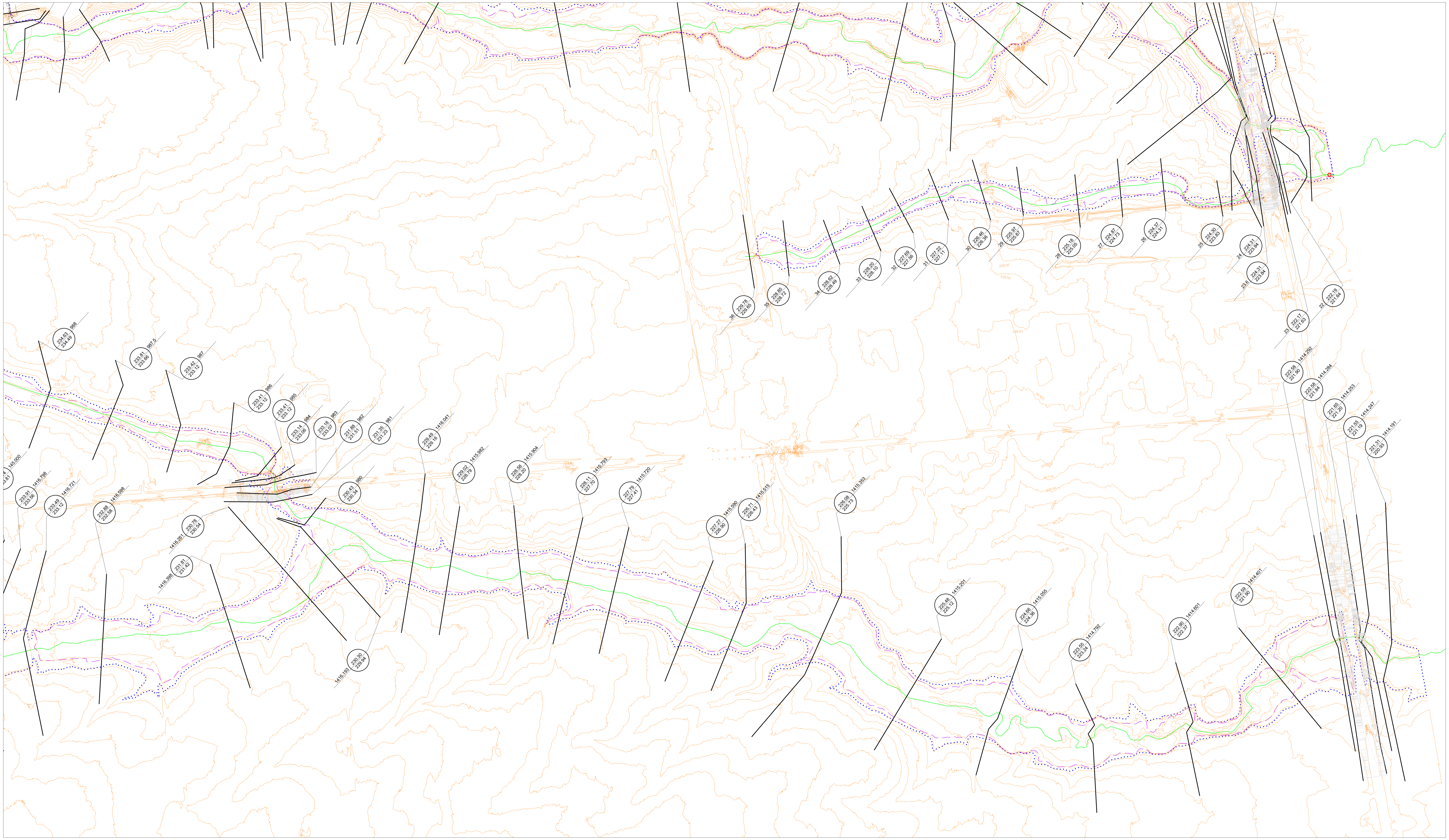
TORONTO AND REGION Conservation
for The Living City
5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

Scale 1:2000

CONTOUR INTERVAL 1.0 METRES:

HUMBER RIVER

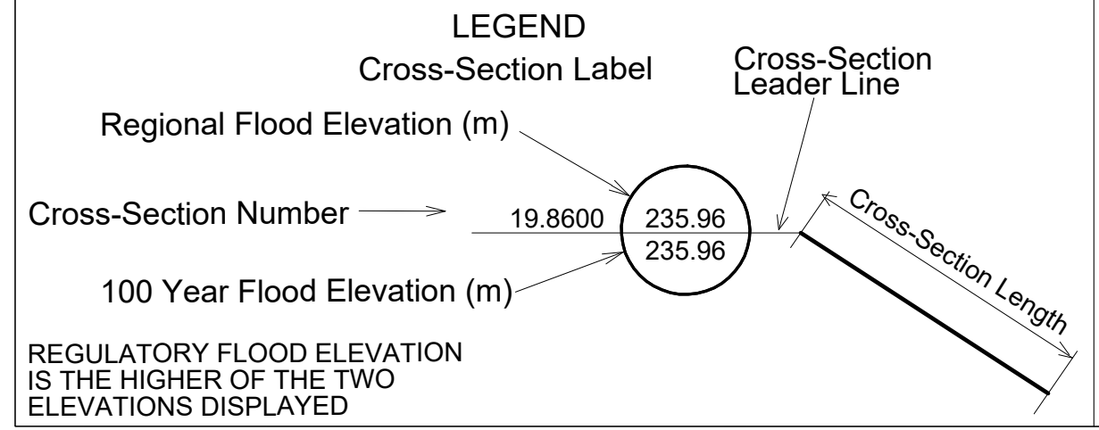
SHEET No. EX-3



R E V I S I O N S

NO.	DESCRIPTION	BY	DATE

LEGEND



REGULATORY FLOOD ELEVATION
IS THE HIGHER OF THE TWO
ELEVATIONS DISPLAYED

LEGEND

Contour, Index
,Intermediate
,Supplementary
,Approximate
,Depression
Spot Elevation, Water Level
River, Stream, Canal
,Approximate Alignment
,Disappearing
,Split
Lake
Flooded Land
Marsh, Swamp
Ditch, Drain
Rapids
Reservoir
Falls
Building, Garage, Shed
,Under Construction, Foundation
,Ruins

Road, Hard Surface, with Median
,Driveway, or Loose Surface
,Farm Lane, Cart Track, Wagon Road
,Footpath, Trail
Bridge, Footbridge
Fence
Cliff, Cut and Fill
Culvert
Dam, Beaver Dam
Pipeline
Airport Runway
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Chimney
Hedge
Wall
Regional Flood Line
100 Year Flood Line

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Zone 17, Central Meridian 81° W. in 2007

Grid Interval 100 metres.

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LICENSED PROFESSIONAL ENGINEER
K. SHAHBIKIAN
PROVINCE OF ONTARIO

FLOOD PLAIN MAPPING PROGRAM

FLOODLINE APPROVED DATE:

TORONTO AND REGION Conservation
for The Living City
5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

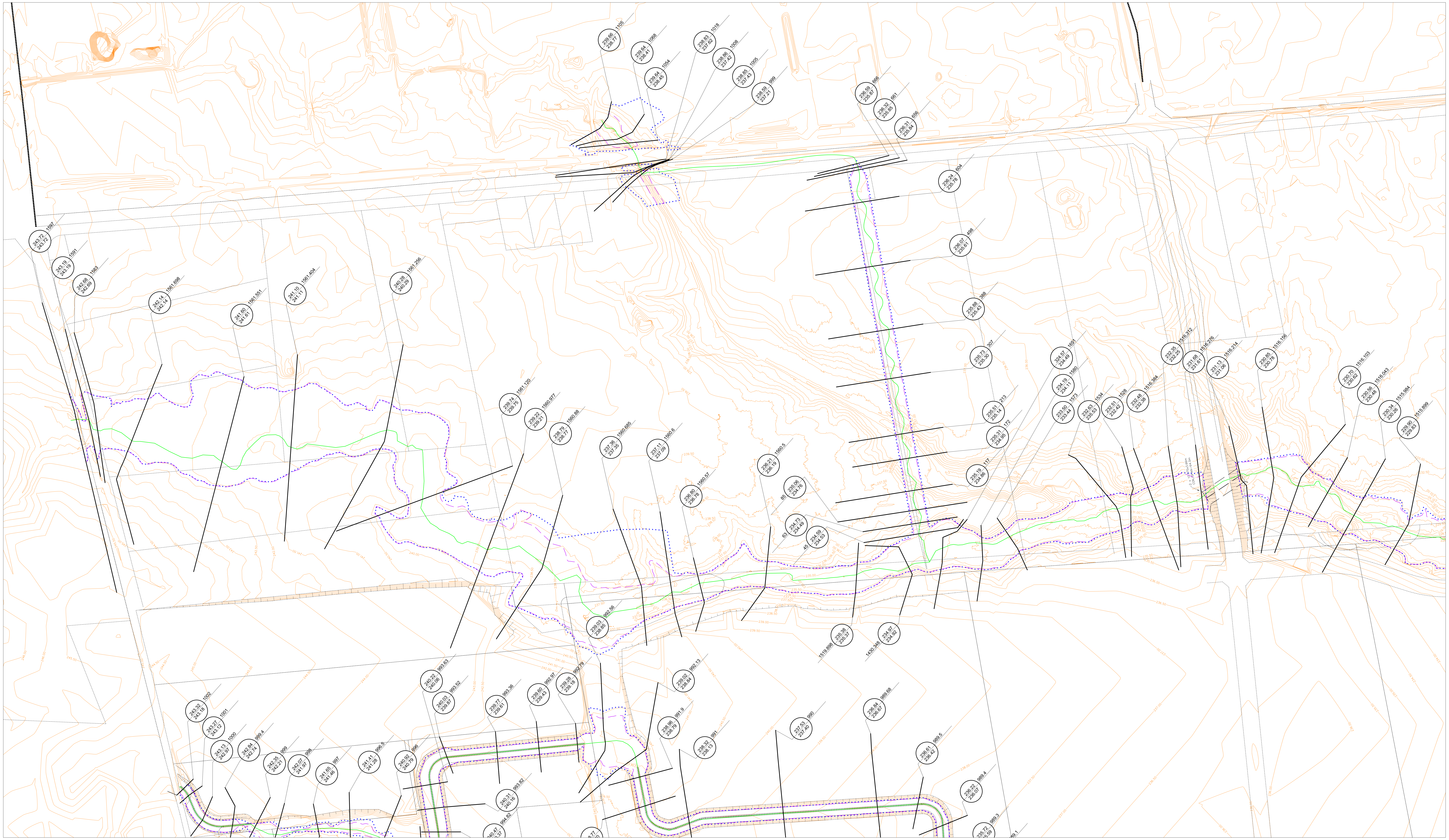
Scale 1:2000

Metres	100	0	100	200		
Feet	200	0	200	400	600	800	1000

CONTOUR INTERVAL 1.0 METRES:

HUMBER RIVER

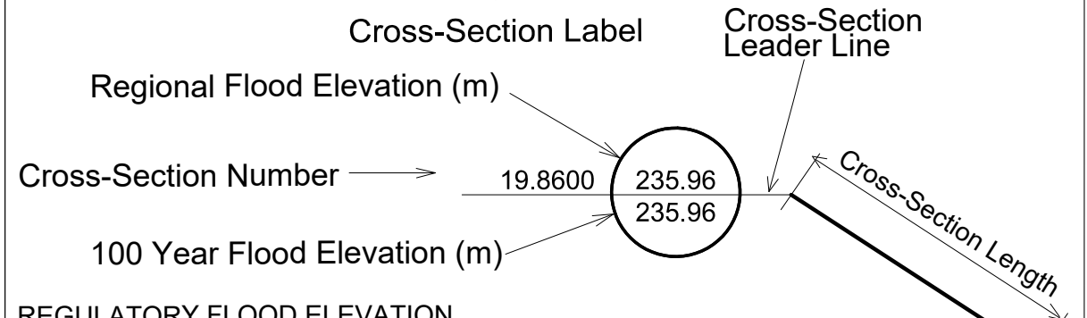
SHEET No. EX-4



R E V I S I O N S

NO.	DESCRIPTION	BY	DATE

LEGEND



REGULATORY FLOOD ELEVATION
IS THE HIGHER OF THE TWO
ELEVATIONS DISPLAYED

LEGEND

- Contour, Index
  - ,Intermediate
  - ,Supplementary
  - ,Approximate
  - ,Depression
- Spot Elevation, Water Level
- River, Stream, Canal
  - ,Approximate Alignment
  - ,Disappearing
  - ,Split
- Lake
- Flooded Land
- Marsh, Swamp
- Ditch, Drain
- Rapids
- Reservoir
- Falls
- Building, Garage, Shed
  - ,Under Construction, Foundation
  - ,Ruins
- Road, Hard Surface, with Median
  - ,Driveway, or Loose Surface
  - ,Farm Lane, Cart Track, Wagon Road
  - ,Footpath, Trail
- Bridge, Footbridge
- Fence
- Cliff, Cut and Fill
- Culvert
- Dam, Beaver Dam
- Pipeline
- Airport Runway
- Power Transmission Line, with Poles, with Pylons
- Railway
- Wooded Area
- Chimney
- Hedge
- Wall
- Regional Flood Line
- 100 Year Flood Line

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Zone 17, Central Meridian 81° W.

Transformed to North American Datum 1983
Zone 17, Central Meridian 81° W. in 2007

Grid Interval 100 metres.

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K. SHAHBIKIAN

FLOOD PLAIN MAPPING PROGRAM

FLOODLINE APPROVED DATE: ____________

TORONTO AND REGION Conservation
for The Living City
5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

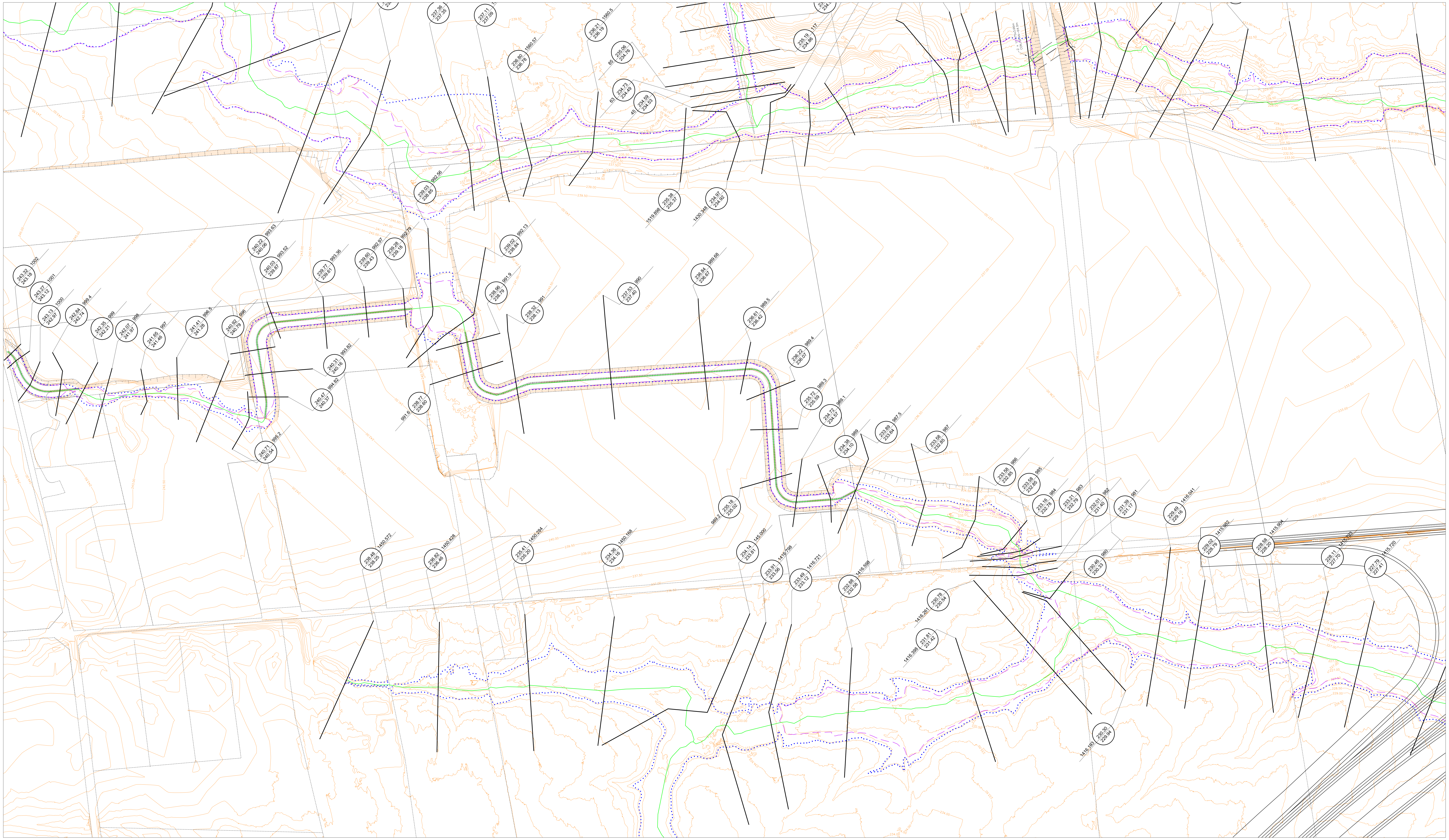
Scale 1:2000

100 Metres 0 100 200 Metres
200 Feet 0 200 400 600 800 1000 Feet

CONTOUR INTERVAL 1.0 METRES:

HUMBER RIVER

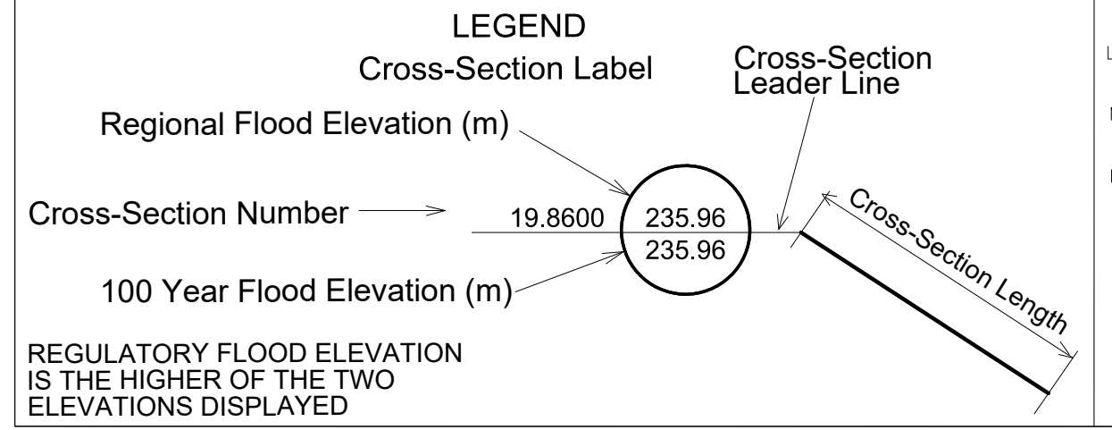
SHEET No. FUT-1



R E V I S I O N S

NO.	DESCRIPTION	BY	DATE

LEGEND



REGULATORY FLOOD ELEVATION
IS THE HIGHER OF THE TWO
ELEVATIONS DISPLAYED

LEGEND

Contour, Index
,Intermediate
,Supplementary
,Approximate
,Depression
Spot Elevation, Water Level
River, Stream, Canal
,Approximate Alignment
,Disappearing
,Split
Lake
Flooded Land
Marsh, Swamp
Ditch, Drain
Rapids
Reservoir
Falls
Building, Garage, Shed
,Under Construction, Foundation
,Ruins

Road, Hard Surface, with Median
,Driveway, or Loose Surface
,Farm Lane, Cart Track, Wagon Road
,Footpath, Trail
Bridge, Footbridge
Fence
Cliff, Cut and Fill
Culvert
Dam, Beaver Dam
Pipeline
Airport Runway
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Hedge
Wall
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FLOOD PLAIN MAPPING PROGRAM

FLOODLINE APPROVED DATE:

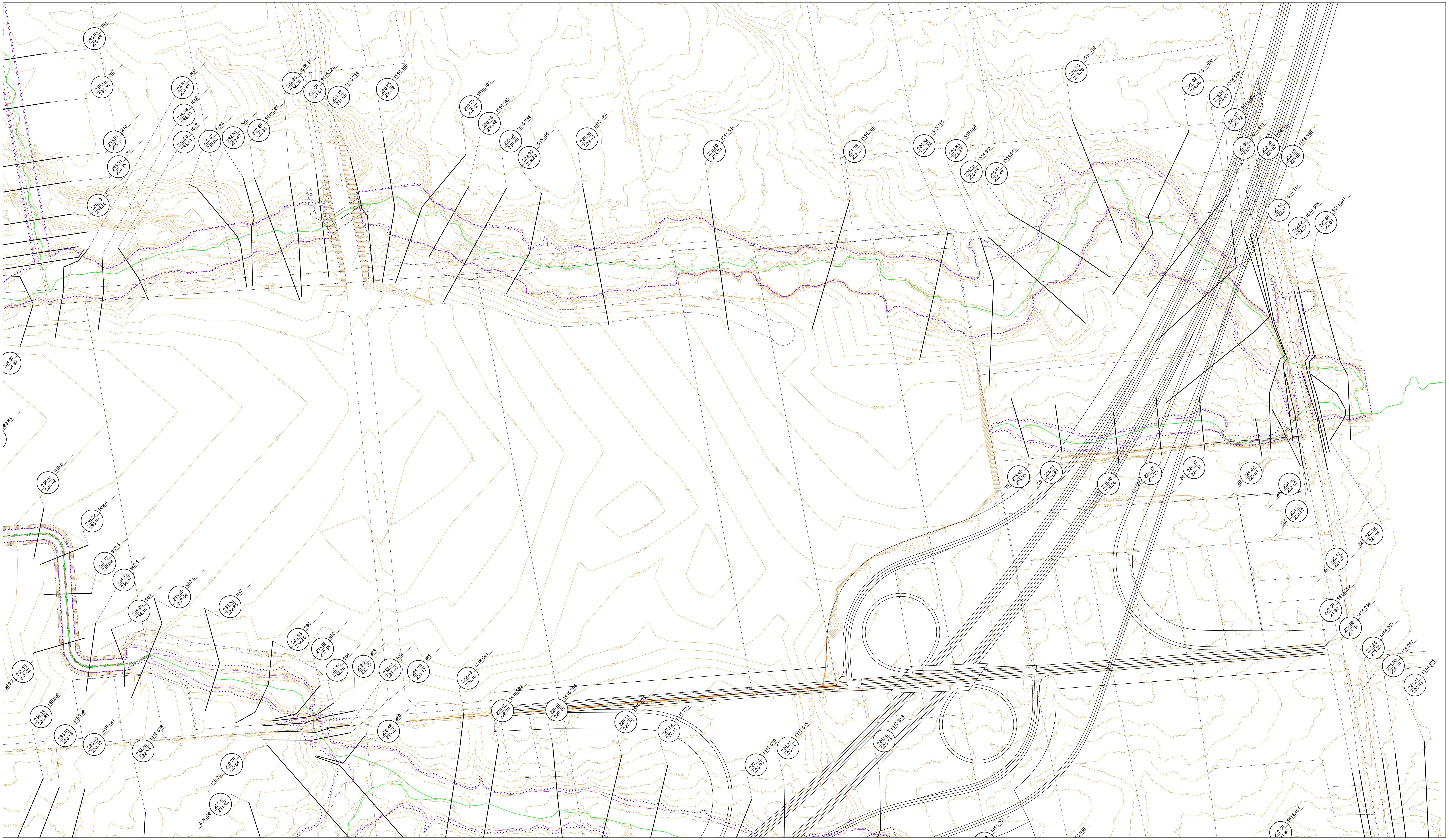
TORONTO AND REGION Conservation
for The Living City
5 Shoreham Drive   Downsview Ontario M3N 1S4 (416) 661-6600

Scale 1:2000

CONTOUR INTERVAL 1.0 METRES:

HUMBER RIVER

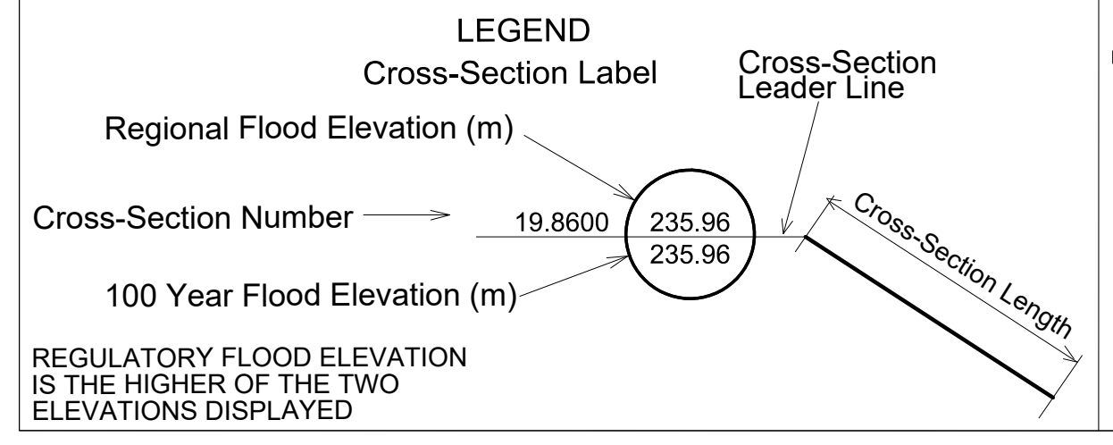
SHEET No. FUT-2



REVISIONS

NO.	DESCRIPTION	BY	DATE

LEGEND



REGULATORY FLOOD ELEVATION IS THE HIGHER OF THE TWO ELEVATIONS DISPLAYED

LEGEND

Contour, Index
,Intermediate
,Supplementary
,Approximate
,Depression
Spot Elevation, Water Level
River, Stream, Canal
,Approximate Alignment
,Disappearing
,Split
Lake
Flooded Land
Marsh, Swamp
Ditch, Drain
Rapids
Reservoir
Falls
Building, Garage, Shed
,Under Construction, Foundation
,Ruins

Road, Hard Surface, with Median
,Driveway, or Loose Surface
,Farm Lane, Cart Track, Wagon Road
,Footpath, Trail
Bridge, Footbridge
Fence
Cliff, Cut and Fill
Culvert
Dam, Beaver Dam
Pipeline
Airport Runway
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Chimney
Hedge
Wall
Regional Flood Line
100 Year Flood Line

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FLOODLINE APPROVED DATE: ____________

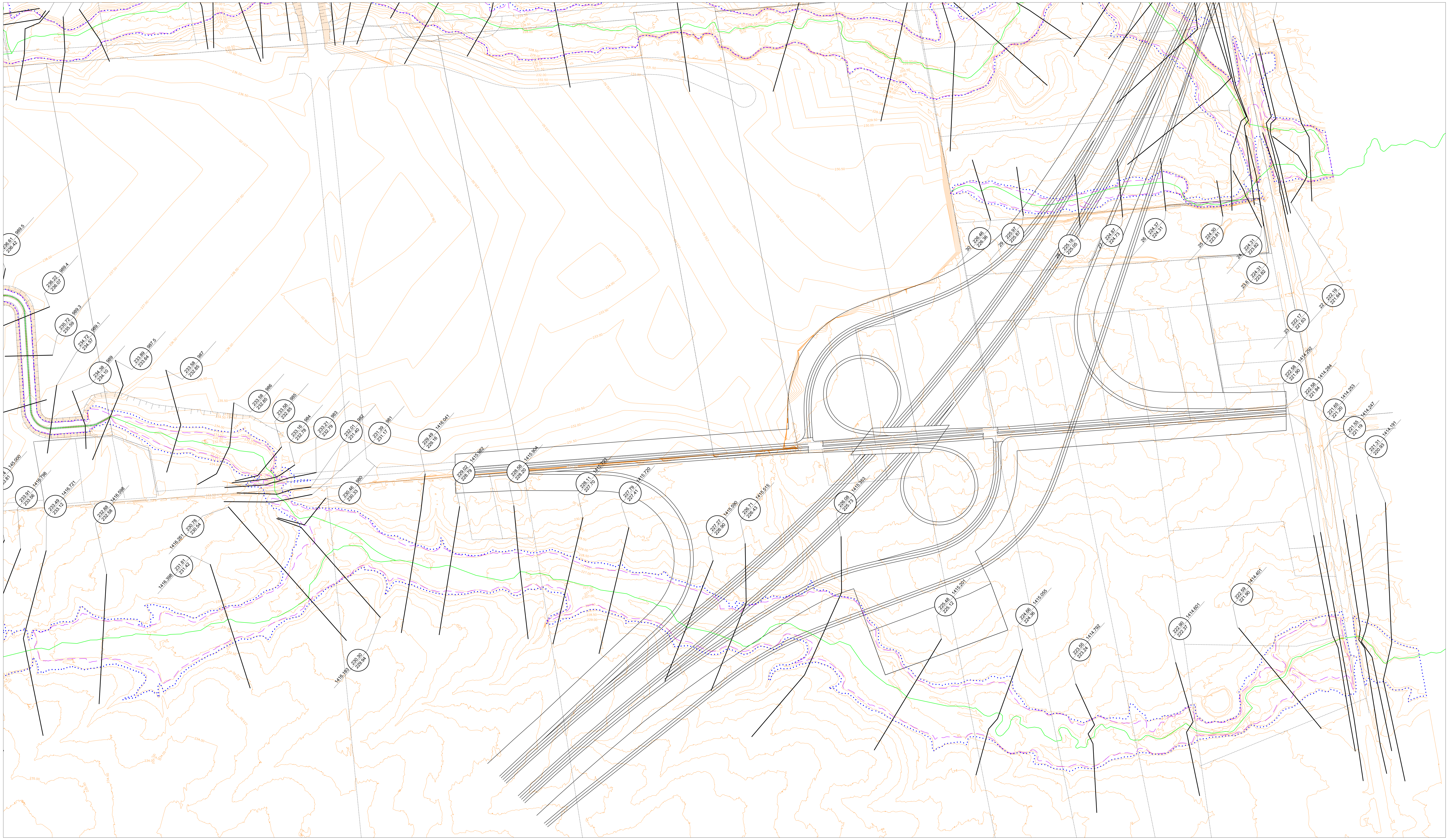
TORONTO AND REGION
Conservation
for The Living City
5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

Scale 1:2000
100 Metres 0 100 200 Metres
200 Feet 0 200 400 600 800 1000 Feet

CONTOUR INTERVAL 1.0 METRES:

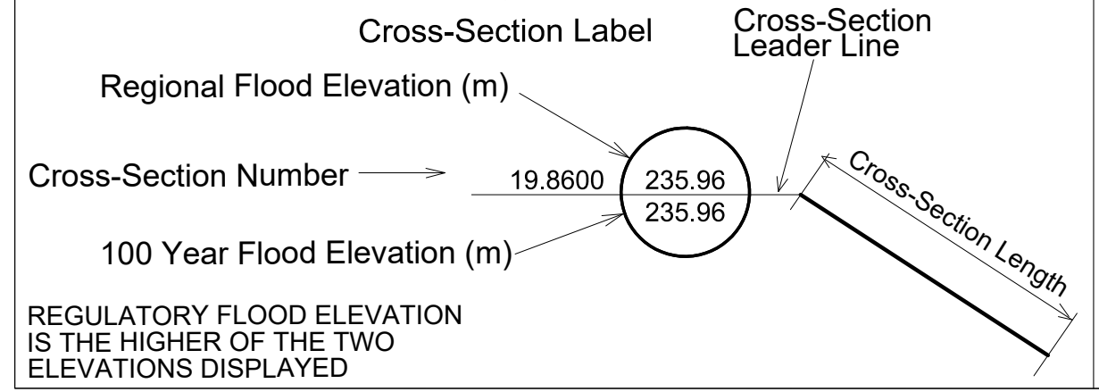
HUMBER RIVER

SHEET No. FUT-3



REVISIONS			
NO.	DESCRIPTION	BY	DATE

LEGEND



REGULATORY FLOOD ELEVATION
IS THE HIGHER OF THE TWO
ELEVATIONS DISPLAYED

LEGEND

Contour, Index — 50
,Intermediate — 48
,Supplementary
,Approximate
,Depression
Spot Elevation, Water Level — .49.6 W/L 43.2
River, Stream, Canal
,Approximate Alignment
,Disappearing
,Split
Lake — L
Flooded Land — F/L
Marsh, Swamp
Ditch, Drain
Rapids — R
Reservoir — RES
Falls — F
Building, Garage, Shed
,Under Construction, Foundation — U/C
,Ruins — RUIN

Road, Hard Surface, with Median
,Driveway, or Loose Surface
,Farm Lane, Cart Track, Wagon Road
,Footpath, Trail
Bridge, Footbridge
Fence — X
Cliff, Cut and Fill
Culvert
Dam, Beaver Dam — BD
Pipeline — P
Airport Runway
Power Transmission Line, with Poles, with Pylons
Railway
Wooded Area
Chimney
Hedge — H
Wall — W
Regional Flood Line — • • • • • • • •
100 Year Flood Line

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PLEASE NOTE:
FLOODLINE ELEVATIONS ARE SUBJECT TO
CHANGE DUE TO REVISED INFORMATION.

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PLEASE NOTE:
THE PROFESSIONAL ENGINEER'S
STAMP VERIFIES THE FLOOD
LINE AND ASSOCIATED DATA
NOT THE MAP DATA
UNLESS OTHERWISE NOTED

K. SHAHBIKIAN

FLOOD PLAIN MAPPING PROGRAM

FLOODLINE APPROVED DATE:

TORONTO AND REGION Conservation
for The Living City
5 Shoreham Drive Downsview Ontario M3N 1S4 (416) 661-6600

Scale 1:2000

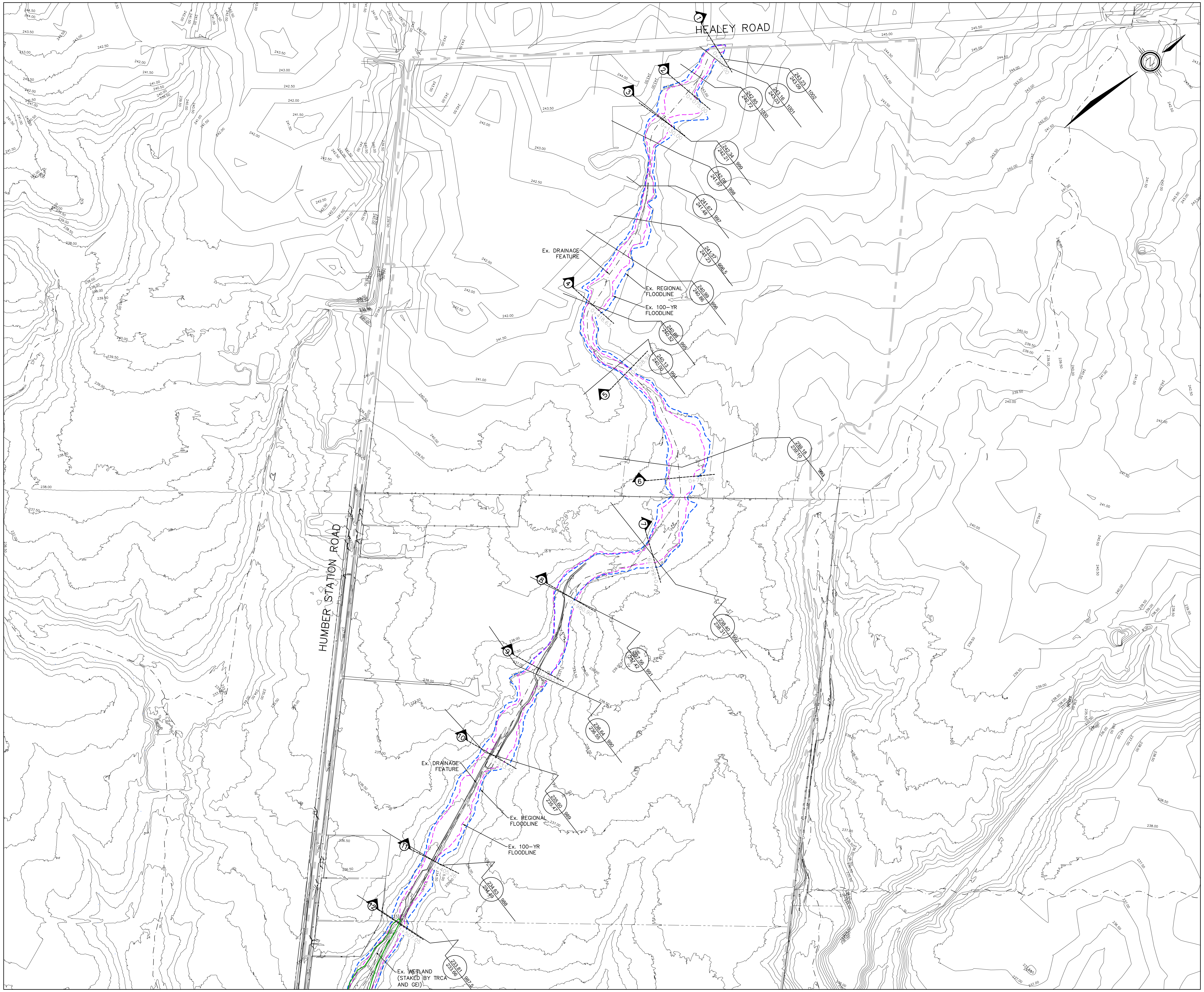
100 Metres 0 100 200 Metres

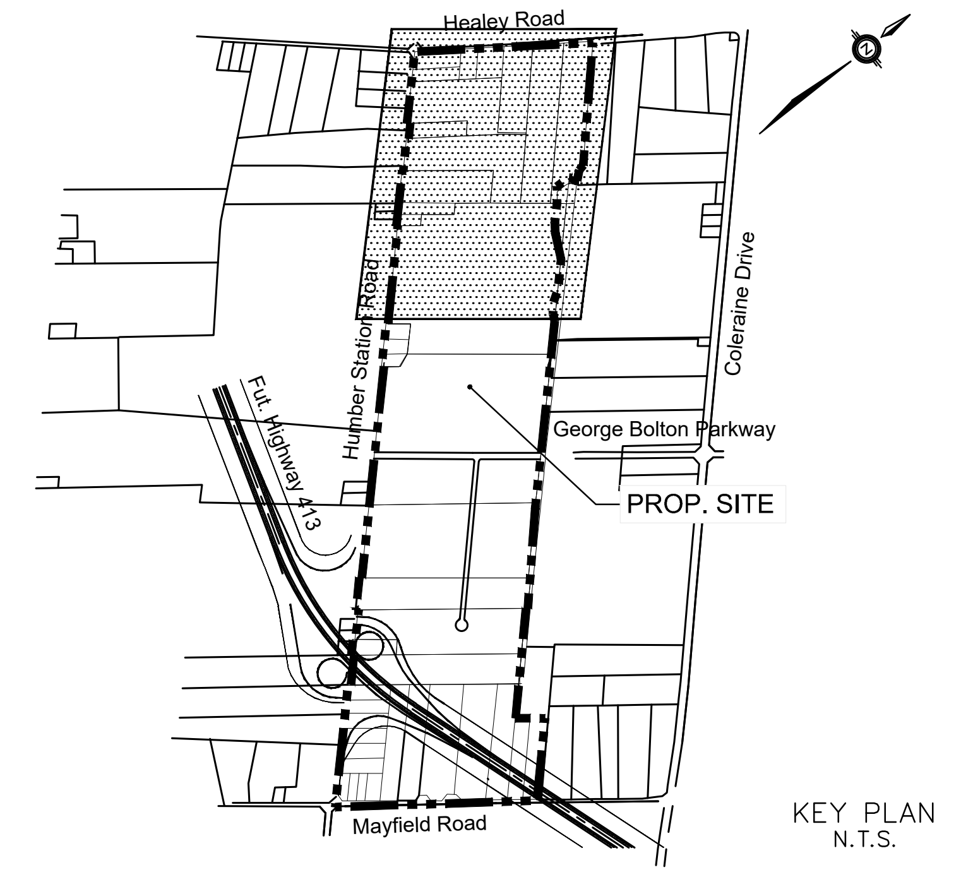
200 Feet 0 200 400 600 800 1000 Feet

CONTOUR INTERVAL 1.0 METRES:

HUMBER RIVER

SHEET No. FUT-4





KEY PLAN
N.T.S.

LEGEND

DENOTES LIMIT OF DEVELOPMENT

DENOTES EXISTING REGIONAL FLOODLINE

DENOTES EXISTING 100–YEAR FLOODLINE

DENOTES EXISTING DRAINAGE FEATURE

DENOTES EXISTING STAKED WETLAND

239.50 DENOTES CONTOURS

13 0+100.00 DENOTES SECTIONS LOCATION & STATION

240.22 993.63 240.06
DENOTES REGIONAL FLOOD ELEVATION (m)
DENOTES HEC–RAS CROSS–SECTION NUMBER
DENOTES 100–YEAR FLOOD ELEVATION (m)

NO.	DATE	ISSUED FOR
1	08/12/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

HUMBER STATION VILLAGES

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Region of Peel
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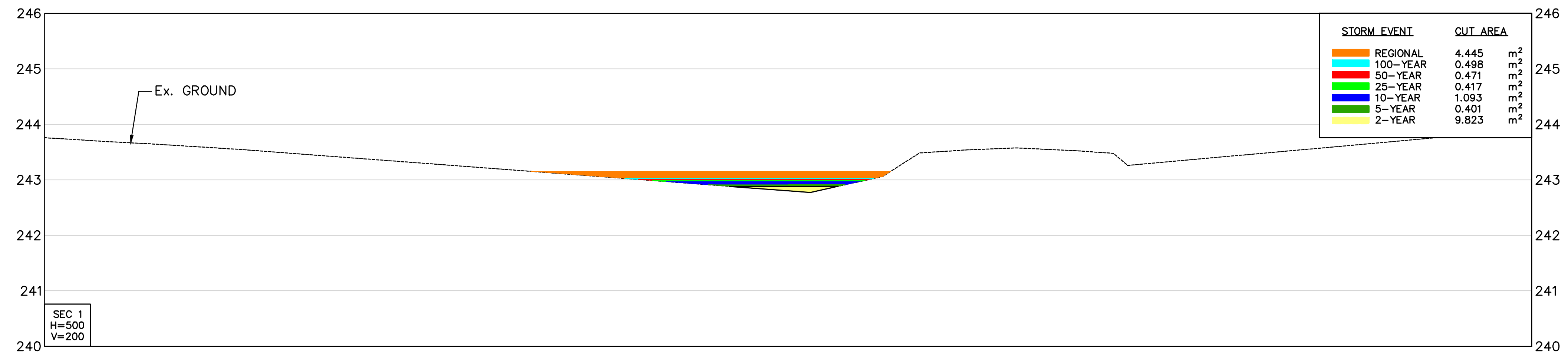
TOWN OF CALEDON

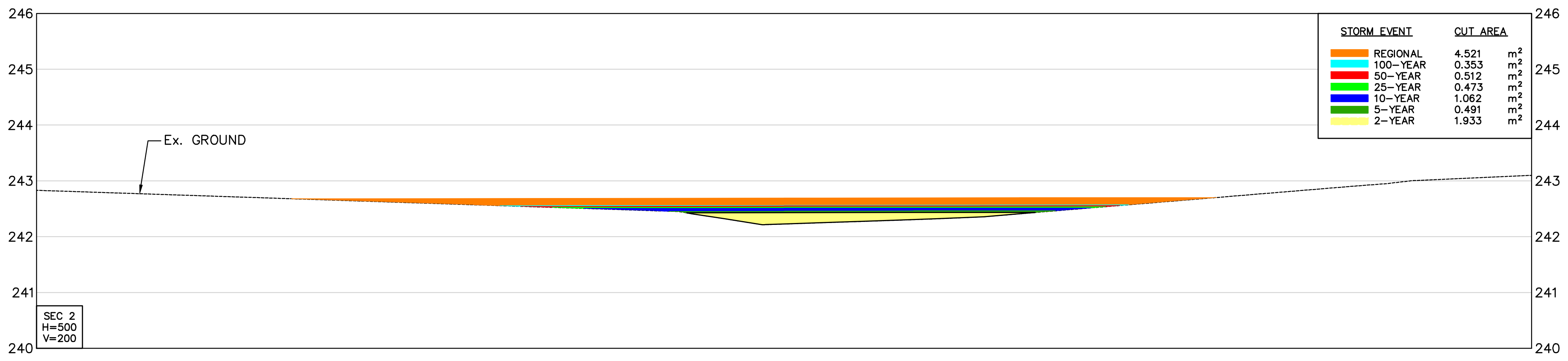
EXISTING FLOODPLAIN MAP

SCALE: 1:2500		PROJECT No. 2021-5139
DESIGNED BY: D.T.	DRAWN BY: D.T.	DRAWING No. EFP-1
CHECKED BY: P.S.	DATE: AUGUST 2024	

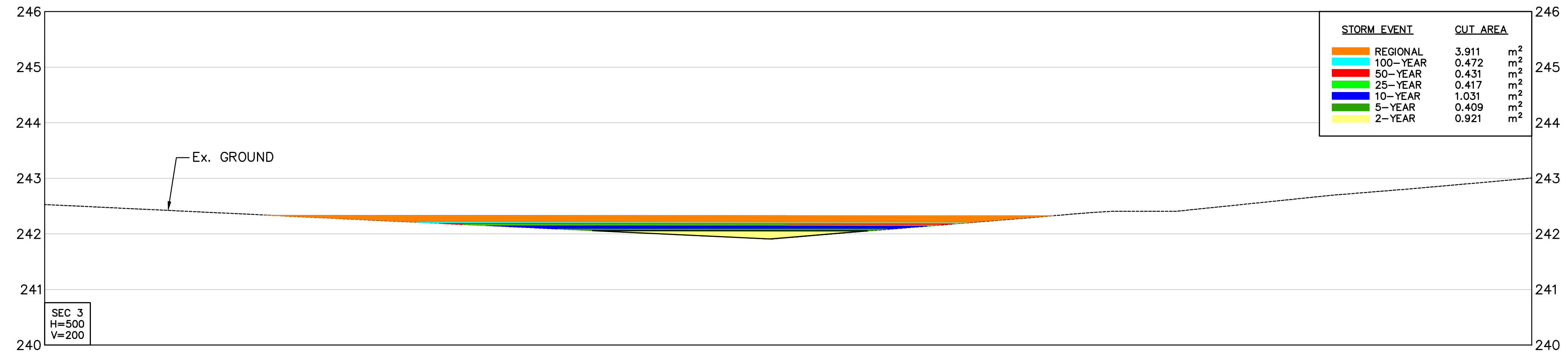
F:\5139\5139–CIVIL3D\FLOODPLAIN VOLUME\EXISTING WATERCOURSE\5139–EFP–1.DWG | 8/15/2024 2:15:25 PM | mzemlyanoy



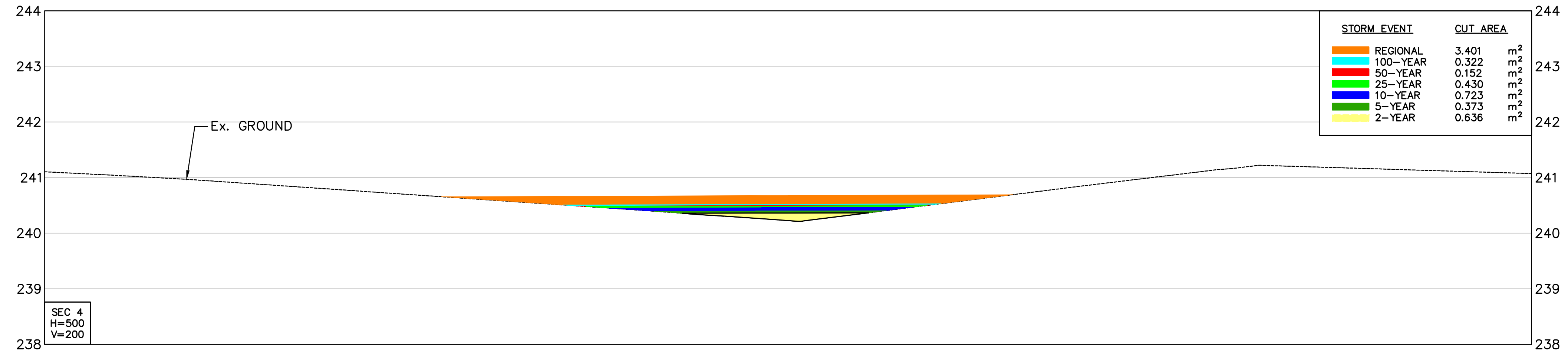
STORM EVENT	CUT AREA	
REGIONAL	4.445	m^2
100–YEAR	0.498	m^2
50–YEAR	0.471	m^2
25–YEAR	0.417	m^2
10–YEAR	1.093	m^2
5–YEAR	0.401	m^2
2–YEAR	9.823	m^2



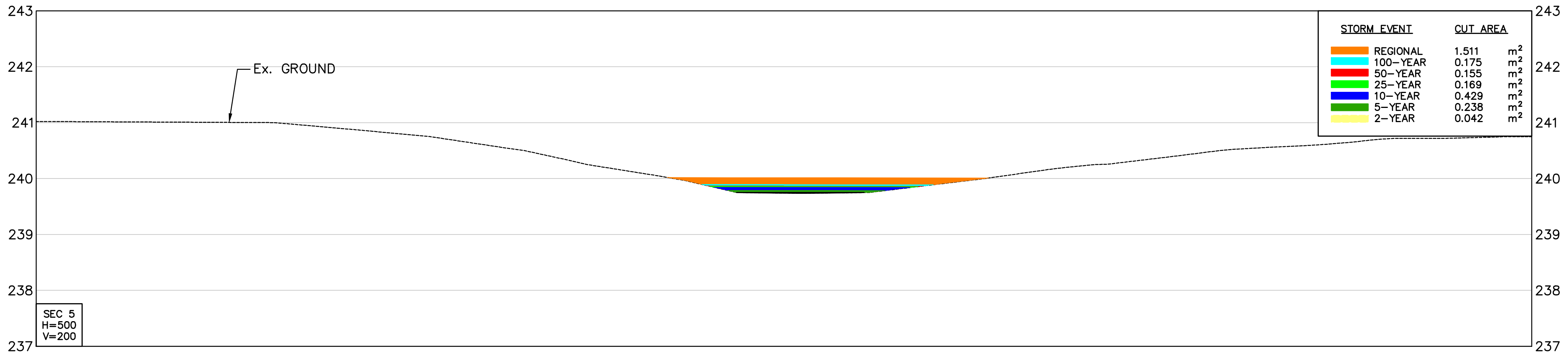
STORM EVENT	CUT AREA	
REGIONAL	4.521	m^2
100–YEAR	0.353	m^2
50–YEAR	0.512	m^2
25–YEAR	0.473	m^2
10–YEAR	1.062	m^2
5–YEAR	0.491	m^2
2–YEAR	1.933	m^2



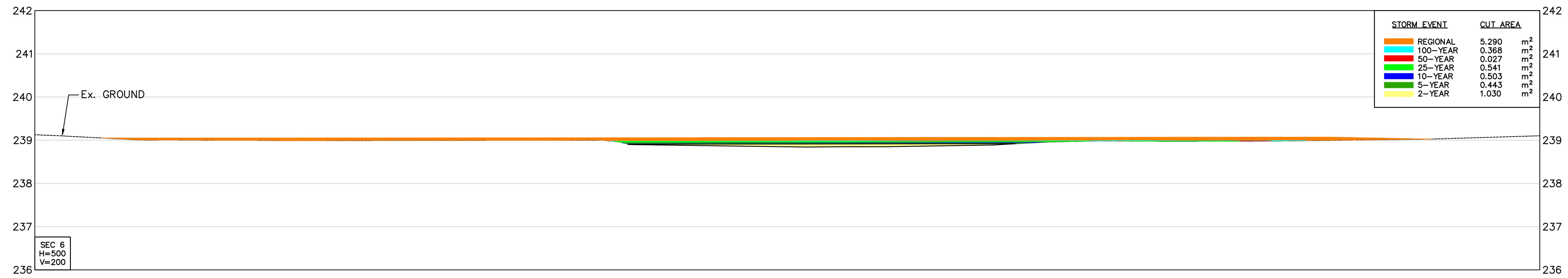
STORM EVENT	CUT AREA	
REGIONAL	3.911	m^2
100–YEAR	0.472	m^2
50–YEAR	0.431	m^2
25–YEAR	0.417	m^2
10–YEAR	1.031	m^2
5–YEAR	0.409	m^2
2–YEAR	0.921	m^2



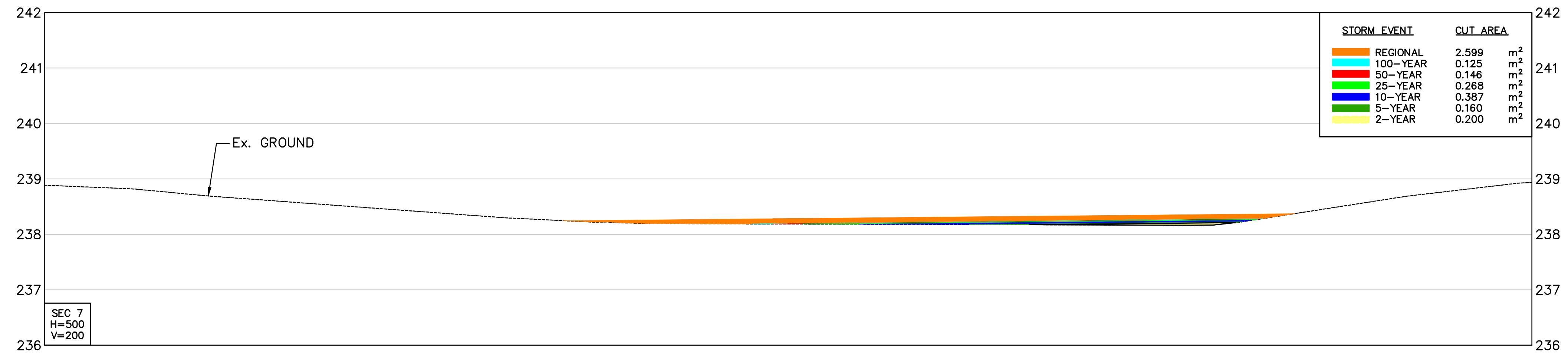
STORM EVENT	CUT AREA	
REGIONAL	3.401	m^2
100–YEAR	0.322	m^2
50–YEAR	0.152	m^2
25–YEAR	0.430	m^2
10–YEAR	0.723	m^2
5–YEAR	0.373	m^2
2–YEAR	0.636	m^2



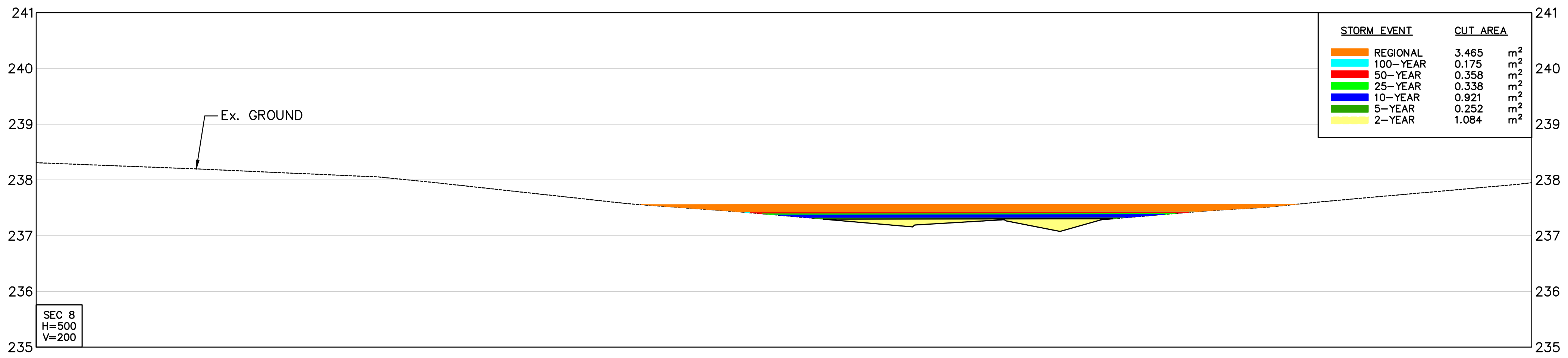
STORM EVENT	CUT AREA	
REGIONAL	1.511	m^2
100–YEAR	0.175	m^2
50–YEAR	0.155	m^2
25–YEAR	0.169	m^2
10–YEAR	0.429	m^2
5–YEAR	0.238	m^2
2–YEAR	0.042	m^2



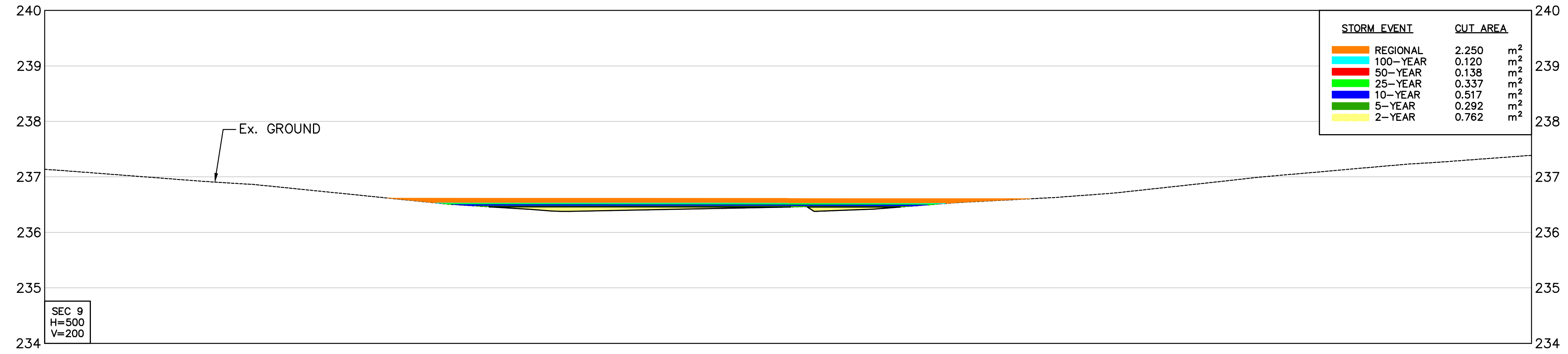
STORM EVENT	CUT AREA	
REGIONAL	5.290	m^2
100–YEAR	0.368	m^2
50–YEAR	0.027	m^2
25–YEAR	0.541	m^2
10–YEAR	0.503	m^2
5–YEAR	0.443	m^2
2–YEAR	1.030	m^2



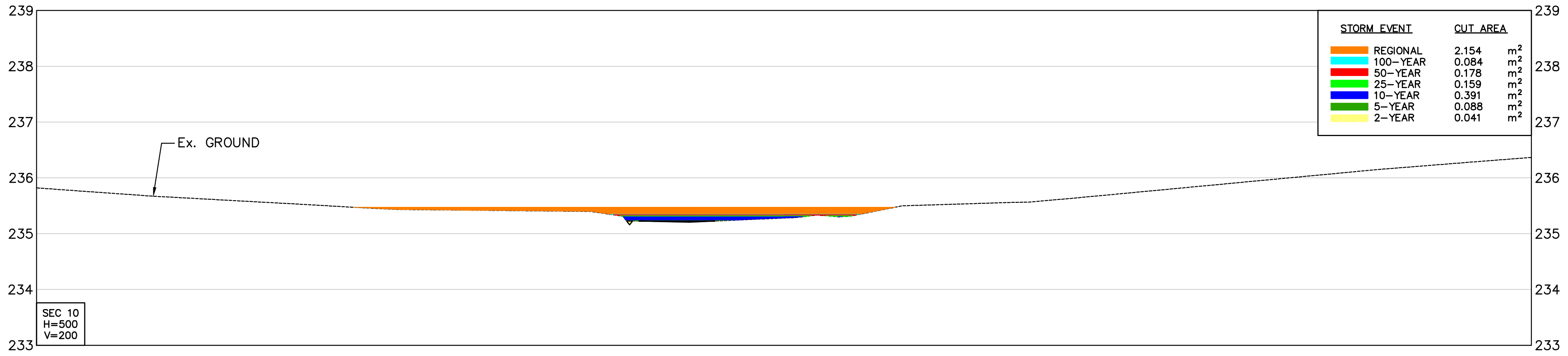
STORM EVENT	CUT AREA	
REGIONAL	2.599	m^2
100–YEAR	0.125	m^2
50–YEAR	0.146	m^2
25–YEAR	0.268	m^2
10–YEAR	0.387	m^2
5–YEAR	0.160	m^2
2–YEAR	0.200	m^2



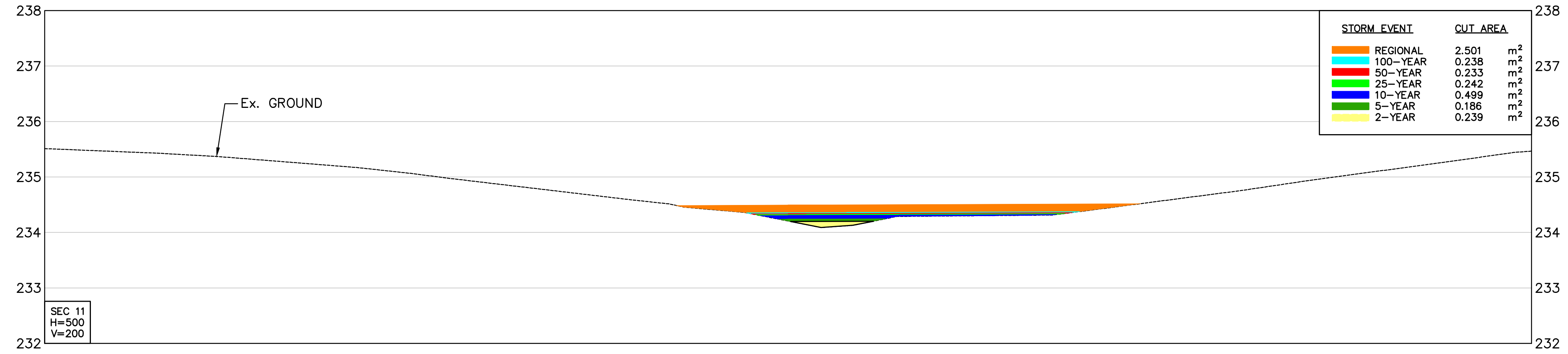
STORM EVENT	CUT AREA	
REGIONAL	3.465	m^2
100–YEAR	0.175	m^2
50–YEAR	0.358	m^2
25–YEAR	0.338	m^2
10–YEAR	0.921	m^2
5–YEAR	0.252	m^2
2–YEAR	1.084	m^2



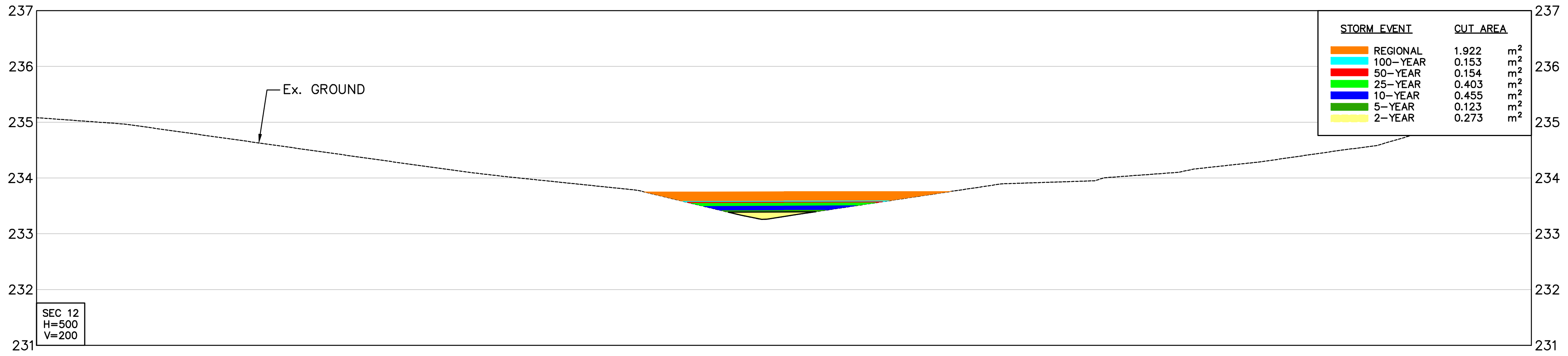
STORM EVENT	CUT AREA	
REGIONAL	2.250	m^2
100–YEAR	0.120	m^2
50–YEAR	0.138	m^2
25–YEAR	0.337	m^2
10–YEAR	0.517	m^2
5–YEAR	0.292	m^2
2–YEAR	0.762	m^2



STORM EVENT	CUT AREA	
REGIONAL	2.154	m^2
100–YEAR	0.084	m^2
50–YEAR	0.178	m^2
25–YEAR	0.159	m^2
10–YEAR	0.391	m^2
5–YEAR	0.088	m^2
2–YEAR	0.041	m^2



STORM EVENT	CUT AREA	
REGIONAL	2.501	m^2
100–YEAR	0.238	m^2
50–YEAR	0.233	m^2
25–YEAR	0.242	m^2
10–YEAR	0.499	m^2
5–YEAR	0.186	m^2
2–YEAR	0.239	m^2



STORM EVENT	CUT AREA	
REGIONAL	1.922	m^2
100–YEAR	0.153	m^2
50–YEAR	0.154	m^2
25–YEAR	0.403	m^2
10–YEAR	0.455	m^2
5–YEAR	0.123	m^2
2–YEAR	0.273	m^2

NO.	DATE	ISSUED FOR
1	08/12/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

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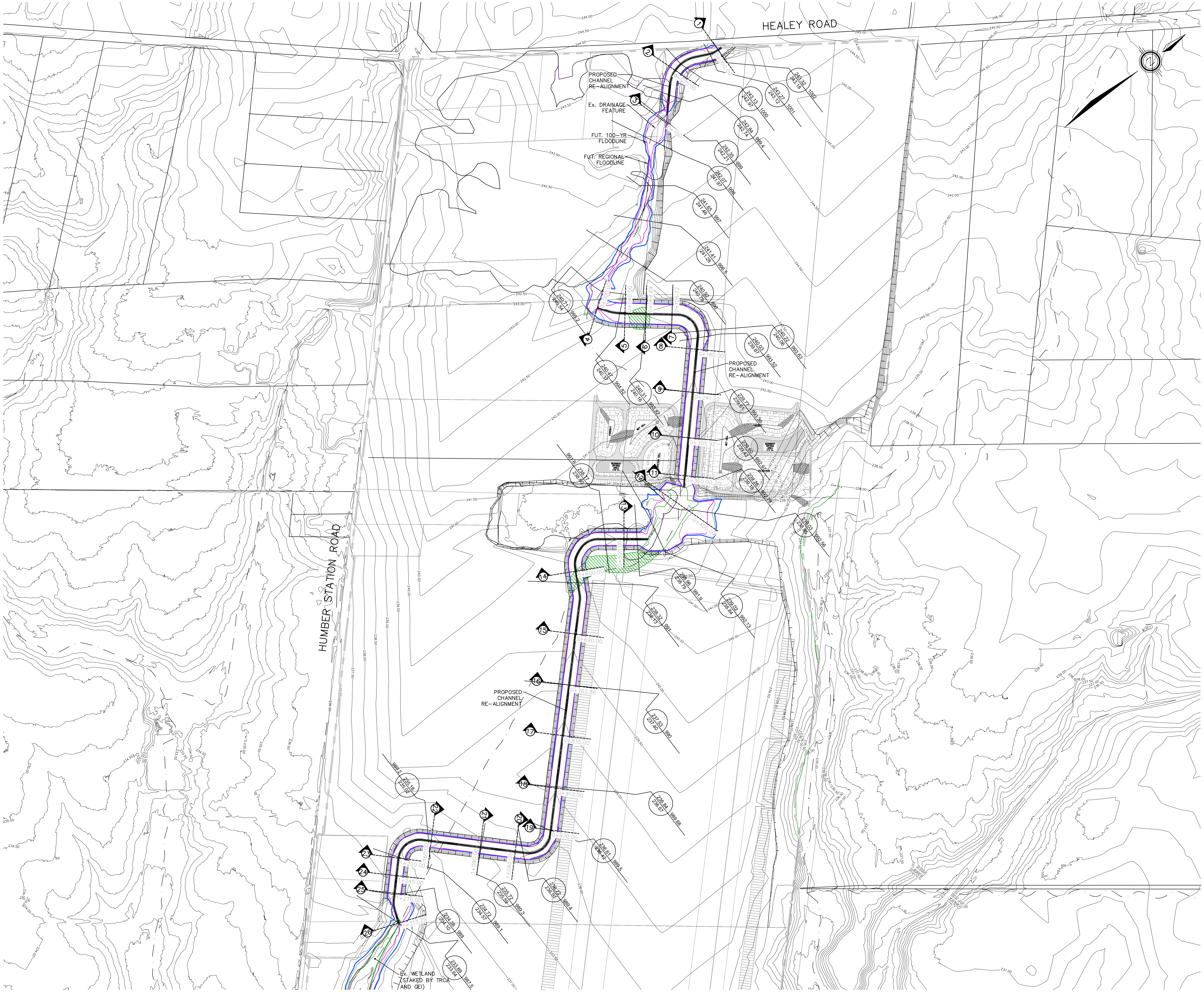
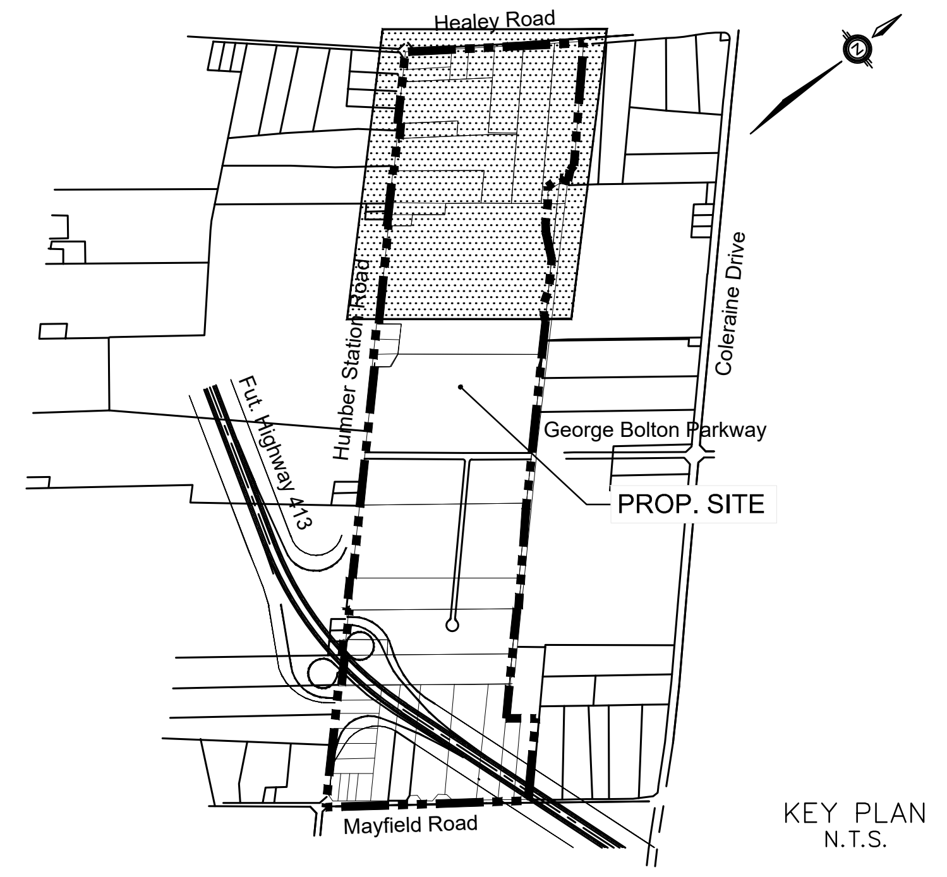
TOWN OF CALEDON

EXISTING FLOODPLAIN
CROSS-SECTIONS 1 TO 12

SCALE: AS SHOWN
PROJECT No. 2021-5139
DESIGNED BY: D.T.
DRAWN BY: D.T.
CHECKED BY: P.S.
DATE: AUGUST 2024
DRAWING No. EFP-2

F:\5139\5139-CIVIL3D\FLOODPLAIN VOLUME\EXISTING WATERCOURSE\5139-EFP-2.DWG | 2024-08-16 2:03:46 PM | mcerniyenoy





KEY PLAN
N.T.S.

LEGEND

▬ ▪ ▪ ▬ DENOTES LIMIT OF DEVELOPMENT

DENOTES FUTURE REGIONAL FLOODLINE

DENOTES FUTURE 100–YEAR FLOODLINE

— · — · — DENOTES EXISTING DRAINAGE FEATURE

DENOTES EXISTING STAKED WETLAND

239.50 DENOTES CONTOURS

13 0+100.00 DENOTES SECTIONS LOCATION & STATION

240.22 993.63 240.06
DENOTES REGIONAL FLOOD ELEVATION (m)
DENOTES HEC–RAS CROSS–SECTION NUMBER
DENOTES 100–YEAR FLOOD ELEVATION (m)

NO.	DATE	ISSUED FOR
1	08/12/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

HUMBER STATION VILLAGES

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design@schaeffers.com

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FUTURE FLOODPLAIN MAP

SCALE: 1:2500
PROJECT No. 2021-5139
DESIGNED BY: D.T.
DRAWN BY: D.T.
CHECKED BY: P.S.
DATE: AUGUST 2024
DRAWING No. FFP-1

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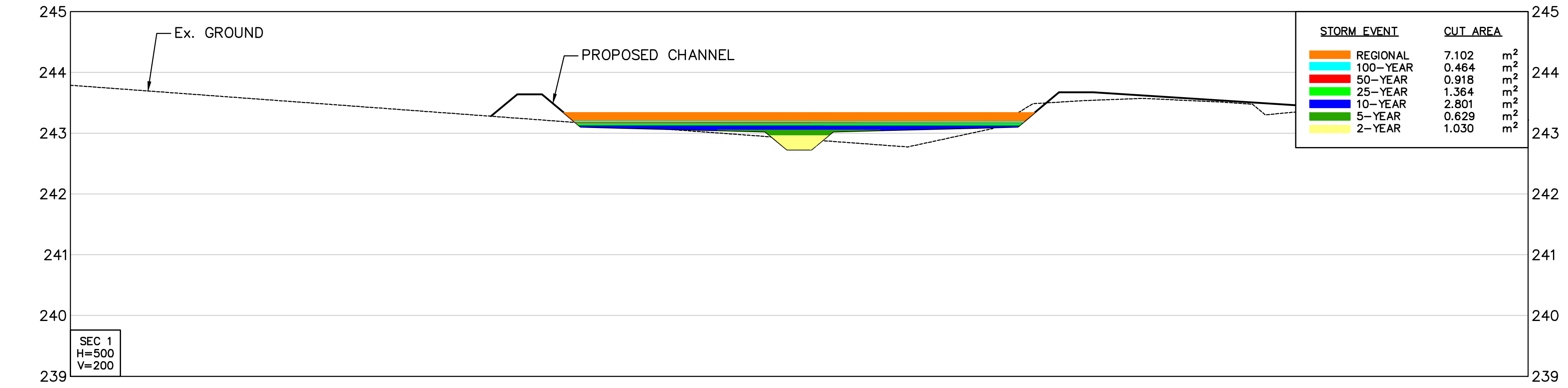
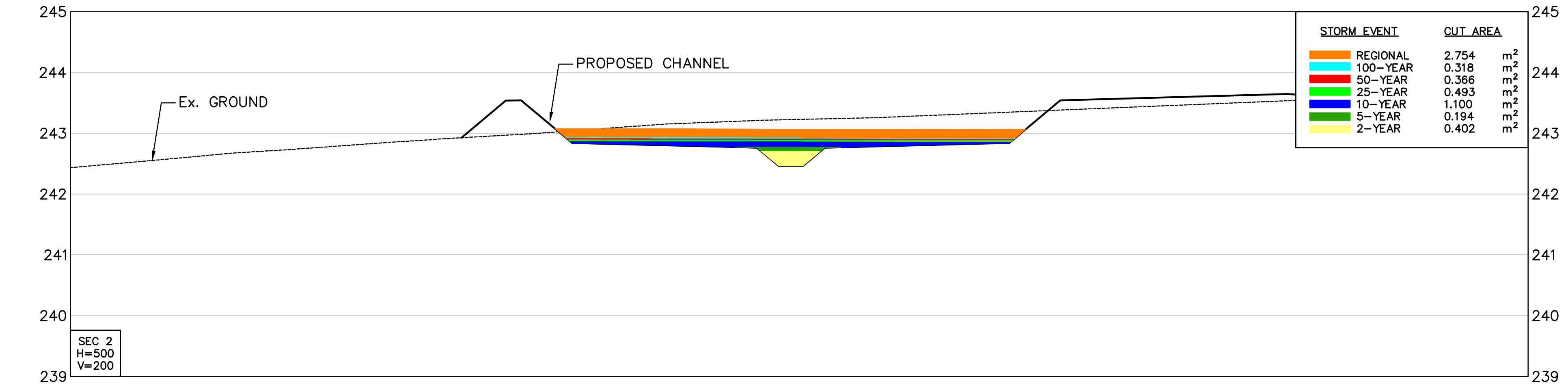
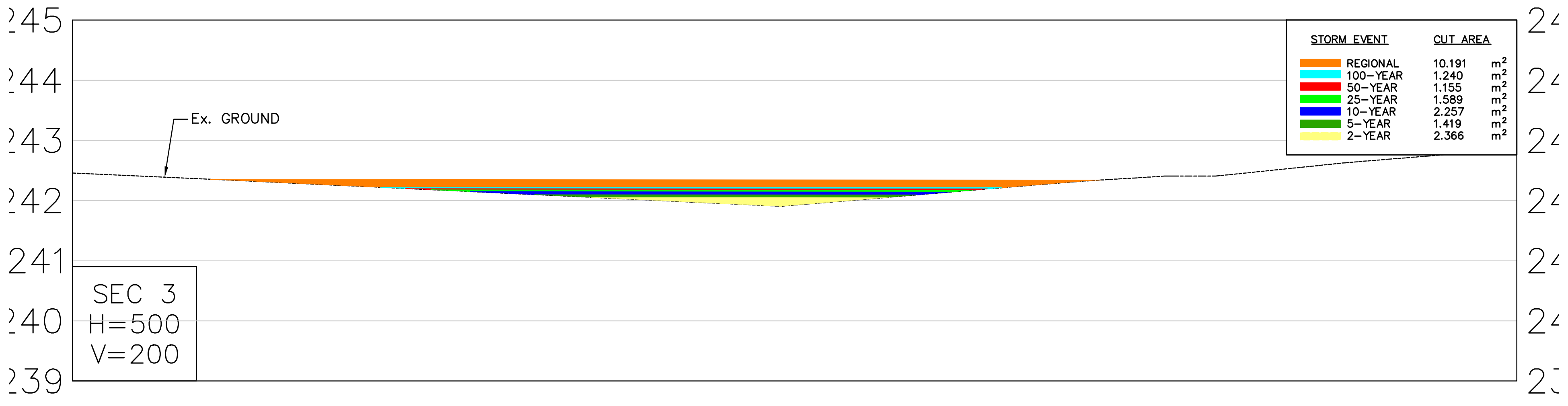


STORM EVENT	CUT AREA	
REGIONAL	7.102	m^2
100-YEAR	0.464	m^2
50-YEAR	0.918	m^2
25-YEAR	1.364	m^2
10-YEAR	2.801	m^2
5-YEAR	0.629	m^2
2-YEAR	1.030	m^2



STORM EVENT	CUT AREA	
REGIONAL	2.754	m^2
100-YEAR	0.318	m^2
50-YEAR	0.366	m^2
25-YEAR	0.493	m^2
10-YEAR	1.100	m^2
5-YEAR	0.194	m^2
2-YEAR	0.402	m^2



STORM EVENT	CUT AREA	
REGIONAL	10.191	m^2
100-YEAR	1.240	m^2
50-YEAR	1.155	m^2
25-YEAR	1.589	m^2
10-YEAR	2.257	m^2
5-YEAR	1.419	m^2
2-YEAR	2.366	m^2

NO.	DATE	ISSUED FOR
1	08/12/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

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TOWN OF CALEDON

FUTURE FLOODPLAIN
CROSS-SECTIONS 1 TO 3

SCALE: AS SHOWN
DESIGNED BY: D.T.
DRAWN BY: D.T.
CHECKED BY: P.S.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. FFP-2

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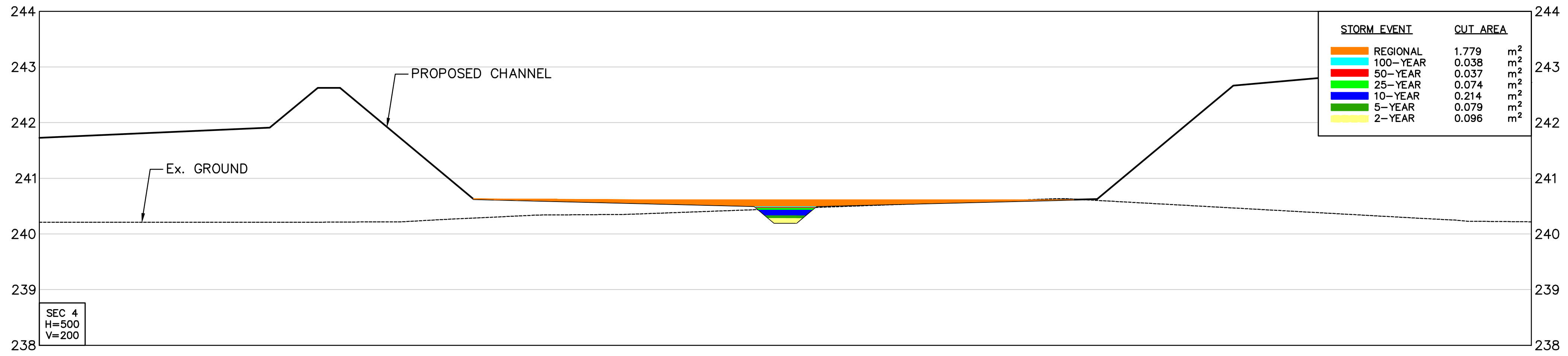
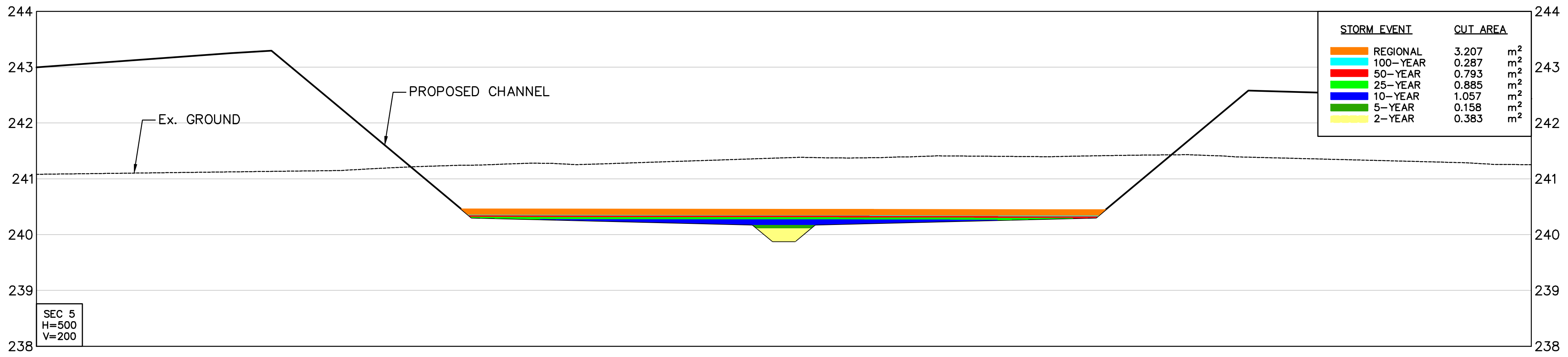
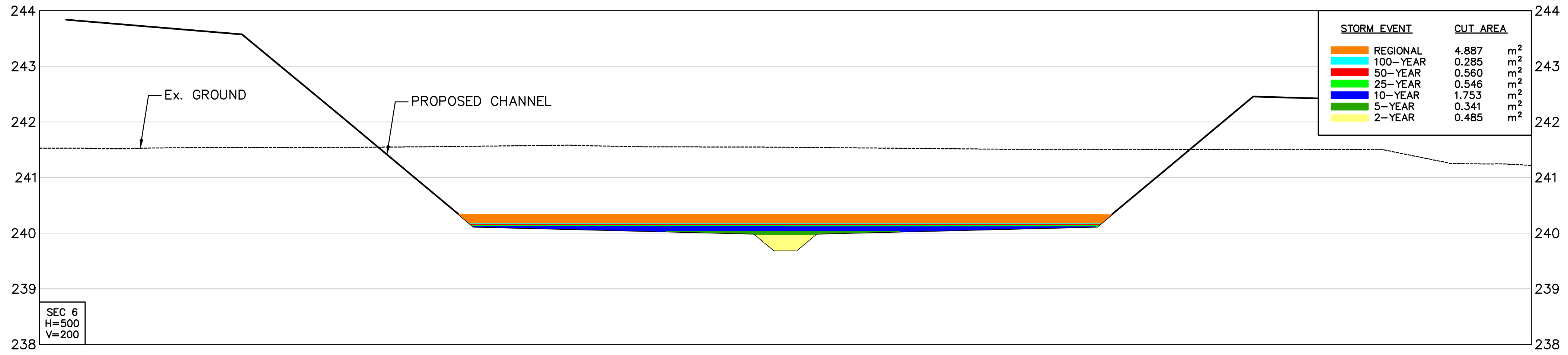


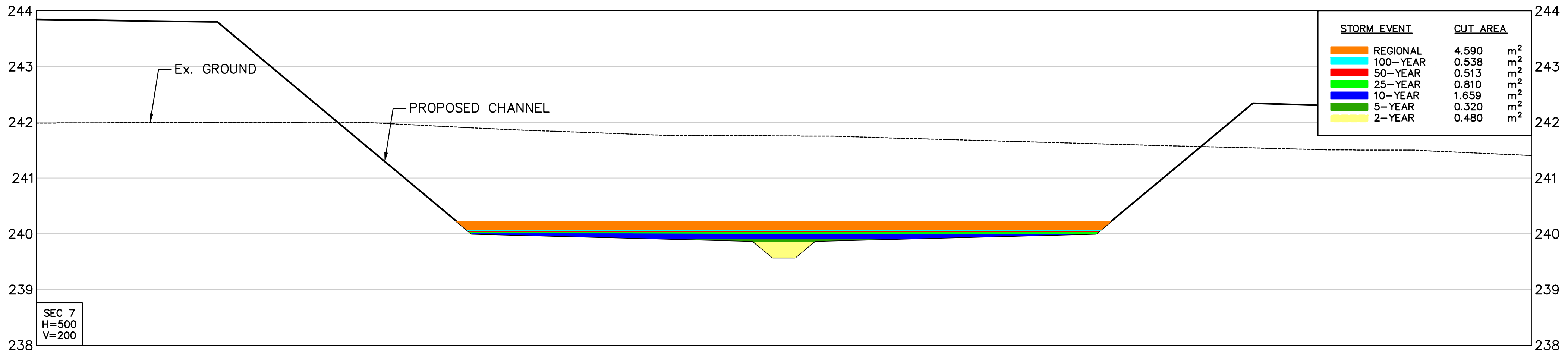
STORM EVENT	CUT AREA
🟧 REGIONAL	1.779 m^2
🟦 100–YEAR	0.038 m^2
🟥 50–YEAR	0.037 m^2
🟩 25–YEAR	0.074 m^2
🟦 10–YEAR	0.214 m^2
🟩 5–YEAR	0.079 m^2
🟨 2–YEAR	0.096 m^2



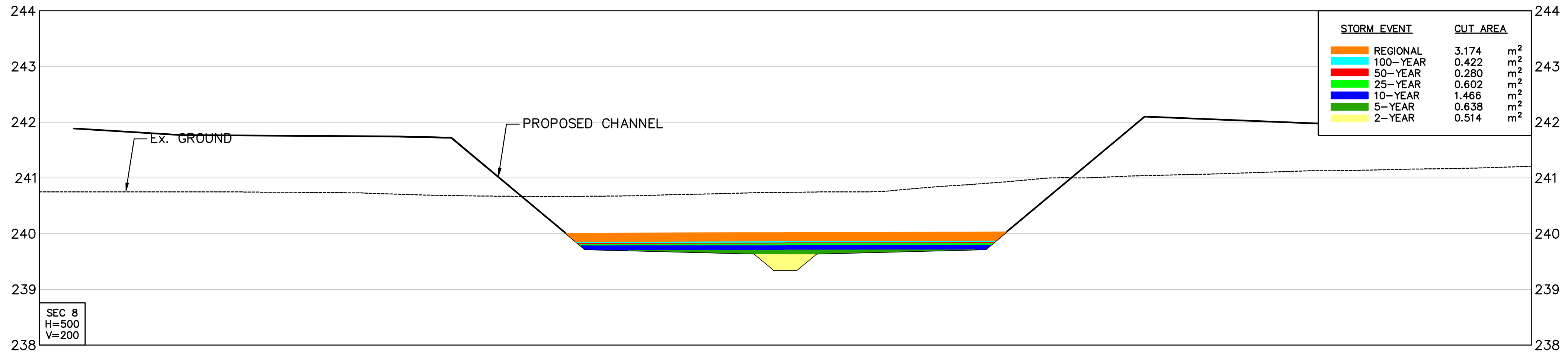
STORM EVENT	CUT AREA
🟧 REGIONAL	3.207 m^2
🟦 100–YEAR	0.287 m^2
🟥 50–YEAR	0.793 m^2
🟩 25–YEAR	0.885 m^2
🟦 10–YEAR	1.057 m^2
🟩 5–YEAR	0.158 m^2
🟨 2–YEAR	0.383 m^2



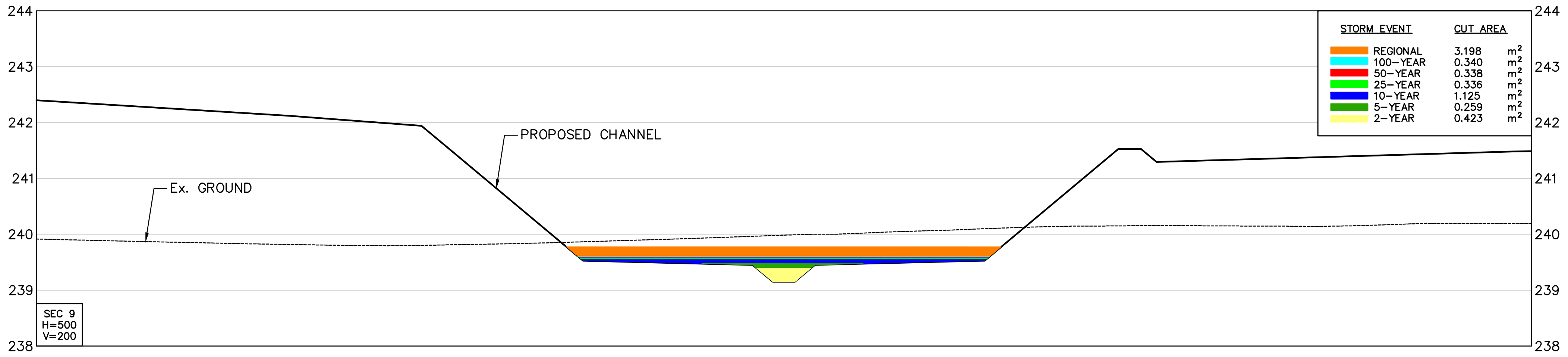
STORM EVENT	CUT AREA
🟧 REGIONAL	4.887 m^2
🟦 100–YEAR	0.285 m^2
🟥 50–YEAR	0.560 m^2
🟩 25–YEAR	0.546 m^2
🟦 10–YEAR	1.753 m^2
🟩 5–YEAR	0.341 m^2
🟨 2–YEAR	0.485 m^2



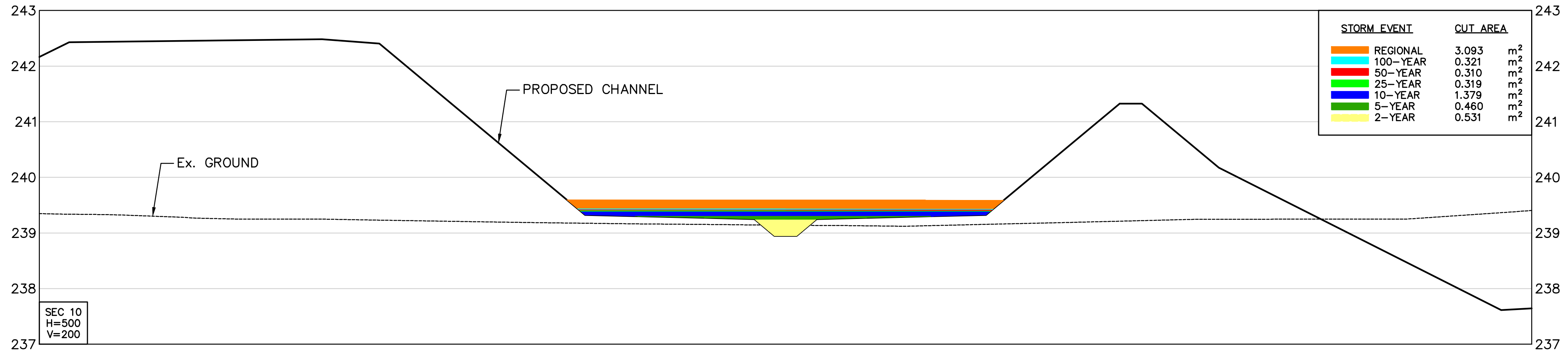
STORM EVENT	CUT AREA
🟧 REGIONAL	4.590 m^2
🟦 100–YEAR	0.538 m^2
🟥 50–YEAR	0.513 m^2
🟩 25–YEAR	0.810 m^2
🟦 10–YEAR	1.659 m^2
🟩 5–YEAR	0.320 m^2
🟨 2–YEAR	0.480 m^2



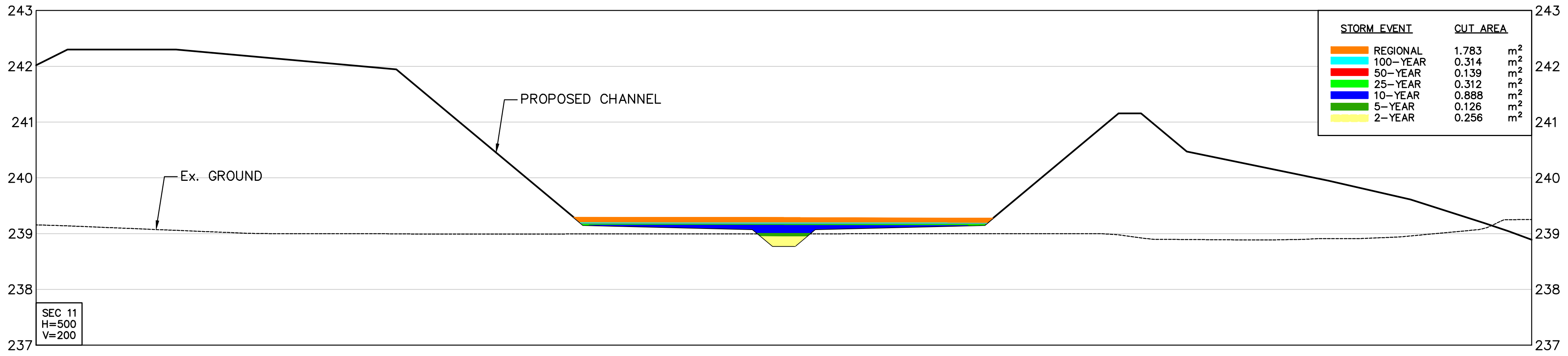
STORM EVENT	CUT AREA
🟧 REGIONAL	3.174 m^2
🟦 100–YEAR	0.422 m^2
🟥 50–YEAR	0.280 m^2
🟩 25–YEAR	0.602 m^2
🟦 10–YEAR	1.466 m^2
🟩 5–YEAR	0.638 m^2
🟨 2–YEAR	0.514 m^2



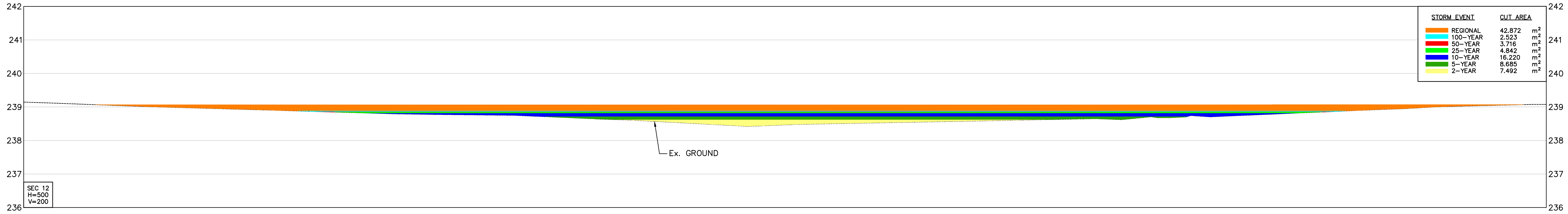
STORM EVENT	CUT AREA
🟧 REGIONAL	3.198 m^2
🟦 100–YEAR	0.340 m^2
🟥 50–YEAR	0.338 m^2
🟩 25–YEAR	0.336 m^2
🟦 10–YEAR	1.125 m^2
🟩 5–YEAR	0.259 m^2
🟨 2–YEAR	0.423 m^2



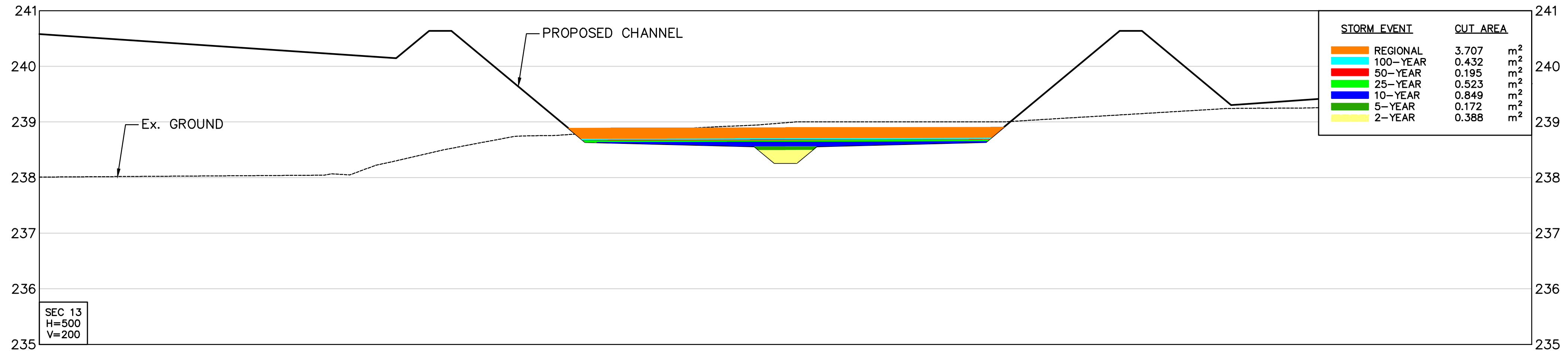
STORM EVENT	CUT AREA
🟧 REGIONAL	3.093 m^2
🟦 100–YEAR	0.321 m^2
🟥 50–YEAR	0.310 m^2
🟩 25–YEAR	0.319 m^2
🟦 10–YEAR	1.379 m^2
🟩 5–YEAR	0.460 m^2
🟨 2–YEAR	0.531 m^2



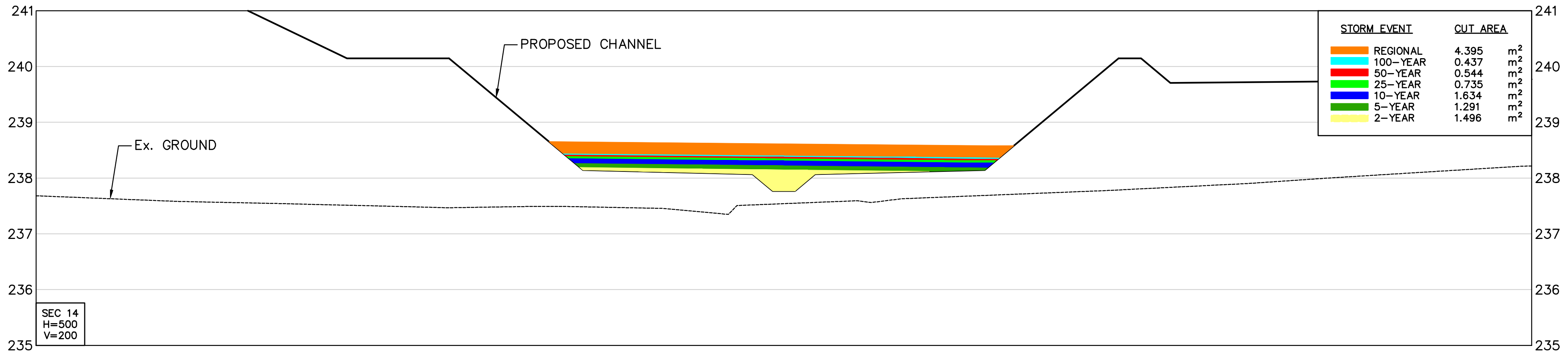
STORM EVENT	CUT AREA
🟧 REGIONAL	1.783 m^2
🟦 100–YEAR	0.314 m^2
🟥 50–YEAR	0.139 m^2
🟩 25–YEAR	0.312 m^2
🟦 10–YEAR	0.888 m^2
🟩 5–YEAR	0.126 m^2
🟨 2–YEAR	0.256 m^2



STORM EVENT	CUT AREA
🟧 REGIONAL	42.872 m^2
🟦 100–YEAR	2.523 m^2
🟥 50–YEAR	3.716 m^2
🟩 25–YEAR	4.842 m^2
🟦 10–YEAR	16.220 m^2
🟩 5–YEAR	8.685 m^2
🟨 2–YEAR	7.492 m^2



STORM EVENT	CUT AREA
🟧 REGIONAL	3.707 m^2
🟦 100–YEAR	0.432 m^2
🟥 50–YEAR	0.195 m^2
🟩 25–YEAR	0.523 m^2
🟦 10–YEAR	0.849 m^2
🟩 5–YEAR	0.172 m^2
🟨 2–YEAR	0.388 m^2



STORM EVENT	CUT AREA
🟧 REGIONAL	4.395 m^2
🟦 100–YEAR	0.437 m^2
🟥 50–YEAR	0.544 m^2
🟩 25–YEAR	0.735 m^2
🟦 10–YEAR	1.634 m^2
🟩 5–YEAR	1.291 m^2
🟨 2–YEAR	1.496 m^2

NO.	DATE	ISSUED FOR
1	08/12/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

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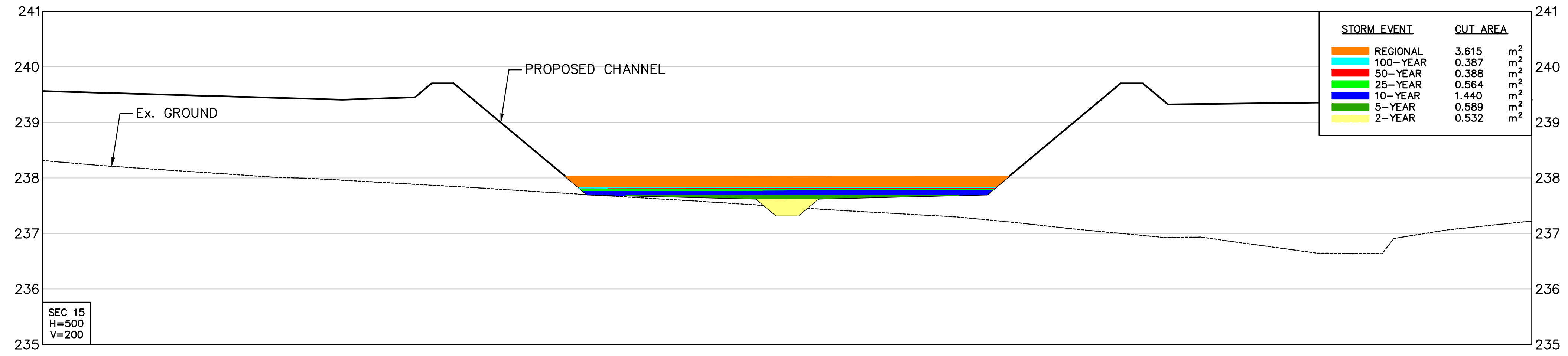
TOWN OF CALEDON

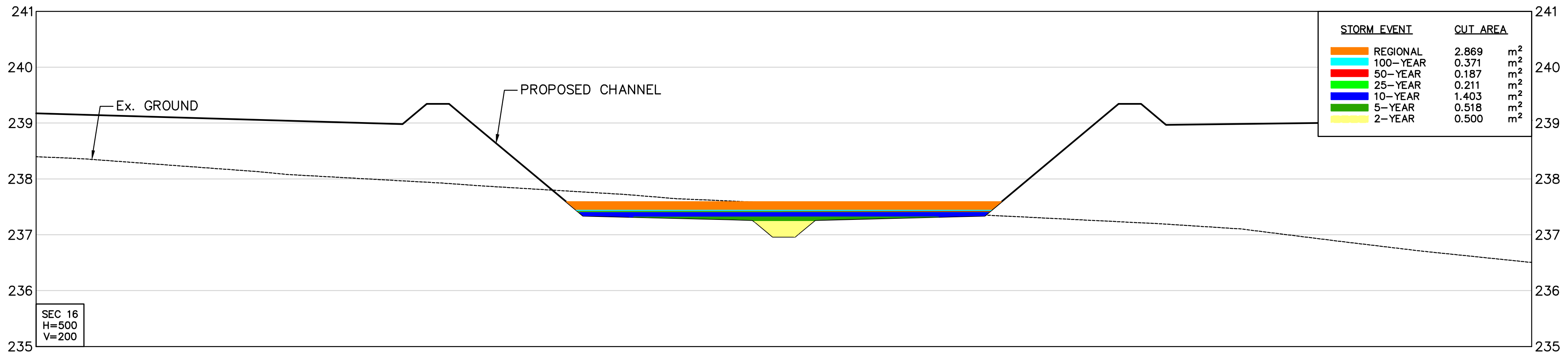
FUTURE FLOODPLAIN
CROSS-SECTIONS 4 TO 14

SCALE: AS SHOWN
DESIGNED BY: D.T.
DRAWN BY: D.T.
CHECKED BY: P.S.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. FFP-3

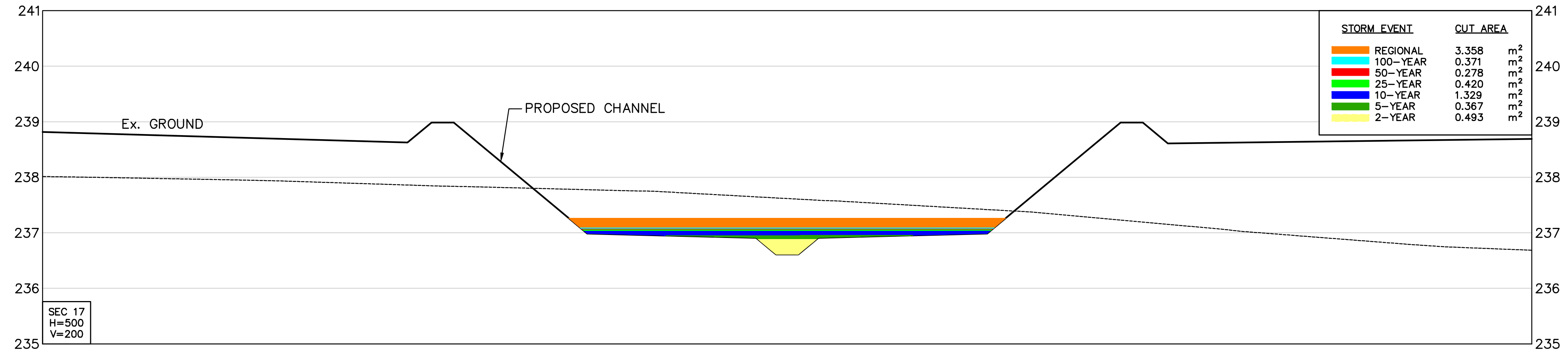
F:\5139\5139-CIVIL3D\FLOODPLAIN VOLUME\PROP CHANNEL VOLUMES\5139-FFP-2-4.DWG | 2024-08-16 1:59:57 PM | mzemlyanoy



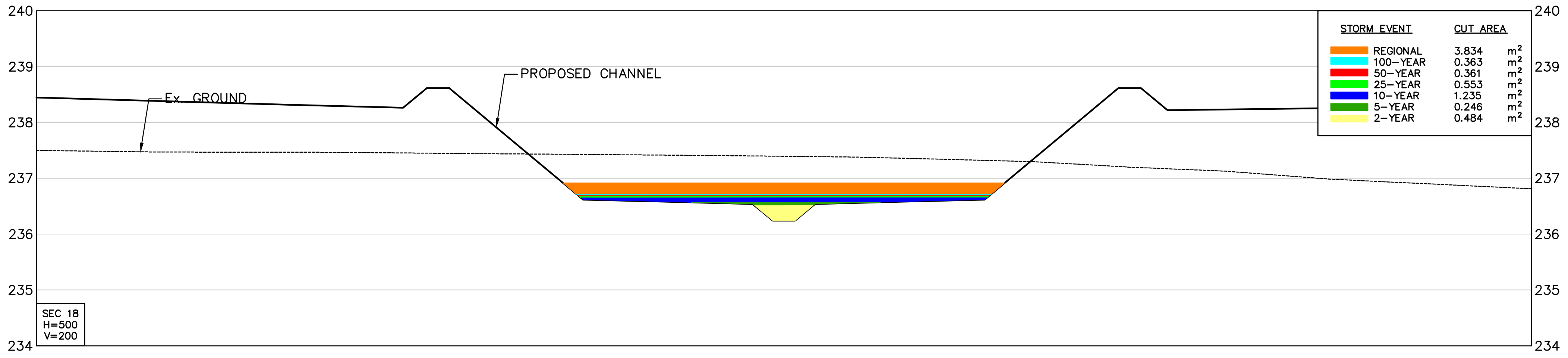
STORM EVENT	CUT AREA
🟧 REGIONAL	3.615 m^2
🟦 100-YEAR	0.387 m^2
🟥 50-YEAR	0.388 m^2
🟩 25-YEAR	0.564 m^2
🟦 10-YEAR	1.440 m^2
🟩 5-YEAR	0.589 m^2
🟨 2-YEAR	0.532 m^2



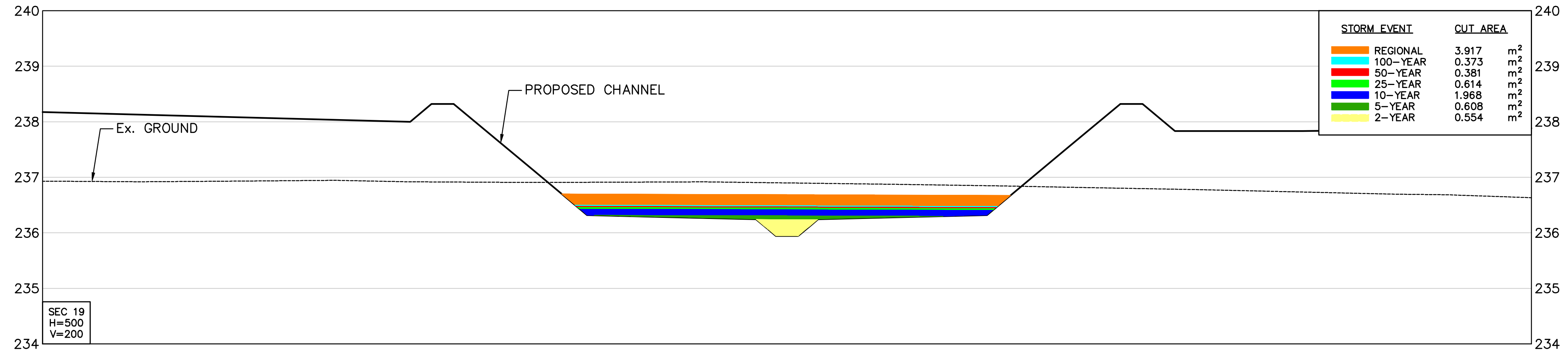
STORM EVENT	CUT AREA
🟧 REGIONAL	2.869 m^2
🟦 100-YEAR	0.371 m^2
🟥 50-YEAR	0.187 m^2
🟩 25-YEAR	0.211 m^2
🟦 10-YEAR	1.403 m^2
🟩 5-YEAR	0.518 m^2
🟨 2-YEAR	0.500 m^2



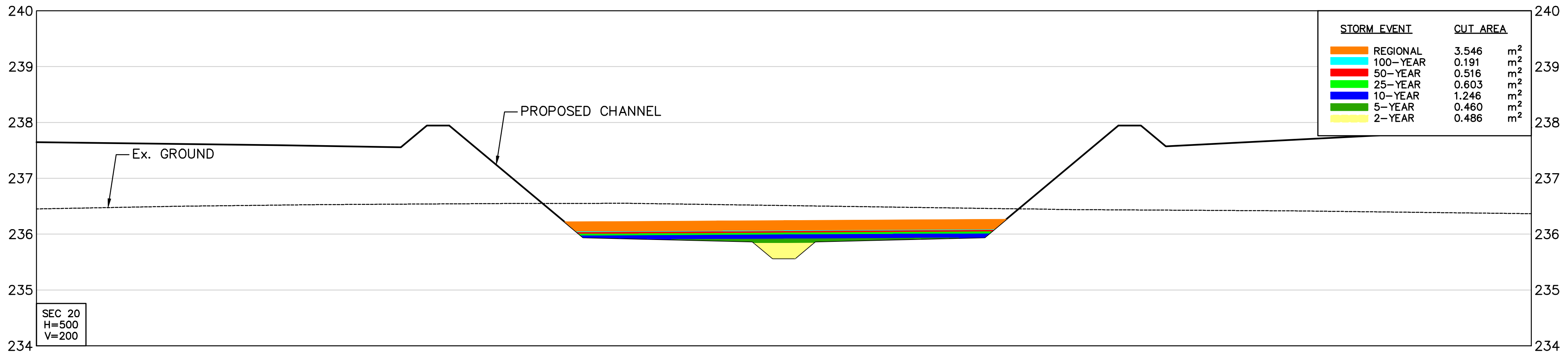
STORM EVENT	CUT AREA
🟧 REGIONAL	3.358 m^2
🟦 100-YEAR	0.371 m^2
🟥 50-YEAR	0.278 m^2
🟩 25-YEAR	0.420 m^2
🟦 10-YEAR	1.329 m^2
🟩 5-YEAR	0.367 m^2
🟨 2-YEAR	0.493 m^2



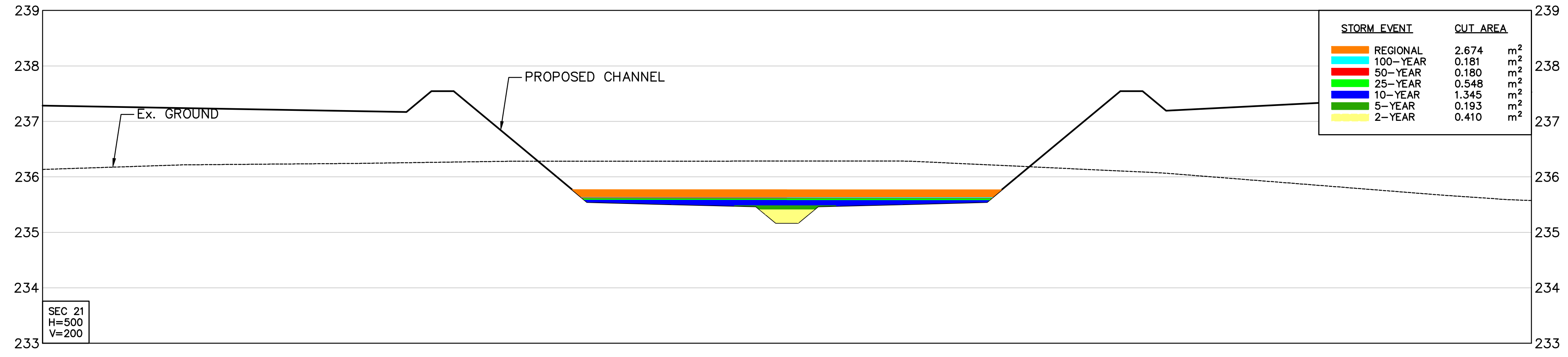
STORM EVENT	CUT AREA
🟧 REGIONAL	3.834 m^2
🟦 100-YEAR	0.363 m^2
🟥 50-YEAR	0.361 m^2
🟩 25-YEAR	0.553 m^2
🟦 10-YEAR	1.235 m^2
🟩 5-YEAR	0.246 m^2
🟨 2-YEAR	0.484 m^2



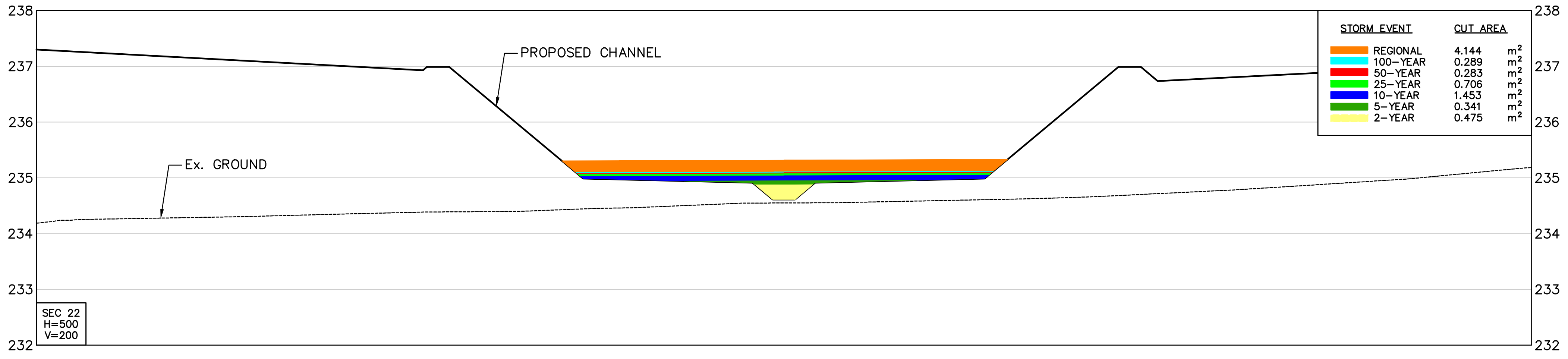
STORM EVENT	CUT AREA
🟧 REGIONAL	3.917 m^2
🟦 100-YEAR	0.373 m^2
🟥 50-YEAR	0.381 m^2
🟩 25-YEAR	0.614 m^2
🟦 10-YEAR	1.968 m^2
🟩 5-YEAR	0.608 m^2
🟨 2-YEAR	0.554 m^2



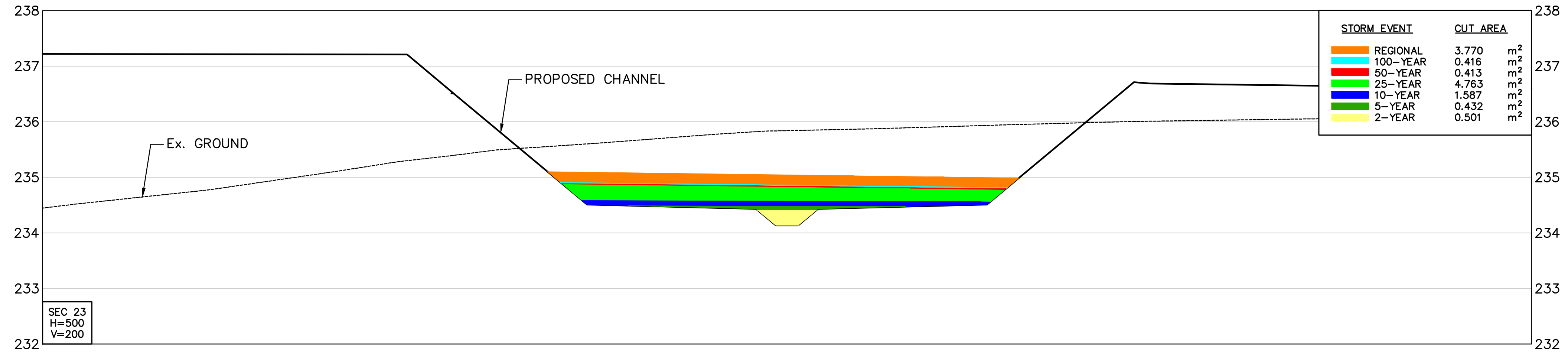
STORM EVENT	CUT AREA
🟧 REGIONAL	3.546 m^2
🟦 100-YEAR	0.191 m^2
🟥 50-YEAR	0.516 m^2
🟩 25-YEAR	0.603 m^2
🟦 10-YEAR	1.246 m^2
🟩 5-YEAR	0.460 m^2
🟨 2-YEAR	0.486 m^2



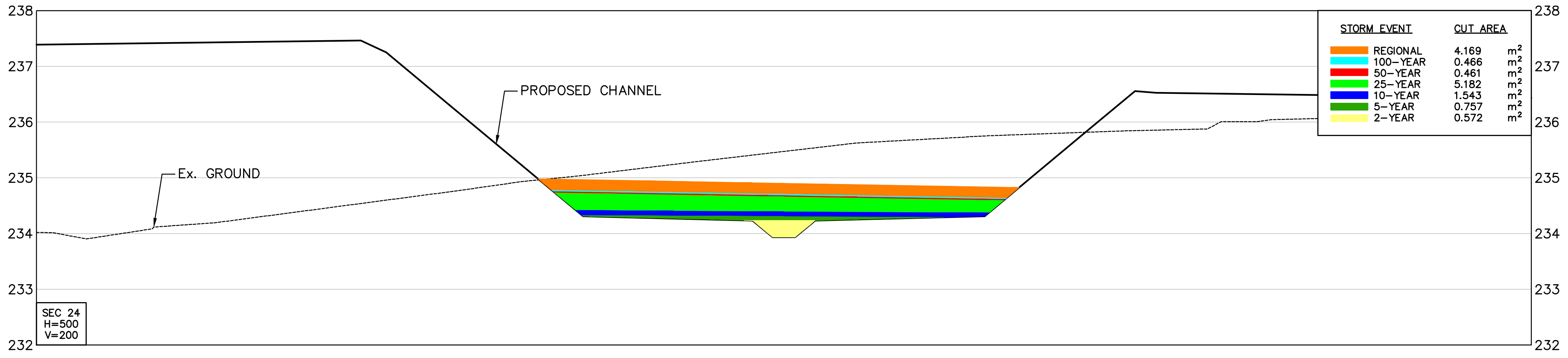
STORM EVENT	CUT AREA
🟧 REGIONAL	2.674 m^2
🟦 100-YEAR	0.181 m^2
🟥 50-YEAR	0.180 m^2
🟩 25-YEAR	0.548 m^2
🟦 10-YEAR	1.345 m^2
🟩 5-YEAR	0.193 m^2
🟨 2-YEAR	0.410 m^2



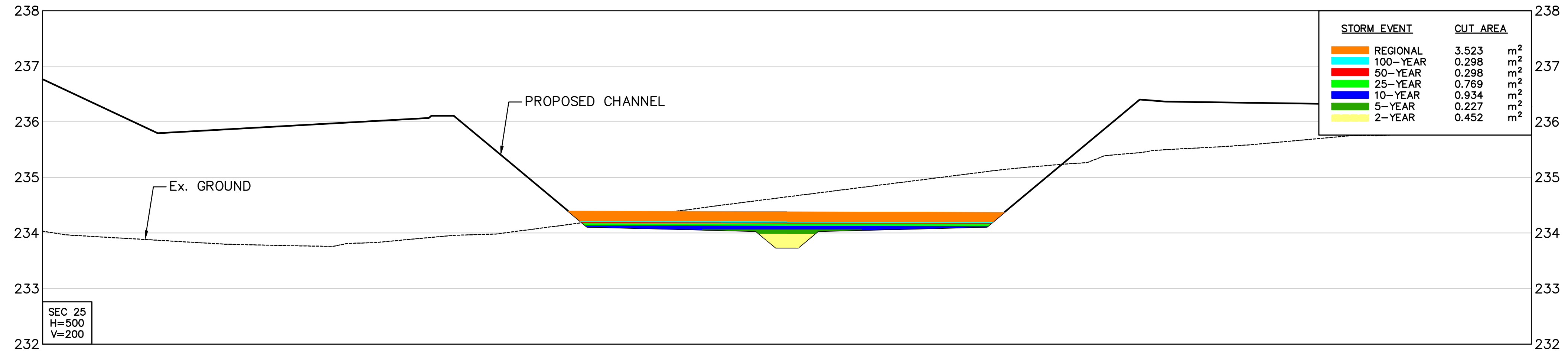
STORM EVENT	CUT AREA
🟧 REGIONAL	4.144 m^2
🟦 100-YEAR	0.289 m^2
🟥 50-YEAR	0.283 m^2
🟩 25-YEAR	0.706 m^2
🟦 10-YEAR	1.453 m^2
🟩 5-YEAR	0.341 m^2
🟨 2-YEAR	0.475 m^2



STORM EVENT	CUT AREA
🟧 REGIONAL	3.770 m^2
🟦 100-YEAR	0.416 m^2
🟥 50-YEAR	0.413 m^2
🟩 25-YEAR	4.763 m^2
🟦 10-YEAR	1.587 m^2
🟩 5-YEAR	0.432 m^2
🟨 2-YEAR	0.501 m^2



STORM EVENT	CUT AREA
🟧 REGIONAL	4.169 m^2
🟦 100-YEAR	0.466 m^2
🟥 50-YEAR	0.461 m^2
🟩 25-YEAR	5.182 m^2
🟦 10-YEAR	1.543 m^2
🟩 5-YEAR	0.757 m^2
🟨 2-YEAR	0.572 m^2



STORM EVENT	CUT AREA
🟧 REGIONAL	3.523 m^2
🟦 100-YEAR	0.298 m^2
🟥 50-YEAR	0.298 m^2
🟩 25-YEAR	0.769 m^2
🟦 10-YEAR	0.934 m^2
🟩 5-YEAR	0.227 m^2
🟨 2-YEAR	0.452 m^2

NO.	DATE	ISSUED FOR
1	08/12/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

HUMBER STATION VILLAGES

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Region of Peel
Working for you

TOWN OF CALEDON

FUTURE FLOODPLAIN
CROSS-SECTIONS 15 TO 25

SCALE: AS SHOWN
DESIGNED BY: D.T.
DRAWN BY: D.T.
CHECKED BY: P.S.
DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. FFP-4

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Calculated from Cross Sections

Table 3: Existing Condition Fill Volume Calculation

Storm:	Regional to 100 Year			
Section ID*	Area**	Length	Average Area	Volume
	m²	m	m²	m³
1	4.445			
		75	4.48	336
2	4.521			
		55	4.22	232
3	3.911			
4	3.401			
		110	2.46	271
5	1.511			
		192	3.40	653
6	5.290			
		124	3.94	489
7	2.599			
		136	3.03	413
8	3.465			
		121	2.86	345
9	2.250			
		132	2.20	290
10	2.154			
		172	2.33	400
11	2.501			
		102	2.21	227
12	1.922			

Storm :	100 Year to 50 Year			
Section ID	Area**	Length	Average Area	Volume
	m²	m	m²	m³
1	0.498			
		75	0.43	32
2	0.353			
		55	0.41	23
3	0.472			
4	0.322			
		110	0.25	27
5	0.175			
		192	0.27	52
6	0.368			
		124	0.25	31
7	0.125			
		136	0.15	20
8	0.175			
		121	0.15	18
9	0.120			
		132	0.10	13
10	0.084			
		172	0.16	28
11	0.238			
		102	0.20	20
12	0.153			

Storm :	50 Year to 25 Year			
Section ID	Area**	Length	Average Area	Volume
	m²	m	m²	m³
1	0.471			
		75	0.49	37
2	0.512			
		55	0.47	26
3	0.431			
4	0.152			
		110	0.15	17
5	0.155			
		192	0.09	17
6	0.027			
		124	0.09	11
7	0.146			
		136	0.25	34
8	0.358			
		121	0.25	30
9	0.138			
		132	0.16	21
10	0.178			
		172	0.21	35
11	0.233			
		102	0.19	20
12	0.154			

Storm :	25 Year to 10 Year			
Section ID	Area**	Length	Average Area	Volume
	m²	m	m²	m³
1	0.417			
		75	0.45	33
2	0.473			
		55	0.45	24
3	0.417			
4	0.430			
		110	0.30	33
5	0.169			
		192	0.36	68
6	0.541			
		124	0.40	50
7	0.268			
		136	0.30	41
8	0.338			
		121	0.34	41
9	0.337			
		132	0.25	33
10	0.159			
		172	0.20	34
11	0.242			
		102	0.32	33
12	0.403			

Storm :	10 Year to 5 Year			
Section ID	Area**	Length	Average Area	Volume
	m²	m	m²	m³
1	1.093			
		75	1.08	81
2	1.062			
		55	1.05	58
3	1.031			
4	0.723			
		110	0.58	64
5	0.429			
		192	0.47	89
6	0.503			
		124	0.45	55
7	0.387			
		136	0.65	89
8	0.921			
		121	0.72	87
9	0.517			
		132	0.45	60
10	0.391			
		172	0.45	76
11	0.499			
		102	0.48	49
12	0.455			

Storm :	5 Year to 2 Year			
Section ID	Area**	Length	Average Area	Volume
	m²	m	m²	m³
1	0.401			
		75	0.45	33
2	0.491			
		55	0.45	25
3	0.409			
4	0.373			
		110	0.31	34
5	0.238			
		192	0.34	65
6	0.443			
		124	0.30	37
7	0.160			
		136	0.21	28
8	0.252			
		121	0.27	33
9	0.292			
		132	0.19	25
10	0.088			
		172	0.14	24
11	0.186			
		102	0.15	16
12	0.123			

Storm :	2 Year			
Section ID	Area**	Length	Average Area	Volume
	m²	m	m²	m³
1	9.823			
		75	5.88	441
2	1.933			
		55	1.43	78
3	0.921			
4	0.636			
		110	0.34	37
5	0.042			
		192	0.54	103
6	1.030			
		124	0.62	76
7	0.200			
		136	0.64	87
8	1.084			
		121	0.92	111
9	0.762			
		132	0.40	53
10	0.041			
		172	0.14	24
11	0.239			
		102	0.26	26
12	0.273			

Volume (Section 1 to Section 3)	**568**	**55**	**63**	**58**	**138**	**58**	**519**
Volume (Section 4 to Section 12)	**3,087**	**209**	**185**	**333**	**569**	**262**	**519**
Total Volume	**3,655**	**264**	**248**	**391**	**707**	**320**	**1,038**

Note:

* Please See Drawing # EFP-1 For the location of the Cross-Section ID.

** Fill Area Between Each Storm Events Water Elevation.

Calculated from Cross Sections

Table 4: Future Condition Cut Volume Calculation

Storm:	Regional to 100 Year			
Section ID*	Area**	Length	Average Area	Volume
	m^2	m	m^2	m^3
1	7.102			
		75	4.93	370
2	2.754			
		75	6.47	485
3	10.191			
4	1.779			
		40	2.49	100
5	3.207			
		30	4.05	120
6	4.887			
		37	4.74	175
7	4.590			
		73	3.88	284
8	3.174			
		61	3.19	195
9	3.198			
		65	3.15	204
10	3.093			
		54	2.44	132
11	1.783			
		40	22.33	893
12	42.872			
		100	23.29	2329
13	3.707			
		100	4.05	405
14	4.395			
		90	4.01	360
15	3.615			
		73	3.24	236
16	2.869			
		72	3.11	225
17	3.358			
		75	3.60	270
18	3.834			
		60	3.88	233
19	3.917			
		70	3.73	261
20	3.546			
		50	3.11	156
21	2.674			
		70	3.41	239
22	4.144			
		60	3.96	237
23	3.770			
		25	3.97	99
24	4.169			
		25	3.85	96
25	3.523			

Storm :	100 Year to 50 Year			
Section ID	Area**	Length	Average Area	Volume
	m^2	m	m^2	m^3
1	0.464			
		75	0.39	29
2	0.318			
		75	0.78	58
3	1.240			
4	0.038			
		40	0.16	7
5	0.287			
		30	0.29	8
6	0.285			
		37	0.41	15
7	0.538			
		73	0.48	35
8	0.422			
		61	0.38	23
9	0.340			
		65	0.33	21
10	0.321			
		54	0.32	17
11	0.314			
		40	1.42	57
12	2.523			
		100	1.48	148
13	0.432			
		100	0.43	43
14	0.437			
		90	0.41	37
15	0.387			
		73	0.38	28
16	0.371			
		72	0.37	27
17	0.371			
		75	0.37	28
18	0.363			
		60	0.37	22
19	0.373			
		70	0.28	20
20	0.191			
		50	0.19	9
21	0.181			
		70	0.24	16
22	0.289			
		60	0.35	21
23	0.416			
		25	0.44	11
24	0.466			
		25	0.38	10
25	0.298			

Storm :	50 Year to 25 Year			
Section ID	Area**	Length	Average Area	Volume
	m^2	m	m^2	m^3
1	0.918			
		75	0.64	48
2	0.366			
		75	0.76	57
3	1.155			
4	0.037			
		40	0.42	17
5	0.793			
		30	0.68	20
6	0.560			
		37	0.54	20
7	0.513			
		73	0.40	29
8	0.280			
		61	0.31	19
9	0.338			
		65	0.32	21
10	0.310			
		54	0.22	12
11	0.139			
		40	1.93	77
12	3.716			
		100	1.96	196
13	0.195			
		100	0.37	37
14	0.544			
		90	0.47	42
15	0.388			
		73	0.29	21
16	0.187			
		72	0.23	17
17	0.278			
		75	0.32	24
18	0.361			
		60	0.37	22
19	0.381			
		70	0.45	31
20	0.516			
		50	0.35	17
21	0.180			
		70	0.23	16
22	0.283			
		60	0.35	21
23	0.413			
		25	0.44	11
24	0.461			
		25	0.38	9
25	0.298			

Storm :	25 Year to 10 Year			
Section ID	Area**	Length	Average Area	Volume
	m^2	m	m^2	m^3
1	1.364			
		75	0.93	70
2	0.493			
		75	1.04	78
3	1.589			
4	0.074			
		40	0.48	19
5	0.885			
		30	0.72	21
6	0.546			
		37	0.68	25
7	0.810			
		73	0.71	52
8	0.602			
		61	0.47	29
9	0.336			
		65	0.33	21
10	0.319			
		54	0.32	17
11	0.312			
		40	2.58	103
12	4.842			
		100	2.68	268
13	0.523			
		100	0.63	63
14	0.735			
		90	0.65	58
15	0.564			
		73	0.39	28
16	0.211			
		72	0.32	23
17	0.420			
		75	0.49	36
18	0.553			
		60	0.58	35
19	0.614			
		70	0.61	43
20	0.603			
		50	0.58	29
21	0.548			
		70	0.63	44
22	0.706			
		60	2.73	164
23	4.763			
		25	4.97	124
24	5.182			
		25	2.98	74
25	0.769			

Storm :	10 Year to 5 Year			
Section ID	Area**	Length	Average Area	Volume
	m^2	m	m^2	m^3
1	2.801			
		75	1.95	146
2	1.100			
		75	1.68	126
3	2.257			
4	0.214			
		40	0.64	25
5	1.057			
		30	1.41	42
6	1.753			
		37	1.71	63
7	1.659			
		73	1.56	115
8	1.466			
		61	1.30	79
9	1.125			
		65	1.25	81
10	1.379			
		54	1.13	61
11	0.888			
		40	8.55	342
12	16.220			
		100	8.53	853
13	0.849			
		100	1.24	124
14	1.634			
		90	1.54	138
15	1.440			
		73	1.42	104
16	1.403			
		72	1.37	99
17	1.329			
		75	1.28	96
18	1.235			
		60	1.60	96
19	1.968			
		70	1.61	112
20	1.246			
		50	1.30	65
21	1.345			
		70	1.40	98
22	1.453			
		60	1.52	91
23	1.587			
		25	1.57	39
24	1.543			
		25	1.24	31
25	0.934			

Storm :	5 Year to 2 Year			
Section ID	Area**	Length	Average Area	Volume
	m^2	m	m^2	m^3
1	0.629			
		75	0.41	31
2	0.194			
		75	0.81	60
3	1.419			
4	0.079			
		40	0.12	5
5	0.158			
		30	0.25	7
6	0.341			
		37	0.33	12
7	0.320			
		73	0.48	35
8	0.638			
		61	0.45	27
9	0.259			
		65	0.36	23
10	0.460			
		54	0.29	16
11	0.126			
		40	4.41	176
12	8.685			
		100	4.43	443
13	0.172			
		100	0.73	73
14	1.291			
		90	0.94	85
15	0.589			
		73	0.55	40
16	0.518			
		72	0.44	32
17	0.367			
		75	0.31	23
18	0.246			
		60	0.43	26
19	0.608			
		70	0.53	37
20	0.460			
		50	0.33	16
21	0.193			
		70	0.27	19
22	0.341			
		60	0.39	23
23	0.432			
		25	0.59	15
24	0.757			
		25	0.49	12
25	0.227			

Storm :	2 Year			
Section ID	Area**	Length	Average Area	Volume
	m^2	m	m^2	m^3
1	1.030			
		75	0.72	54
2	0.402			
		75	1.38	104
3	2.366			
4	0.096			
		40	0.24	10
5	0.383			
		30	0.43	13
6	0.485			
		37	0.48	18
7	0.480			
		73	0.50	36
8	0.514			
		61	0.47	29
9	0.423			
		65	0.48	31
10	0.531			
		54	0.39	21
11	0.256			
		40	3.87	155
12	7.492			
		100	3.94	394
13	0.388			
		100	0.94	94
14	1.496			
		90	1.01	91
15	0.532			
		73	0.52	38
16	0.500			
		72	0.50	36
17	0.493			
		75	0.49	37
18	0.484			
		60	0.52	31
19	0.554			
		70	0.52	36
20	0.486			
		50	0.45	22
21	0.410			
		70	0.44	31
22	0.475			
		60	0.49	29
23	0.501			
		25	0.54	13
24	0.572			
		25	0.51	13
25	0.452			

Vol. (NORTH Section 1 to Section 3)	**855**	**88**	**105**	**148**	**272**	**91**	**158**
Volume (Section 1 to Section 23)	**7,249**	**604**	**679**	**1,277**	**2,755**	**1,146**	**1,178**
Total Volume	**8,104**	**691**	**785**	**1,425**	**3,028**	**1,238**	**1,336**

Note:

* Please See Drawing # FFP-1 For the location of the Cross-Section ID.

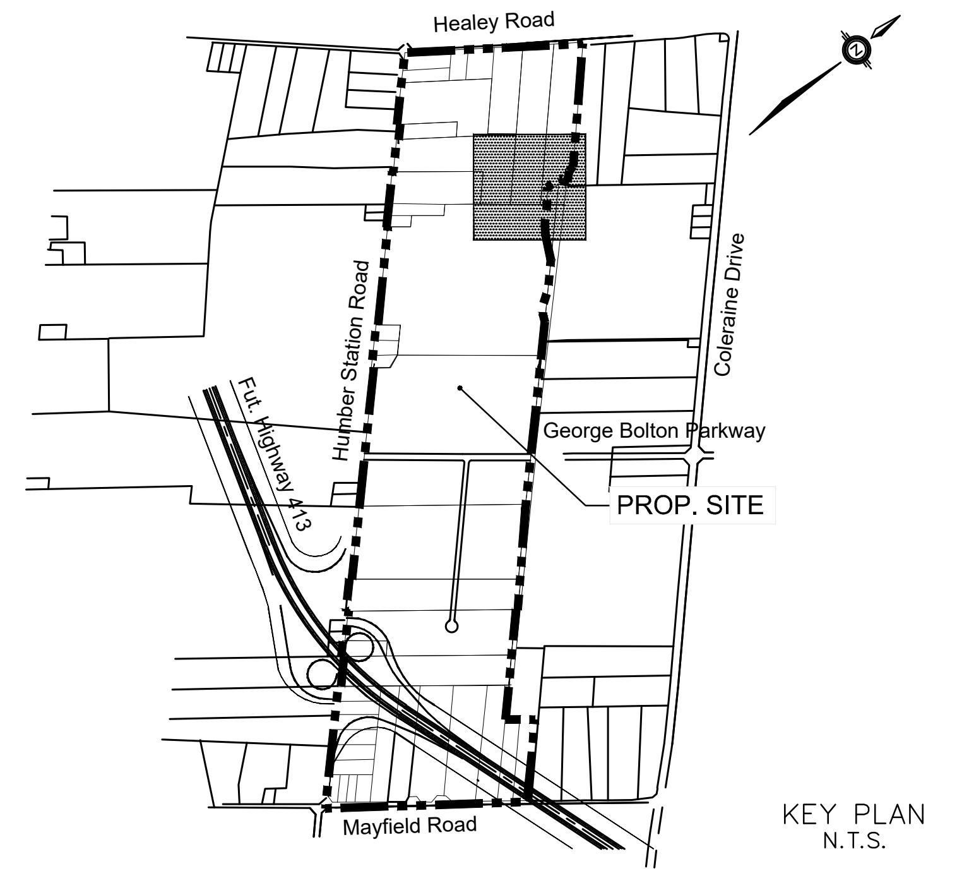
** Fill Area Between Each Storm Events Water Elevation.

Table 5: Summary of Storage Volume Calculation

Incremental Volume Calculation				Total Volume Calculation			
Return Period	**Required Storage (m^3)**	**Provided Storage (m^3)**	**Surplus (m^3)**	**Return Period**	**Required Storage (m^3)**	**Provided Storage (m^3)**	**Surplus (m^3)**
Less than 2 Year	1,038	1,336	298	2 Year	1,038	1,336	298
2 Year - 5 Year	320	1,238	918	5 Year	1,358	2,574	1,216
5 Year - 10 Year	707	3,028	2,320	10 Year	2,065	5,601	3,536
10 Year - 25 Year	391	1,425	1,034	25 Year	2,457	7,026	4,570
25 Year - 50 Year	248	785	536	50 Year	2,705	7,811	5,106
50 Year - 100 Year	264	691	427	100 Year	2,969	8,502	5,534
100 Year - Regional	3,655	8,104	4,449	Regional	6,624	16,606	9,983

APPENDIX D

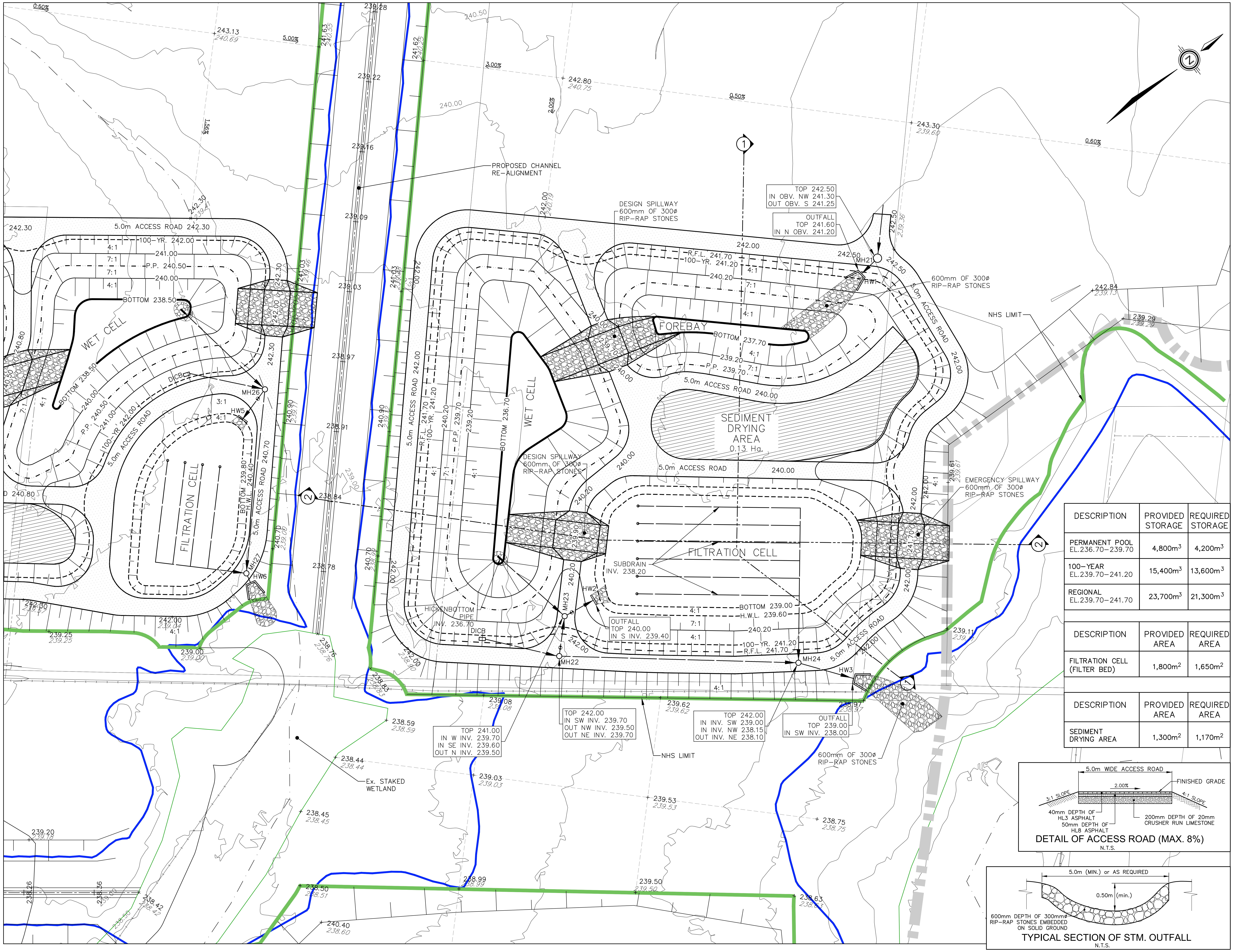
SUPPORTING DOCUMENTS



KEY PLAN
N.T.S.

LEGEND

— · — ·	DENOTES REGIONAL WATER LEVEL
– – – –	DENOTES 100–YEAR WATER LEVEL
— ·· — ··	DENOTES PERMANENT POOL LEVEL
━━	DENOTES SWM POND BOTTOM
——	DENOTES SWM POND CONTOUR
▭	DENOTES ACCESS ROAD
▦	DENOTES RIP–RAP STONE ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R OR APPROVED EQUAL.
▨	DENOTES SEDIMENT DRYING AREA
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM
▬ ▪ ▪ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
211.0	DENOTES EXISTING CONTOUR ELEVATION
208.00	DENOTES PROPOSED ELEVATION
🟦	DENOTES REGULATORY FLOODLINE



DESCRIPTION	PROVIDED STORAGE	REQUIRED STORAGE
PERMANENT POOL EL.236.70–239.70	4,800m^3	4,200m^3
100–YEAR EL.239.70–241.20	15,400m^3	13,600m^3
REGIONAL EL.239.70–241.70	23,700m^3	21,300m^3

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
FILTRATION CELL (FILTER BED)	1,800m^2	1,650m^2

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
SEDIMENT DRYING AREA	1,300m^2	1,170m^2

DETAIL OF ACCESS ROAD (MAX. 8%)
N.T.S.

TYPICAL SECTION OF STM. OUTFALL
N.T.S.

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

REGISTERED PROFESSIONAL ENGINEER
H.SARKISSIAN
NOV. 1, 2024
PROVINCE OF ONTARIO

HUMBER STATION VILLAGES

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

SWM POND 1

SCALE: 1:500
DESIGNED BY: M.Z. | DRAWN BY: M.Z.
CHECKED BY: P.S. | DATE: AUGUST 2024
PROJECT No. 2021-5139
DRAWING No. SWM-1-1

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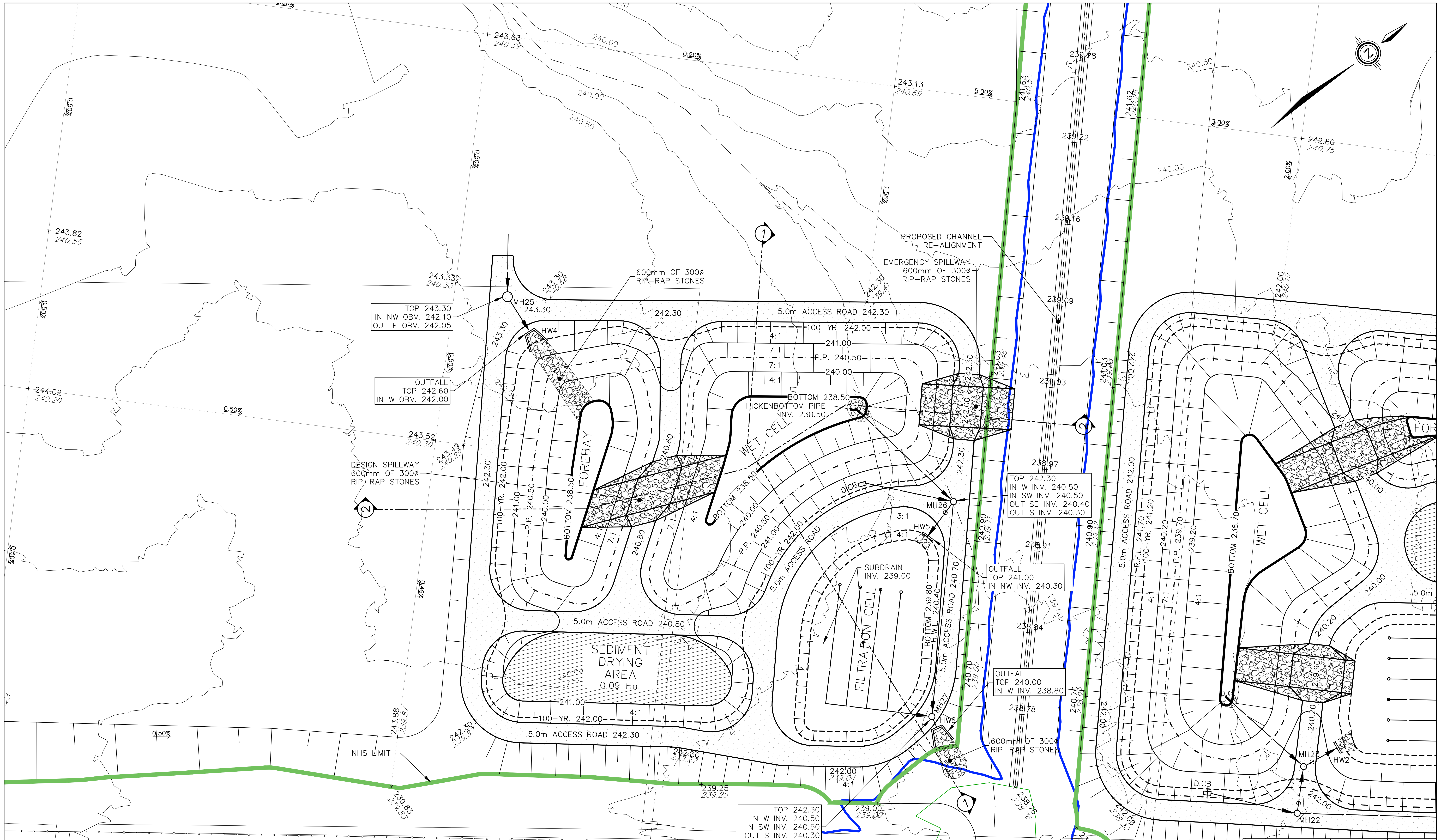
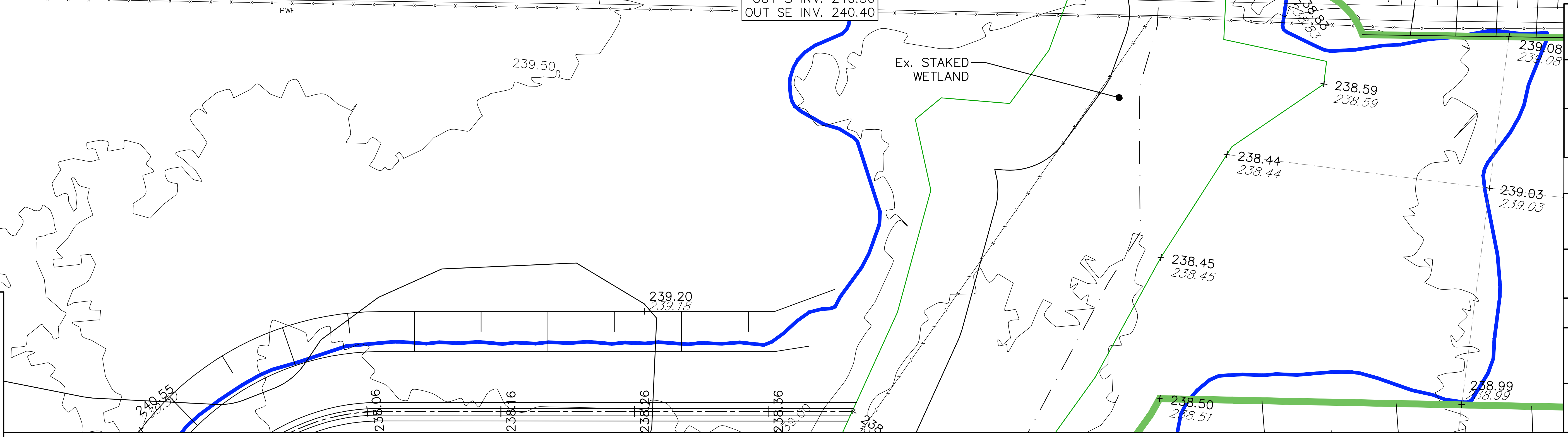
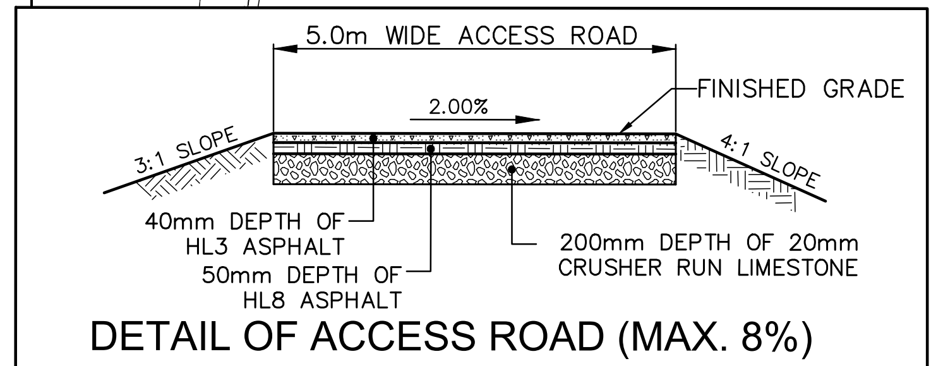
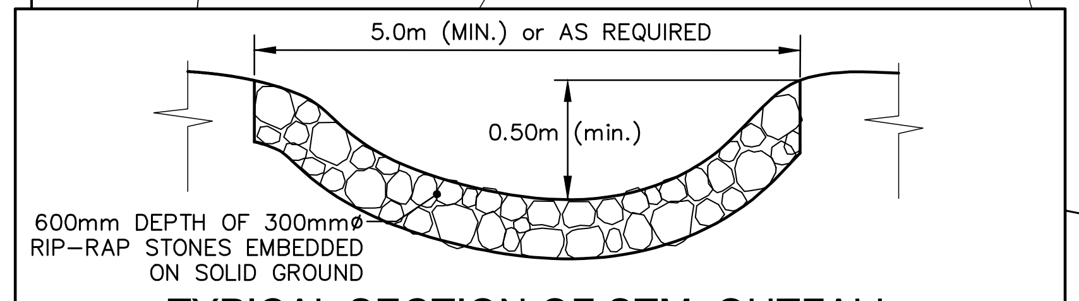






DETAIL OF ACCESS ROAD (MAX. 8%)

N.T.S.



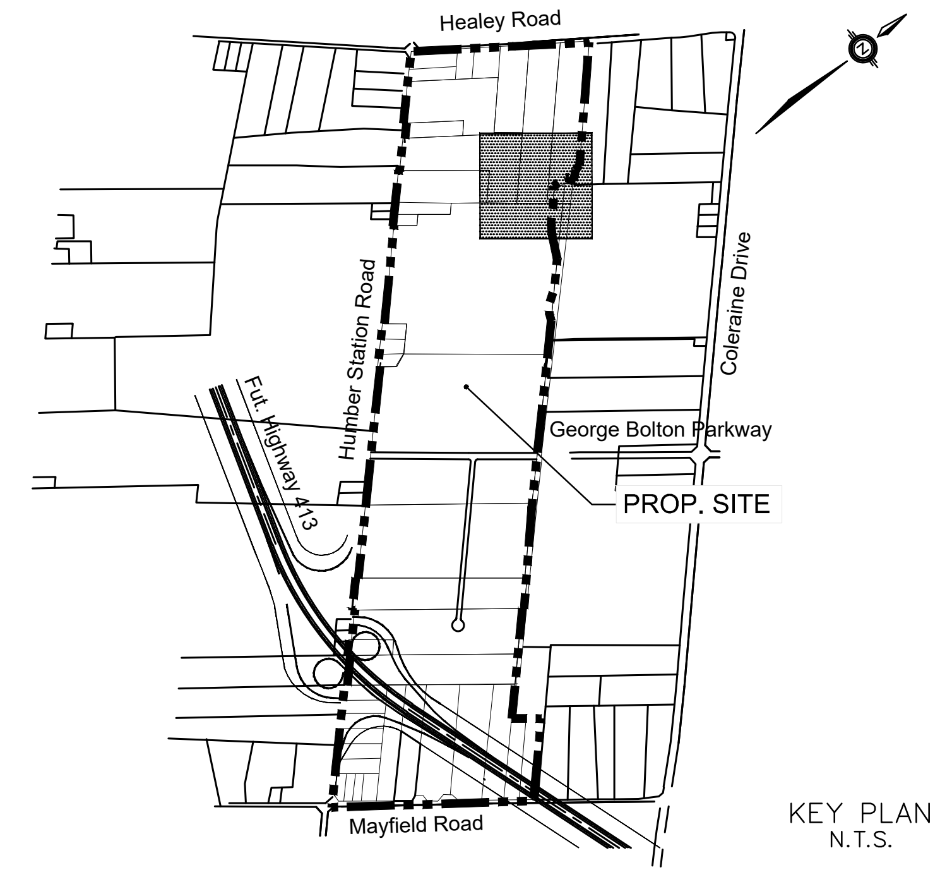
TYPICAL SECTION OF STM. OUTFALL

N.T.S.

DESCRIPTION	PROVIDED STORAGE	REQUIRED STORAGE
PERMANENT POOL EL.238.50-240.50	2,950m^3	2,600m^3
100-YEAR EL.240.50-242.00	8,900m^3	8,070m^3

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
FILTRATION CELL (FILTER BED)	1,080m^2	1,000m^2

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
SEDIMENT DRYING AREA	900m^2	735m^2



KEY PLAN

N.T.S.

LEGEND

— — —	DENOTES REGIONAL WATER LEVEL
- - - -	DENOTES 100-YEAR WATER LEVEL
-- -- --	DENOTES PERMANENT POOL LEVEL
▬	DENOTES SWM POND BOTTOM
—	DENOTES SWM POND CONTOUR
▭	DENOTES ACCESS ROAD
▩	DENOTES RIP-RAP STONE ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R OR APPROVED EQUAL.
▨	DENOTES SEDIMENT DRYING AREA
🟩	DENOTES LIMIT OF NATURAL HERITAGE SYSTEM
▬ ▬	DENOTES LIMIT OF DEVELOPMENT BOUNDARY
211.0	DENOTES EXISTING CONTOUR ELEVATION
208.00	DENOTES PROPOSED ELEVATION
🟦	DENOTES REGULATORY FLOODLINE

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN

NOV. 1, 2024

HUMBER STATION VILLAGES

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

SWM POND 2

SCALE: 1:500		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. SWM-2-1
CHECKED BY: P.S.	DATE: AUGUST 2024	

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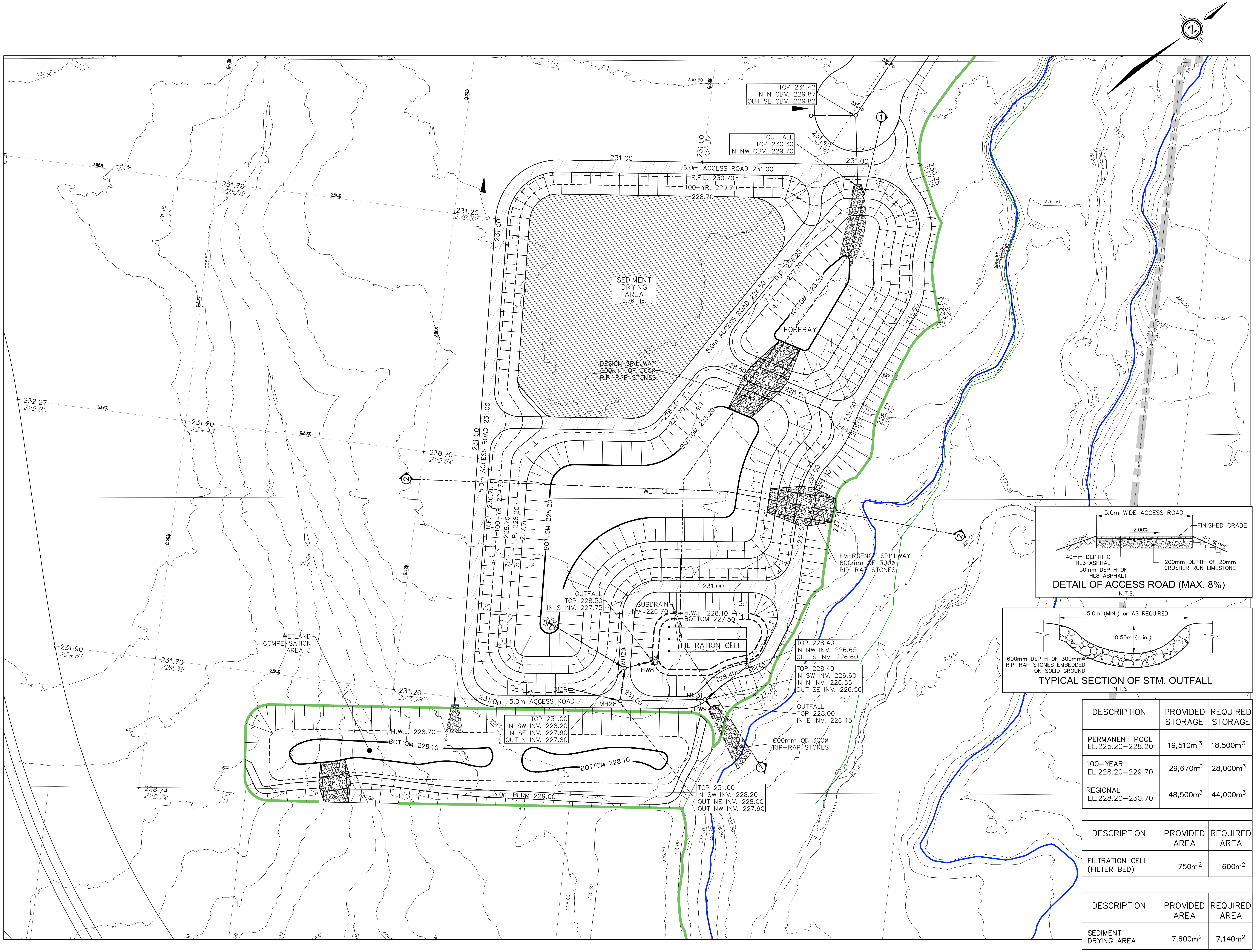


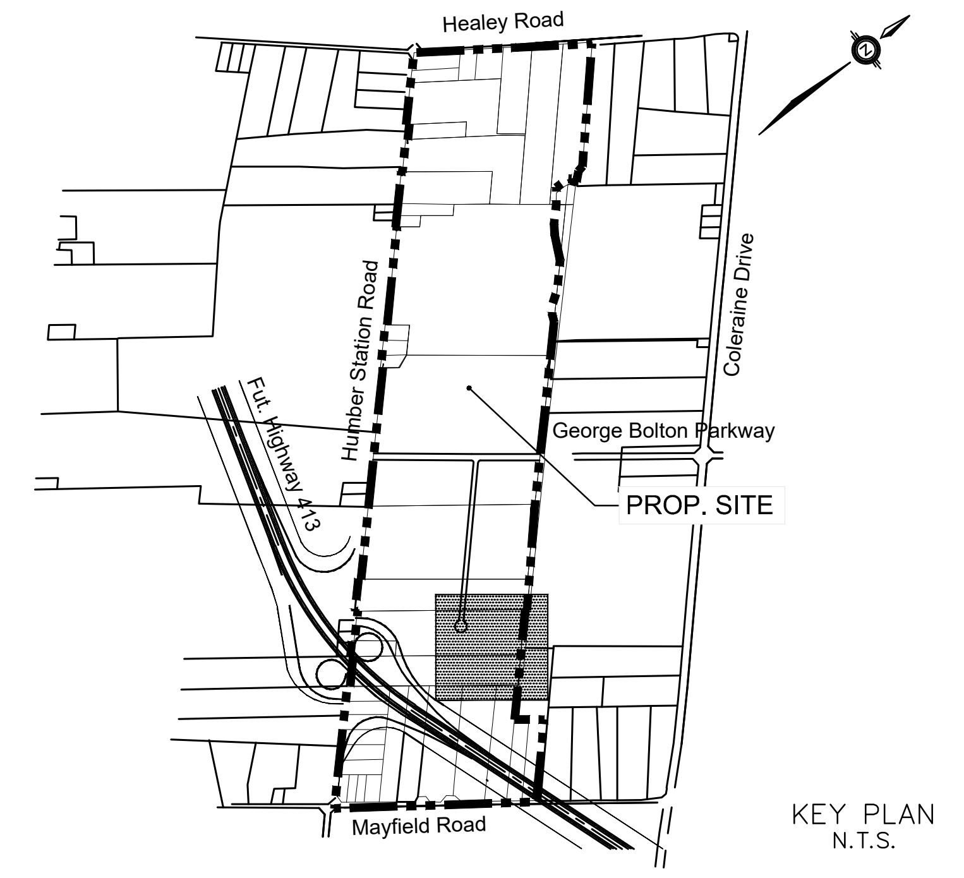
DETAIL OF ACCESS ROAD (MAX. 8%)
N.T.S.

TYPICAL SECTION OF STM. OUTFALL
N.T.S.

DESCRIPTION	PROVIDED STORAGE	REQUIRED STORAGE
PERMANENT POOL EL.225.20–228.20	19,510m^3	18,500m^3
100–YEAR EL.228.20–229.70	29,670m^3	28,000m^3
REGIONAL EL.228.20–230.70	48,500m^3	44,000m^3

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
FILTRATION CELL (FILTER BED)	750m^2	600m^2

DESCRIPTION	PROVIDED AREA	REQUIRED AREA
SEDIMENT DRYING AREA	7,600m^2	7,140m^2



KEY PLAN
N.T.S.

LEGEND

- DENOTES REGIONAL WATER LEVEL
- DENOTES 100–YEAR WATER LEVEL
- DENOTES PERMANENT POOL LEVEL
- DENOTES SWM POND BOTTOM
- DENOTES SWM POND CONTOUR
- DENOTES ACCESS ROAD
- DENOTES RIP–RAP STONE ON TOP OF TERRAFIX FILTER CLOTH TYPE 270R OR APPROVED EQUAL.
- DENOTES SEDIMENT DRYING AREA
- DENOTES LIMIT OF NATURAL HERITAGE SYSTEM
- DENOTES LIMIT OF DEVELOPMENT BOUNDARY
- 211.0 DENOTES EXISTING CONTOUR ELEVATION
- 208.00 DENOTES PROPOSED ELEVATION
- DENOTES REGULATORY FLOODLINE

NO.	DATE	ISSUED FOR
1	11/01/24	COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY AND MANAGEMENT PLAN

H.SARKISSIAN
NOV. 1, 2024

HUMBER STATION VILLAGES

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Fax: (905) 738-6875
E-mail:
design@schaeffers.com

Region of Peel
Working for you

TOWN OF CALEDON

SWM POND 3

SCALE: 1:500		PROJECT No. 2021-5139
DESIGNED BY: M.Z.	DRAWN BY: M.Z.	DRAWING No. SWM-3-1
CHECKED BY: P.S.	DATE: AUGUST 2024	

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SKETCH SHOWING TOPOGRAPHIC INFORMATION

SCALE 1: 2000

40m 20m 0m 40m 80m 120m 160 metres

R–PE SURVEYING LTD., O.L.S.

CAUTION

THIS IS NOT A PLAN OF SURVEY AND SHALL NOT TO BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

NOTES

BOUNDARIES ARE NOT CERTIFIED BY THIS PLAN, AND ARE SUBJECT TO CLARIFICATION UPON THE INCORPORATION OF ADDITIONAL DOCUMENTARY AND FIELD SURVEY EVIDENCE.BOUNDARIES HAVE BEEN TAKEN FROM R–PE CAD FILE NO.s 07032R01a, 07033R02, 07035R03A, 07035R02 AND, 15107R01a,

LEGEND

ø	DENOTES DIAMETER
—x—x—x—	DENOTES FENCE
—w—w—w—	DENOTES OVERHEAD WIRE
⊥	DENOTES HYDRO–GUY
SIGN	DENOTES SIGN
UP ○	DENOTES UTILITY POLE

FIELD OBSERVATIONS:

THE FIELD OBSERVATIONS REPRESENTED ON THIS PLAN WERE COMPLETED ON THE 17th DAY OF DECEMBER , 2021

R–PE SURVEYING LTD.
ONTARIO LAND SURVEYORS
643 Chrislea Road, Suite 7
Woodbridge, Ontario L4L 8A3
Tel.(416)635–5000 Fax (416)635–5001
Tel.(905)264–0881 Fax (905)264–2099
Website: www.r–pe.ca
DRAWN: K.M.
JOB No. 07–031 CAD FILE No.07031tp01

SKETCH ILLUSTRATING
TOPOGRAPHIC INFORMATION
12519–12713 HUMBER STATION ROAD
FOR THE PURPOSE OF SITE ASSESSMENT
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SCALE 1: 1250

David B. Searles Surveying Ltd.
ONTARIO LAND SURVEYORS

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

LEGEND

ANC	DENOTES	ANCHOR	MBOX	DENOTES	MAILBOX
BB	DENOTES	BELL BOX	MW	DENOTES	MONITORING WELL
BOB	DENOTES	BOTTOM OF BANK	PWF	DENOTES	POST AND WIRE FENCE
BC	DENOTES	BACK OF CURB	RF	DENOTES	RAIL FENCE
BF	DENOTES	BOARD FENCE	RM	DENOTES	ROAD MARKING
BOLL	DENOTES	BOLLARD	SAP	DENOTES	SAPLING
CB	DENOTES	CATCH BASIN	SP	DENOTES	SIGN POST
CCP	DENOTES	CULVERT (CONCRETE PIPE)	TOB	DENOTES	TOP OF BANK
CLF	DENOTES	CHAIN LINK FENCE	WIF	DENOTES	WROUGHT IRON FENCE
CLCK	DENOTES	CENTRE LINE OF CREEK	WV	DENOTES	WATER VALVE
CPAD	DENOTES	CONCRETE PAD	ø	DENOTES	DIAMETER
CSP	DENOTES	CULVERT (STEEL PIPE)	229.95	DENOTES	FIELDWORK COMPLETED ON DECEMBER 08, 2023.
CSW	DENOTES	CONCRETE SIDE WALK	—BOS—BOS—	DENOTES	BOTTOM OF SLOPE
DS	DENOTES	DOOR SILL	—DL—DL—DL—	DENOTES	DITCH LINE
DI	DENOTES	DITCH INLET	—OHW—OHW—	DENOTES	OVERHEAD WIRES
EG	DENOTES	EDGE OF GRAVEL	—SW—SW—	DENOTES	SWALE
EP	DENOTES	EDGE OF PAVEMENT	—TOS—TOS—	DENOTES	TOP OF SLOPE
FF	DENOTES	FINISHED FLOOR	✷	DENOTES	CONIFEROUS TREE
FH	DENOTES	FIRE HYDRANT	○	DENOTES	DECIDUOUS TREE
INV	DENOTES	INVERT	⌒⌒⌒	DENOTES	TREE LINE
LP	DENOTES	LIGHT POLE			

BENCHMARK NOTE

ELEVATIONS ARE REFERRED TO THE REGION OF PEEL BENCHMARK No. 40 LOCATED ON THE SOUTH FACE AT THE WEST CORNER OF SOUTH END OF A CONCRETE BOX CULVERT ACROSS MAYFIELD ROAD APPROXIMATELY 0.56 km EAST OF CLARKWAY DRIVE, HAVING AN ELEVATION OF 222.165 m.

VERTICAL DATUM: CANADIAN GEODETIC DATUM, 1928
(1978 SOUTHERN ONTARIO READJUSTMENT)

CAUTION

BOUNDARY INFORMATION ILLUSTRATED HEREON HAS BEEN COMPILED FROM REGISTRY OFFICE INFORMATION AND PLAN OF SURVEY BY DAVID B. SEARLES SURVEYING LTD, (FILE 19–0–22) AND HAS NOT BEEN VERIFIED BY FIELD MEASUREMENT.

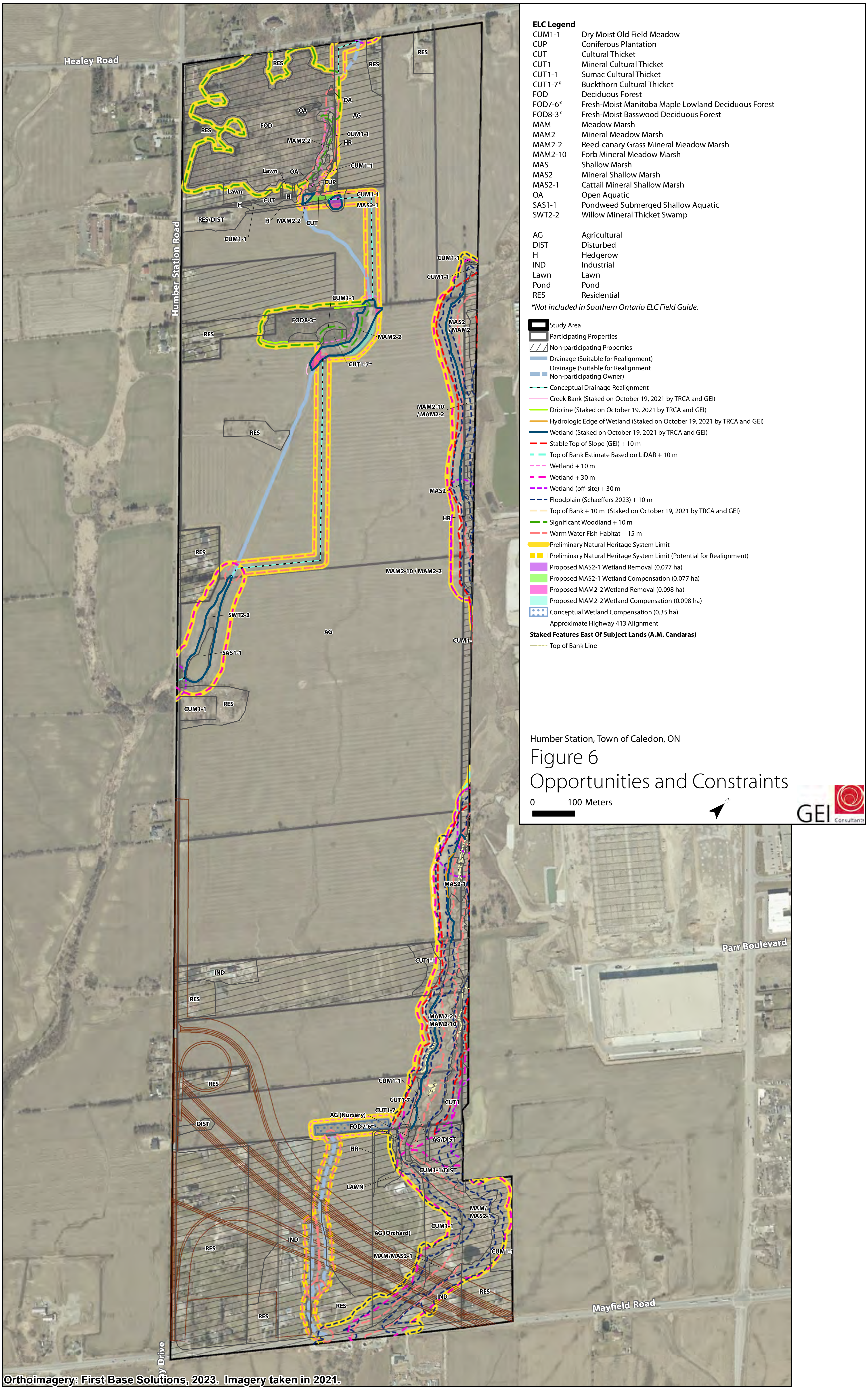
THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

FIELDWORK COMPLETED ON 27 APRIL, 2022.
FIELDWORK UPDATED ON 08 DECEMBER, 2023.

David B. Searles Surveying Ltd.
ONTARIO LAND SURVEYORS
4255 Sherwoodtowne Blvd., Suite 206, Mississauga, Ontario L4Z 1Y5
Tel: (905) 273–6840 Fax: (905) 896–4410
Email: info@dbsearles.ca

Calculator BJ	Draftsperson IV/RM
Editor BJ	Plan Index No. V20

Calculation File 19–22CALC.DWG	Drawing File 19–1–22.DWG	File No. 19–1–22



ELC Legend

CUM1-1	Dry Moist Old Field Meadow
CUP	Coniferous Plantation
CUT	Cultural Thicket
CUT1	Mineral Cultural Thicket
CUT1-1	Sumac Cultural Thicket
CUT1-7*	Buckthorn Cultural Thicket
FOD	Deciduous Forest
FOD7-6*	Fresh-Moist Manitoba Maple Lowland Deciduous Forest
FOD8-3*	Fresh-Moist Basswood Deciduous Forest
MAM	Meadow Marsh
MAM2	Mineral Meadow Marsh
MAM2-2	Reed-canary Grass Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAS	Shallow Marsh
MAS2	Mineral Shallow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
OA	Open Aquatic
SAS1-1	Pondweed Submerged Shallow Aquatic
SWT2-2	Willow Mineral Thicket Swamp
AG	Agricultural
DIST	Disturbed
H	Hedgerow
IND	Industrial
Lawn	Lawn
Pond	Pond
RES	Residential

**Not included in Southern Ontario ELC Field Guide.*

- Study Area
- Participating Properties
- Non-participating Properties
- Drainage (Suitable for Realignment)
- Drainage (Suitable for Realignment Non-participating Owner)
- Conceptual Drainage Realignment
- Creek Bank (Staked on October 19, 2021 by TRCA and GEI)
- Dripline (Staked on October 19, 2021 by TRCA and GEI)
- Hydrologic Edge of Wetland (Staked on October 19, 2021 by TRCA and GEI)
- Wetland (Staked on October 19, 2021 by TRCA and GEI)
- Stable Top of Slope (GEI) + 10 m
- Top of Bank Estimate Based on LiDAR + 10 m
- Wetland + 10 m
- Wetland + 30 m
- Wetland (off-site) + 30 m
- Floodplain (Schaeffers 2023) + 10 m
- Top of Bank + 10 m (Staked on October 19, 2021 by TRCA and GEI)
- Significant Woodland + 10 m
- Warm Water Fish Habitat + 15 m
- Preliminary Natural Heritage System Limit
- Preliminary Natural Heritage System Limit (Potential for Realignment)
- Proposed MAS2-1 Wetland Removal (0.077 ha)
- Proposed MAS2-1 Wetland Compensation (0.077 ha)
- Proposed MAM2-2 Wetland Removal (0.098 ha)
- Proposed MAM2-2 Wetland Compensation (0.098 ha)
- Conceptual Wetland Compensation (0.35 ha)
- Approximate Highway 413 Alignment

Staked Features East Of Subject Lands (A.M. Candaras)

- Top of Bank Line

Humber Station, Town of Caledon, ON

Figure 6
Opportunities and Constraints

Orthoimagery: First Base Solutions, 2023. Imagery taken in 2021.

Path: \\bos-pzcc-1\data_storage\Working\HUMBER STATION VILLAGE LANDOWNERS GROUP INC\1901485 Humber Station Village Caledon CEISMP\05_GIS\figures\report_figures\2023-09 CEISMP\1901485_rpt_fig06_Opportunities and Constraints_revert_oct2023.mxd REVISED: Tuesday, July 9, 2024

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION
& STORMWATER MANAGEMENT POND 4+5

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

TOWN OF CALEDON
REGION OF PEEL

LIST OF DRAWINGS

GENERAL PLAN & GRADING

G1	OVERALL PLAN	
G2	GENERAL PLAN BOLTCOL NORTH LANDS	
G3	GENERAL PLAN BOLTCOL SOUTH LANDS	
GR5	BOLTCOL NORTH LANDS GRADING PLAN	
GR6	BOLTCOL SOUTH LANDS GRADING PLAN	

PLAN & PROFILE DRAWINGS

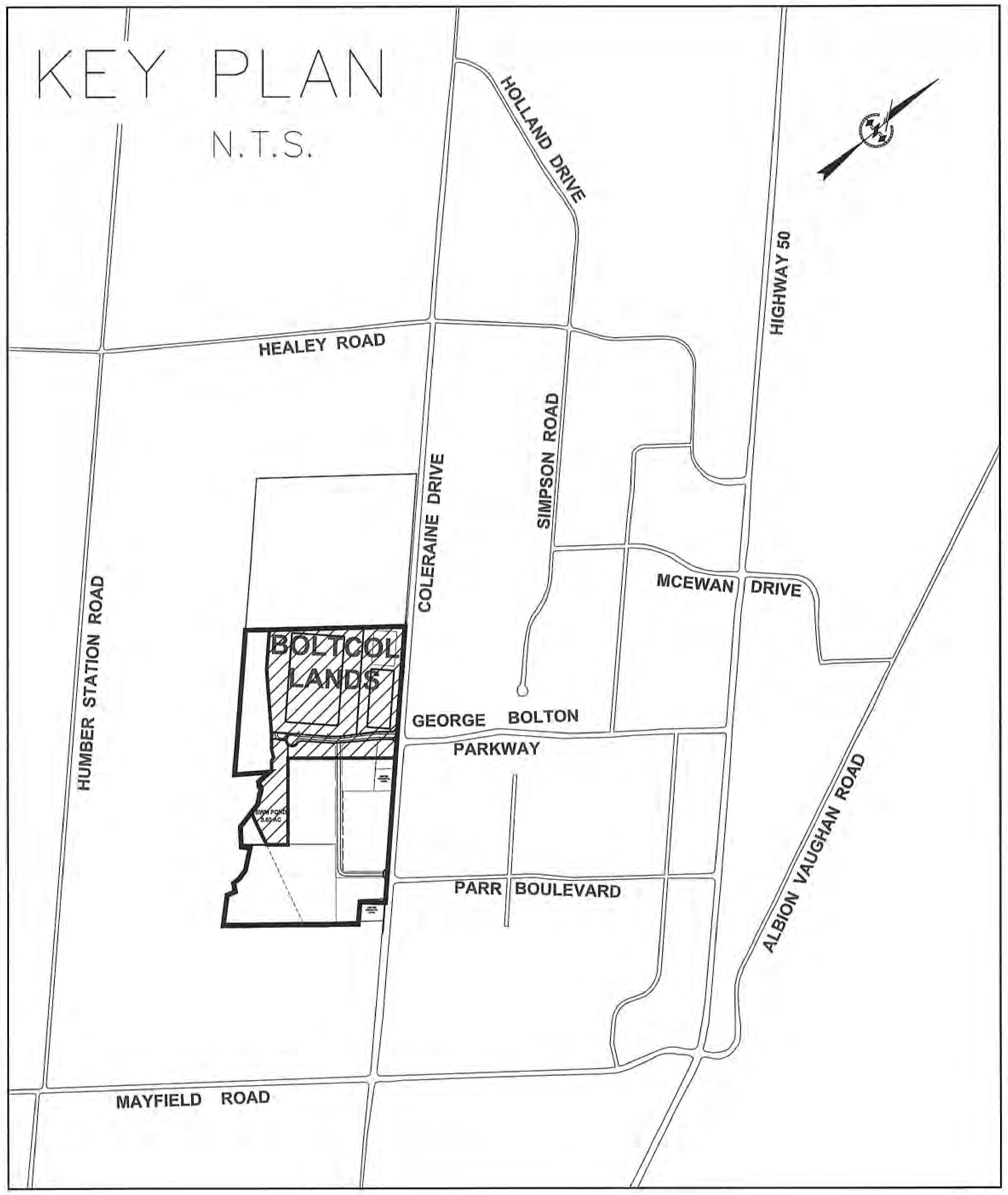
P1	GEORGE BOLTON EXTENSION	0+000.000 TO 0+280.000
P2	GEORGE BOLTON EXTENSION	0+280.000 TO 0+552.000
P3	STORM POND INLET 4+5 (NORTH)	0+000.000 TO 0+066.000
P4	STORM POND INLET 4+5	0+000.000 TO 0+037.000
	STORM POND OUTLET 4+5	0+000.000 TO 0+076.000
P5	STORM POND OUTLET 4+5 SOUTH BYPASS	0+000.000 TO 0+324.000

SUPPLEMENTARY DRAWINGS

W1	WATERMAIN DISTRIBUTION AND COMMISSIONING PLAN
S1	STORM DRAINAGE AREA PLAN
S2	STORM DRAINAGE AREA PLAN GEORGE BOLTON STORM SEWERS
S3	STORMWATER MANAGEMENT POND #(4+5) (Formerly S-7)
S8	DEVELOPMENT PHASING PLAN
S10	GEORGE BOLTON EXT INTERIM AND POST DEVELOPMENT DRAINAGE PLAN
S11	SANITARY DRAINAGE AREA PLAN
S13	BOLTCOL CUT/FILL AND SEDIMENT & EROSION CONTROL PLAN

CONSTRUCTION DETAILS

C1	STORMWATER MANAGEMENT POND (4+5) DETAILS
C2	STORMWATER MANAGEMENT POND (4+5) DETAILS
C3	GENERAL NOTES + CONSTRUCTION DETAILS



TOWN OF CALEDON

MANAGER OF DEVELOPMENT
EAST COMMUNITY SERVICES

REGIONAL MUNICIPALITY OF PEEL
DAN LABRECQUE
COMMISSIONER OF PUBLIC WORKS DEPARTMENT

DEVELOPERS:

TRIOVEST
40 UNIVERSITY AVE STE 1200
TORONTO, ONTARIO
M5J 1T1
(416) 362-0045

PROJECT No. 1667

TOWN OF CALEDON: SPA 18-0004-A

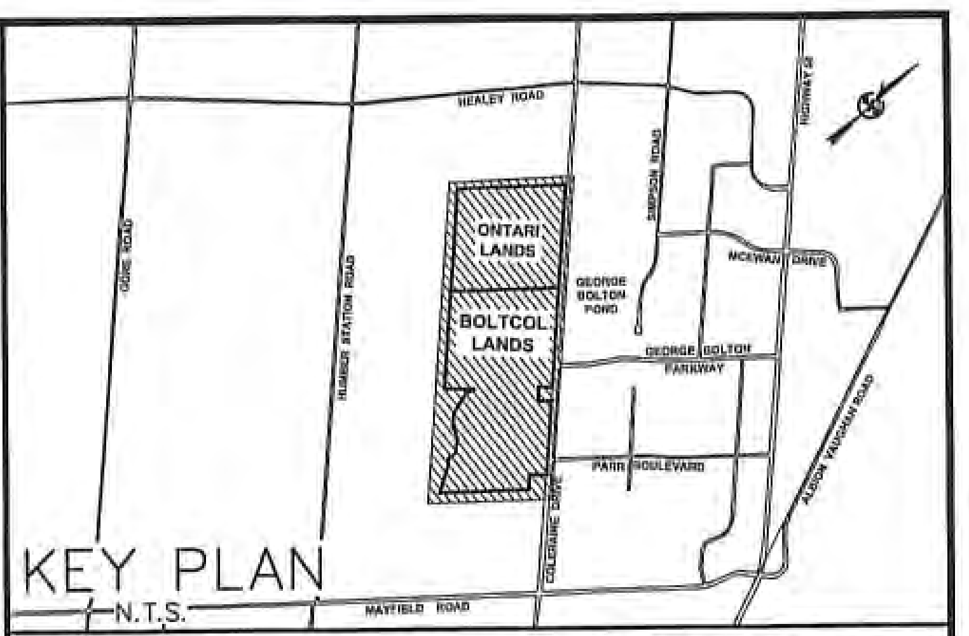
REGION OF PEEL: C02.311

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

4	OCT.16/19	F.P.	ISSUED FOR CONSTRUCTION
3	JUL.29/19	F.P.	SUBMISSION TO REGION OF PEEL
2	APR.2/19	F.P.	SUBMISSION TO REGION OF PEEL
1	NOV.8/18	F.P.	ISSUED TO TOWN OF CALEDON
No.	Date	By	REVISIONS

FILENAME: O:\1667\1667-GB-CVR.dwg
PLOTDATE: Oct 17, 2019 - 3:59pm
PLOTTED BY: fancie

REV: 4



FOR GENERAL NOTES REFER TO DWG C2

LEGEND

-234.00-	EXISTING CONTOURS
■ ▪ ■■ ▪ ■	EXISTING REGIONAL FLOODLINE
– – – –	BUFFER FROM REGIONAL FLOODLINE
12132	← HEC–RAS STATION
236.10	← REGIONAL HIGH WATER LEVEL (WITHOUT SWM CONTROLS)
▨	FILL AREA
▩	CUT AREA
— —	WETLAND BOUNDARY
—·····—	30m WETLAND BUFFER

TOWN OF CALEDON
APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE: Nov 5/19
APPROVED BY: C. Blakely
MANAGER OF DEVELOPMENT
EAST COMMUNITY SERVICES

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES

TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
4	OCT 16/19	F.P.	ISSUED FOR CONSTRUCTION
3	JUL.29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
2	APR.2/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
1	NOV./18	F.P.	ISSUED TO TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905–850–8020 Fax 905–850–8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

OVERALL PLAN

REGION FILE#: C02.311
SPA 18–04A

SCALE: 1:2000	DATE: JAN. 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. G1
DESIGNED: F.P.	SHEET 1 OF 3	

REV: 4

FILENAME: O:\1667\1667–G1.dwg
PLOTDATE: Oct 25, 2019 – 4:16pm
PLOTTED BY: fangie

KEY PLAN

FOR GENERAL NOTES REFER TO DWG C2

LEGEND

×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
▪▪▪▪▪	EXISTING REGIONAL FLOODLINE
- - - - -	10m TRCA FLOODPLAIN SETBACK
□	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
⊡	PROPOSED CATCHBASIN MANHOLE
⋈	VALVE AND BOX
⊖	VALVE AND CHAMBER
⌖	HYDRANT AND VALVE
—SILT—	SILT FENCE
▨	REGIONAL COMPENSATION CUT AREA
▬ ▬ ▬	WETLAND BOUNDARY
▪▫▪▫▪	30m WETLAND BUFFER

RECEIVED
NOV 0 4 2019
PLANNING DEPARTMENT

TOWN OF CALEDON

APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE: Nov 5/19

APPROVED BY: C. Blahily

DIRECTOR OF PUBLIC WORKS & ENGINEERING

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION

PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK

BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES

TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
4	OCT.16/19	F.P.	ISSUED FOR CONSTRUCTION
3	JUL.29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
2	APR.2/19	F.P.	ISSUED TO TOWN OF CALEDON
1	NOV.8/18	F.P.	ISSUED TO TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

BOLTCOL NORTH GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

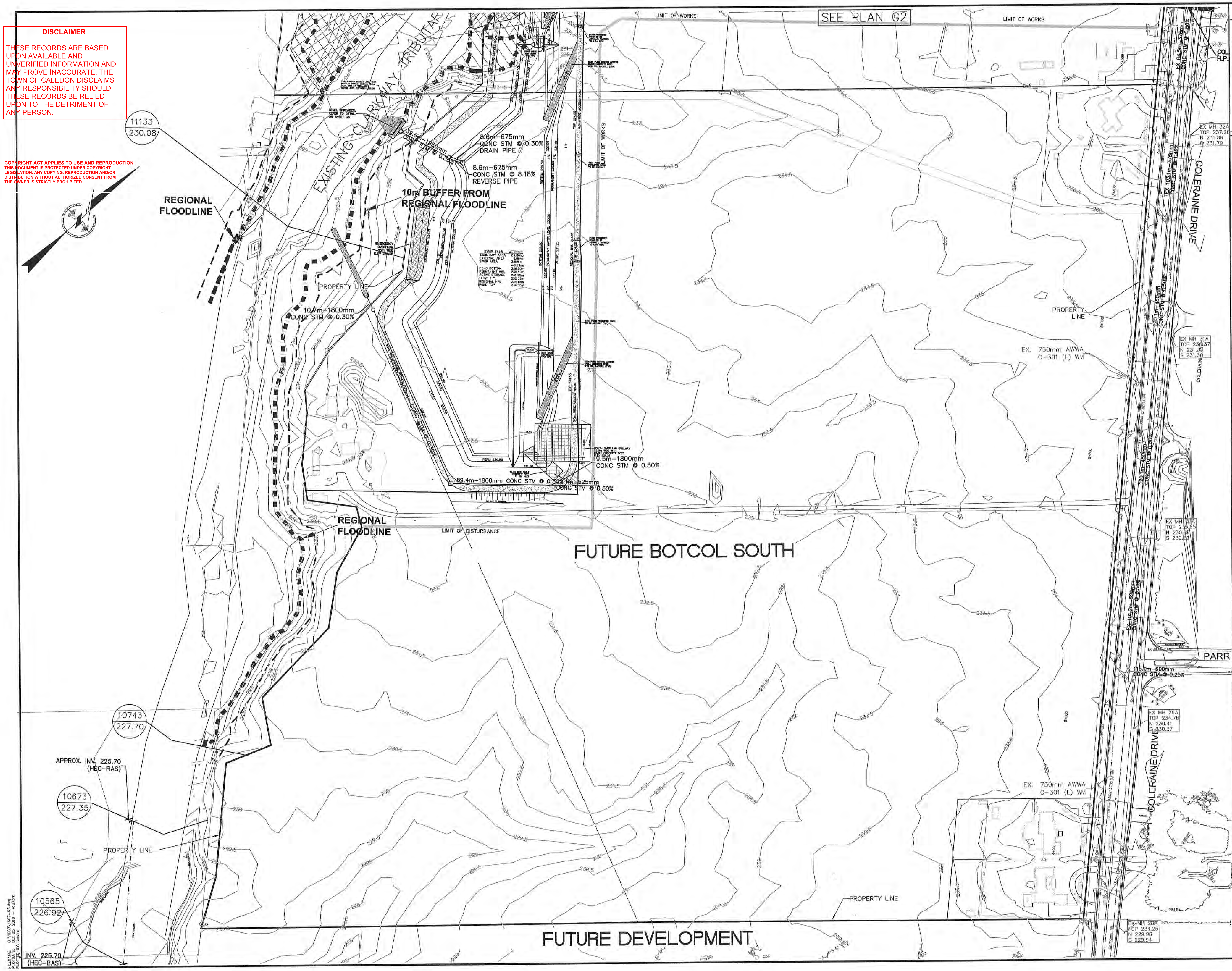
GENERAL PLAN BOLTCOL NORTH LANDS

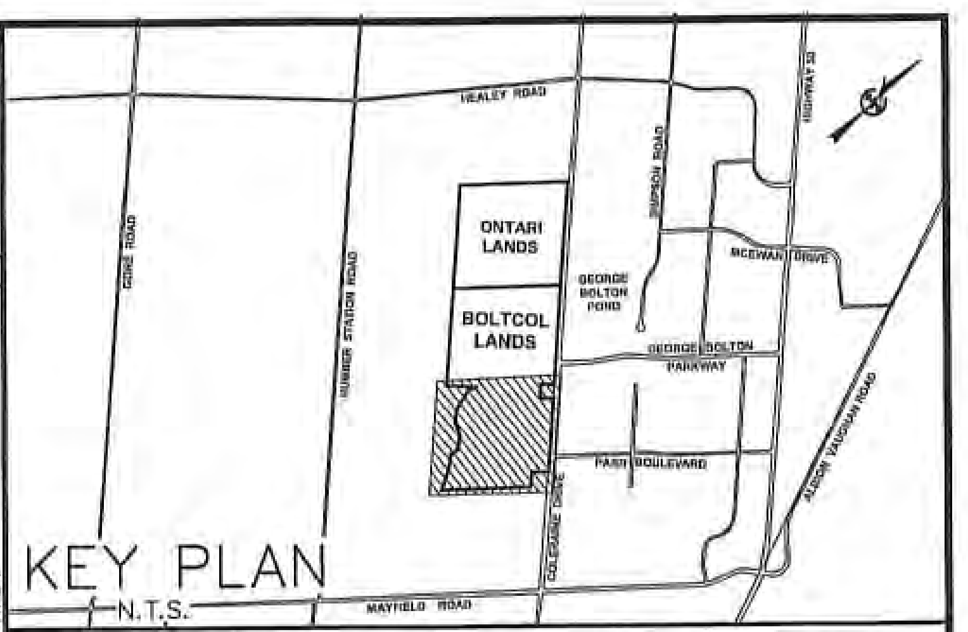
REGION FILE#: C02.311
SPA 18-04A

SCALE: 1:1250	DATE: JAN. 2019	PROJ No. 1409
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. G2
DESIGNED: F.P.	SHEET 2 OF 3	

REV: 4

FILENAME: O:\1667\1667–G2.dwg
PLOTDATE: Oct. 25, 2019 – 3:35pm
PLOTTED BY: fonche





KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C2

LEGEND

×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
■ ▬ ■	EXISTING REGIONAL FLOODLINE
– – – –	10m TRCA FLOODPLAIN SETBACK
□	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
◎	PROPOSED CATCHBASIN MANHOLE
⋈	VALVE AND BOX
⊖	VALVE AND CHAMBER
♁	HYDRANT AND VALVE
—SILT—	SILT FENCE
▧	FILL AREA
▩	CUT AREA
▬ ▬	WETLAND BOUNDARY
▬ ··· ▬	30m WETLAND BUFFER
10878	HEC–RAS STATION
228.84	REGIONAL HIGH WATER LEVEL WITHOUT SWM CONTROLS

RECEIVED
NOV 0 4 2019
PLANNING DEPARTMENT

TOWN OF CALEDON
APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE: Nov 5/19

APPROVED BY: R. Blakely
DIRECTOR OF PUBLIC WORKS & ENGINEERING

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
4	OCT.16/19	F.P.	ISSUED FOR CONSTRUCTION
3	JUL.29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
2	APR.2/19	F.P.	ISSUED TO TOWN OF CALEDON
1	NOV.8/18	F.P.	ISSUED TO TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
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Woodbridge ont. L4L 9R4
905–850–8020 Fax 905–850–8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

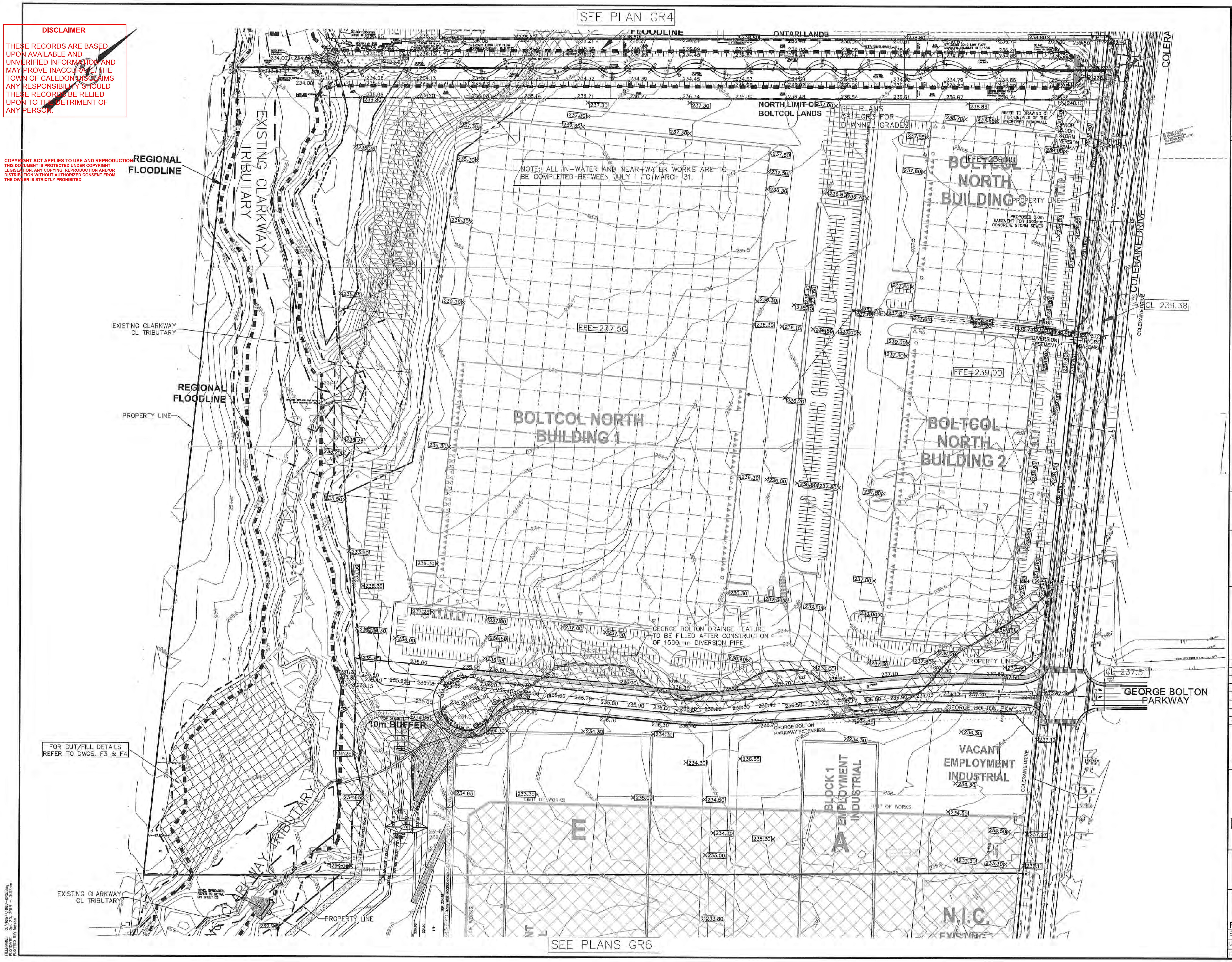
TOWN OF CALEDON
REGION OF PEEL

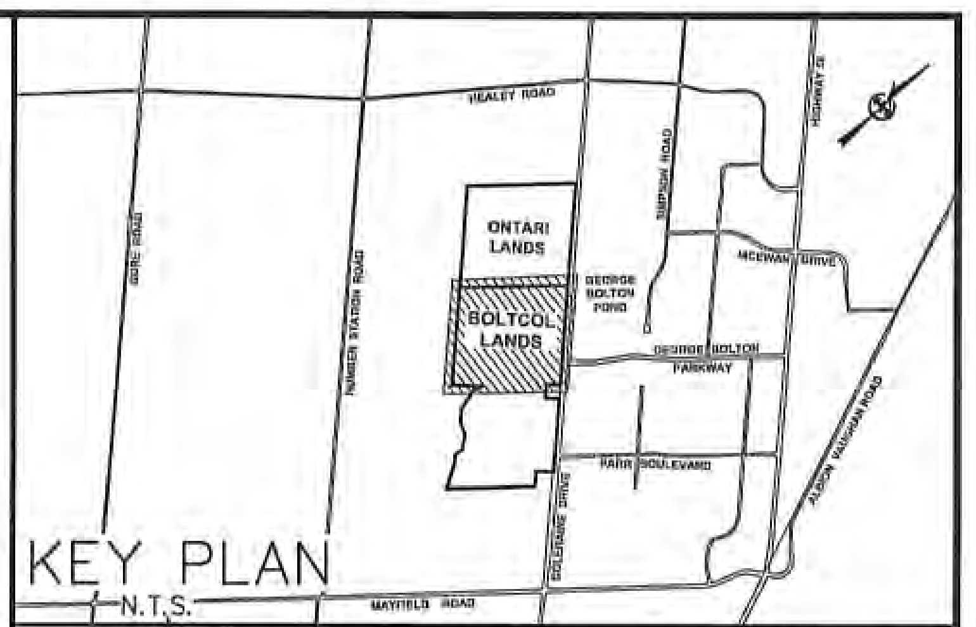
REGION FILE#: C02.311 SPA 18–04A

GENERAL PLAN
BOLTCOL SOUTH LANDS

SCALE: 1:1250	DATE: JAN. 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. G3
DESIGNED: F.P.	SHEET 3 OF 3	

REV: 4





KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C4

LEGEND

×234.20 (boxed)	PROPOSED SITE ELEVATION
×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
■ ▬ ■	EXISTING REGIONAL FLOODLINE
– – – –	10m TRCA FLOODPLAIN SETBACK
▬ ▬	WETLAND BOUNDARY
▬ ··· ▬	30m WETLAND BUFFER
—SILT—	SILT FENCE
▧	FILL AREA
▩	CUT AREA
12132	HEC-RAS STATION
236.10	REGIONAL HIGH WATER LEVEL (WITHOUT SWM CONTROLS)

RECEIVED
NOV 0 4 2019
PLANNING DEPARTMENT

TOWN OF CALEDON

APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE: Nov 5/19
APPROVED BY: C. Blakely
DIRECTOR OF PUBLIC WORKS & ENGINEERING

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES

TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
10	OCT.16/19	F.P.	ISSUED FOR CONSTRUCTION
9	APR.2/19	F.P.	ISSUED TO TOWN OF CALEDON
8	NOV.8/18	F.P.	ISSUED TO REGION
7	MAR.21/18	F.P.	ISSUED TO TOWN OF CALEDON
6	FEB.9/18	F.P.	ISSUED FOR SPA TO TOWN OF CALEDON
5	JULY.7/17	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
3	NOV.4/16	F.P.	REVISED AS PER TRCA COMMENTS

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
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905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

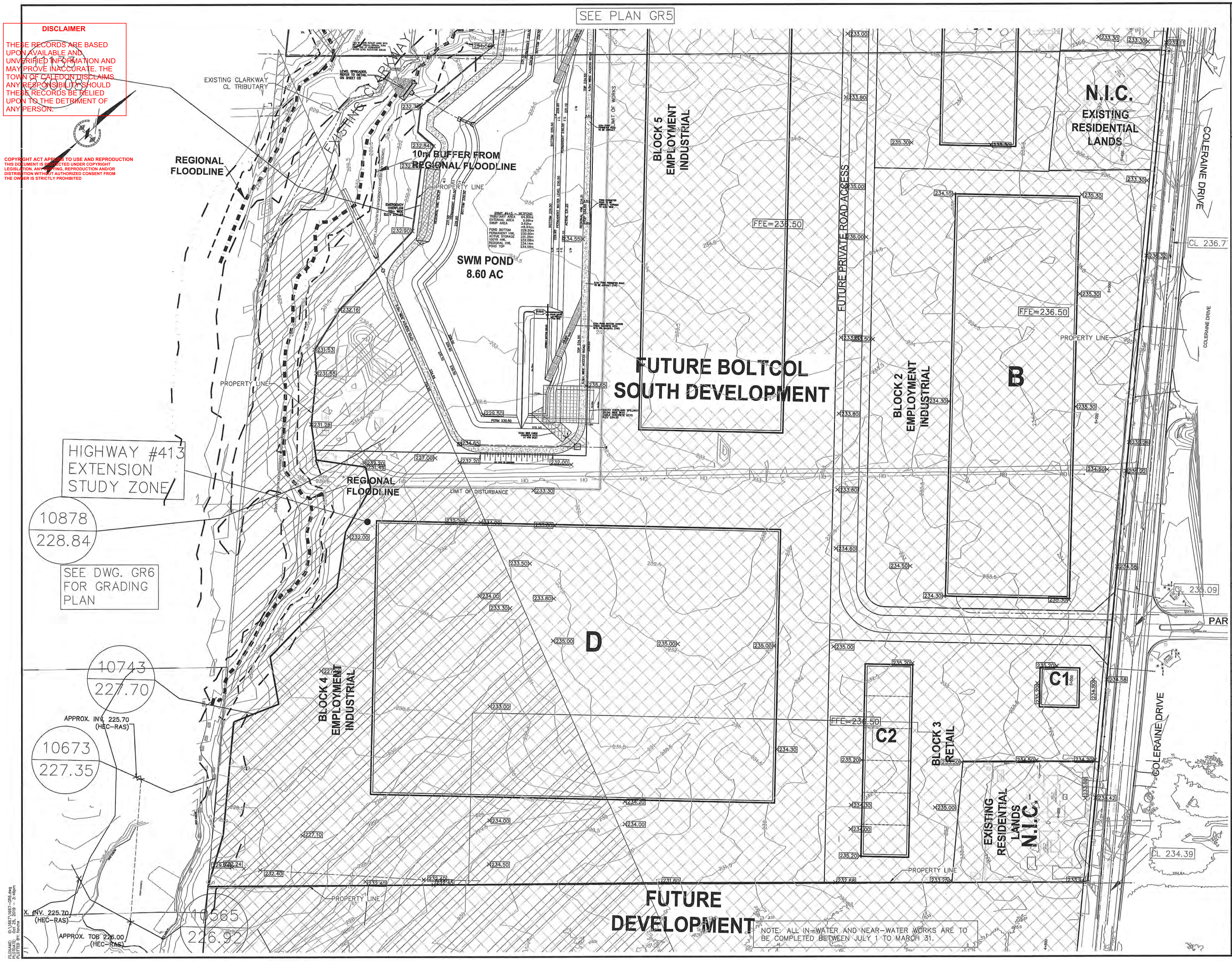
BOLTCOL NORTH LANDS
PRELIMINARY GRADING PLAN

REGION FILE#: C02.311 SPA 18-0004

SCALE: 1:1250	DATE: JULY 2016	PROJ No. 1667
DRAWN: Z.S.S.	CHK'D: A.M.C.	PLAN No. GR5
DESIGNED: Z.S.S.	SHEET 5 OF 6	

REV 10

FILENAME: C:\1667\1667-GR5.dwg
PLOTDATE: Oct 23, 2019 - 3:52pm
PLOTTED BY: fanche



NOTE: ALL IN-WATER AND NEAR-WATER WORKS ARE TO BE COMPLETED BETWEEN JULY 1 TO MARCH 31.

FOR GENERAL NOTES REFER TO DWG C4

LEGEND

×234.20 (boxed)	PROPOSED SITE ELEVATION
×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
■ ▬ ■	EXISTING REGIONAL FLOODLINE
– – – –	10m TRCA FLOODPLAIN SETBACK
▬ ▬	WETLAND BOUNDARY
▬ ··· ▬	30m WETLAND BUFFER
—SILT—	SILT FENCE
▨	FILL AREA
▩	CUT AREA
12132	HEC-RAS STATION
236.10	REGIONAL HIGH WATER LEVEL (WITHOUT SWM CONTROLS)

RECEIVED
NOV 0 4 2019
PLANNING DEPARTMENT

TOWN OF CALEDON
APPROVED AS NOTED

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THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE: Nov 5/19
APPROVED BY: R. Blakely
DIRECTOR OF PUBLIC WORKS & ENGINEERING

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION

PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK

BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES

TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
9	OCT.16/19	F.P.	ISSUED FOR CONSTRUCTION
8	APR.2/19	F.P.	ISSUED TO TOWN OF CALEDON
7	OCT.24/18	F.P.	ISSUED TO TOWN OF CALEDON
6	MAR.21/18	F.P.	ISSUED TO TOWN OF CALEDON
5	JULY.7/17	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
3	NOV.4/16	F.P.	REVISED AS PER TRCA COMMENTS
1	SEPT./16	F.P.	ISSUED FOR TENDER

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

BOLTCOL SOUTH LANDS GRADING PLAN

SPA 18-0004

SCALE: 1:1250	DATE: JULY 2016	PROJ No. 1667
DRAWN: Z.S.S.	CHK'D: A.M.C.	PLAN No. GR6
DESIGNED: Z.S.S.	SHEET 6 OF 6	

REV 9

PROJECT STATISTICS: REGION	
SANITARY SEWER LENGTH:	117.3m
NUMBER OF SANITARY MANHOLES:	4
WATERMAIN LENGTH:	229m
NUMBER OF HYDRANTS:	3
NUMBER OF 25mm WATER SERVICES:	0

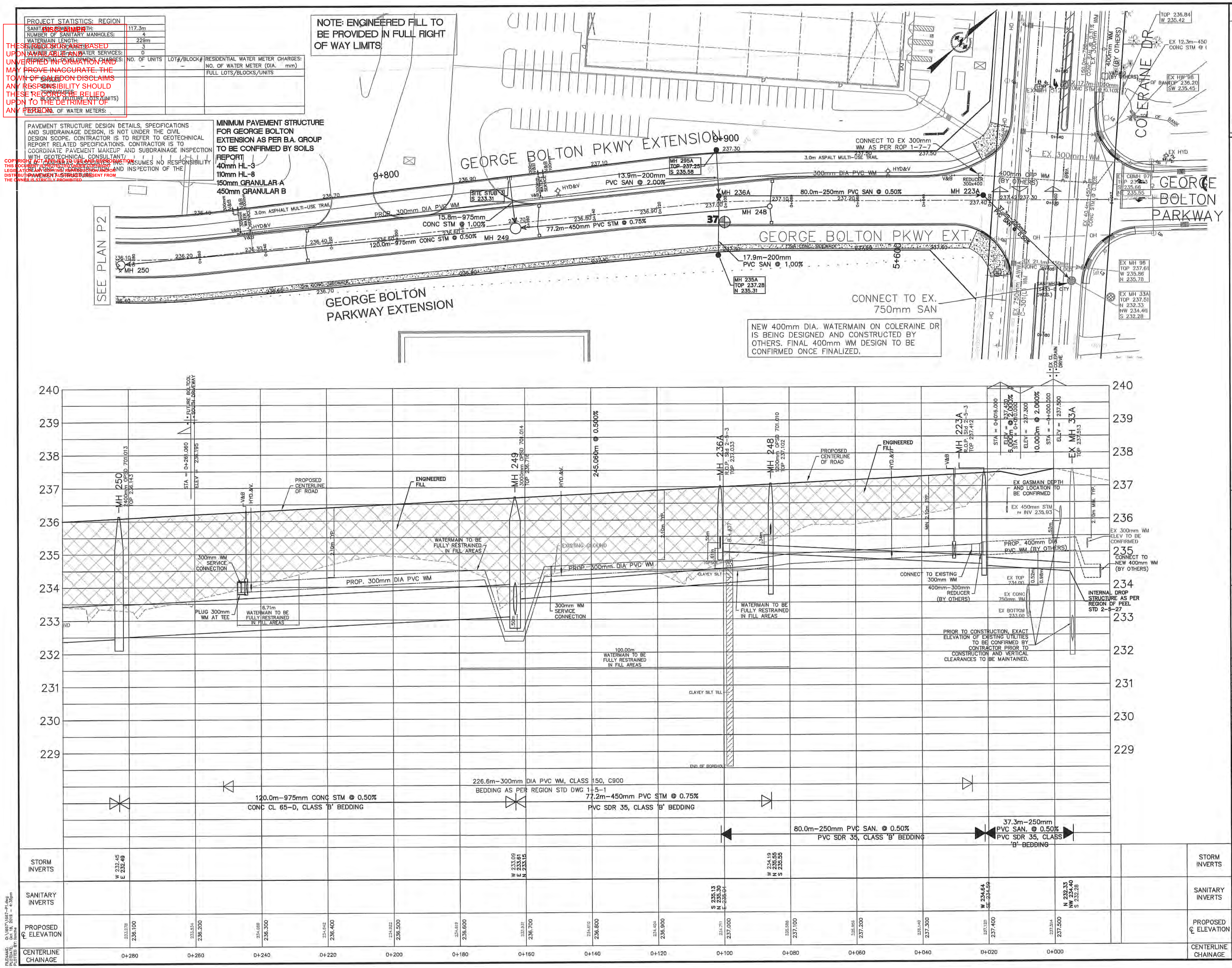
RESIDENTIAL DEVELOPMENT CHARGES:	NO. OF UNITS	LOT#/BLOCK#	RESIDENTIAL WATER METER CHARGES: NO. OF WATER METER (DIA. mm)
	–	–	FULL LOTS/BLOCKS/UNITS
• SINGLES • SEMIS • TOWNHOUSES • BLOCKS (FUTURE LOTS/UNITS)			
TOTAL NO. OF WATER METERS:			

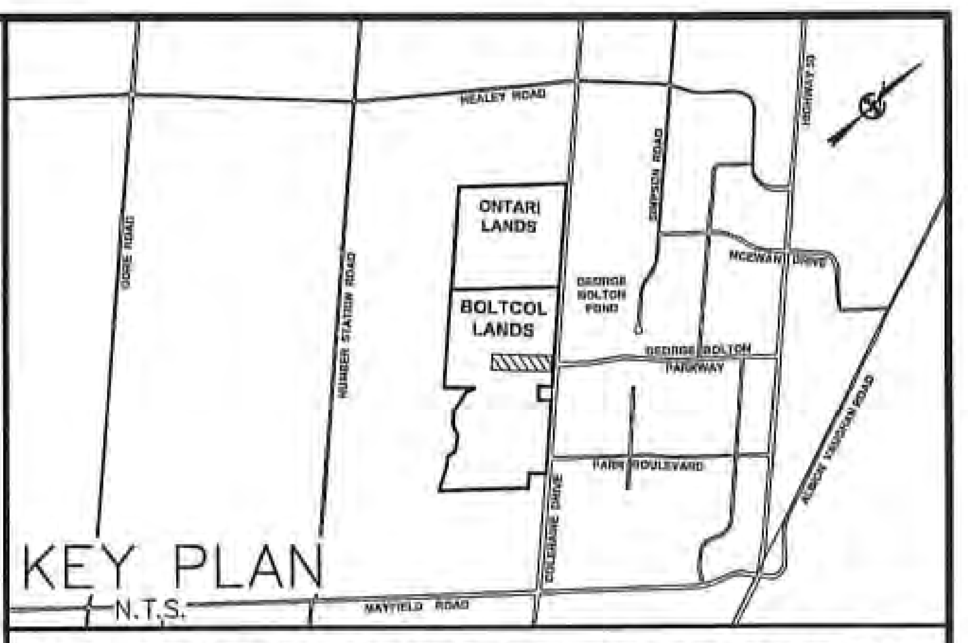
NOTE: ENGINEERED FILL TO BE PROVIDED IN FULL RIGHT OF WAY LIMITS

PAVEMENT STRUCTURE DESIGN DETAILS, SPECIFICATIONS AND SUBDRAINAGE DESIGN, IS NOT UNDER THE CIVIL DESIGN SCOPE. CONTRACTOR IS TO REFER TO GEOTECHNICAL REPORT RELATED SPECIFICATIONS. CONTRACTOR IS TO COORDINATE PAVEMENT MAKEUP AND SUBDRAINAGE INSPECTION WITH GEOTECHNICAL CONSULTANT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY RELATING TO CONSTRUCTION AND INSPECTION OF THE PAVEMENT STRUCTURE.

MINIMUM PAVEMENT STRUCTURE FOR GEORGE BOLTON EXTENSION AS PER B.A. GROUP TO BE CONFIRMED BY SOILS REPORT
40mm HL-3
110mm HL-8
150mm GRANULAR A
450mm GRANULAR B

NEW 400mm DIA. WATERMAIN ON COLERAINE DR IS BEING DESIGNED AND CONSTRUCTED BY OTHERS. FINAL 400mm WM DESIGN TO BE CONFIRMED ONCE FINALIZED.





KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C2

LEGEND

×239.80	PROPOSED SITE ELEVATION
×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
☐	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
⊚	PROPOSED CATCHBASIN MANHOLE
↔	VALVE AND BOX
⊖	VALVE AND CHAMBER
✧	HYDRANT AND VALVE
▨	ENGINEERED FILL.

TOWN OF CALEDON
APPROVED AS NOTED
THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.
THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.
DATE: Nov 5/19
APPROVED BY: C. Blakely
DIRECTOR OF PUBLIC WORKS & ENGINEERING

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
5	OCT 16/19	F.P.	ISSUED FOR CONSTRUCTION
4	JULY 29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
3	JULY 16/19	F.P.	ADD V&B AT WM CONNECTIONS
2	APR.2/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
1	NOV/18	F.P.	ISSUED TO TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
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BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

GEORGE BOLTON EXTENSION
0+000.000 TO 280.000

REGION FILE#: C02.311
SP 18–04A

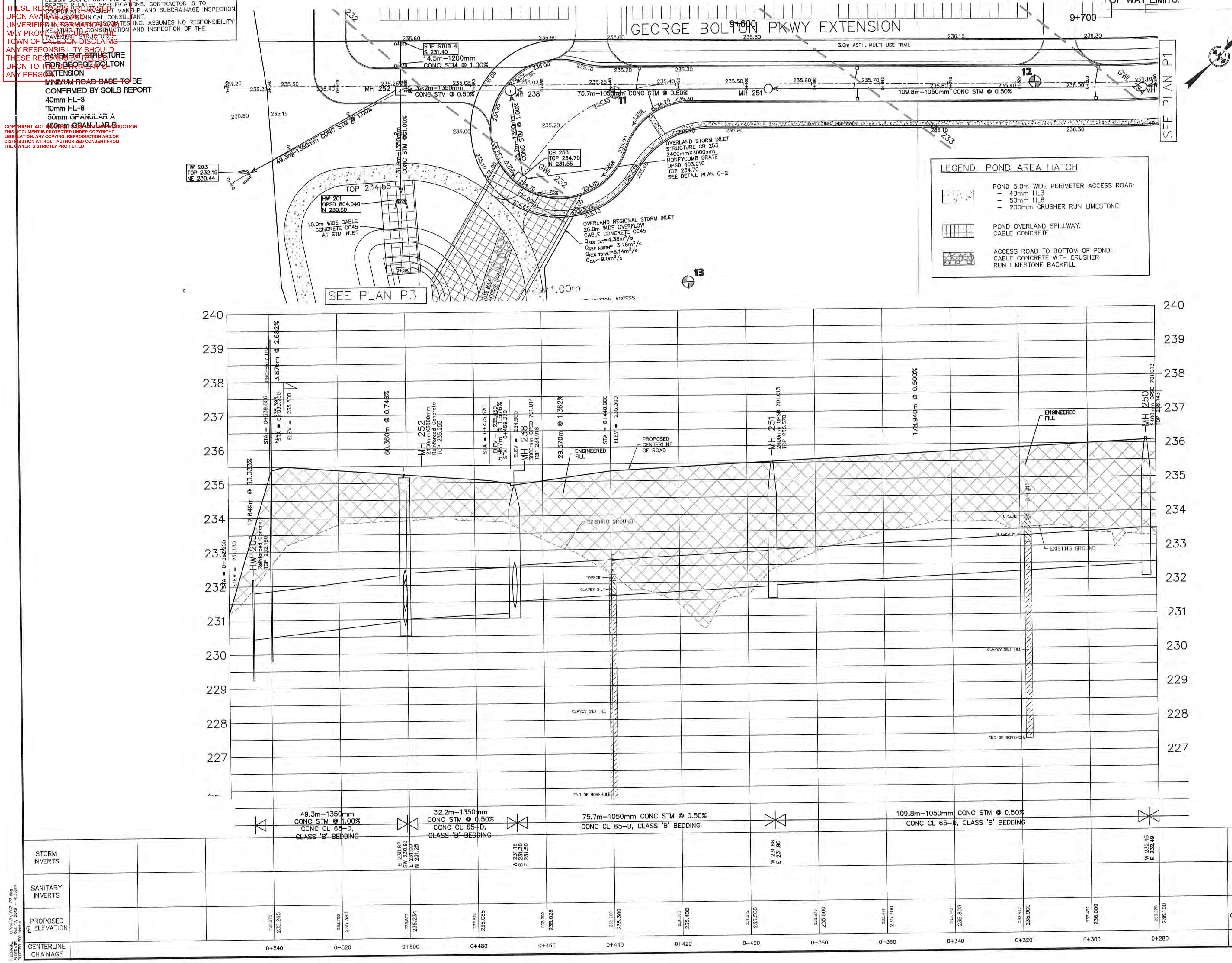
SCALE: HORIZ 1:500 VERT 1:50	DATE: JANUARY 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. P1
DESIGNED: F.P.	SHEET 1 OF 5	

REV: 5

PAVEMENT STRUCTURE DESIGN DETAILS, SPECIFICATIONS AND SUBDRAINAGE DESIGN, IS NOT UNDER THE CIVIL DESIGN SCOPE. CONTRACTOR IS TO REFER TO GEOTECHNICAL REPORT RELATED SPECIFICATIONS. CONTRACTOR IS TO COORDINATE PAVEMENT MAKEUP AND SUBDRAINAGE INSPECTION WITH GEOTECHNICAL CONSULTANT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY RELATING TO CONSTRUCTION AND INSPECTION OF THE PAVEMENT STRUCTURE.

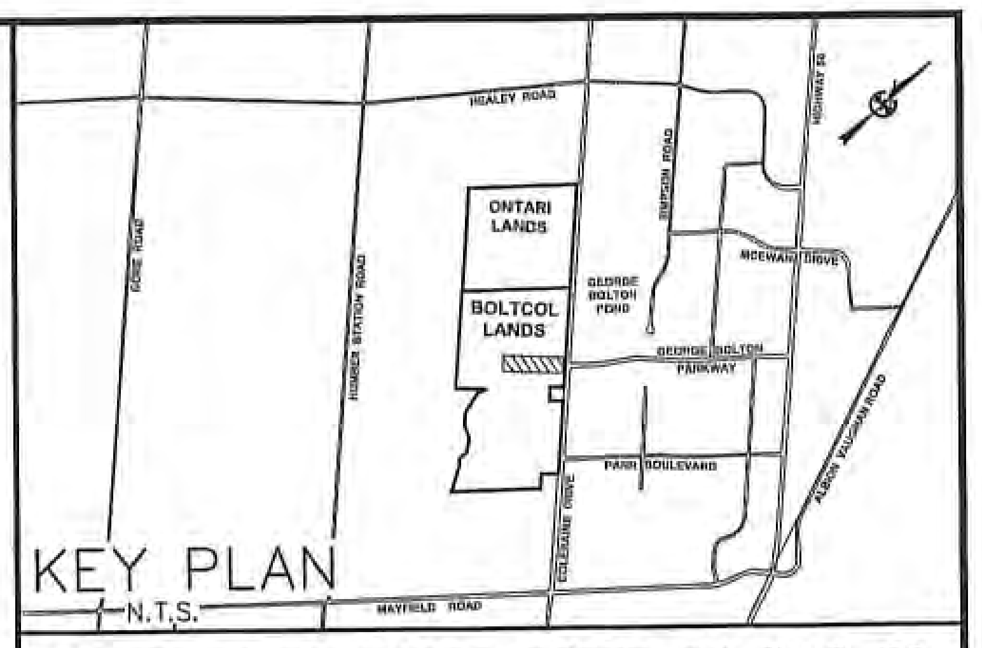
PAVEMENT STRUCTURE FOR GEORGE BOLTON EXTENSION
MINIMUM ROAD BASE TO BE CONFIRMED BY SOILS REPORT
40mm HL-3
110mm HL-8
150mm GRANULAR A
450mm GRANULAR B

NOTE: ENGINEERED FILL TO BE PROVIDED IN FULL RIGHT OF WAY LIMITS.



LEGEND: POND AREA HATCH

▨	POND 5.0m WIDE PERIMETER ACCESS ROAD: – 40mm HL3 – 50mm HL8 – 200mm CRUSHER RUN LIMESTONE
▦	POND OVERLAND SPILLWAY: CABLE CONCRETE
▩	ACCESS ROAD TO BOTTOM OF POND: CABLE CONCRETE WITH CRUSHER RUN LIMESTONE BACKFILL



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C3

LEGEND

×239.80	PROPOSED SITE ELEVATION
×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
□	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
◎	PROPOSED CATCHBASIN MANHOLE
⊢⊣	VALVE AND BOX
⊖	VALVE AND CHAMBER
⚲	HYDRANT AND VALVE
▨	ENGINEERED FILL

TOWN OF CALEDON
APPROVED AS NOTED
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DATE: Nov 5/19
APPROVED BY: C. Blakely
DIRECTOR OF PUBLIC WORKS & ENGINEERING

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LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
5	OCT 16/19	F.P.	ISSUED FOR CONSTRUCTION
4	SEPT 19/19	F.P.	ISSUED TO TOWN OF CALEDON
3	JULY 29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
2	APR. 2/19	F.P.	ISSUED TO TOWN OF CALEDON
1	NOV.8/19	F.P.	ISSUED TO TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
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905–850–8020 Fax 905–850–8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PKWY EXT + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

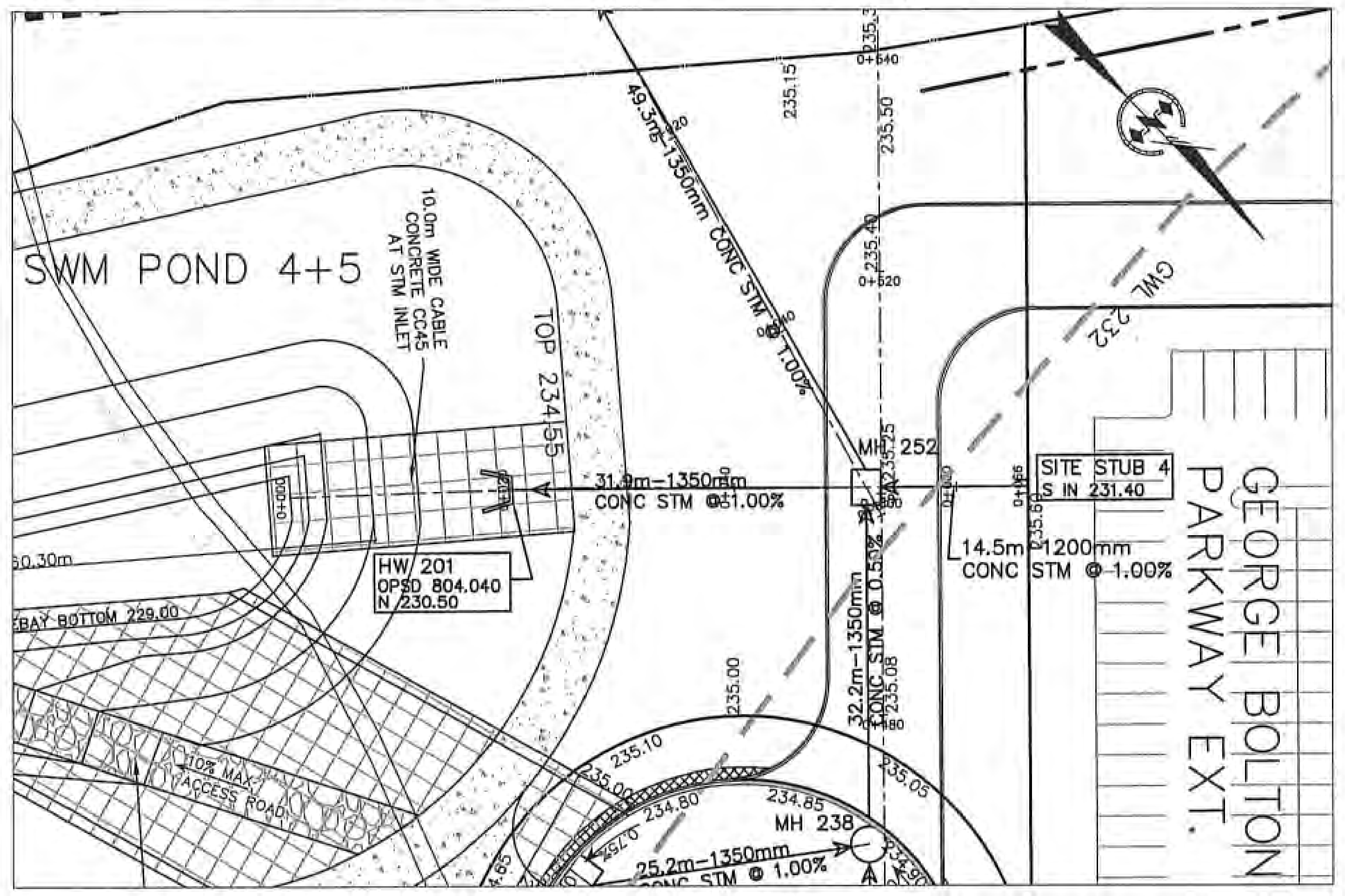
GEORGE BOLTON EXTENSION
0+280.000 TO 552.000

REGION FILE#: C02.311
SP 18–04A

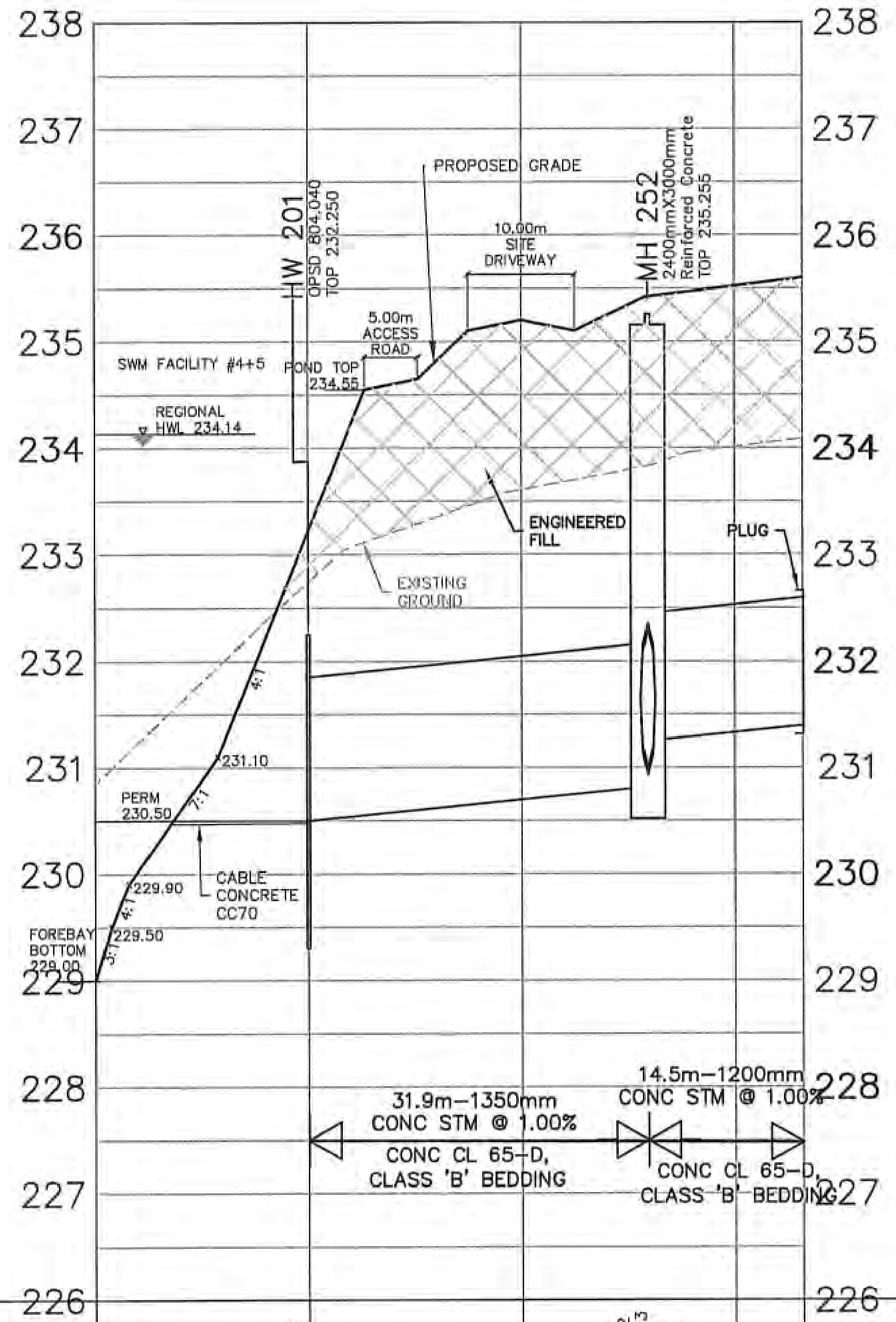
SCALE: HORIZ 1:500 VERT 1:50	DATE: JANUARY 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. P2
DESIGNED: F.P.	SHEET 2 OF 5	

REV: 5

STORM POND INLET 4+5 (NORTH)

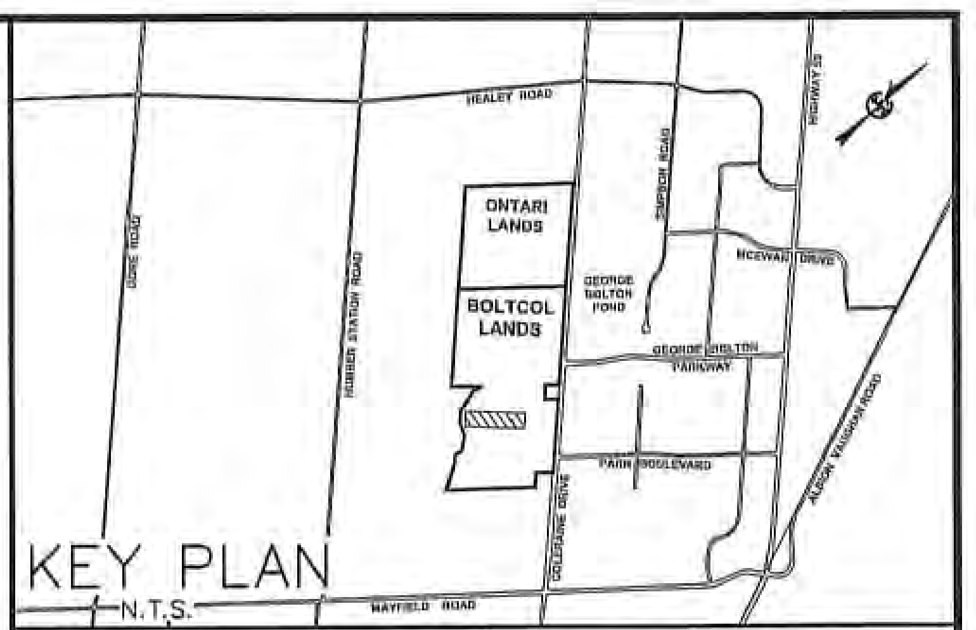


SEE PLAN P2



STORM INVERTS	N 230.50		S 230.82 SW 230.93 E 231.00 N 231.25		S 231.40
SANITARY INVERTS					
PROPOSED ℄ ELEVATION	232.743 233.225	233.606 235.200		234.012 235.523	
CENTERLINE CHAINAGE	0+020	0+040		0+060	

FILENAME: Q:\1667\1667-P3.dwg
PLOTDATE: Oct 17, 2019 - 4:58pm
PLOTTED BY: fonchei



FOR GENERAL NOTES REFER TO DWG C2

LEGEND

239.80	PROPOSED SITE ELEVATION
×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
□	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
⊡	PROPOSED CATCHBASIN MANHOLE
↔	VALVE AND BOX
⊖	VALVE AND CHAMBER
⯑	HYDRANT AND VALVE
▨	ENGINEERED FILL

TOWN OF CALEDON
APPROVED AS NOTED

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DATE: Nov 5/19
APPROVED BY: C. Blakely
DIRECTOR OF PUBLIC WORKS & ENGINEERING

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

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CONCESSION 5,
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OCT 16/19
A. M. CANDARAS

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3	JULY 29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
2	APR. 2/19	F.P.	ISSUED TO TOWN OF CALEDON
1	NOV/18	F.P.	ISSUED TO TOWN OF CALEDON

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BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

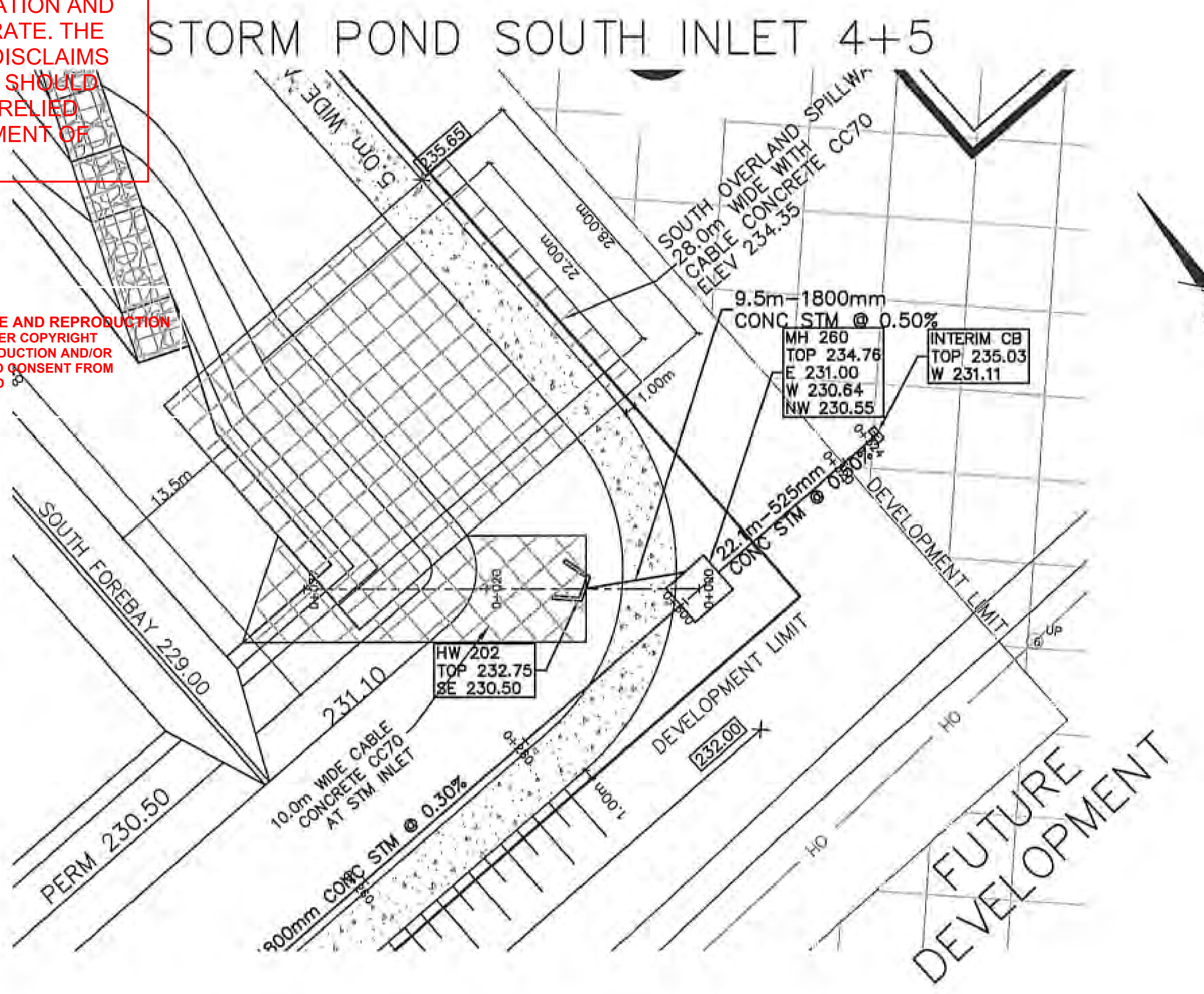
STORM POND INLET 4+5 (NORTH)
0+000.000 TO 0+066.000

REGION FILE#: C02.311
SP 18-04A

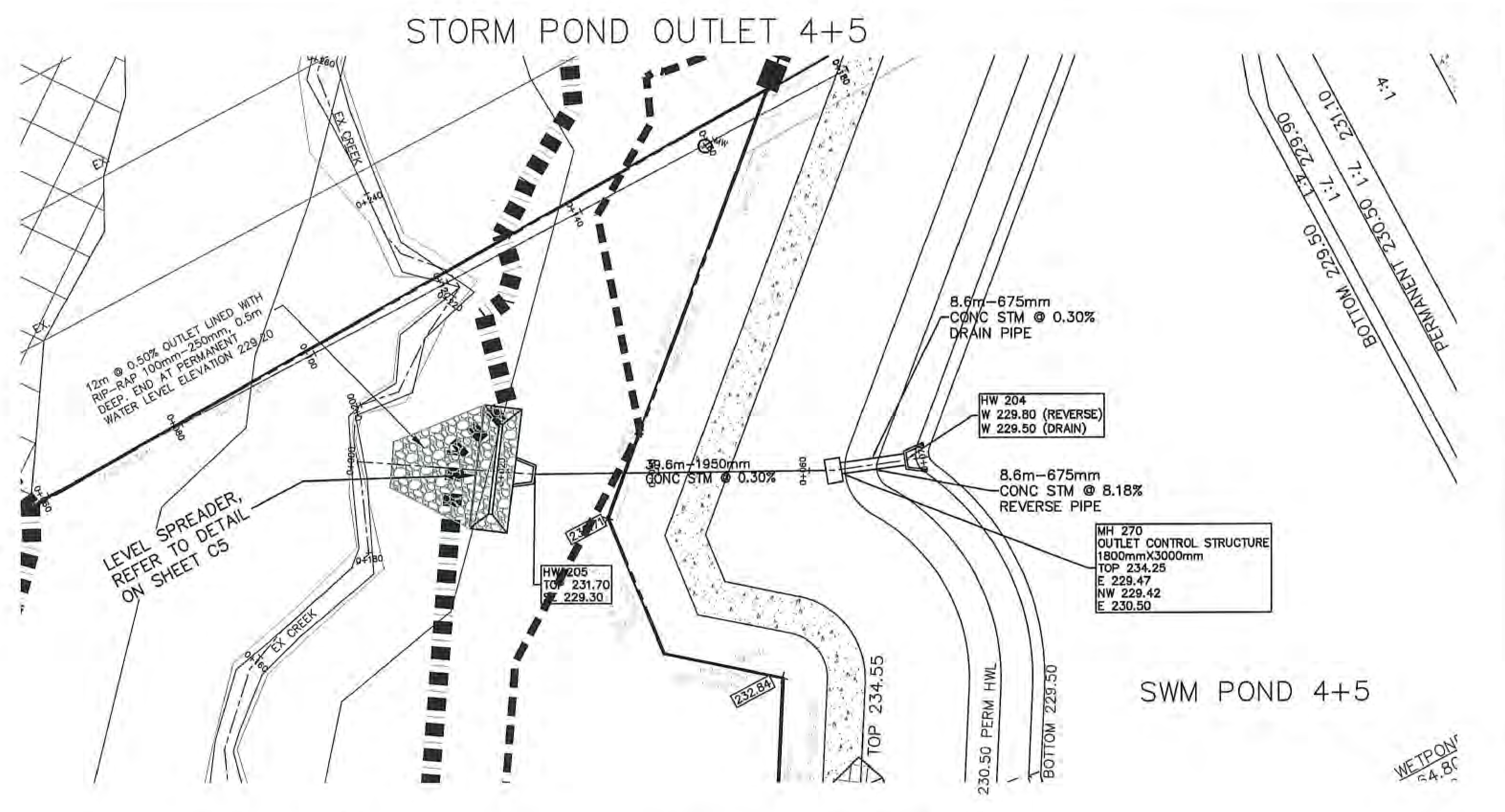
SCALE: HORIZ 1:500 VERT 1:50	DATE: JANUARY 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. P3
DESIGNED: F.P.	SHEET 3 OF 5	

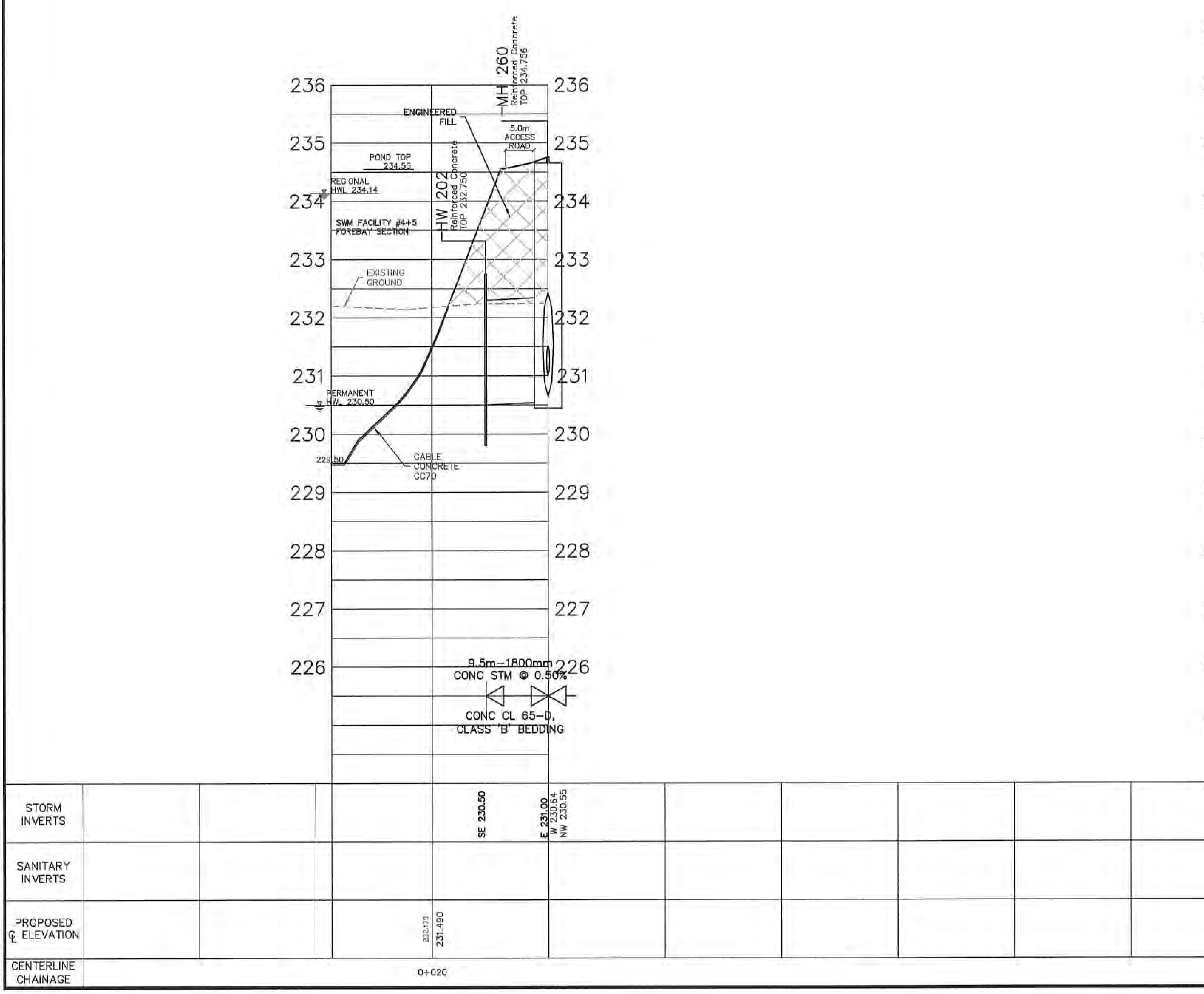
REV: 4

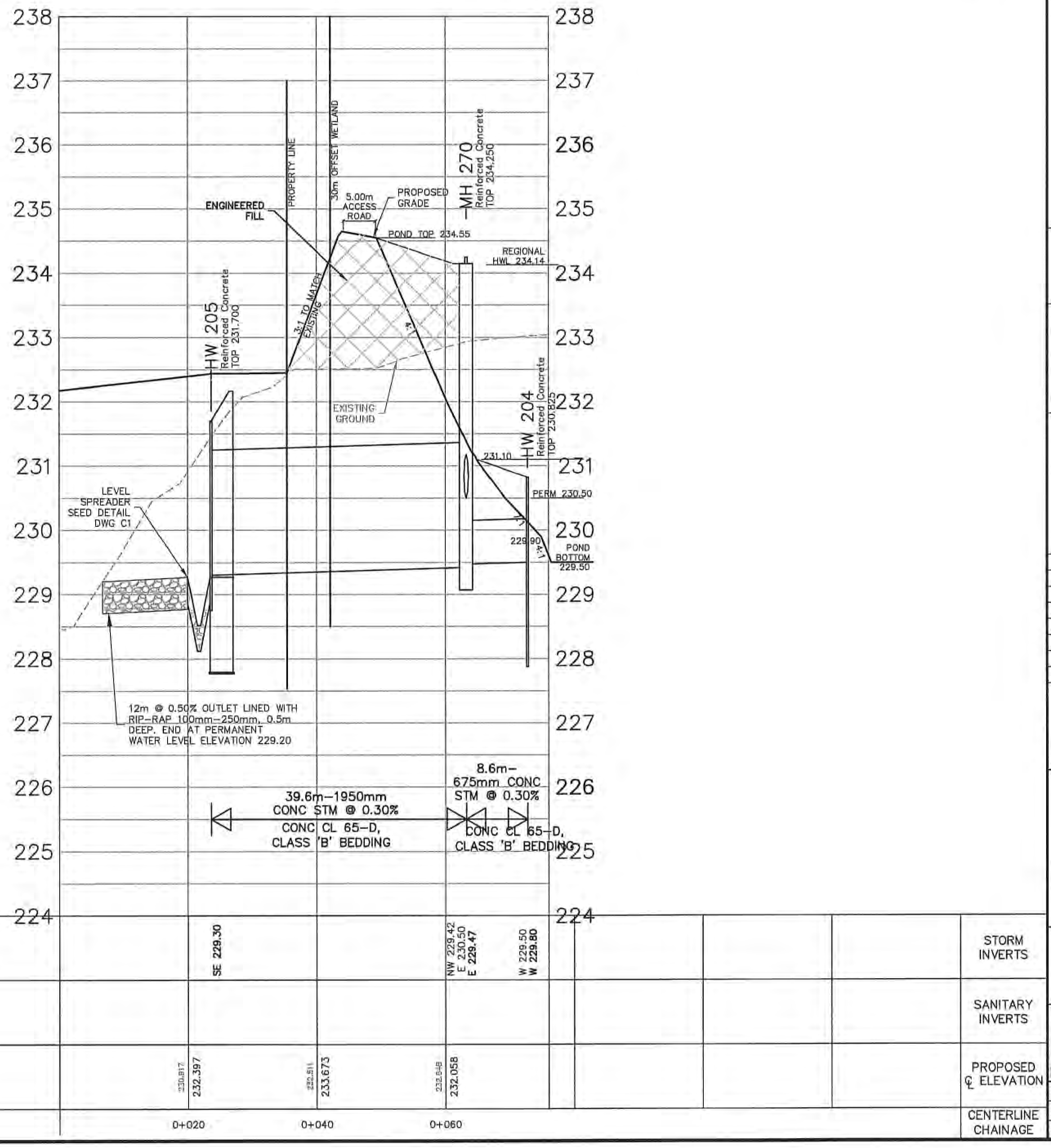
STORM POND SOUTH INLET 4+5



STORM POND OUTLET 4+5







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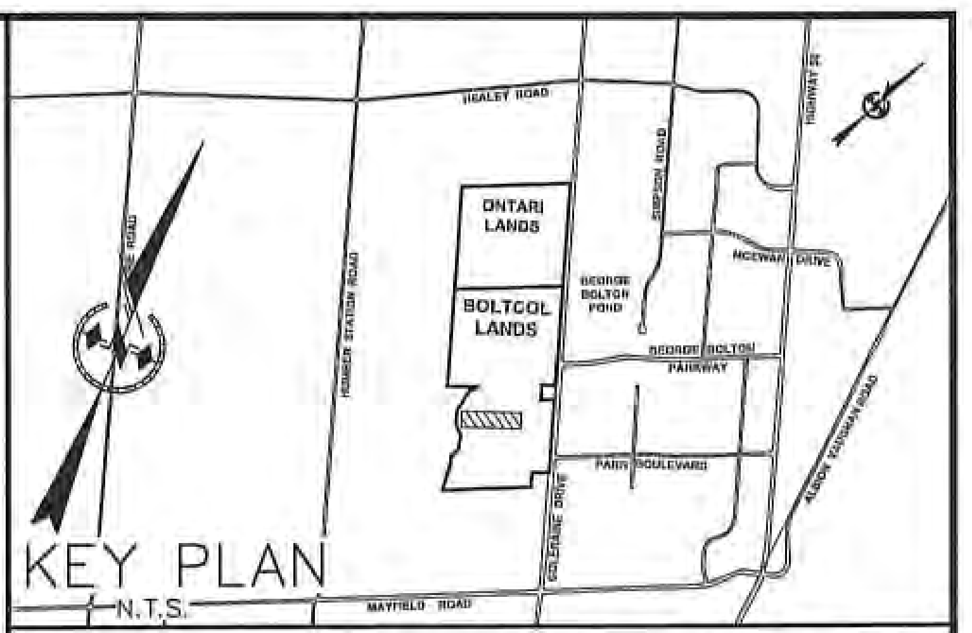
PLOTDATE: Oct 17, 2019 – 4:53pm
PLOTTED BY: fonche



FOR GENERAL NOTES REFER TO DWG C2

LEGEND

239.80	PROPOSED SITE ELEVATION
×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
□	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
⊚	PROPOSED CATCHBASIN MANHOLE
⋈	VALVE AND BOX
⊖	VALVE AND CHAMBER
♁	HYDRANT AND VALVE

TOWN OF CALEDON
APPROVED
AS NOTED
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DATE: Nov 5/19
APPROVED BY: R. Blahey
DIRECTOR OF PUBLIC WORKS & ENGINEERING

RECEIVED
NOV 0 4 2019
PLANNING DEPARTMENT

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BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

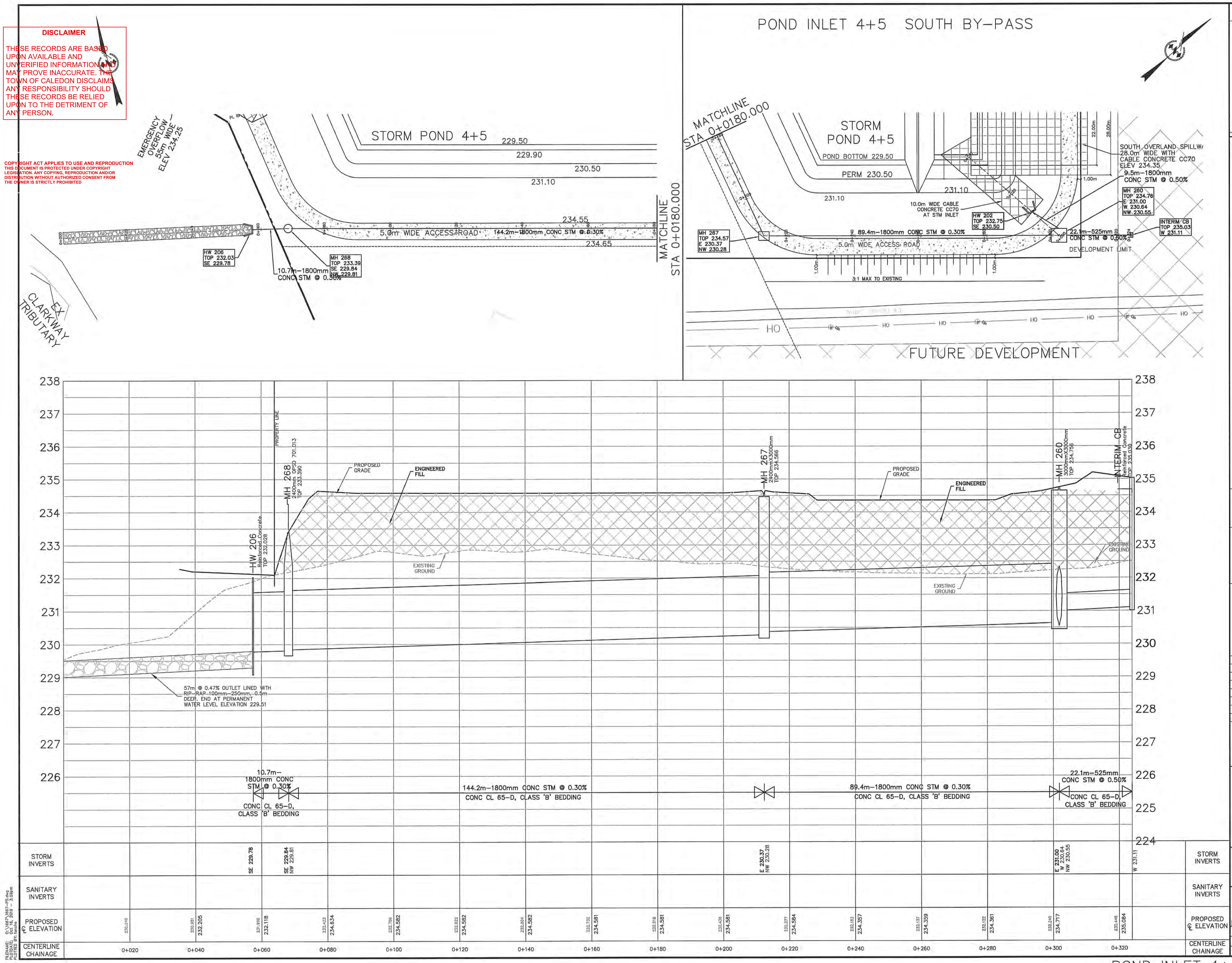
STORM POND INLET 4+5 AND OUTLET
0+000.000 TO 0+037.00
0+000.000 TO 0+076.00

REGION FILE#: C02.311
SP 18–04A

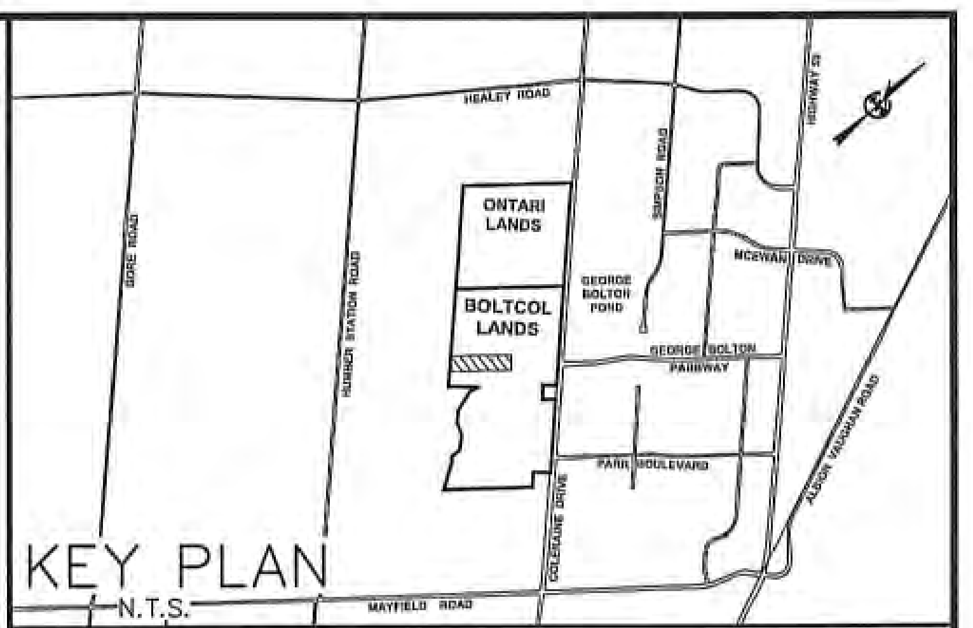
SCALE: HORIZ 1:500 VERT 1:50	DATE: JANUARY 2019	PROJ No. 1667
DRAWN: F.P	CHK'D: A.M.C.	PLAN No. P4
DESIGNED: F.P.	SHEET 4 OF 5	

REV: 4

POND INLET 4+5 SOUTH BY-PASS



FILENAME: D:\1667\1667-P5.dwg
PLOTDATE: Oct 16, 2019 – 3:09pm



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C2

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×234.20	PROPOSED ELEVATION
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TOWN OF CALEDON

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1	NOV/18	F.P.	ISSUED TO TOWN OF CALEDON

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consulting engineers
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Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

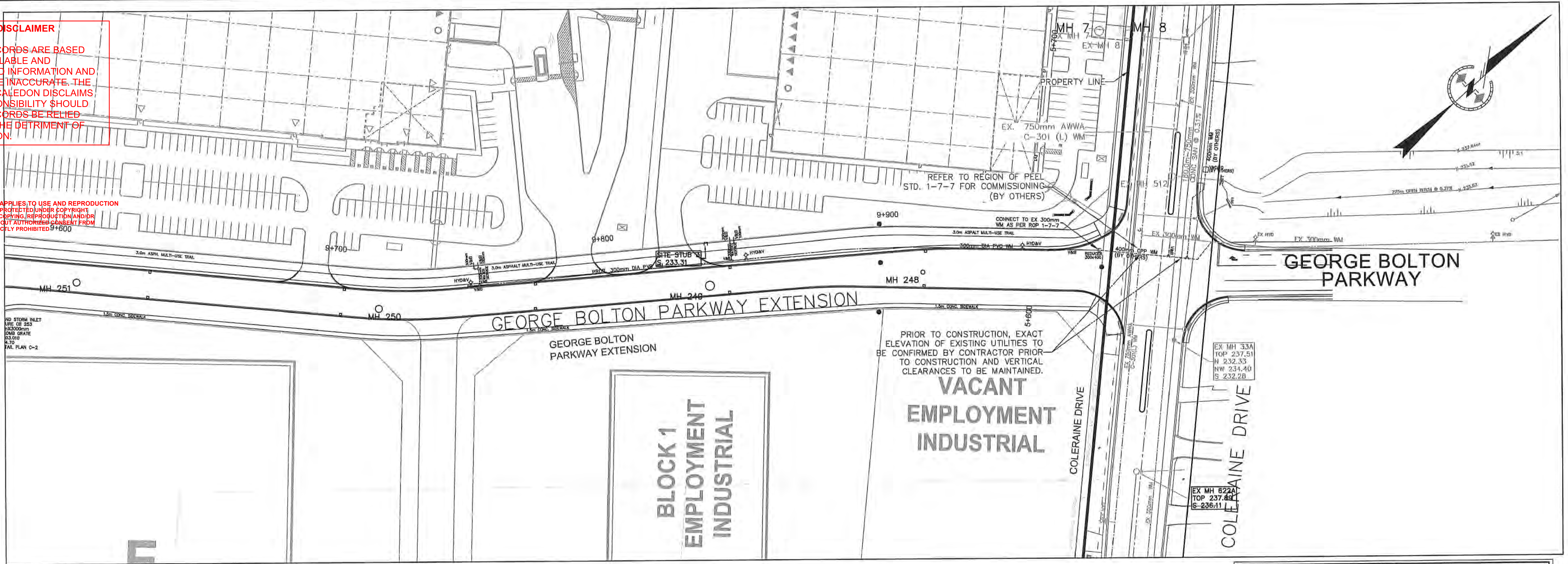
STORM POND 4+5
POND INLET SOUTH BYPASS
0+000.000 TO 0+324.000

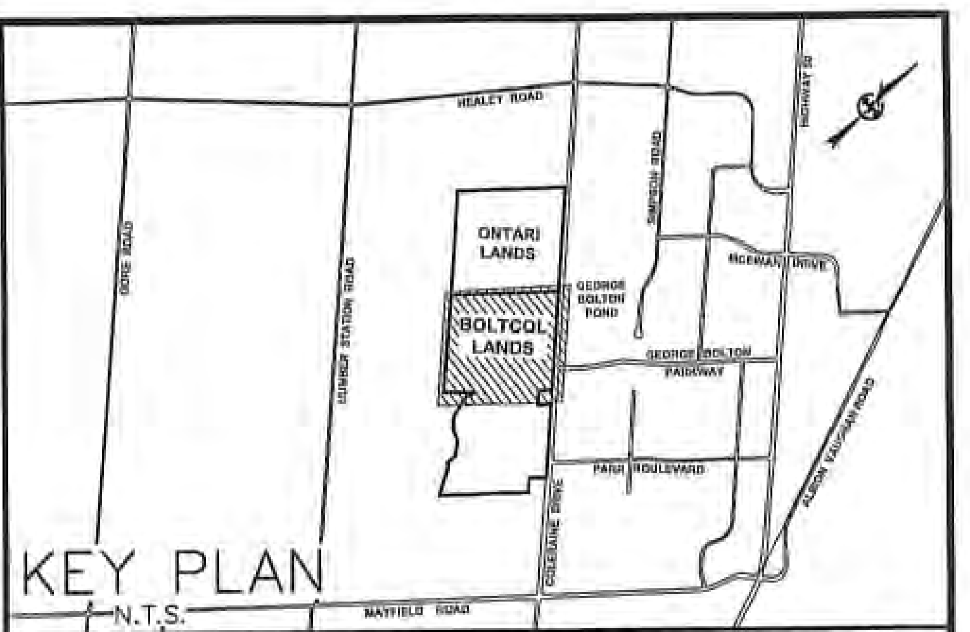
REGION FILE#: C02.311
SP 18–04A

SCALE: HORIZ 1:500 VERT 1:50	DATE: JANUARY 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. P5
DESIGNED: F.P.	SHEET 5 OF 5	

POND INLET 4+5 SOUTH BY-PASS

REV: 4





KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C2

LEGEND

▫	CATCHBASIN
▫▫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
⊡	PROPOSED CATCHBASIN MANHOLE
⋈	VALVE AND BOX
⊖	VALVE AND CHAMBER
⊕	HYDRANT AND VALVE

RECEIVED
NOV 0 4 2019
PLANNING DEPARTMENT

TOWN OF CALEDON
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BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4 + 5

TOWN OF CALEDON
REGION OF PEEL

WATERMAIN DISTRIBUTION AND COMMISSIONING PLAN

REGION FILE#: C02.311
SP 18-04A

SCALE: 1:1250	DATE: JAN. 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. W1
DESIGNED: F.P.	SHEET 1 OF 1	

REV: 4

Region of Peel General Notes:

GENERAL

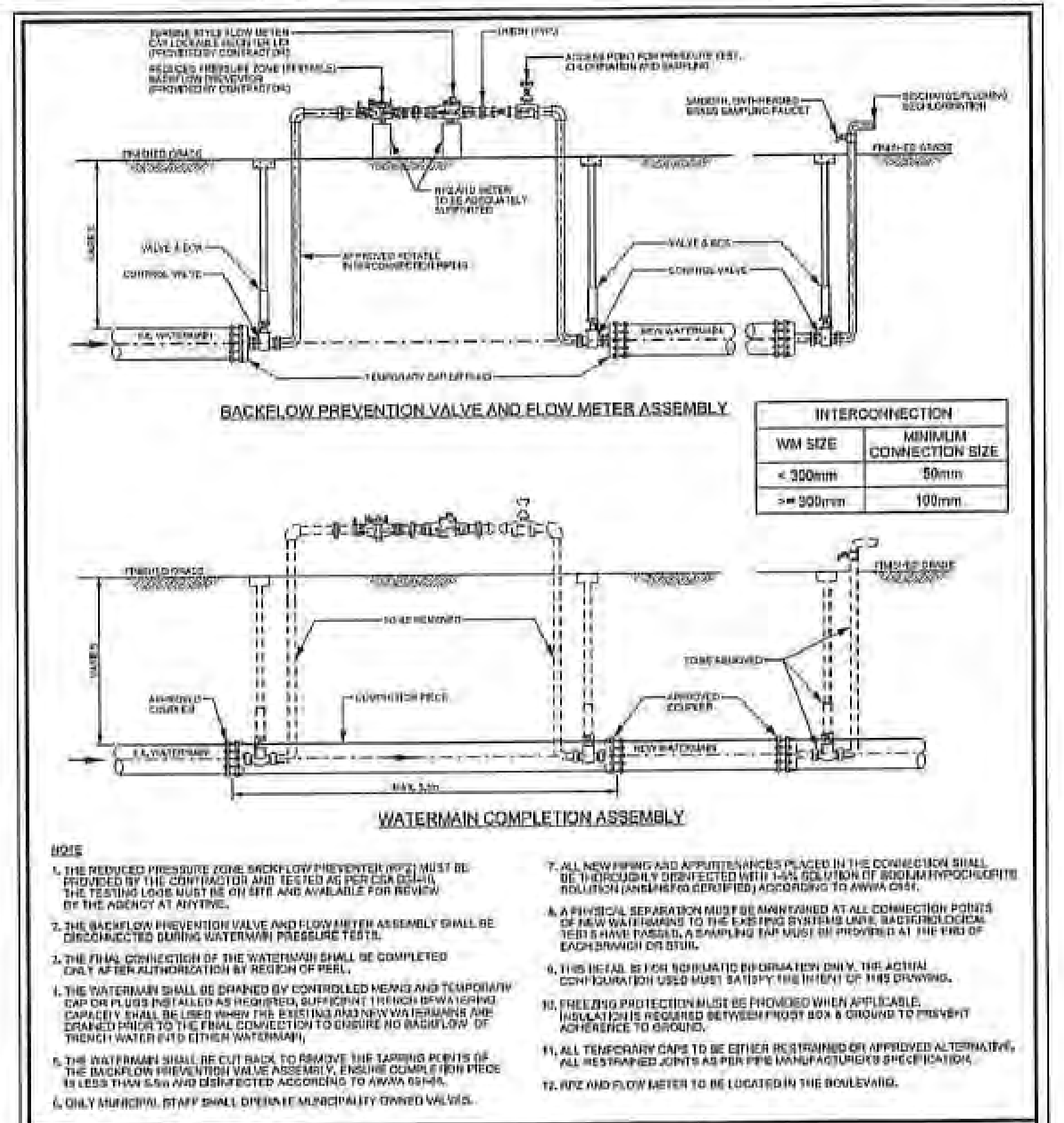
1. THE APPLICANT, APPLICANT'S REPRESENTATIVE, CONSULTANT, CONTRACTOR AND SUB CONTRACTORS ARE RESPONSIBLE TO ENSURE THAT THEIR DESIGN MATERIALS AND CONSTRUCTION PRACTICES CONFORM TO THE LATEST REGION OF PEEL STANDARDS, SPECIFICATIONS, MATERIALS AND DESIGN CRITERIA, POSTED ON REGION OF PEEL'S WEBSITE (www.peelregion.ca/pw/standards). IN THE ABSENCE OF REGION SPECIFICATIONS, THE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS (OPSS) SHALL APPLY.
2. ALL WORKS SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT". THE GENERAL CONTRACTOR SHALL BE DEEMED THE CONSTRUCTOR AS DEFINED IN THE ACT.
3. THE CONTRACTOR AT THEIR EXPENSE SHALL VERIFY THE LOCATION, DIMENSION AND ELEVATION OF ALL EXISTING SERVICES AND UTILITIES IN THE FIELD.
4. PRIOR TO EXCAVATION OR BORING CONTRACTOR AT THEIR EXPENSE SHALL EXPOSE AND VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES AND SERVICES TO BE CROSSED AND MUST NOTIFY THE DESIGN ENGINEER AND THE AGENCY FIELD INSPECTOR AND/OR PROJECT MANAGER IMMEDIATELY, IN WRITING, OF ANY CONFLICTS OR DISCREPANCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR EXPOSING THE EXISTING UTILITIES FAR ENOUGH IN ADVANCE OF CONSTRUCTION TO MAKE NECESSARY DESIGN MODIFICATIONS FOR REVIEW AND APPROVAL, IF REQUIRED, WITHOUT DELAYING THE WORK.
5. THE CONTRACTOR, AT THEIR EXPENSE AND TO THE SATISFACTION OF THE REGION OF PEEL, SHALL BE RESPONSIBLE FOR THE RESTORATION AND THE REPAIR OF THE EXISTING UTILITIES AND ALL AREAS BEYOND THE PLAN OF SUBDIVISION DISTURBED DURING CONSTRUCTION.
6. THE SUPPORT OF ALL UTILITIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
7. ALL BACKFILL FOR SEWERS, WATERMAINS AND UTILITIES ON THE ROAD ALLOWANCE MUST BE MECHANICALLY COMPACTED.
8. ALL BOREHOLES SHOWN ON DRAWING ARE FOR INFORMATION ONLY. REFER TO GEOTECHNICAL REPORT.
9. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.

WATERMAINS

1. THE REGION OF PEEL SHALL CONDUCT THE OPERATION OF EXISTING VALVES AND HYDRANTS IF REQUIRED.
2. CONTRACTOR MUST USE BATTER BOARD OR ROD-AND-LEVEL METHOD FOR WATERMAIN INSTALLATION.
3. ALL WATERMAINS SHALL HAVE 1.70m MINIMUM COVER FOR URBAN ROAD DESIGN AND 2.1m MINIMUM COVER FOR RURAL ROAD DESIGN.
4. ALL WATERMAINS SHALL MAINTAIN A MINIMUM 1.5m CLEARANCE FROM ALL MANHOLES AND CATCH BASINS, WHERE APPLICABLE.
5. FOR WATERMAINS CROSSING OVER OR UNDER SEWERS A MINIMUM 0.5m VERTICAL CLEARANCE SHALL BE PROVIDED.
6. FOR WATERMAIN CROSSING A SANITARY SEWER, WATERMAIN JOINTS ARE TO BE OFFSET A MINIMUM OF 2.5m HORIZONTALLY FROM THE CENTERLINE OF THE SANITARY SEWER.
7. WATERMAIN BEDDING SHOULD BE AS PER DWG 1-5-1.
8. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED PLANS, COPY OF GRADE SHEET MUST BE SUPPLIED TO THE REGION OF PEEL INSPECTOR PRIOR TO COMMENCEMENT OF WORK.
9. ANY JOINT DEFLECTION SHALL BE 50% OF MANUFACTURER'S SPECIFICATIONS. PIPE BARREL DEFLECTION IS PROHIBITED.
10. FIRE HYDRANTS SHALL BE INSTALLED AS PER REGION STD. DWG. 1-6-1 OR 1-6-2 WITH FLANGE SET BETWEEN 50mm AND 150mm ABOVE FINISHED GRADE.
11. ALL HYDRANTS SHALL HAVE 1.2m MINIMUM HORIZONTAL CLEARANCE FROM ALL OTHER UTILITIES AND STRUCTURES MEASURED FROM THE NEAREST POINT OF THE STRUCTURE.
12. MECHANICAL RESTRAINERS ARE REQUIRED FOR ALL FITTINGS, VALVES, DEAD ENDS, CAPS AND HYDRANTS ON ALL PVC WATERMAINS; MINIMUM RESTRAINED PIPE LENGTH AS PER REGION'S STANDARD DRAWING 1-5-9.
13. STAINLESS STEEL NUTS AND BOLTS ARE TO BE USED ON ALL METALLIC FITTINGS AND JOINT RESTRAINTS;
14. ALL METALLIC VALVES, FITTINGS, THROUGH WALL METAL PIPING AND JOINT RESTRAINTS TO BE C/W DENSO PASTE, DENSO MASTIC & DENSO TAPE OR APPROVED EQUAL APPLIED TO MANUFACTURER'S RECOMMENDATIONS.
15. WHERE PLASTIC PIPE IS USED, INSTALL A 12 GAUGE TWO STRANDED COPPER, LIGHT COLOURED, PLASTIC COATED TRACER WIRE ATTACHED TO THE PIPE WITH APPROVED WIRE SPLICE. THE WIRE SHOULD BE BROUGHT TO THE SURFACE AT EACH SERVICE & VALVE BOX AND HYDRANT VALVES.
16. 50mm DIAMETER WATERMAIN SHALL BE TYPE K SOFT COPPER. WATERMAIN INSTALLATION IN CUL-DE-SACS AS PER REGION STD. DWG. 1-7-4.
17. A PHYSICAL SEPARATION MUST BE MAINTAINED AT ALL CONNECTION POINTS OF NEW WATERMAIN TO THE EXISTING SYSTEM UNTIL BACTERIOLOGICAL TESTS HAVE PASSED, AS PER STD. DWG 1-7-7 AND 1-7-8.
18. PROVISION FOR FLUSHING OF NEW WATERMAINS PRIOR TO TESTING MUST BE PROVIDED WITH AT LEAST 50mm OUTLET ON WATERMAINS SMALLER THAN 300mm IN DIAMETER, AND MINIMUM 100mm OUTLET ON WATERMAINS 300mm AND LARGER. COPPER WATERMAINS ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE WATERMAIN, AS PER STD. DWG. 1-7-7 AND 1-7-8.
19. ALL SERVICE CONNECTIONS TO PVC PIPES ARE TO BE MADE USING APPROVED WIDE BAND SERVICE SADDLE. DIRECT TAPPING IS NOT ALLOWED.
20. ALL WATER SERVICES SHALL BE MINIMUM 25mm DIA NOMINAL COPPER PIPE SIZE OR 32mm DIA POLYETHYLENE PIPE. IN GENERAL, NON METALLIC SERVICES SHALL BE ONE SIZE LARGER THAN THE NOMINAL COPPER PIPE SIZE AS PER LATEST APPROVED REGIONAL PRODUCT LIST AND SIZES C/W TRACER WIRE.
21. THE MINIMUM LATERAL DISTANCE BETWEEN WATER SERVICES AND OTHER UTILITIES SHALL BE 1.2m.
22. ALL RESIDENTIAL WATER SERVICE BOXES/CURB STOPS SHALL BE INSTALLED WITHIN SODDED AREAS WITH MINIMUM DISTANCE OF 1.0 METRES FROM THE EDGE OF THE DRIVEWAY, BE FLUSH WITH GRADE AND ACCESSIBLE AT ALL TIME.
23. VALVE AND BOXES SHALL BE CAST IRON SLIDING TYPE, COMPLETED WITH VALVE GUIDE PLATES AND INSTALLED AS PER REGION STD. 1-3-8. MAINLINE VALVES TO BE RESTRAINED AS PER REGION STD. 1-3-3A. VALVES SHALL OPEN TO THE LEFT (COUNTER-CLOCKWISE)
24. ALL WATER SERVICES BOXES SHOULD BE "LEAD FREE" AS PER REGION'S MATERIAL SPECIFICATIONS.
25. THE REGION WILL COMPLETE THE NECESSARY WATER TESTING (PRESSURE TEST, FLUSHING, CHLORINATION AND SAMPLING). CONTRACTOR MAY PROCEED WITH HIS OWN PRESSURE TEST AND FLUSHING PRIOR TO REGION'S TESTING.
26. ALL METALLIC WATER PIPES INCLUDING ~~K~~COPPER WATER SERVICES, INSTALLED OR REPAIRED, SHALL HAVE ZINC ANODE AS PER REGION OF PEEL STANDARD 1-7-1, OPSS422 AND OPSD 1109.011 AND TO CONFORM TO ASTM B-418 TYPE.
27. WATERMAIN PIPES SHALL BE BROUGHT ON SITE WITH MANUFACTURER'S PLUGS AND STORED SO NO DEBRIS ENTER THE PIPE. THE CONTRACTOR IS NOT ALLOWED TO INSTALL ANY WATERMAIN UNTIL HE HAS A NIGHT PLUG ON SITE.
THE NIGHT PLUG IS TO BE USED EVERY TIME WHEN THE WORK IS STOPPED.

WATERMAIN IN FILL AREA

1. NO WATERMAIN TO BE LAID ON FILL UNTIL THE FIELD DENSITY TEST REPORTS HAVE BEEN SUBMITTED TO AND APPROVED BY THE REGION OF PEEL OR THE CONSULTING ENGINEER.
2. PIPE JOINTS DEFLECTIONS ARE NOT ALLOWED IN FILL AREA.
3. JOINTS SHALL BE MECHANICALLY RESTRAINED THE WHOLE LENGTH.
4. ALL HYDRANTS, TEE BRANCH VALVES AND HORIZONTAL BENDS ARE TO BE MECHANICALLY RESTRAINED WITH TIE RODS.
5. IN EXISTING MUNICIPAL RIGHT-OF-WAY OR EASEMENT, FILL TO BE PLACED TO 600mm MINIMUM ABOVE THE OBVERT OF THE WATERMAIN AND TO 300mm EITHER SIDE, COMPACTED TO MINIMUM 100% STANDARD PROCTOR DENSITY IN 300mm LIFTS; AND THEREAFTER, FOR EVERY 300mm LIFT ALONG THE CENTERLINE, AND 1.5m TO EITHER SIDE, OF WATERMAIN AT MAXIMUM INTERVAL OF 30.0m. TEST RESULTS MUST BE SUBMITTED TO AND APPROVED BY THE CONSULTANT OR AGENCY.



BACKFLOW PREVENTION VALVE AND FLOW METER ASSEMBLY

INTERCONNECTION	
WM SIZE	MINIMUM CONNECTION SIZE
< 300mm	50mm
>= 300mm	100mm

WATERMAIN COMPLETION ASSEMBLY

Region of Peel
Working for you

PUBLIC WORKS STANDARD DRAWING

TEMPORARY WATERMAIN CONNECTION DETAIL FROM WATERMAIN

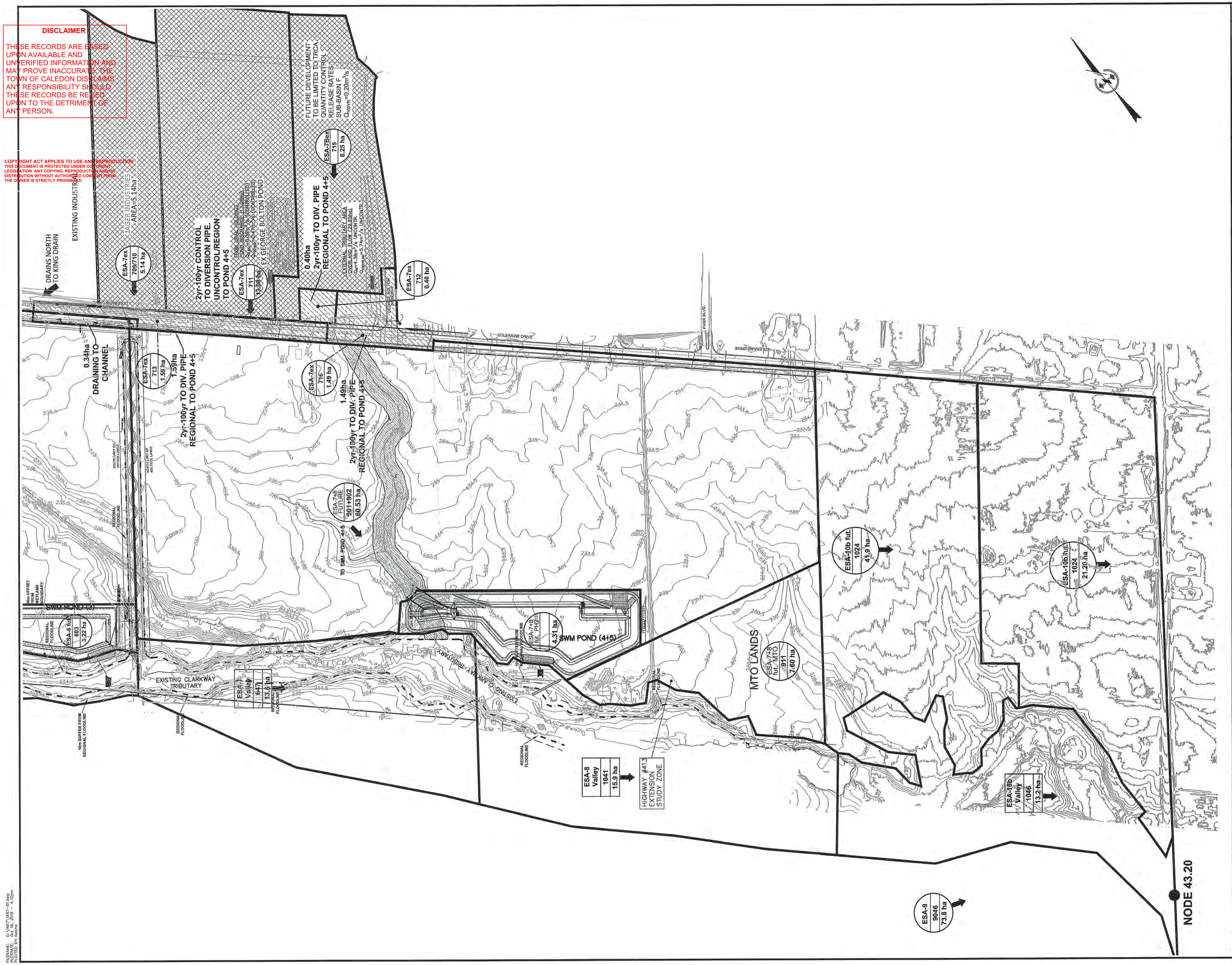
REV. DATE: DECEMBER 2015

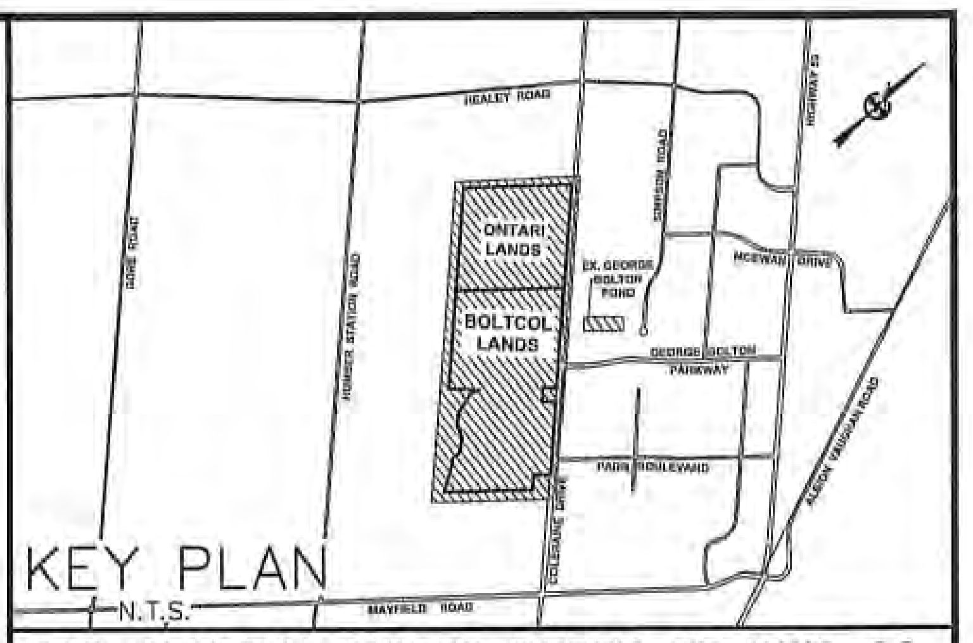
APPROVED BY: S.D.	DRAWN BY: AINLEY GROUP
STD. DWG. NUMBER: 1-7-7	SCALE: N.T.S.

REGION OF PEEL NOTES:

1. All materials and construction methods must correspond to the current Peel Public Works standards and specifications.
2. Watermain and / or water service materials 100 mm (4") and larger must be PVC DR 18 AWWA C900. Size 50 mm (2") and smaller must be copper Type K Soft Copper ASTM B88-49, STD DWG 1-7-1.
3. Watermains and / or water services are to have a minimum cover of 1.7 m (5'6") with a minimum horizontal spacing of 1.2 m (4") from themselves and all other utilities.
4. Provisions for flushing water line prior to testing, etc. must be provided with at least a 50 mm (2") outlet on 100 mm (4") and larger lines. Copper lines are to have flushing points at the end, the same size as the line. They must also be hosed or piped to allow the water to drain onto a parking lot or down a drain. On fire lines, flushing outlet to be 100 mm (4") diameter minimum on a hydrant.
5. All curb stops to be 3.0 m (10') off the face of the building unless otherwise noted.
6. Hydrant and valve set to Region standard 1 - 6 - 1 Dimension A and B, 0.7 m (2') and 0.9 m (3') and to have pumper nozzle.
7. Watermains to be installed to grades as shown on approved site plan. Copy of grade sheet must be supplied to inspector prior to commencement of work, where requested by inspector.
8. Watermains must have a minimum vertical clearance of 0.3 m (12") over / 0.5 m (20") under sewers and all other utilities when crossing.
9. All proposed water piping must be isolated from existing lines in order to allow independent pressure testing and chlorinating from existing systems.
10. All live tapping and operation of Region water valves shall be arranged through the Regional Inspector assigned or by contacting the Operations and Maintenance Division.
11. Location of all existing utilities in the field to be established by the contractor.
12. The contractor(s) shall be solely responsible for locates, exposing, supporting and protecting of all underground and overhead utilities and structures existing at the time of construction in the area of their work whether shown on the plans or not and for all repairs and consequences resulting from damage to same.
13. The contractor(s) shall be solely responsible to give 72 hours written notice to the utilities prior to crossing such utilities, for the purpose of inspection by the concerned utility. This inspection will be for the duration of the construction, with the contractor responsible for all costs arising from such inspection.
14. All proposed water piping must be isolated through a temporary connection that shall include an appropriate cross-connection control device, consistent with the degree of hazard, for backflow prevention of the active distribution system, conforming to Region of Peel standards 1-7-7 or 1-7-8.

REFER TO REGION OF PEEL WEBSITE FOR CURRENT STANDARDS:
http://www.peelregion.ca/pw/standards/linear/





KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C2

LEGEND

-250.65-	EXISTING CONTOUR
▪ ▪ ▪	POST-DEVELOPMENT REGIONAL FLOODLINE
– – – –	10m TRCA FLOODPLAIN SETBACK
ESA-5a fut.	URBAN CATCHMENT I.D.
74.7 ha	DRAINAGE AREA
ESA-8 valley	RURAL CATCHMENT I.D.
15.1 ha	DRAINAGE AREA
➡	DRAINAGE AREA FLOW DIRECTION
▩	DRAINAGE AREA DIVERTED TO NEW CHANNEL FOR 2 YEAR – 100 YEAR STORM EVENT WITH ON-SITE CONTROLS, REGIONAL TO POND 4+5
▨	DRAINAGE AREA DIVERTED TO NEW CHANNEL FOR 2 YEAR – 100 YEAR STORM EVENT REGIONAL DRAINAGE TO POND 4+5

TOWN OF CALEDON

APPROVED AS NOTED

THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.

DATE: Nov 5/19
APPROVED BY: C. Blakely
MANAGER OF DEVELOPMENT EAST COMMUNITY SERVICES

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
4	OCT 16/19	F.P.	ISSUED FOR CONSTRUCTION
3	JULY 29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
2	APR. 2/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
1	NOV/18	F.P.	ISSUED TO TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM 4+5

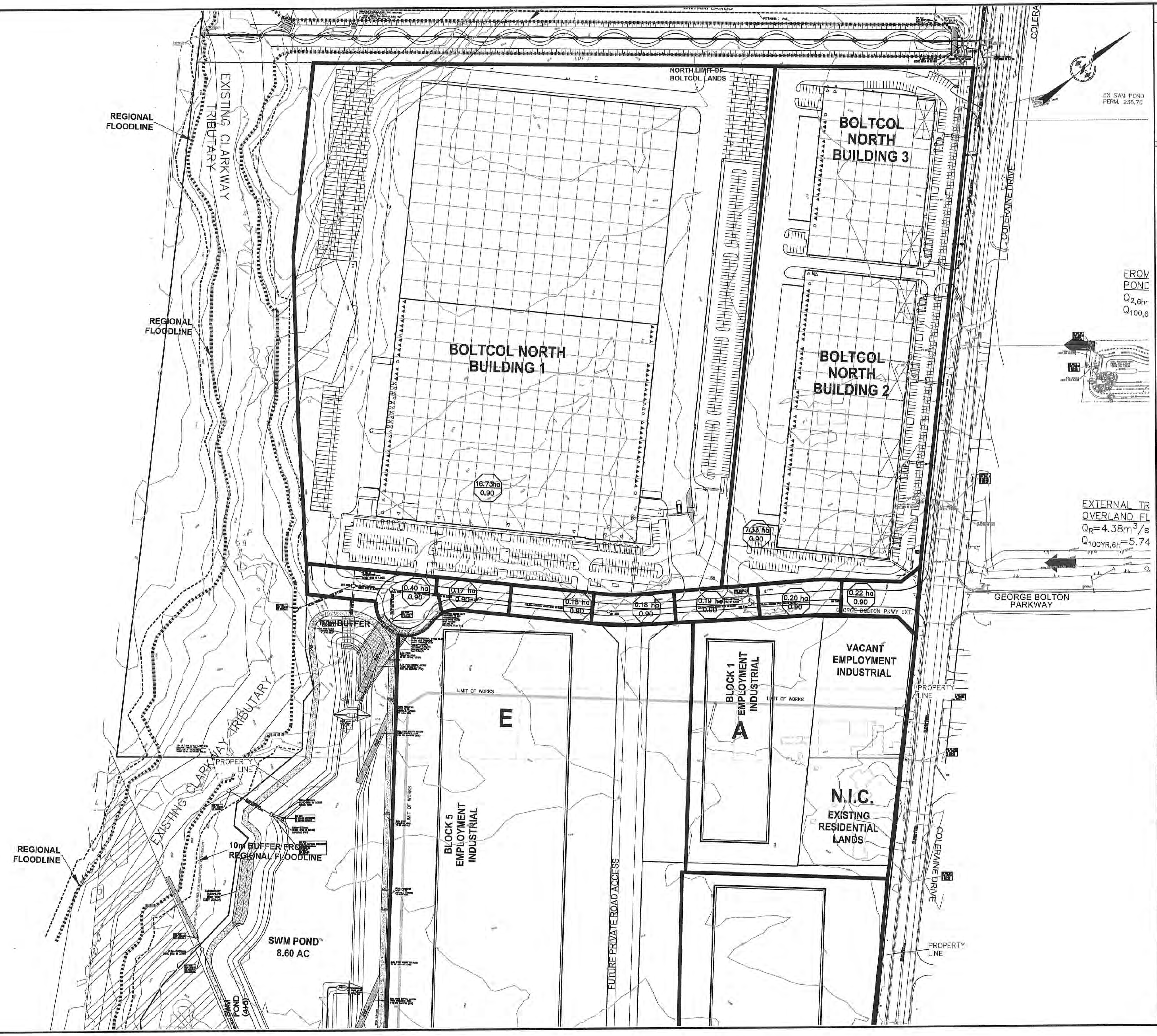
TOWN OF CALEDON
REGION OF PEEL

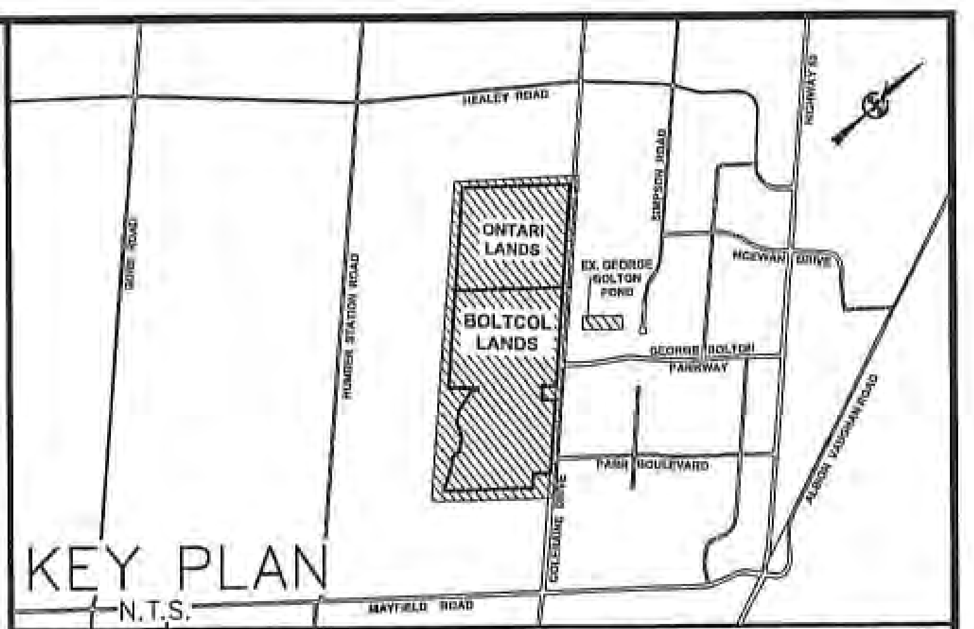
STORM DRAINAGE AREA PLAN

SP 18-04A

SCALE: 1:3000	DATE: JAN 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. S1
DESIGNED: F.P.	SHEET 1 OF 3	

REV: 4





KEY PLAN

N.T.S.

FOR GENERAL NOTES REFER TO DWG C2

LEGEND

-250.65-	EXISTING CONTOUR
▪▪▪▪▪▪▪▪	POST-DEVELOPMENT REGIONAL FLOODLINE
------------	10m TRCA FLOODPLAIN SETBACK
ESA-5a fut. 74.7 ha	URBAN CATCHMENT I.D. DRAINAGE AREA
ESA-8 valley 15.1 ha	RURAL CATCHMENT I.D. DRAINAGE AREA
➡	DRAINAGE AREA FLOW DIRECTION
▨	DRAINAGE AREA DIVERTED TO NEW CHANNEL FOR 2 YEAR – 100 YEAR STORM EVENT WITH ON-SITE CONTROLS, REGIONAL TO POND 4+5
0.26 ha 0.90	AREA (HECTARES) RUN-OFF CO-EFFICIENT

RECEIVED
NOV 06 2019
PLANNING DEPARTMENT

TOWN OF CALEDON
APPROVED AS NOTED
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DATE: Nov 5/19
APPROVED BY: C. Blakely
MANAGER OF DEVELOPMENT EAST COMMUNITY SERVICES

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A. M. CANDARAS

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2	APR 2/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
1	NOV/18	F.P.	ISSUED TO TOWN OF CALEDON

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BOLTCOL NORTH GEORGE BOLTON PARKWAY EXTENSION + SWM 4+5

TOWN OF CALEDON
REGION OF PEEL

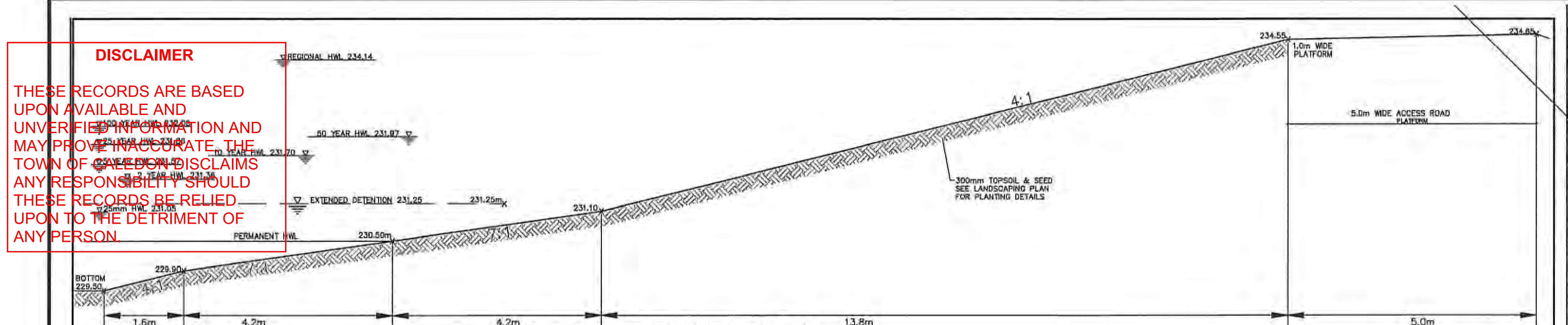
STORM DRAINAGE AREA PLAN GEORGE BOLTON STORM SEWERS

SP 18–04A

SCALE: 1:1500	DATE: JAN 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. S2
DESIGNED: F.P.	SHEET 2 OF 3	

REV: 4

FILENAME: G:\1667\1667–S2.dwg
PLOTDATE: Oct 25, 2019 – 4:14pm
PLOTTED BY: fsancha

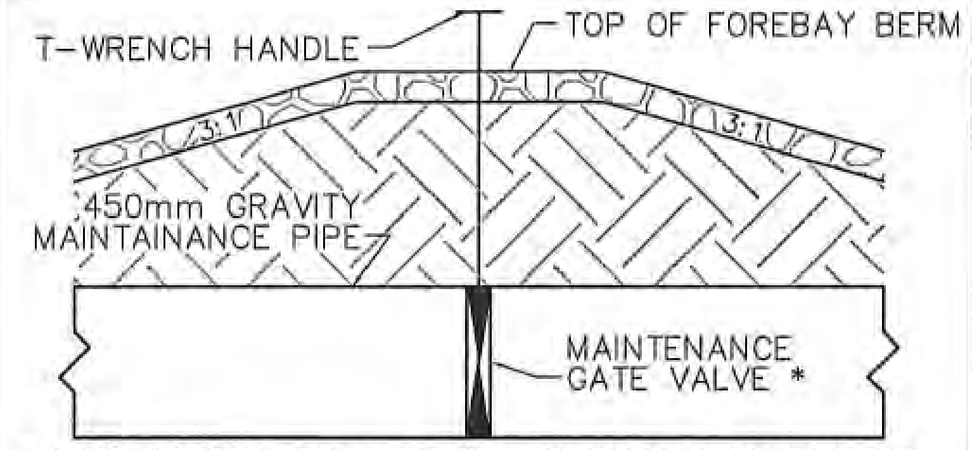


SWM FACILITY #(4+5)
TYPICAL CROSS SECTION

SCALE 1:50

SITE DEWATERING

1. THE INLET PUMP HEAD MUST BE WRAPPED IN FILTER FABRIC, SITUATED ON A BED OF RIP-RAP WITHIN THE WATERCOURSE. AS AN ALTERNATIVE TO SCREENING, A PILE OF CLEAR STONE MAY BE PLACED OVER THE PUMP TO COMPLETELY COVER THE PUMP HEAD. PUMPS MUST NOT ENTRAIN FISH OR OTHER AQUATIC SPECIES
2. OUTLET PUMP MUST DISCHARGE TO A SEDIMENT BAG OR SEDIMENT TRAP/BASIN
3. DISCHARGE FROM THE SEDIMENT BAG IS TO BE RELEASED AT A VEGETATED LOCATION. IF UNAVAILABLE, THE SEDIMENT BAG IS TO BE PLACED OVER A FLOW DISSIPATING STRUCTURE
4. SEDIMENT TRAP OR BASIN SHOULD BE PROTECTED WITH SEDIMENT FENCE INSTALLED AROUND ITS PERIMETER
5. DEWATERING TO A WELL VEGETATED, GRASSED ARE MAY BE PERMITTED PROVIDED THAT THE PUMP OUTLET HEAD IS LOCATED AT LEAST 30 METERS FROM THE RECEIVING WATER BODY



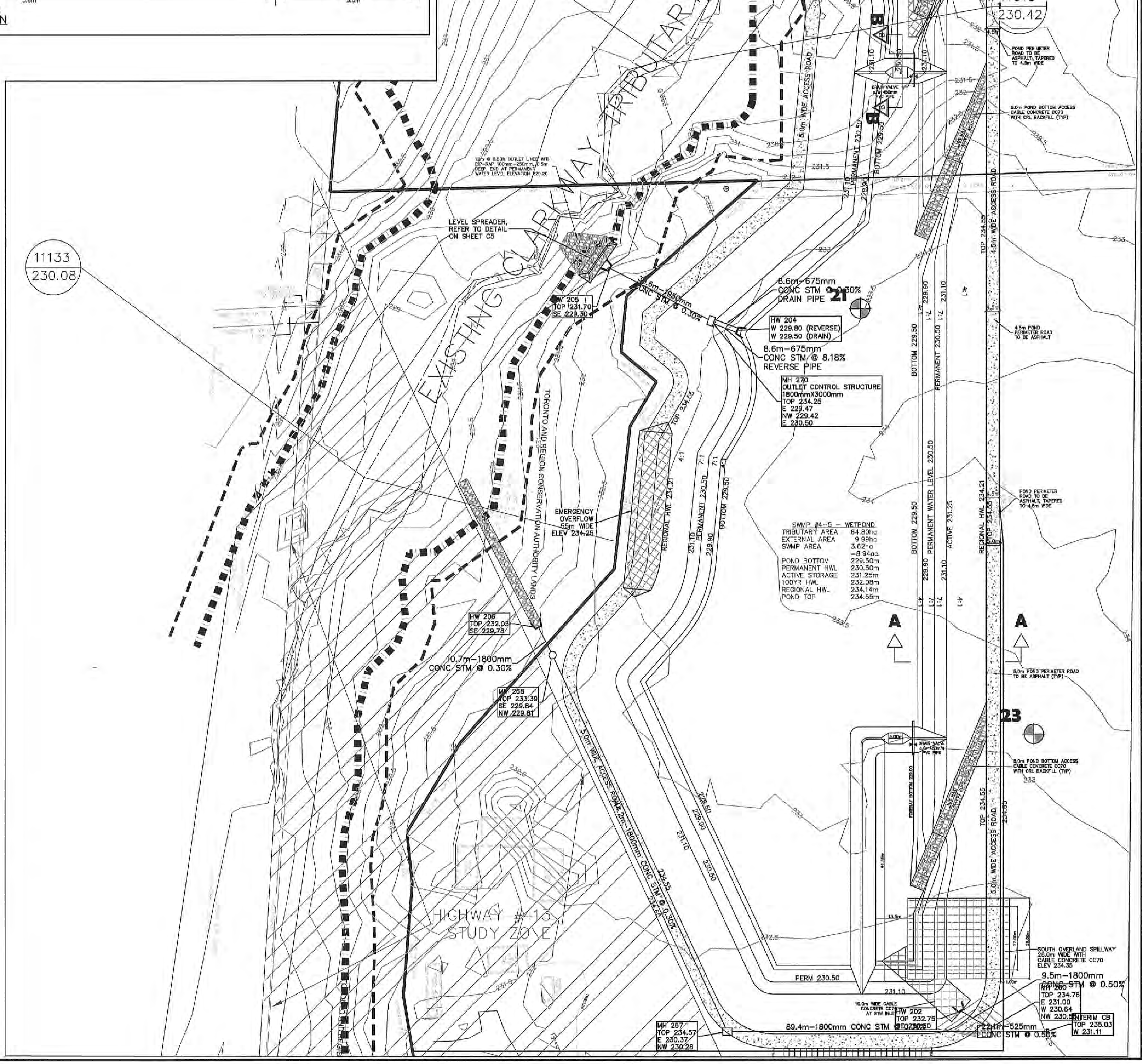
* MAINTENANCE GATE VALVE TO REMAIN CLOSED AT ALL TIMES & OPENED ONLY DURING MAINTENANCE PROCESS IN ORDER TO DRAIN SWM FACILITY.

MAINTENANCE GATE VALVE DETAIL

N.T.S.

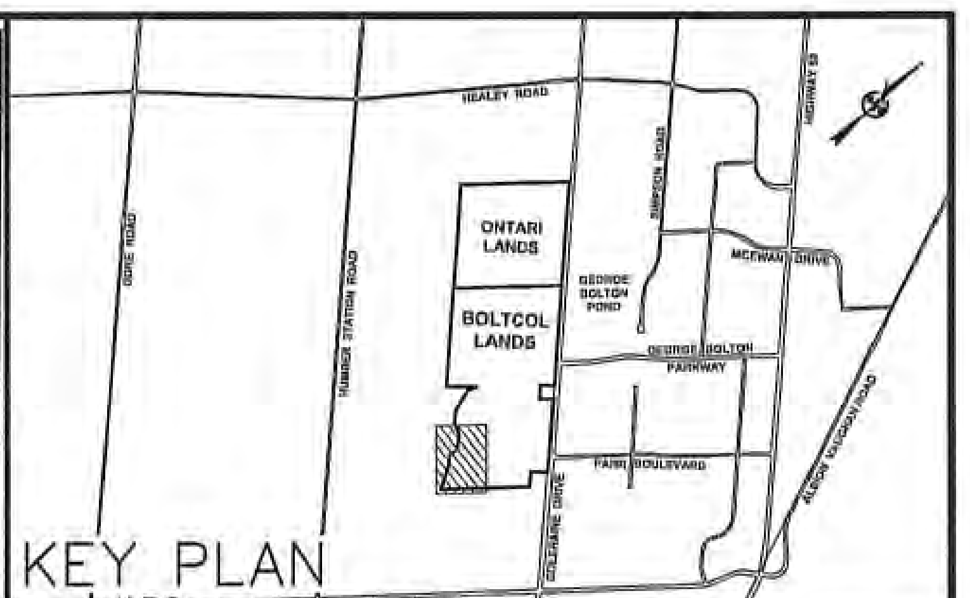
LEGEND: POND AREA HATCH

░	POND 5.0m WIDE PERIMETER ACCESS ROAD: – 40mm HL3 – 50mm HL8 – 200mm CRUSHER RUN LIMESTONE
▦	POND OVERLAND SPILLWAY: CABLE CONCRETE
▨	ACCESS ROAD TO BOTTOM OF POND: CABLE CONCRETE WITH CRUSHER RUN LIMESTONE BACKFILL



SWMP #4+5 – WETPOND

TRIBUTARY AREA	64.80ha
EXTERNAL AREA	9.99ha
SWMP AREA	3.62ha =8.94ac.
POND BOTTOM	229.50m
PERMANENT HWL	230.50m
ACTIVE STORAGE	231.25m
100YR HWL	232.08m
REGIONAL HWL	234.14m
POND TOP	234.55m



KEY PLAN

N.T.S.

FOR GENERAL NOTES REFER TO DWG C4

LEGEND

×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
■ ▬ ■	EXISTING REGIONAL FLOODLINE
– – – –	10m TRCA FLOODPLAIN SETBACK
□	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
⊡	PROPOSED CATCHBASIN MANHOLE
⋈	VALVE AND BOX
⊖	VALVE AND CHAMBER
♁	HYDRANT AND VALVE

TOWN OF CALEDON

APPROVED AS NOTED

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DATE: Nov. 5/19

APPROVED BY: C. Blakely

DIRECTOR OF PUBLIC WORKS & ENGINEERING

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

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OCT 16/19
A. M. CANDARAS

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9	OCT 16/19	F.P.	ISSUED FOR CONSTRUCTION
8	JUNE 18/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION
7	APR. 2/19	F.P.	ISSUED TO TOWN OF CALEDON
6	OCT.24/18	F.P.	ISSUED TO TOWN OF CALEDON
5	MAR.21/18	F.P.	ISSUED TO TOWN OF CALEDON
4	JULY.7/17	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
1	AUG./16	F.P.	FIRST SUBMISSION – TRCA

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BOLTCOL NORTH
GEORGE BOLTON PKWY EXT
+ SWM POND 4+5

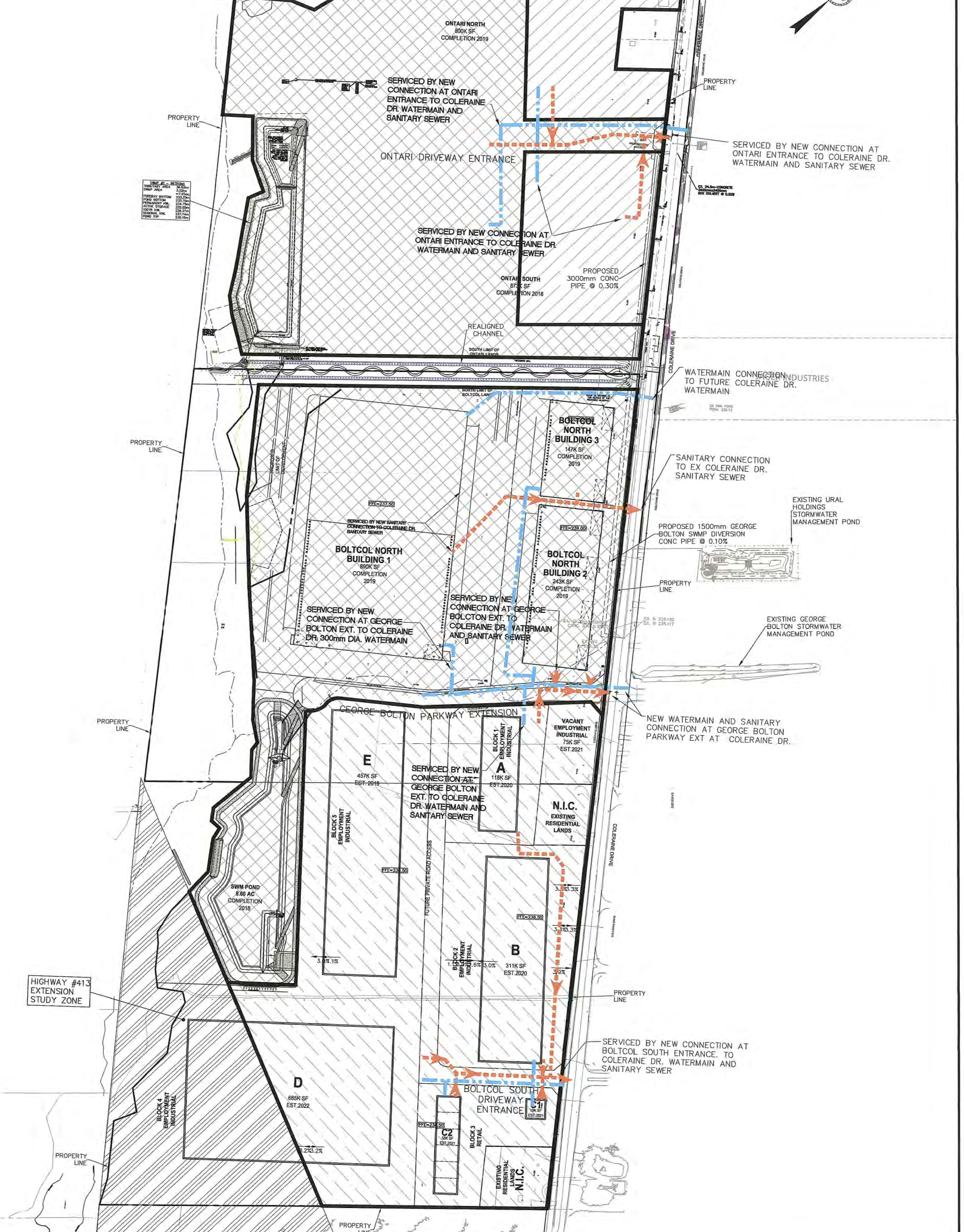
TOWN OF CALEDON
REGION OF PEEL

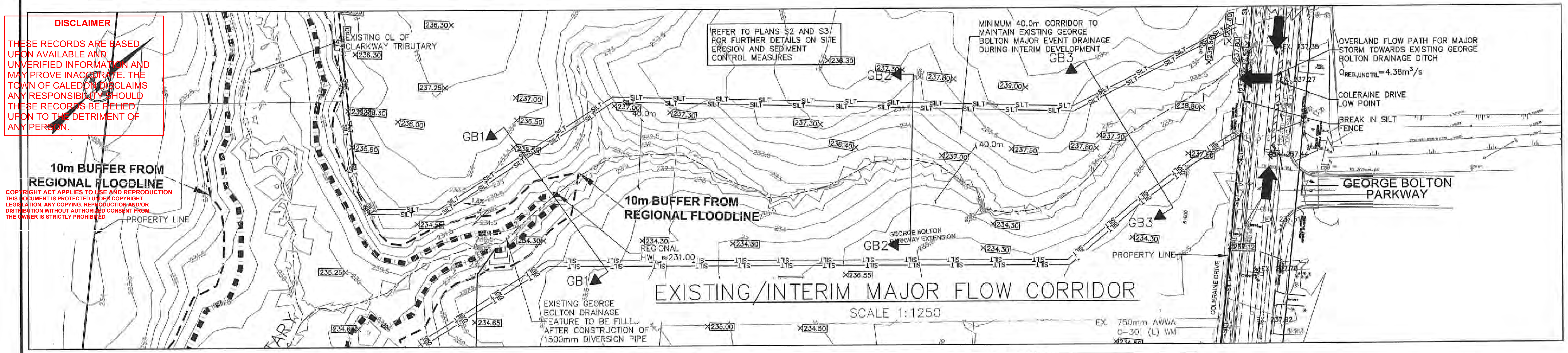
STORMWATER MANGEMENT
POND #(4+5)

REGION FILE#: C02.311
SPA 18-0004

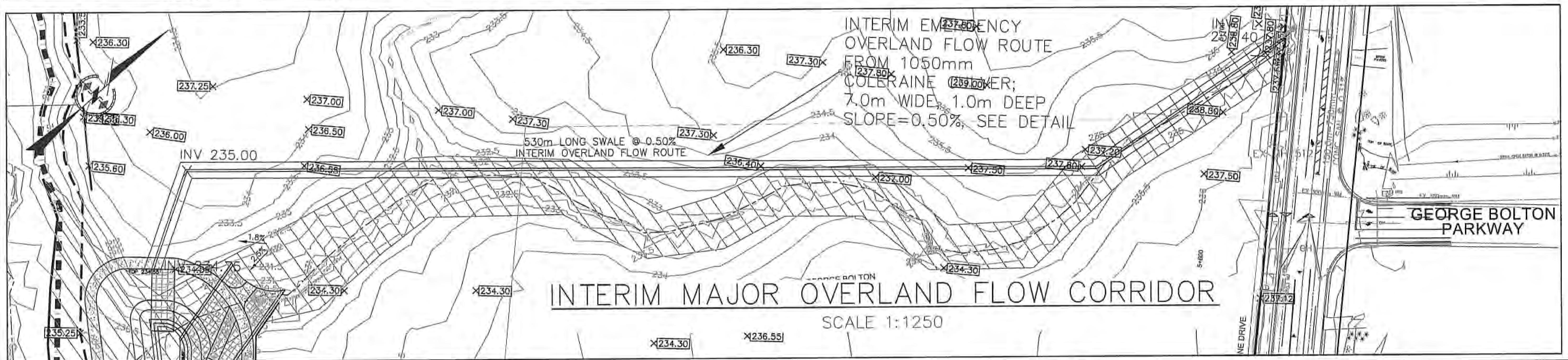
SCALE: 1:750	DATE: JULY 2016	PROJ No. 1667
DRAWN: Z.S.S.	CHK'D: A.M.C.	PLAN No. S3
DESIGNED: Z.S.S.	SHEET 3 OF 10	

REV 9

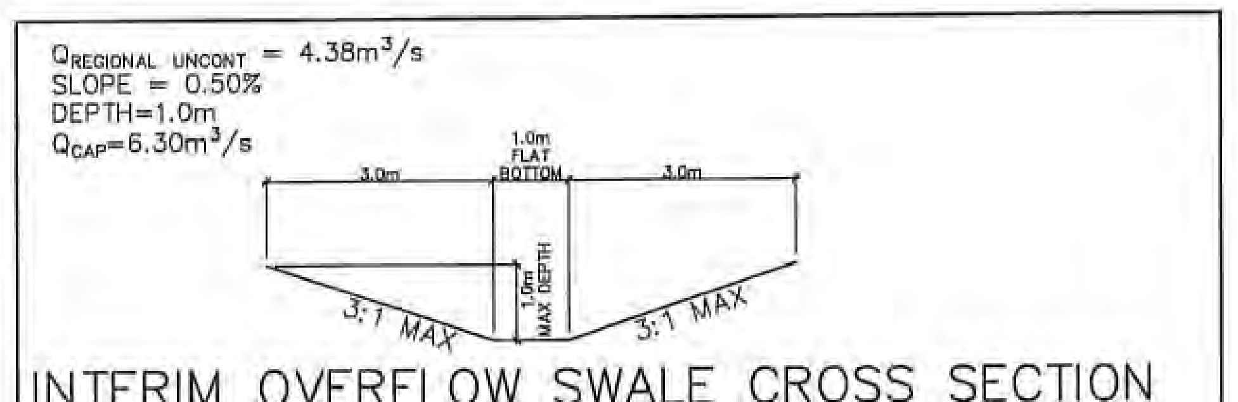

ONTARI NORTH
800K SF
COMPLETION 2019
SERVICED BY NEW CONNECTION AT ONTARI ENTRANCE TO COLERAINE DR. WATERMAIN AND SANITARY SEWER
PROPERTY LINE
SERVICED BY NEW CONNECTION AT ONTARI ENTRANCE TO COLERAINE DR. WATERMAIN AND SANITARY SEWER
ONTARI DRIVEWAY ENTRANCE
PROPERTY LINE
EX. 24.5m-CONCRETE 3400mmx3400mm BOX CULVERT @ 0.30%
SERVICED BY NEW CONNECTION AT ONTARI ENTRANCE TO COLERAINE DR. WATERMAIN AND SANITARY SEWER
ONTARI SOUTH
873K SF
COMPLETION 2018
PROPOSED 3000mm CONC PIPE @ 0.30%
REALIGNED CHANNEL
SOUTH LIMIT OF ONTARI LANDS
COLERAINE DRIVE
WATERMAIN CONNECTION TO FUTURE COLERAINE DR. WATERMAIN
JAGER INDUSTRIES
NORTH LIMIT OF BOLTCOL LANDS
PROPERTY LINE
PROPOSED LIMIT OF DEVELOPMENT
BOLTCOL NORTH BUILDING 3
147K SF
COMPLETION 2019
SANITARY CONNECTION TO EX COLERAINE DR. SANITARY SEWER
FFE=237.50
SERVICED BY NEW SANITARY CONNECTION TO COLERAINE DR. SANITARY SEWER
FFE=239.00
EXISTING URAL HOLDINGS STORMWATER MANAGEMENT POND
PROPOSED 1500mm GEORGE BOLTON SWMP DIVERSION CONC PIPE @ 0.10%
BOLTCOL NORTH BUILDING 1
890K SF
COMPLETION 2019
BOLTCOL NORTH BUILDING 2
243K SF
COMPLETION 2019
PROPERTY LINE
SERVICED BY NEW CONNECTION AT GEORGE BOLTON EXT. TO COLERAINE DR. 300mm DIA. WATERMAIN
SERVICED BY NEW CONNECTION AT GEORGE BOLCTON EXT. TO COLERAINE DR. WATERMAIN AND SANITARY SEWER
EXISTING GEORGE BOLTON STORMWATER MANAGEMENT POND
PROPERTY LINE
GEORGE BOLTON PARKWAY EXTENSION
NEW WATERMAIN AND SANITARY CONNECTION AT GEORGE BOLTON PARKWAY EXT AT COLERAINE DR.
VACANT EMPLOYMENT INDUSTRIAL
75K SF
EST.2021
BLOCK 1 EMPLOYMENT INDUSTRIAL
E
457K SF
EST. 2019
SERVICED BY NEW CONNECTION AT GEORGE BOLTON EXT. TO COLERAINE DR. WATERMAIN AND SANITARY SEWER
A
118K SF
EST.2020
N.I.C.
EXISTING RESIDENTIAL LANDS
BLOCK 5 EMPLOYMENT INDUSTRIAL
COLERAINE DRIVE
FUTURE PRIVATE ROAD ACCESS
SWM POND
8.60 AC
COMPLETION 2018
FFE=238.50
B
311K SF
EST.2020
BLOCK 2 EMPLOYMENT INDUSTRIAL
HIGHWAY #413 EXTENSION STUDY ZONE
PROPERTY LINE
SERVICED BY NEW CONNECTION AT BOLTCOL SOUTH ENTRANCE. TO COLERAINE DR. WATERMAIN AND SANITARY SEWER
D
685K SF
EST.2022
BOLTCOL SOUTH DRIVEWAY ENTRANCE
C1
10K SF
EST.2021
C2
58K SF
EST.2021
BLOCK 4 EMPLOYMENT INDUSTRIAL
BLOCK 3 RETAIL
EXISTING RESIDENTIAL LANDS
N.I.C.
PROPERTY LINE
PROPERTY LINE



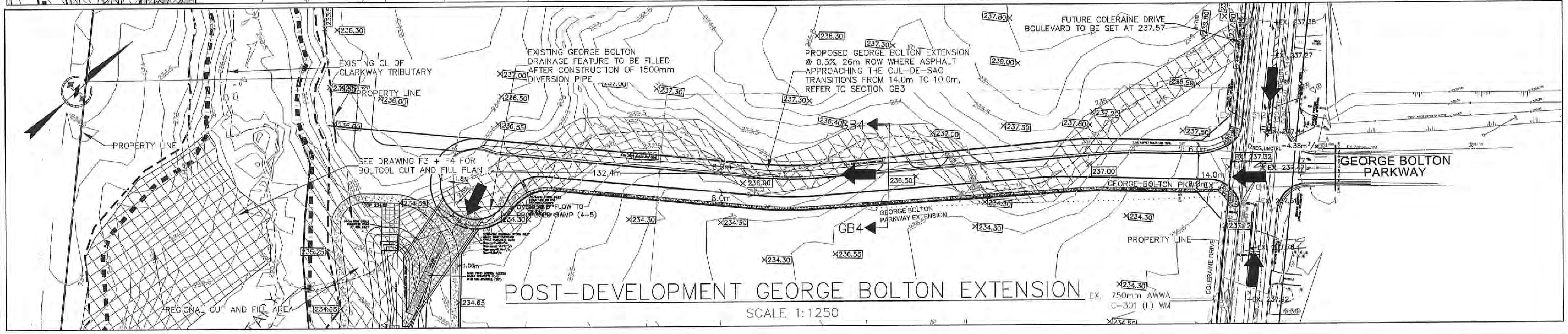
EXISTING/INTERIM MAJOR FLOW CORRIDOR
SCALE 1:1250



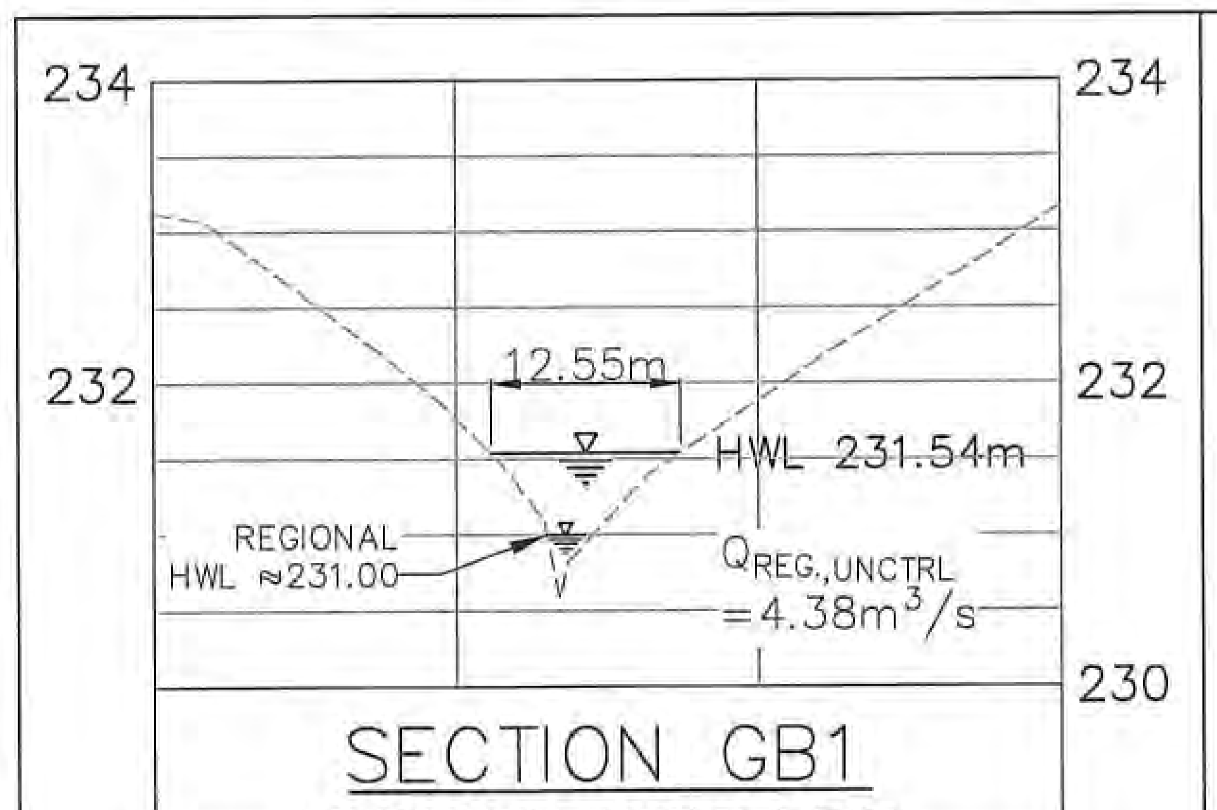
INTERIM MAJOR OVERLAND FLOW CORRIDOR
SCALE 1:1250



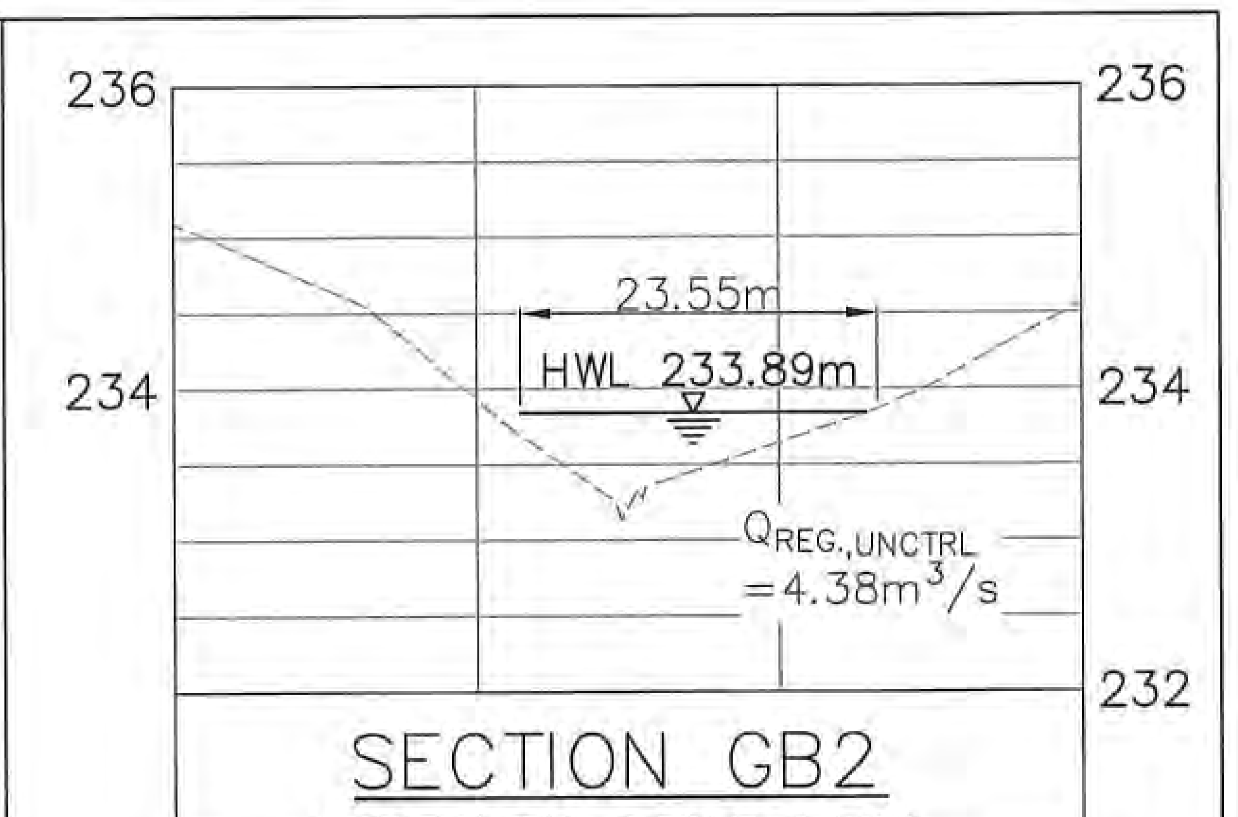
INTERIM OVERFLOW SWALE CROSS SECTION
BOLTCOL NORTH WATERCOURSE DIVERSION
SCALE: 1:500



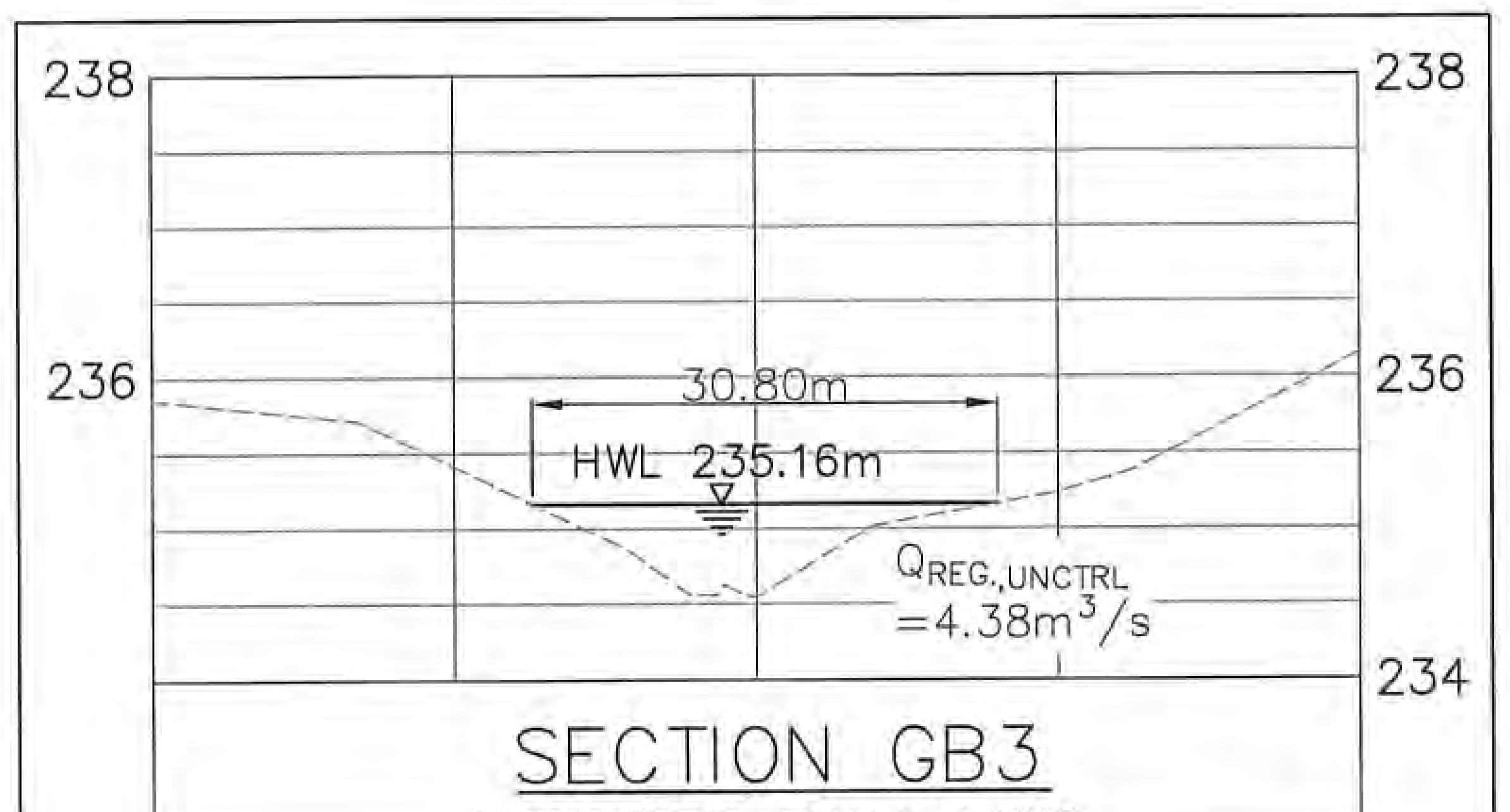
POST-DEVELOPMENT GEORGE BOLTON EXTENSION
SCALE 1:1250



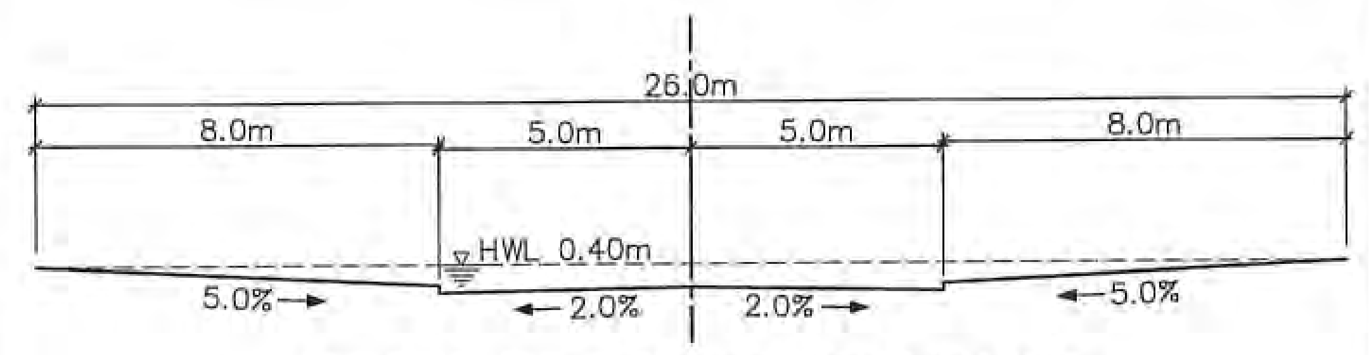
SECTION GB1
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50



SECTION GB2
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50

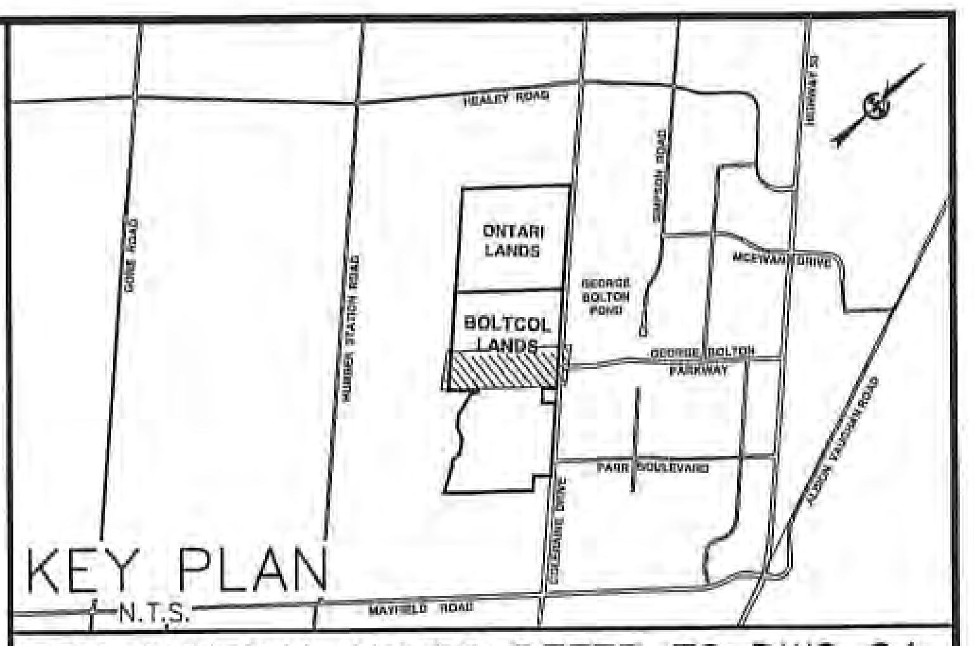


SECTION GB3
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50



26m R.O.W. 10.0m PAVEMENT CAPACITY AT 0.5%
$Q_{REG.,UNCTRL}=4.38m^3/s$
$Q_{CAPACITY}=10.31m^3/s$, HWL 0.40m

SECTION GB4
GEORGE BOLTON EXTENSION
SCALE 1:150



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C4

LEGEND

×234.20	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
■ ▬ ■	EXISTING REGIONAL FLOODLINE
- - - -	10m TRCA FLOODPLAIN SETBACK
□	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
⊡	PROPOSED CATCHBASIN MANHOLE
⋈	VALVE AND BOX
⊖	VALVE AND CHAMBER
⊕	HYDRANT AND VALVE
—SILT—	SILT FENCE
▧	FILL AREA
▩	REGIONAL COMPENSATION CUT AREA
▨	40.0 INTERIM CORRIDOR
▬ ▬	WETLAND BOUNDARY
▬ ⁞ ▬	30m WETLAND BUFFER
⬅	OVERLAND FLOW

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

TOWN OF CALEDON
APPROVED AS NOTED
THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.
THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.
DATE: Nov 5/19
APPROVED BY: C. Blakely
DIRECTOR OF PUBLIC WORKS & ENGINEERING

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
9	OCT 16/19	F.P.	ISSUED FOR CONSTRUCTION
8	JUNE 18/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
7	APR 2/19	F.P.	ISSUED TO TOWN OF CALEDON
6	JUNE 4/18	F.P.	FINAL SUBMISSION TRCA – PRE-GRADING PERMIT
5	FEB.9/18	F.P.	ISSUED FOR SPA TO TOWN OF CALEDON
4	JULY.7/17	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
1	NOV.4/16	F.P.	REVISED AS PER TRCA COMMENTS

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905–850–8020 Fax 905–850–8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY
EXTENSION + SWM POND 4+5

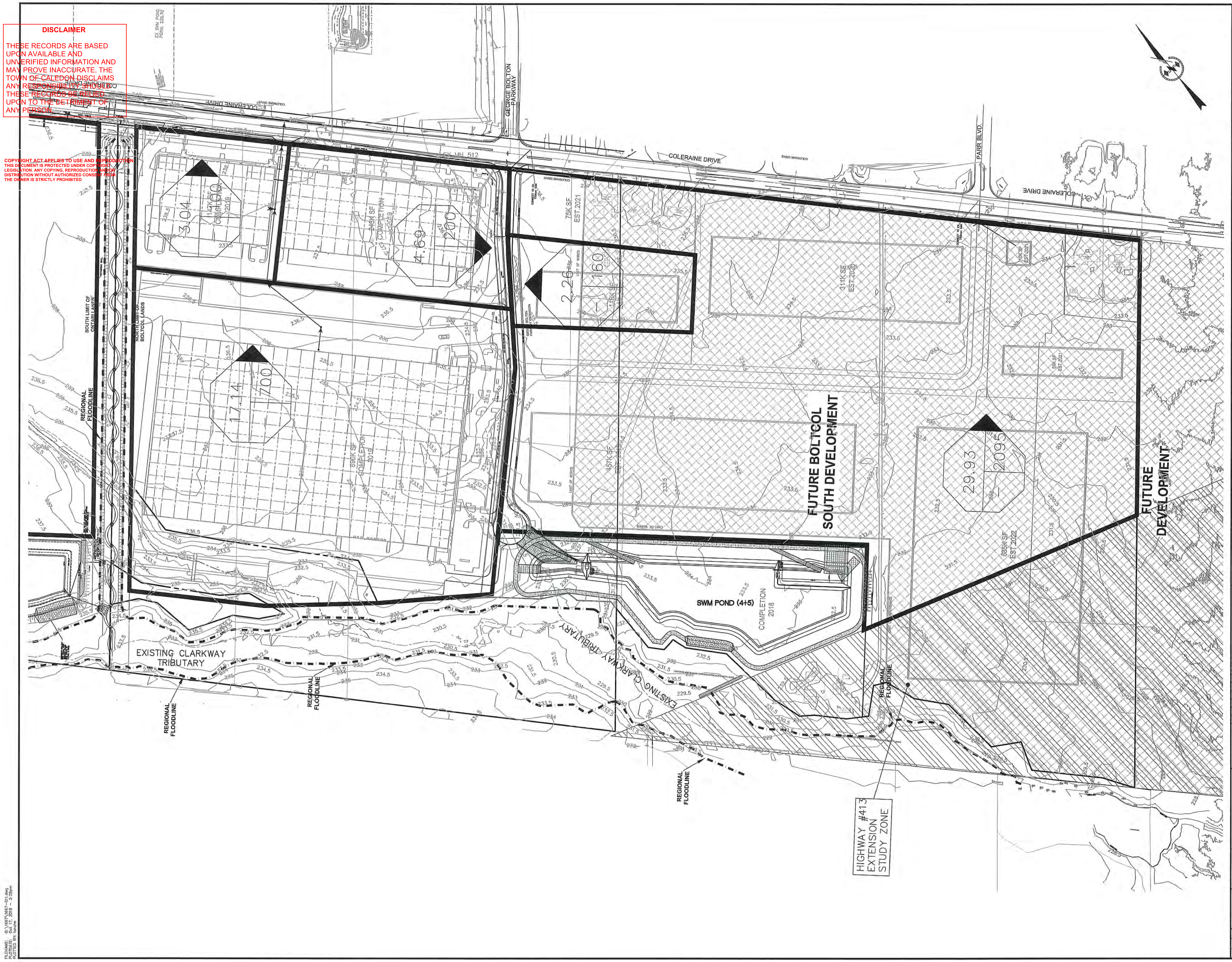
TOWN OF CALEDON
REGION OF PEEL

GEORGE BOLTON EXT INTERIM AND POST-DEVELOPMENT DRAINAGE PLAN

REGION FILE#: C02.311
SP 17–0059

SCALE: 1:1250	DATE: JULY 2016	PROJ No. 1667
DRAWN: Z.S.S.	CHK'D: A.M.C.	PLAN No. S10
DESIGNED: Z.S.S.	SHEET 10 OF 10	

REV 9



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C4

LEGEND

-250.65-	EXISTING CONTOUR
▬	SANITARY DRAINAGE AREA BOUNDARY
32.72	SANITARY DRAINAGE AREA (ha)
▶	DRAINAGE AREA FLOW DIRECTION
2290	ESTIMATED POPULATION, BASED ON 70 people/ha
–	LOT COUNT

RECEIVED
NOV 0 4 2019
PLANNING DEPARTMENT

TOWN OF CALEDON
APPROVED
AS NOTED
THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.

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DATE: Nov 5/19
APPROVED BY: C. Blakely
DIRECTOR OF PUBLIC WORKS & ENGINEERING

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LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
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OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
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OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
5	OCT 16/19	F.P.	ISSUED FOR CONSTRUCTION
4	SEPT 30/19	F.P.	ISSUED TO REGION OF PEEL
3	JULY 29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
2	OCT./18	F.P.	ISSUED TO TOWN OF CALEDON
1	MAR.21/18	F.P.	ISSUED TO TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION

TOWN OF CALEDON
REGION OF PEEL

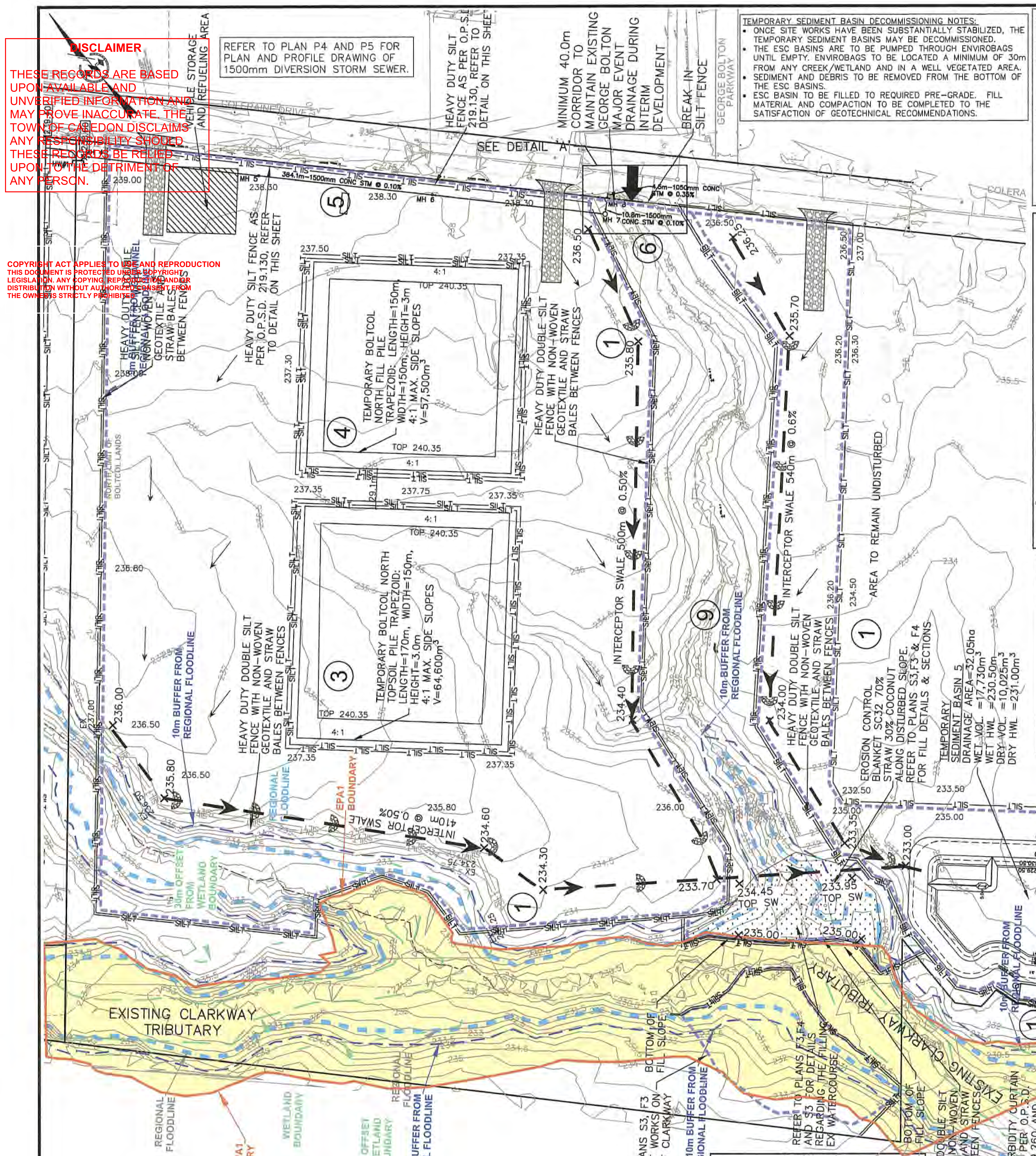
SANITARY DRAINAGE AREA PLAN

REGION FILE#: C02.311
SPA 18-04A

SCALE: 1:2000	DATE: OCT 2018	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. S11
DESIGNED: F.P.	SHEET 11 OF 13	

REV: 5

FILENAME: G:\1667\1667-S11.dwg
PLOTDATE: Oct 17, 2019 - 3:25pm
PLOTTED BY: fonche



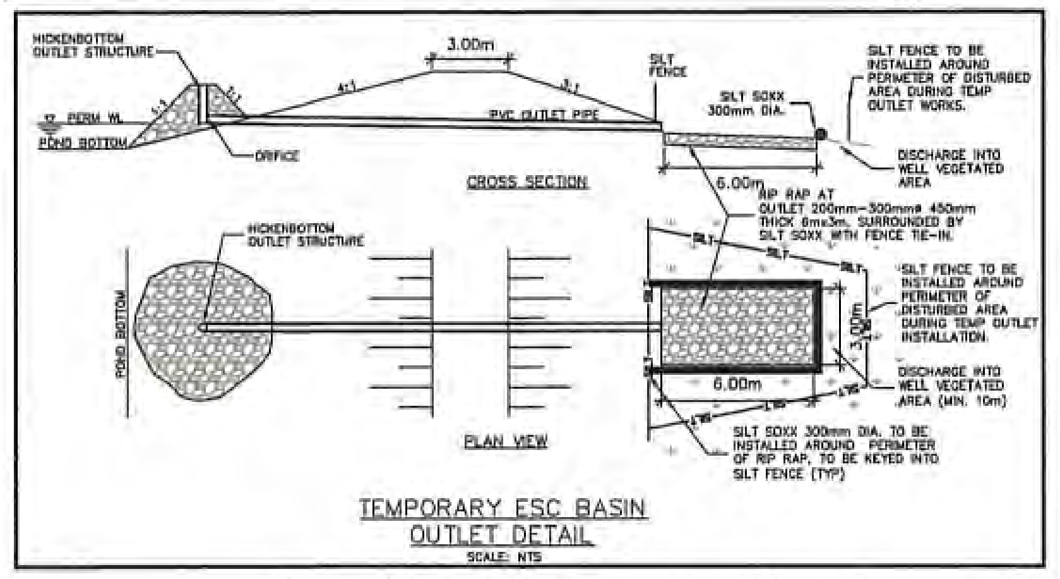
TEMPORARY SEDIMENT BASIN DECOMMISSIONING NOTES:

- ONCE SITE WORKS HAVE BEEN SUBSTANTIALLY STABILIZED, THE TEMPORARY SEDIMENT BASINS MAY BE DECOMMISSIONED.
- THE ESC BASINS ARE TO BE PUMPED THROUGH ENVIROBAGS UNTIL EMPTY. ENVIROBAGS TO BE LOCATED A MINIMUM OF 30m FROM ANY CREEK/WETLAND AND IN A WELL VEGETATED AREA.
- SEDIMENT AND DEBRIS TO BE REMOVED FROM THE BOTTOM OF THE ESC BASINS.
- ESC BASIN TO BE FILLED TO REQUIRED PRE-GRADE. FILL MATERIAL AND COMPACTION TO BE COMPLETED TO THE SATISFACTION OF GEOTECHNICAL RECOMMENDATIONS.

STABILIZATION NOTES:

- PROVIDE TEMPORARY STABILIZATION FOR AREAS THAT ARE BEING DISTURBED
- REFER TO PLAN S3 FOR EROSION BLANKET DETAIL AND PLAN L1 FOR SEED NOTES.
- ALL ESC POND SLOPES AND INTERCEPTOR SWALES TO BE EFFECTIVELY STABILIZED WITH VEGETATION PRIOR TO RECEIVING ANY WATER FLOWS TO PREVENT SOIL EROSION. TEMP SEEDING TO CONSIST OF ANNUAL RYE GRASS, 25 kg/ha. ALTERNATE MEASURE TO BE PROVIDED OUTSIDE OF GROWING SEASON, SUCH AS EROSION CONTROL BLANKETS.
- REFER TO PLANS S13 FOR STAGING PLAN, INCLUDING PUMP DETAILS
- SITE TO BE STABILIZED BEFORE RECEIVING FLOWS
- SILT FENCE TO BE INSTALLED ALONG NEW CHANNEL CORRIDOR ONCE CONSTRUCTED.
- MECHANICAL SEEDING TO BE APPLIED TO VEGETATE ANY DISTURBED SURFACE THAT IS TO BE LEFT EXPOSED FOR 30 DAYS OR GREATER AND FOR AREAS THAT ARE AT FINAL GRADE.
- TOPSOIL PILES LEFT LONGER THAN 6 MONTHS TO BE STABILIZED BY ESTABLISHING GROUNDCOVER VEGETATION WITH A NON-INVASIVE SPECIES, IE: SEEDED COMPOST OR SEEDED BIODEGRADABLE MATS. TEMP SEEDING MIX TO CONSIST OF ANNUAL RYE GRASS 25kg/ha.

FILL HAUL ROUTE
SCALE: NTS



TEMPORARY ESC BASIN OUTLET DETAIL
SCALE: NTS

1500mm DIVERSION STORM SEWER CONSTRUCTION PHASING

1. INSTALL SEDIMENT AND EROSION CONTROLS THROUGH OUT THE AREA OF DISTURBANCE.
2. CONSTRUCT TEMPORARY SEDIMENT BASIN 5.
3. COMMENCE EARTHWORKS AND ENGINEERING FILL PLACED ON SITE.
4. COMMENCE CONSTRUCTION OF 1500mm DIVERSION STORM SEWER, BEGINNING AT NORTH LIMIT AT OUTLET TO NEW CHANNEL AND PROCEEDING SOUTH TO MH 7.
5. BEGIN INSTALLATION OF 1500mm STORM EAST OF MH 7, TERMINATING PRIOR TO MH 8, WEST OF THE EXISTING HEADWALL, ALLOWING EXISTING WATERCOURSE TO REMAIN IN PLACE. COMPLETE CCTV INSPECTION OF NEWLY CONSTRUCTED 1500mm AND 1050mm PIPES AND COMMISSION .
6. INSTALL IMPERMEABLE PEA GRAVEL BAG DAM INSIDE EXISTING 1050mm OUTLET HEADWALL TO 3/4 DEPTH OF OUTLET PIPE. INSTALL PUMP ON UPSTREAM SIDE OF IMPERMEABLE DAM INSIDE EXISTING 1050mm PIPE. PUNCH HOLE THROUGH TOP OF EXISTING 1050mm AND FEED PUMP HOSE THROUGH, TO DISCHARGED DOWNSTREAM TO EXISTING WATERCOURSE. REFER TO STAGING DETAIL A.
7. REMOVE EXISTING 1050mm HEADWALL AND INSTALL REMAINING 2 LENGTHS OF 1050mm PIPE TO CONNECT EXISTING CULVERT TO NEW 1050mm.
8. REMOVE IMPERMEABLE PEA GRAVEL BAGS FROM INSIDE 1050mm. REMOVE PUMP FROM INSIDE 1050mm PIPE. PARGE HOLE IN 1050mm PIPE FROM PUMP HOSE. FLOWS NOW DIVERTED NORTH TO CHANNEL.
9. COMPLETE FILL WORKS OF EXISTING EAST-WEST WATERCOURSE, CUT WORKS ON WEST SIDE. REFER TO PLANS S3, F3 & F4 FOR CUT/FILL WORKS NEAR CLARKWAY TRIBUTARY.

SITE DEWATERING

1. THE INLET PUMP HEAD MUST BE WRAPPED IN FILTER FABRIC, SITUATED ON A BED OF RIP-RAP WITHIN THE WATERCOURSE. AS AN ALTERNATIVE TO SCREENING, A PILE OF CLEAR STONE MAY BE PLACED OVER THE PUMP TO COMPLETELY COVER THE PUMP HEAD. PUMPS MUST NOT ENTRAIN FISH OR OTHER AQUATIC SPECIES.
2. OUTLET PUMP MUST DISCHARGE TO A SEDIMENT BAG OR SEDIMENT TRAP/BASIN.
3. DISCHARGE FROM THE SEDIMENT BAG IS TO BE RELEASED AT A VEGETATED LOCATION. IF UNAVAILABLE, THE SEDIMENT BAG IS TO BE PLACED OVER A FLOW DISSIPATING STRUCTURE.
4. SEDIMENT TRAP OR BASIN SHOULD BE PROTECTED WITH SEDIMENT FENCE INSTALLED AROUND ITS PERIMETER.
5. DEWATERING TO A WELL VEGETATED, GRASSED ARE MAY BE PERMITTED PROVIDED THAT THE PUMP OUTLET HEAD IS LOCATED AT LEAST 30 METERS FROM THE RECEIVING WATER BODY

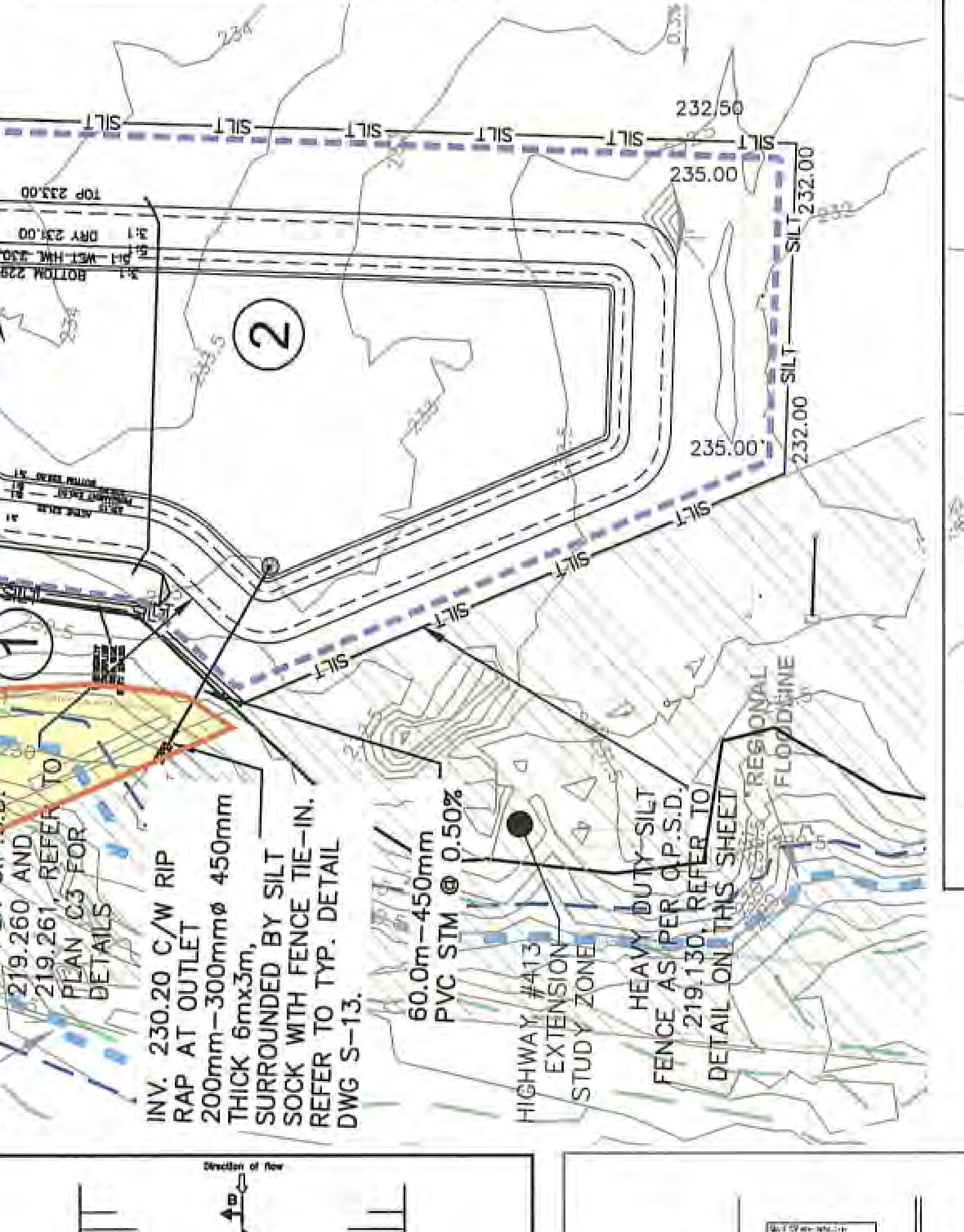
NOTE: ALL IN-WATER AND NEAR-WATER WORKS ARE TO BE COMPLETED BETWEEN JULY 1 TO MARCH 31.

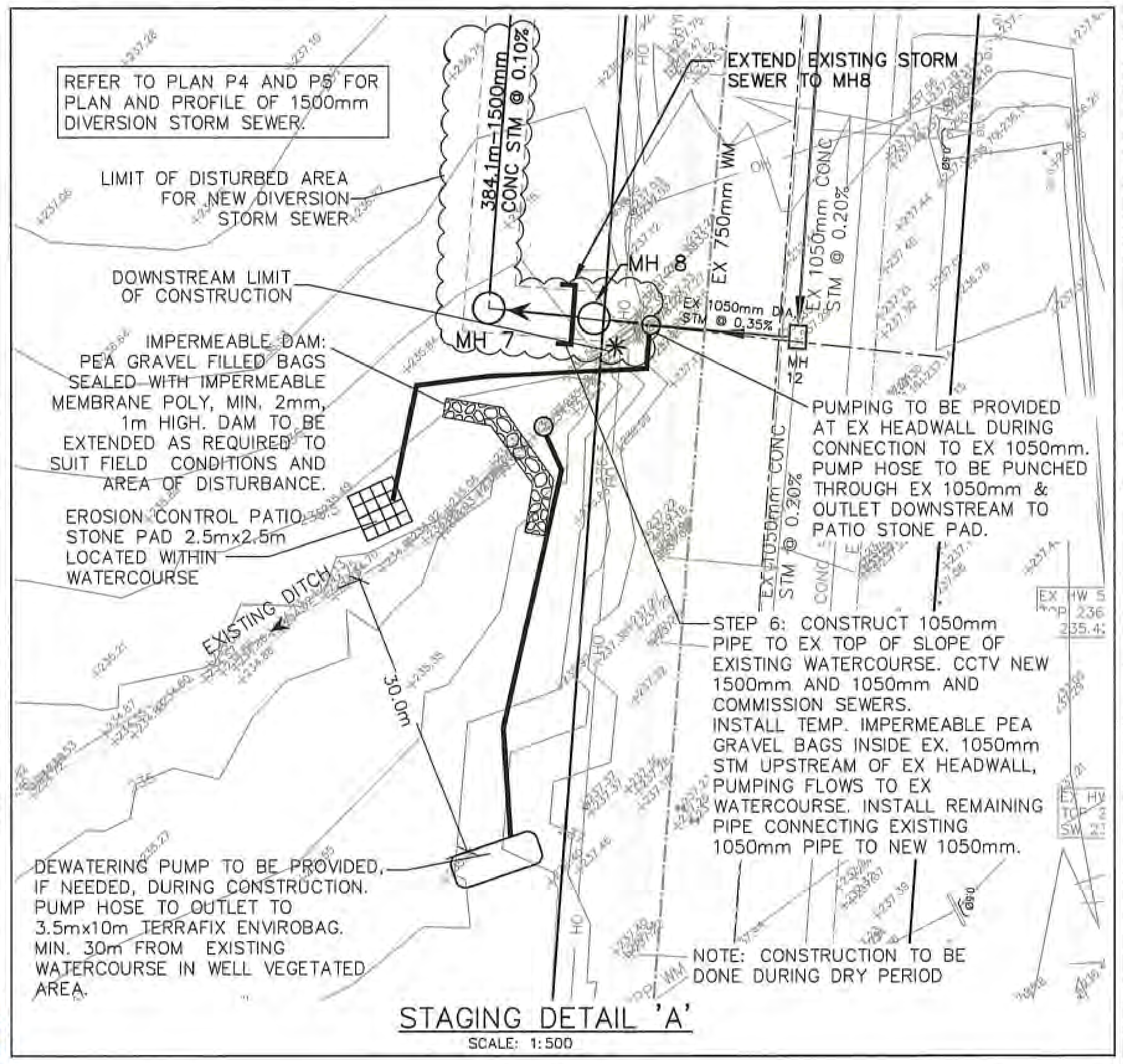
NOTE: ALL FIELD STONE/BOULDERS FOUND DURING EARTHWORKS TO BE STOCKPILED FOR USE IN BOTLCOL CUT/FILL OPERATION AT MAIN CHANNEL AS DETAILED ON PLANS S3, F3 AND F4.

REFER TO PLANS GR4, GR6, GR7 AND GR8 FOR PROPOSED FINISHED GRADES. PRE-GRADES ARE TO BE 0.5m BELOW FINISHED GRADES.

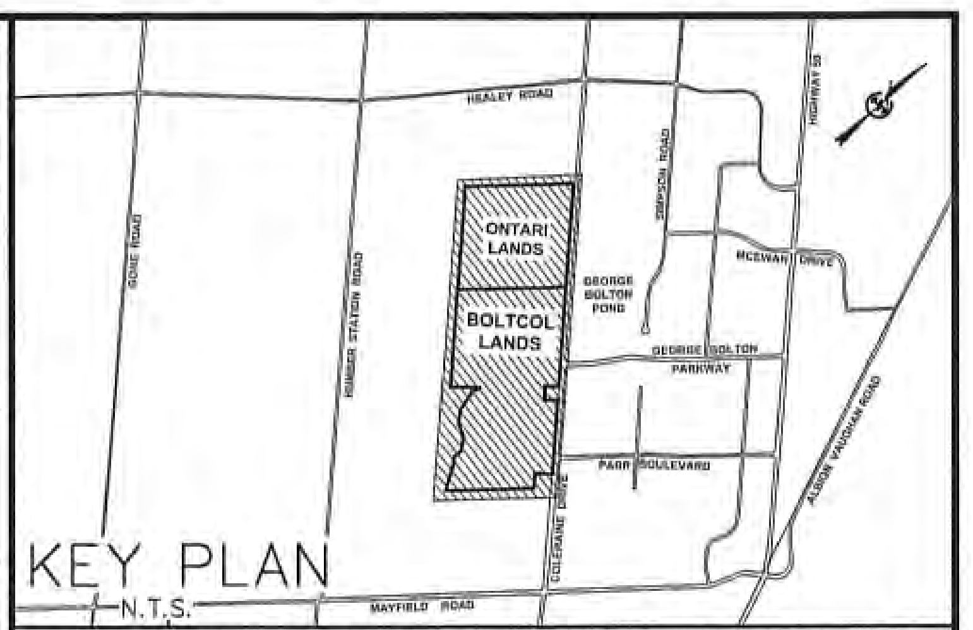
EROSION AND SEDIMENT CONTROL – SUPPLEMENTARY NOTES

A. ESC PLAN IS A DYNAMIC DOCUMENT, WHICH MAY BE SUBJECT TO CHANGE OR MODIFICATION AS A RESULT OF SITE DEVELOPMENTS OR CHANGES ON SITE.
B. SEDIMENT LADEN WATERS ARE TO BE TREATED PRIOR TO DISCHARGING INTO THE CREEK.
C. NO PUMPING OF SEDIMENT LADEN RUNOFF FROM TEMPORARY POND(S) TO THE CREEK IS ALLOWED AT ANY TIME.
D. EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE EVALUATED BY A QUALIFIED PERSON AS DETERMINED BY THE TOWN AND THE TRCA, ON A WEEKLY BASIS AND AFTER ANY STORM EVENT. ANY REPAIRS REQUIRED ARE TO BE RECTIFIED IMMEDIATELY.
E. ADDITIONAL EROSION AND SEDIMENT CONTROL MATERIALS (IE SILT FENCE, STRAW BALES, CLEAR STONES...ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIRS.
F. AN AFTER HOURS CONTACT NUMBER IS TO BE VISIBLY POSTED ON-SITE FOR EMERGENCIES. EMERGENCY CONTACTS:
DON ROUGHLEY 416-712-9603 (AM CANDARAS)
G. ANY SEDIMENT SPILL FROM THE SITE SHOULD BE REPORTED TO MINISTRY OF ENVIRONMENT (SPILL ACTION CENTER) AT 1-800-268-6060.
H. SHOULD THERE BE CONTINUOUS PUMPING PROPOSED, AN AFTER HOURS TECHNICIAN IS TO BE ASSIGNED TO ENSURE THAT THE TREATMENT SYSTEM (PUMPING EQUIPMENT, DIVERSION, SETTLEMENT PONDS...ETC) IS FUNCTIONING PROPERLY.





STAGING DETAIL 'A'
SCALE: 1:500



KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C4

LEGEND

×232.00	EXISTING ELEVATION
× 233.00	PROPOSED INTERCEPTOR SWALE ELEVATIONS
▬ ▬ ▬	EROSION DRAINAGE AREA/LIMIT OF DISTURBANCE
—SILT—	SILT FENCE
—SILT— —SILT—	HEAVY DUTY DOUBLE SILT FENCE WITH NON-WOVEN GEOTEXTILE AND STRAW BALES BETWEEN FENCES
▨	CONSTRUCTION MUD MAT
	TEMPORARY ROCK CHECK DAM
①	PHASING SEQUENCE NUMBER; REFER TO PHASING OF BOLTCOL NORTH ESC AND EARTHWORKS ON DRAWINGS S13
▬ ▬ ▬	EXISTING REGIONAL FLOODLINE
— — — —	10m TRCA FLOODPLAIN SETBACK
▬ ▬	WETLAND BOUNDARY
▬ ▬	30m WETLAND BUFFER
🟨	EPA1 AREA TO REMAIN UNDISTRUBED AS PART OF PRE-GRADING WORKS

TOWN OF CALEDON
APPROVED AS NOTED
THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.
THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.
DATE: Nov 5/19
APPROVED BY: C. Blakely
MANAGER OF DEVELOPMENT
EAST COMMUNITY SERVICES

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

JAN 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
5	JAN 16/19	F.P.	ADDITIONAL ELEVATIONS ADDED INTERCEPTOR SWALE
4	DEC 12/18	F.P.	REVISED SILT FENCE LOCATION, ABANDONED CHANNEL
3	JUNE 4/18	F.P.	FINAL SUBMISSION TRCA – PRE-GRADING PERMIT
2	MAY 25/18	F.P.	REVISED AS PER TRCA COMMENTS
1	FEB 9/18	F.P.	ISSUED FOR SPA TO TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

BOLTCOL NORTH AND SOUTH DEVELOPMENT

TOWN OF CALEDON
REGION OF PEEL

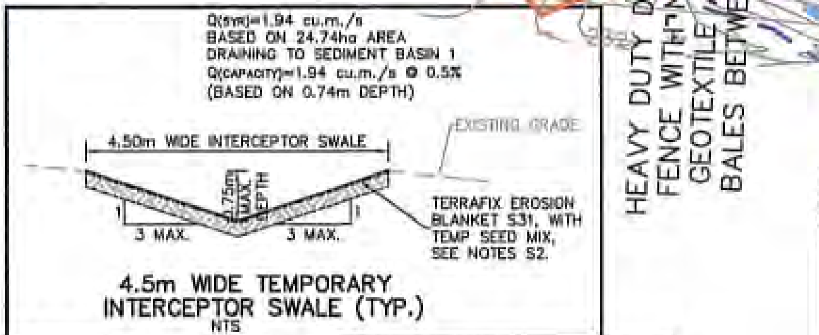
SITE EARTH WORKS, FILL, ESC AND 1500mm DIVERSION SEWER PLAN

REGION FILE#: C02.309
SP 17-0059

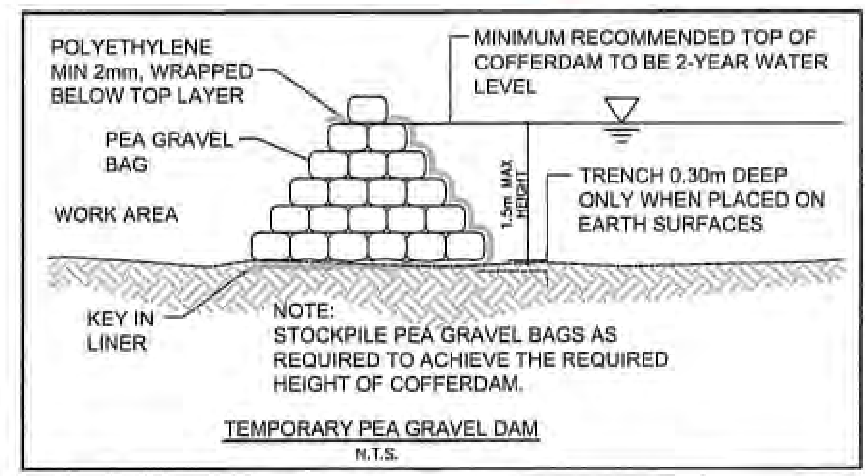
SCALE: 1:2000	DATE: JULY 2016	PROJ No. 1409
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. S13
DESIGNED: F.P.	SHEET 13 OF 13	

PLAN SUBMITTED AS PART OF EARTHWORKS/FILL APPLICATION, INCLUDES PRE-GRADING, ESC PONDS AND 1500mm STORM DIVERSION PIPE FROM COLERAINE CULVERT.

SP 17-0059 PRE-SERVICING/PRE-GRADING AGREEMENT



4.5m WIDE TEMPORARY INTERCEPTOR SWALE (TYP.)
NTS



TEMPORARY PEA GRAVEL DAM
N.T.S.

SEDIMENT STORAGE VOLUME REQUIRED:

DRY STORAGE = 125m³/ha
WET STORAGE = 125m³/ha
*WET STORAGE = 185m³/ha (L:W RATIO<4:1)

RELEASE RATE

AVG HEAD=Dry Storage Depth/2

$$\text{AVG DISCHARGE}=\frac{\text{Dry Storage Volume}}{48X60X60}$$

$$Q=CA\sqrt{2gh}$$

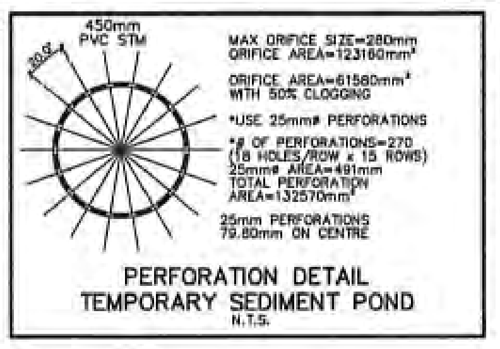
$$A= Q/C\sqrt{2gh}$$

$$\text{DRAWDOWN TIME}=\frac{2Ap}{CAo\sqrt{2g}}(h_1^{0.5}-h_2^{0.5})$$

Ap= AVG POND AREA
Ao= AREA OF ORIFICE

EMERGENCY OVERFLOW CALCULATIONS:

Q=CAIN
I_{100yr} = 196.5 mm/hr (for tc=10min)
C = 0.25
A = AREA (ha)
N = 2.778
WEIR EQN: $Q=CLH^{3/2}$
C = COEFF 1.705
L = LENGTH OF WEIR
H = HEAD (m)



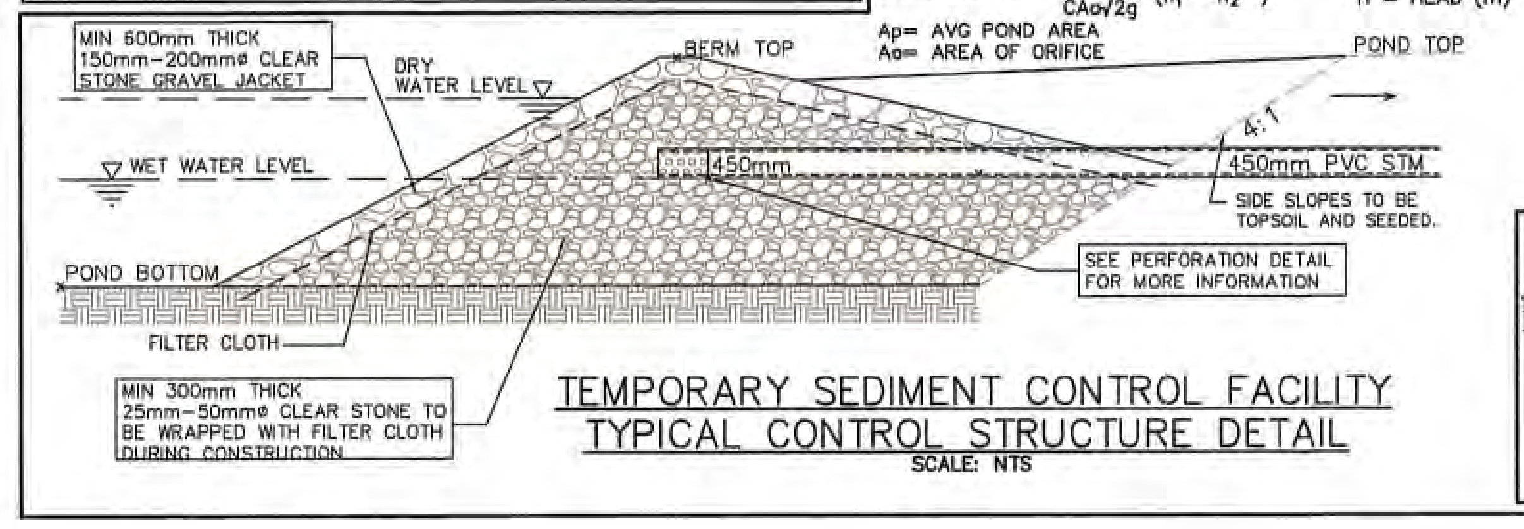
PERFORATION DETAIL
TEMPORARY SEDIMENT POND
N.T.S.

SEDIMENT BASIN SUMMARY TABLE

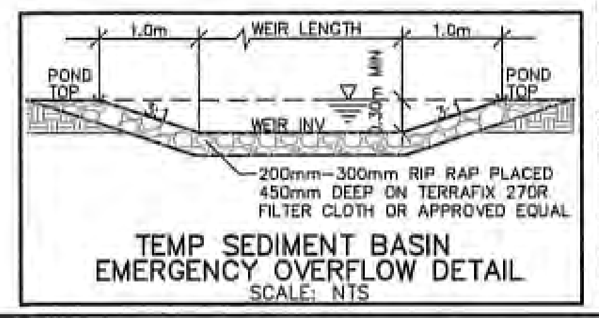
	BASIN 5
AREA (ha)	32.05
Wet Vol.–Required (m³)	4006.25
Wet Vol.–Provided (m³)	17,730
Dry Vol.–Required (m³)	4006.25
Dry Vol.–Provided (m³)	10,025
BOTTOM	229.50
Wet Water Level	230.50
Dry Water Level	231.00
POND TOP	233.00
Dry Storage Depth	0.50
Avg Disch. (m³/s)	0.058
ORIFICE AREA (m²)	0.062
ORIFICE SIZE (mm)	280
DRAWDOWN TIME (h)	48.1

EMERGENCY OVERFLOW WEIR

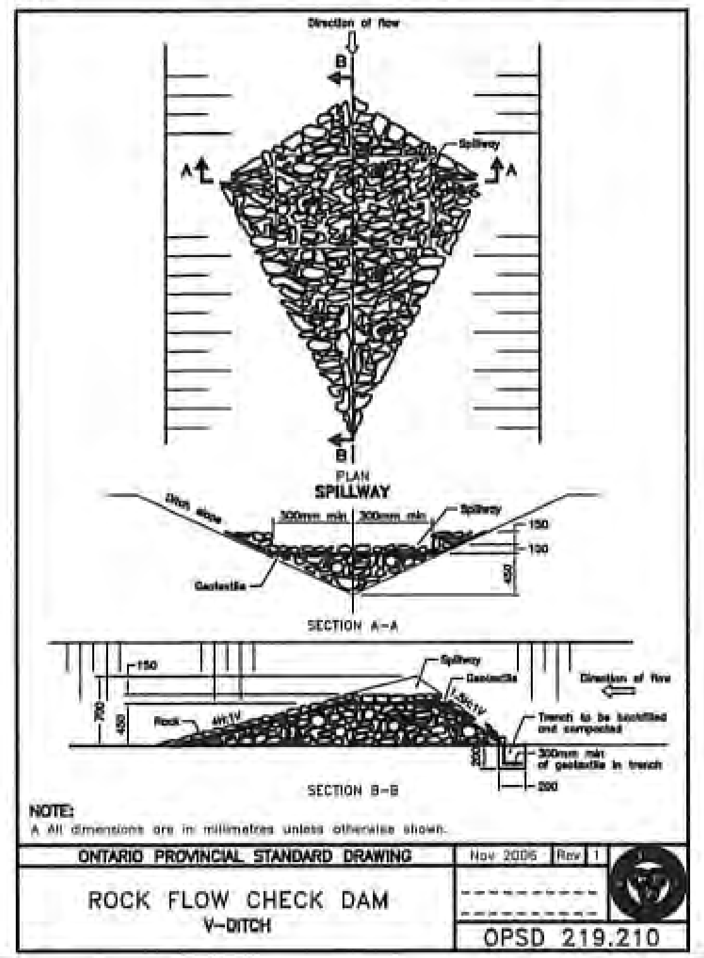
100yr FLOW (m3/s)	4.37
WEIR INV	231.50
WEIR LENGTH (m)	8.0
HEAD (m)	0.50
WEIR CAPACITY (m3/s)	4.81



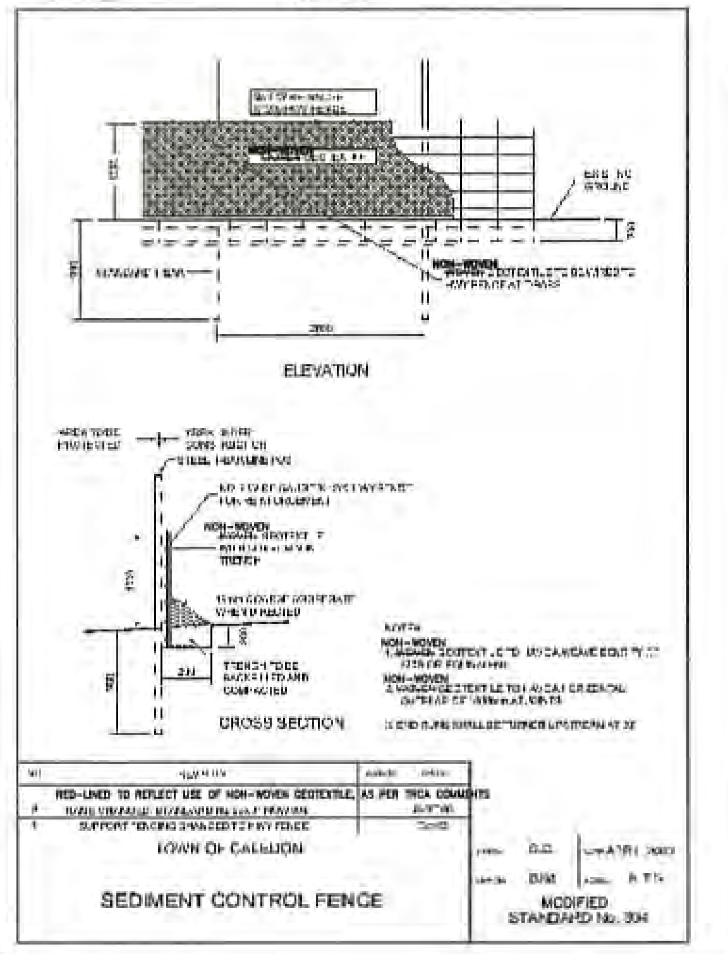
TEMPORARY SEDIMENT CONTROL FACILITY
TYPICAL CONTROL STRUCTURE DETAIL
SCALE: NTS



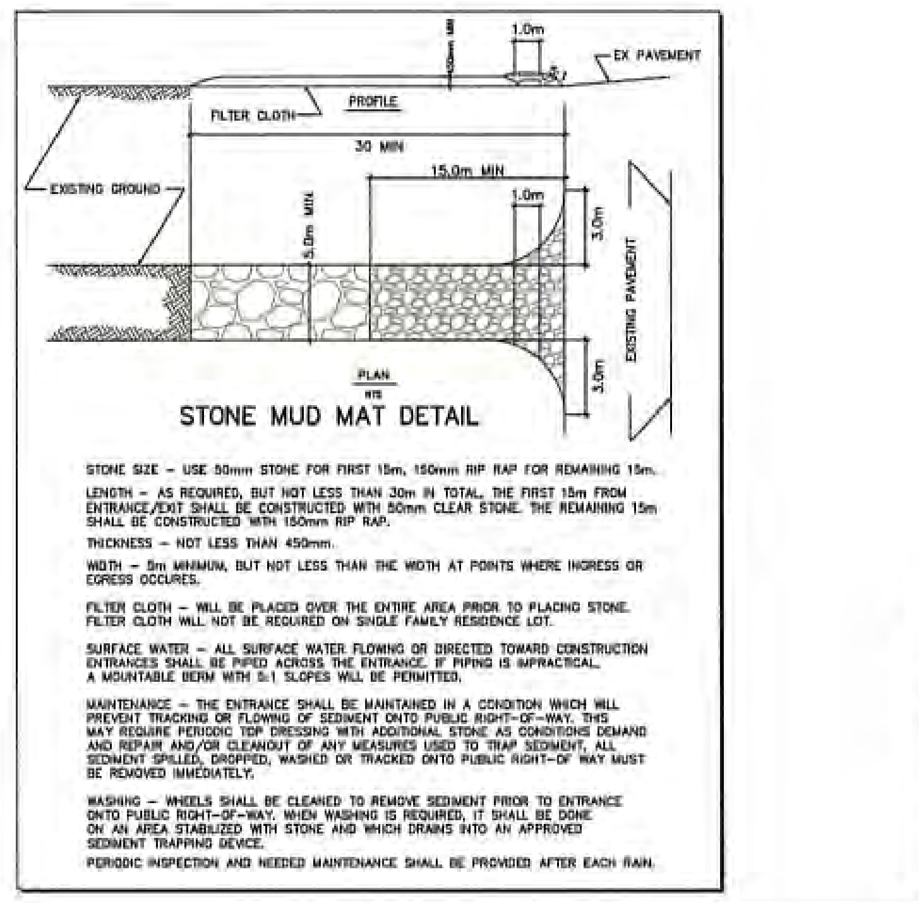
TEMP SEDIMENT BASIN
EMERGENCY OVERFLOW WEIR DETAIL
SCALE: NTS



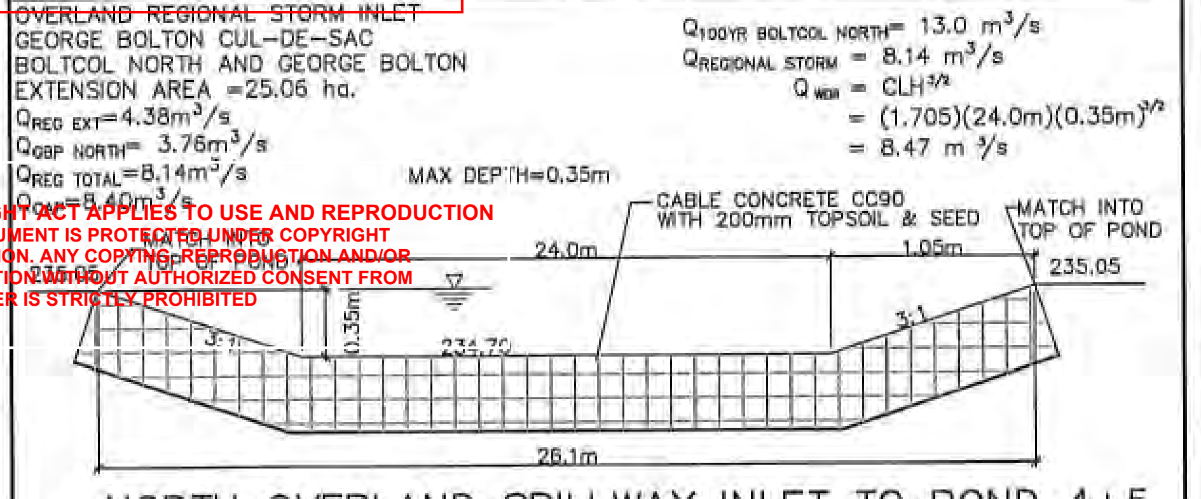
ROCK FLOW CHECK DAM
V-DITCH
OPSD 219.210



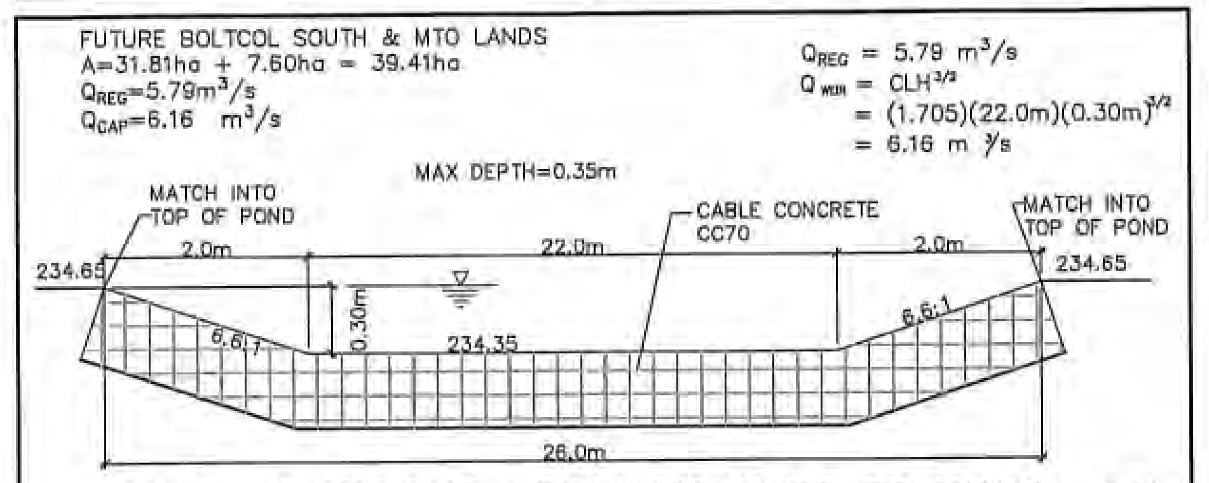
SEDIMENT CONTROL FENCE



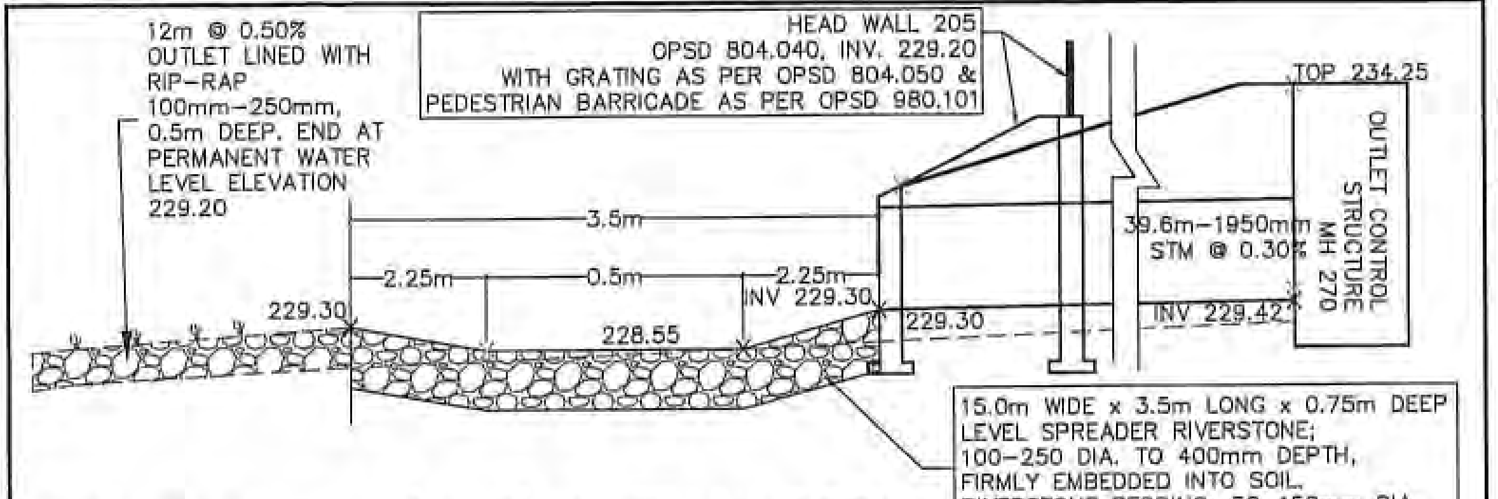
STONE MUD MAT DETAIL



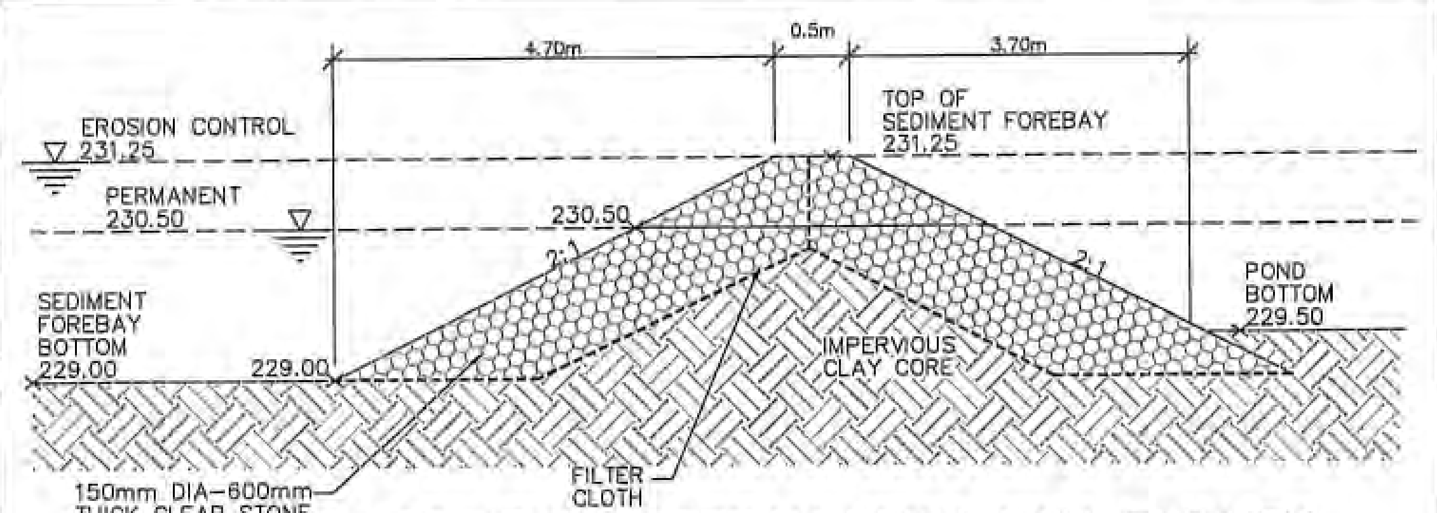
NORTH OVERLAND SPILLWAY INLET TO POND 4+5
TYPICAL CROSS SECTION DETAIL
SCALE: NTS



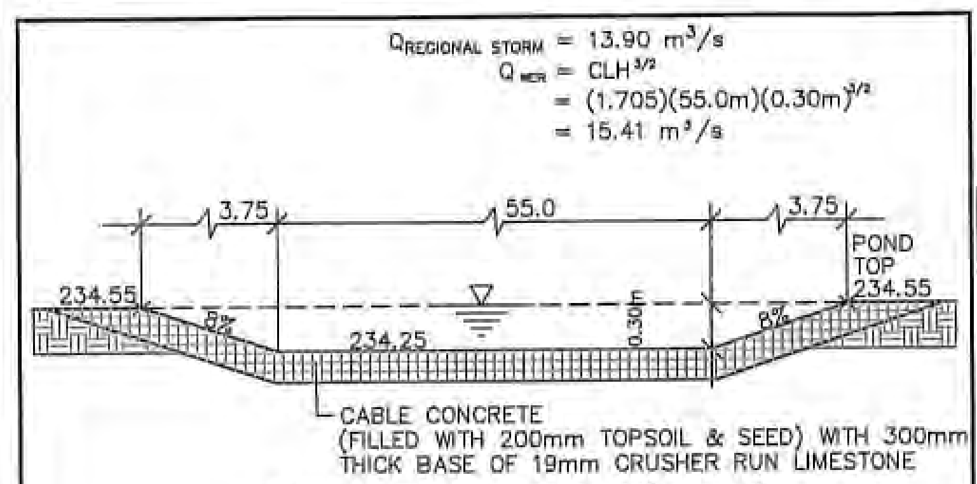
SOUTH OVERLAND SPILLWAY INLET TO POND 4+5
TYPICAL CROSS SECTION DETAIL
SCALE: NTS



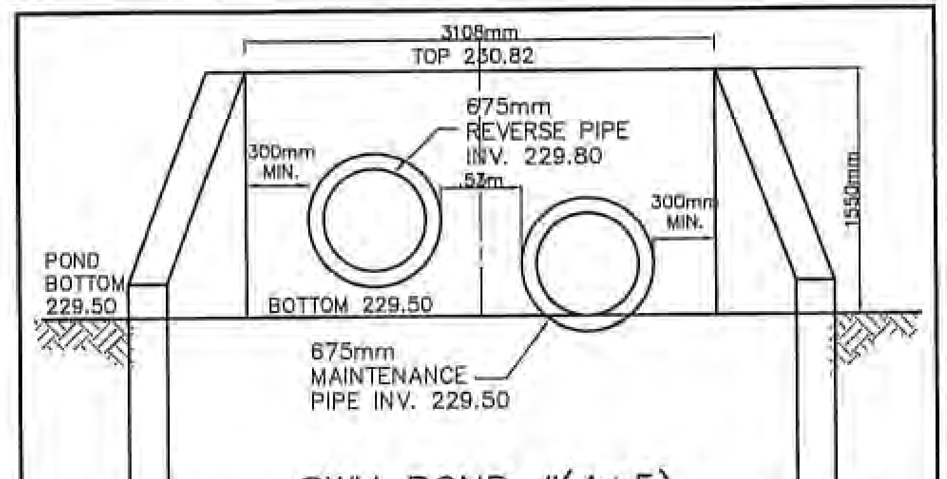
SWM FACILITY #(4+5) OUTFALL DETAIL
SCALE NTS



SEDIMENT FOREBAY BERM SWM FACILITY
SECTION B-B
SCALE N.T.S.

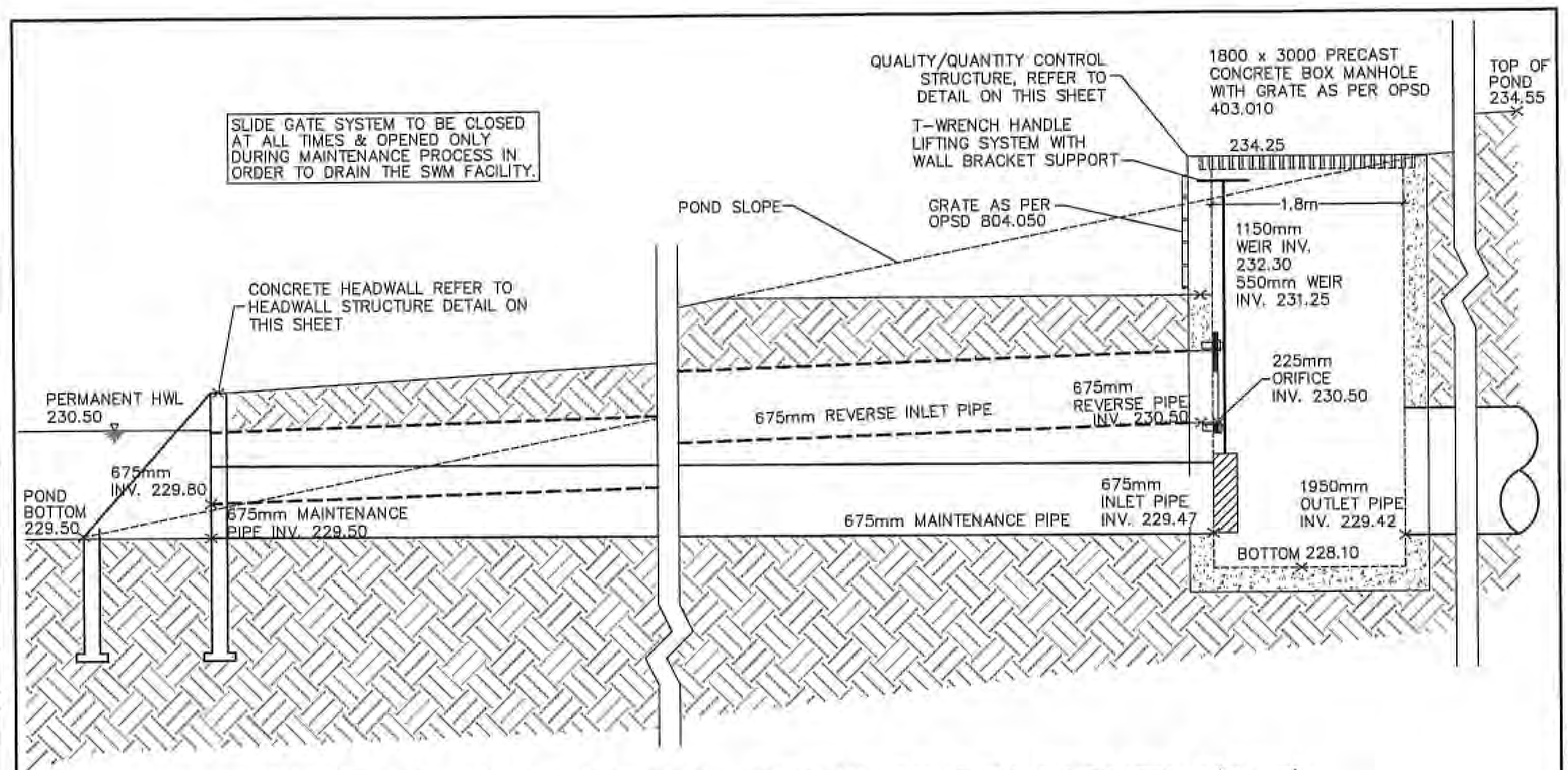


SWM FACILITY #(4+5)
EMERGENCY OVERFLOW DETAIL
SCALE: NTS

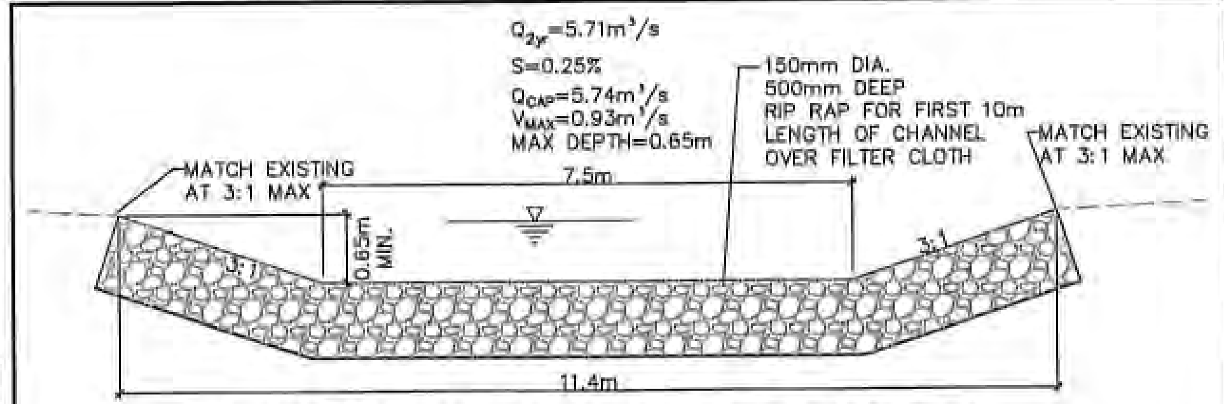


SWM POND #(4+5)
CONCRETE HEADWALL
STRUCTURE HW 204 DETAIL
SCALE 1:50

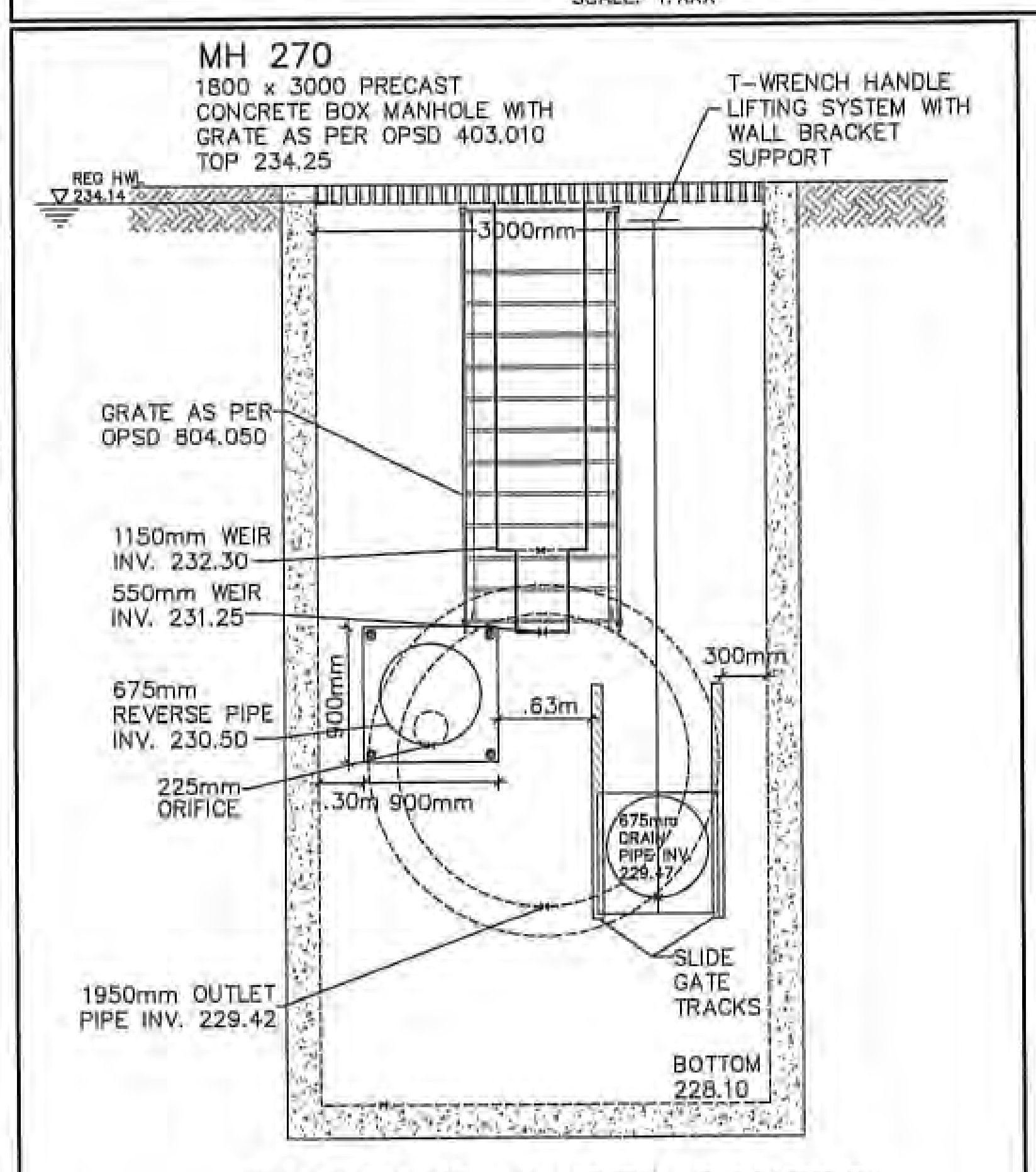
FILENAME: G:\1667\1667-C1.dwg
PLOTDATE: Oct 16, 2019 - 4:49pm
PLOTTED BY: fonchs



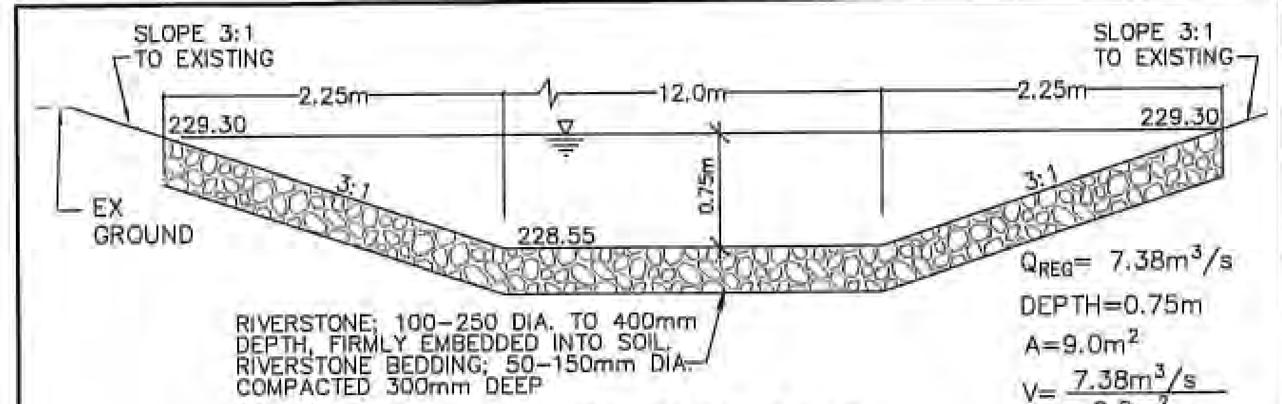
QUALITY/QUANTITY CONTROL STRUCTURE SWM FACILITY #(4+5)
SCALE 1:50



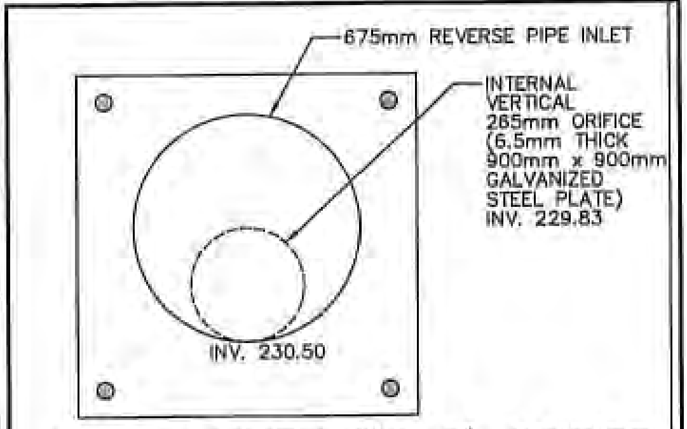
FOREBAY BY-PASS OUTLET CHANNEL
TYPICAL CROSS SECTION DETAIL
SCALE: 1:XXX



QUALITY/QUANTITY CONTROL
STRUCTURE SWM POND #(4+5)
SCALE: 1:50



SWM FACILITY #(4+5)
LEVEL SPREADER DETAIL
SECTION D-D
SCALE 1:50



SWM FACILITY #(4+5) ORIFICE
PLATE DETAIL
N.T.S.

KEY PLAN
N.T.S.

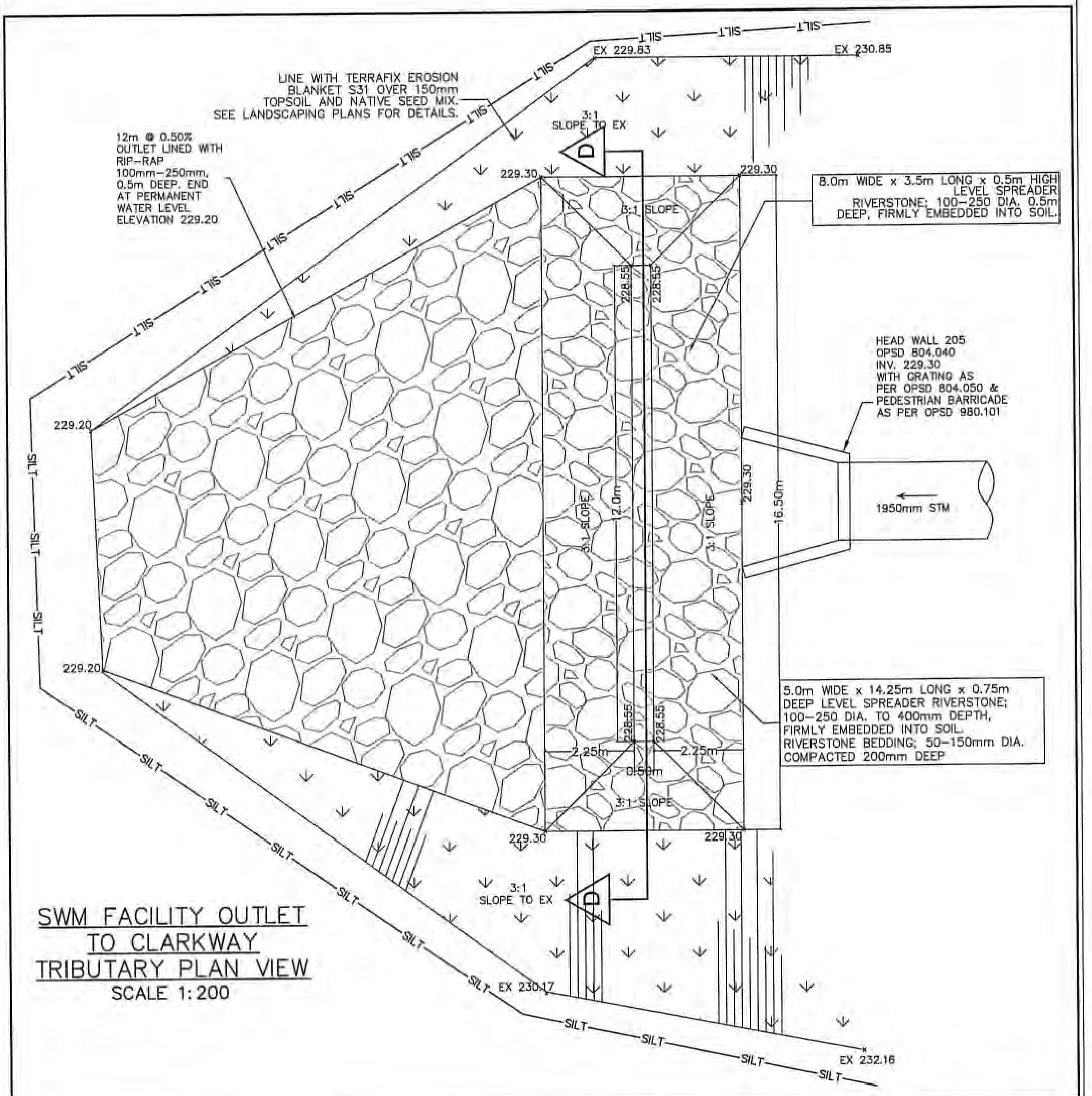
FOR GENERAL NOTES REFER TO DWG C3

LEGEND

⚲	HYDRANT AND VALVE
□	CATCHBASIN
◫	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
⊕	PROPOSED CATCHBASIN MANHOLE
236.00	PROPOSED ELEVATION
235.50	EXISTING ELEVATION
↔	VALVE AND BOX
⊖	VALVE AND CHAMBER

TOWN OF CALEDON
APPROVED AS NOTED
THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.
THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.
DATE: Nov 5/19
APPROVED BY: C. Blabaly
MANAGER OF DEVELOPMENT EAST COMMUNITY SERVICES

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT



SWM FACILITY OUTLET
TO CLARKWAY
TRIBUTARY PLAN VIEW
SCALE 1:200

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

No.	Date	By	REVISIONS
4	OCT.16/19	F.P.	ISSUED FOR CONSTRUCTION
3	JUL.29/19	F.P.	ISSUED TO THE TOWN OF CALEDON, REGION OF PEEL
2	APR.2/19	F.P.	ISSUED TO THE TOWN OF CALEDON, REGION OF PEEL
1	NOV./18	F.P.	ISSUED TO THE TOWN OF CALEDON

a.m.candaras associates inc.
consulting engineers
8551 Weston rd., suite 203
Woodbridge ont. L4L 9R4
905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON
PARKWAY EXTENSION

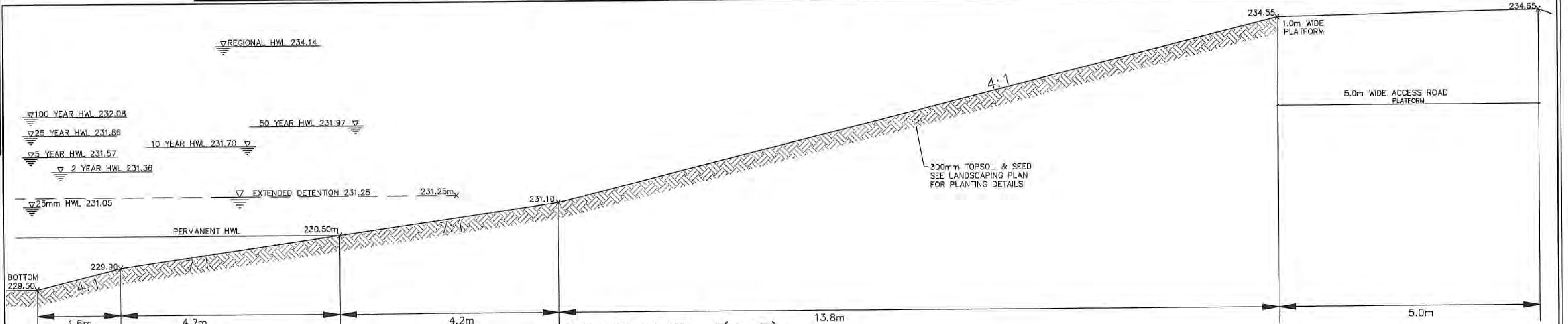
TOWN OF CALEDON
REGION OF PEEL

STORMWATER MANAGEMENT
POND (4+5) DETAILS

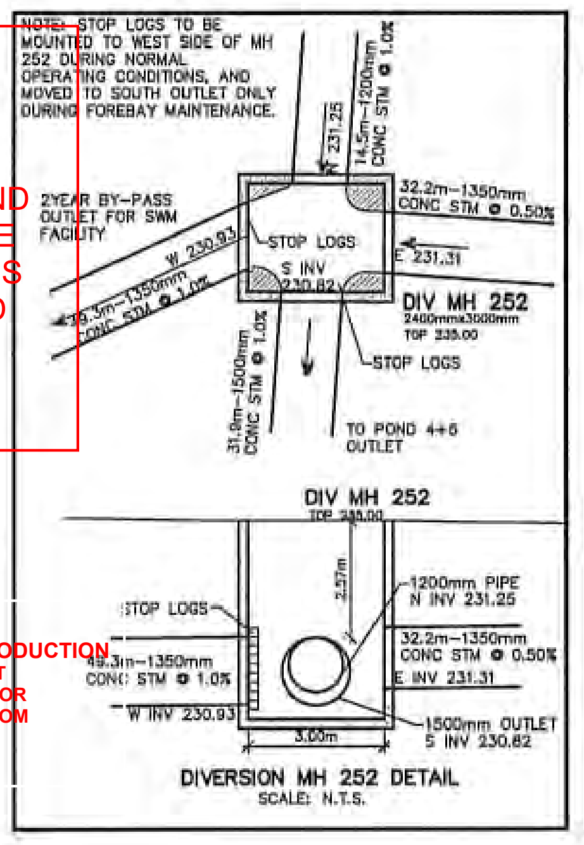
REGION FILE#: C02.311
SP 18-04A

SCALE: AS NOTED	DATE: NOVEMBER 2016	PROJ No.	1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No.	C1
DESIGNED: F.P.	SHEET 1 OF 3		

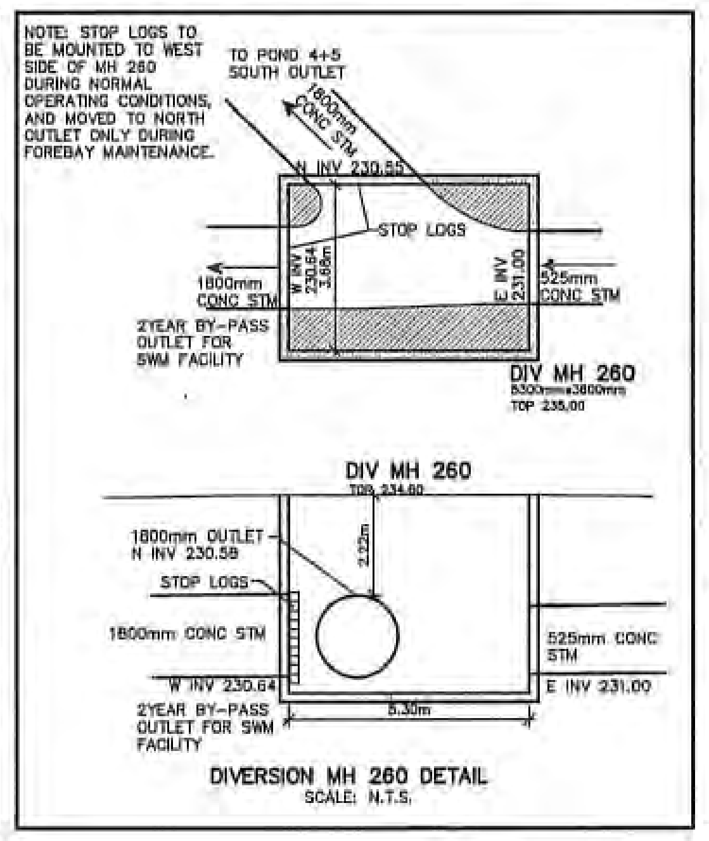
REV: 4



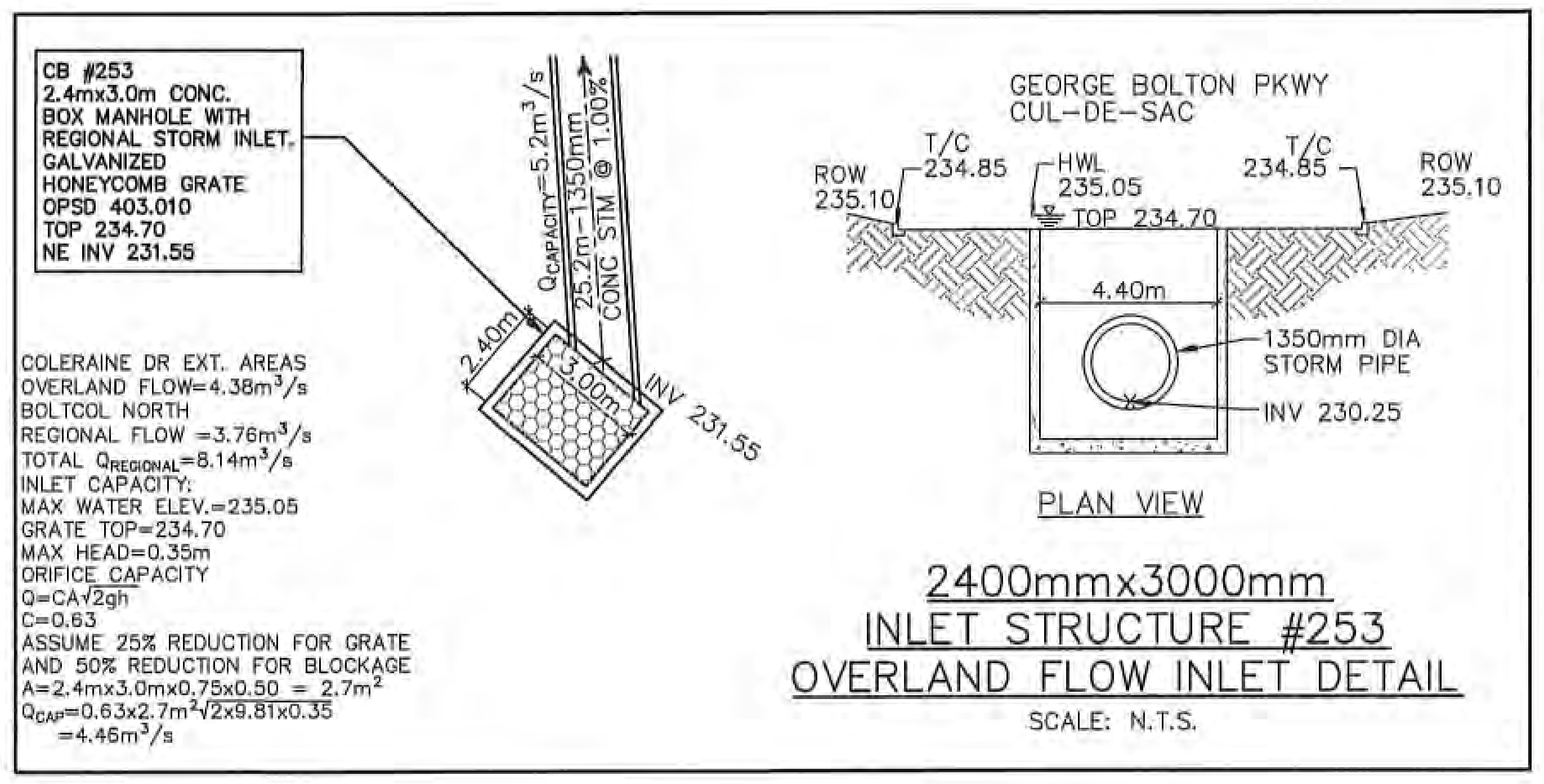
SWM FACILITY #(4+5)
TYPICAL CROSS SECTION
SCALE 1:50



DIVERSION MH 252 DETAIL
SCALE: N.T.S.

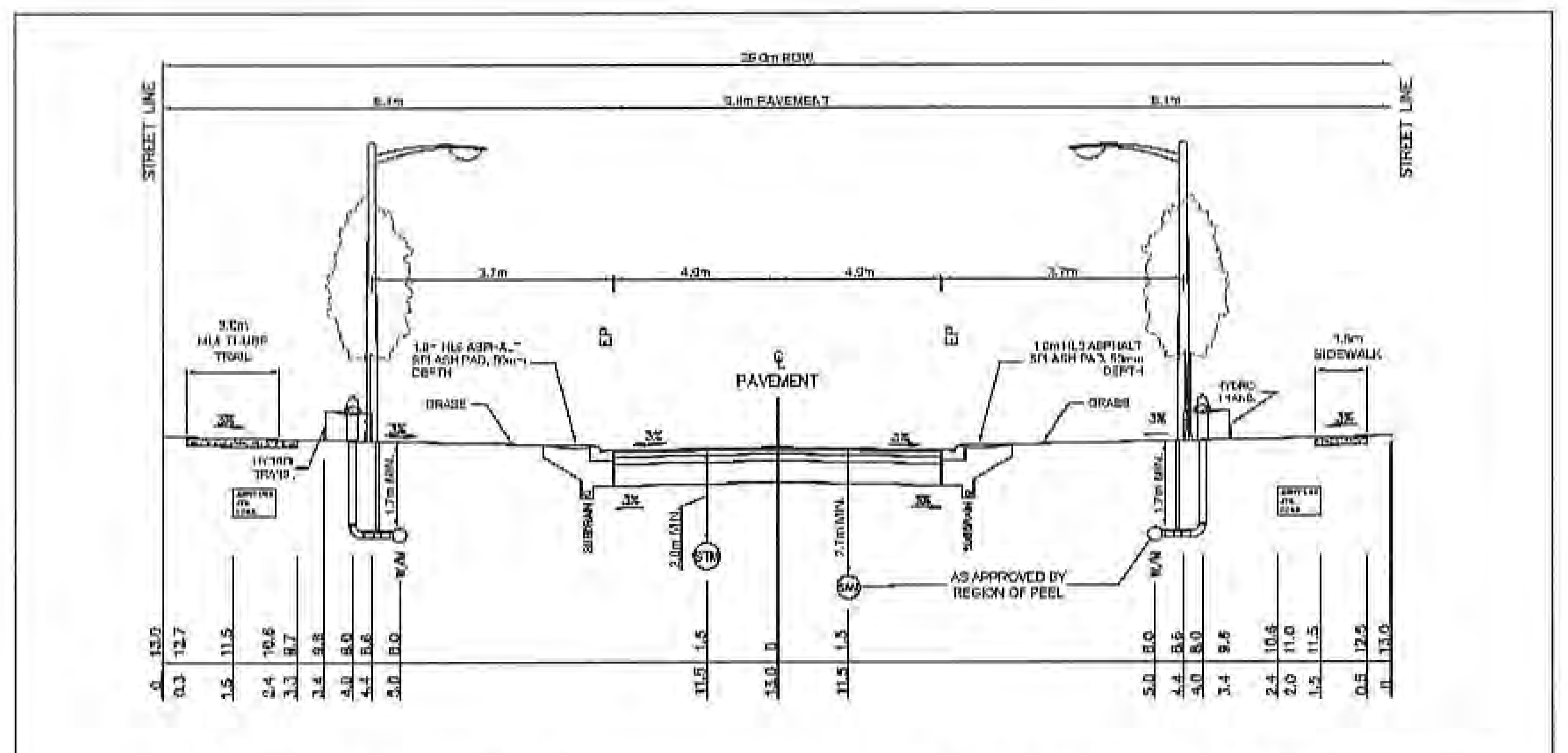


DIVERSION MH 260 DETAIL
SCALE: N.T.S.



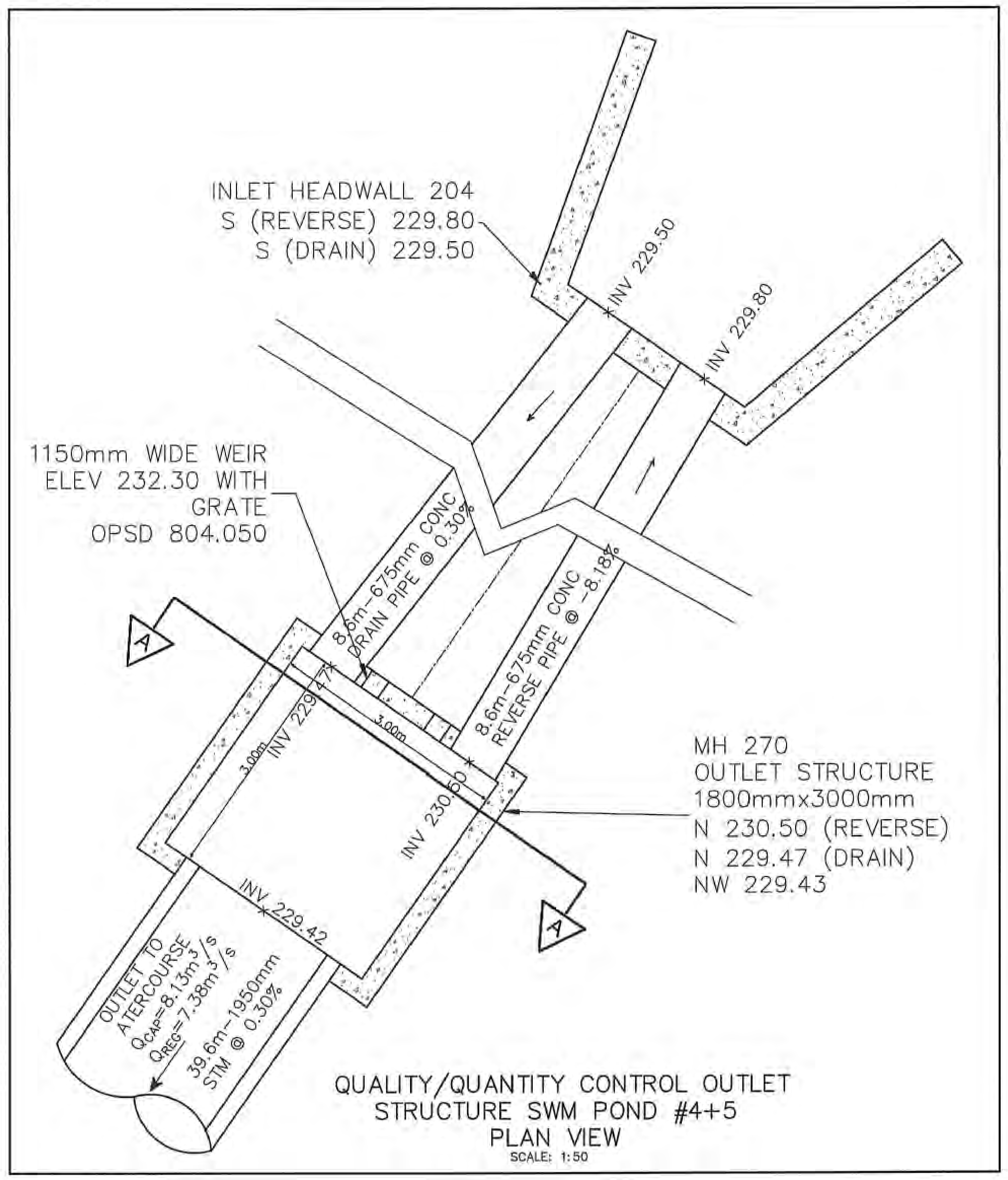
COLERAINE DR EXT. AREAS
OVERLAND FLOW=4.38m³/s
BOLTCOL NORTH
REGIONAL FLOW =3.76m³/s
TOTAL $Q_{REGIONAL}$=8.14m³/s
INLET CAPACITY:
MAX WATER ELEV.=235.05
GRATE TOP=234.70
MAX HEAD=0.35m
ORIFICE CAPACITY
$Q=CA\sqrt{2gh}$
C=0.63
ASSUME 25% REDUCTION FOR GRATE AND 50% REDUCTION FOR BLOCKAGE
$A=2.4m\times3.0m\times0.75\times0.50 = 2.7m^2$
$Q_{CAP}=0.63\times2.7m^2\sqrt{2\times9.81\times0.35}$
$=4.46m^3/s$

2400mmx3000mm
INLET STRUCTURE #253
OVERLAND FLOW INLET DETAIL
SCALE: N.T.S.



NOTES
1. UTILITY CORRIDOR TO HAVE A MINIMUM COVER OF 0.9 m.
2. WATERMAIN TO HAVE A MINIMUM COVER OF 1.7 m.
3. THE FOLLOWING IS A MINIMUM ROAD BASE AND WILL REQUIRE A SOILS REPORT VERIFICATION
40 mm DFC
110 mm HDBC
150 mm GRANULAR 'A'
450 mm GRANULAR 'B'
4. THE BOULEVARDS REQUIRE A MINIMUM OF 300mm OF TOPSOIL AND NURSERY SOD.
5. TREES TO BE PLACED IN LOCATIONS PER APPROVED LANDSCAPE PLANS.
6. STREETLIGHT FIXTURE PER APPROVED TOWN OF CALEDON STANDARD.
7. FULL LENGTH MINIMUM 100 MM DIA SUB-DRAINS C/W "FILTERCLOTH" SHALL BE INSTALLED AS PER APPROVED TOWN STANDARD NO. 219.
8. SUB-GRADE SHALL BE COMPACTED TO A MINIMUM 98% OF S.P.D. AT OPTIMUM MOISTURE CONTENT.
9. WHERE POSSIBLE MANHOLE LIDS TO BE LOCATED OUT OF THE LANE OF TRAFFIC.
10. LONG DIMENSION OF TRANSFORMER TO BE PARALLEL TO STREETLINE.
11. THE MULTI USE TRAIL MAY BE REDUCED TO 2.4m OVER VERY SHORT DISTANCES IN ORDER TO MAINTAIN A 0.5m SEPARATION FROM UTILITY POLES OR OTHER INFRASTRUCTURE THAT MAY BE COSTLY TO RELOCATE.

TOWN OF CALEDON	NO.	REVISION	APR'D	DATE	APP'D: D.H.	DATE: JULY 16
GEORGE BOLTON PARKWAY EXTENSION WEST OF COLERAINE DRIVE					DRAWN: B.M.	SCALE: N.T.S.
					STANDARD	



QUALITY/QUANTITY CONTROL OUTLET
STRUCTURE SWM POND #4+5
PLAN VIEW
SCALE: 1:50

KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C3

LEGEND

⚲	HYDRANT AND VALVE
□	CATCHBASIN
□□	DOUBLE CATCHBASIN
○	PROPOSED STORM MANHOLE
●	PROPOSED SANITARY MANHOLE
◎	PROPOSED CATCHBASIN MANHOLE
236.00	PROPOSED ELEVATION
235.00	EXISTING ELEVATION
••	VALVE AND BOX
⊖	VALVE AND CHAMBER

TOWN OF CALEDON
APPROVED AS NOTED
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DATE: Nov 5/19
APPROVED BY:
MANAGER OF DEVELOPMENT
EAST COMMUNITY SERVICES

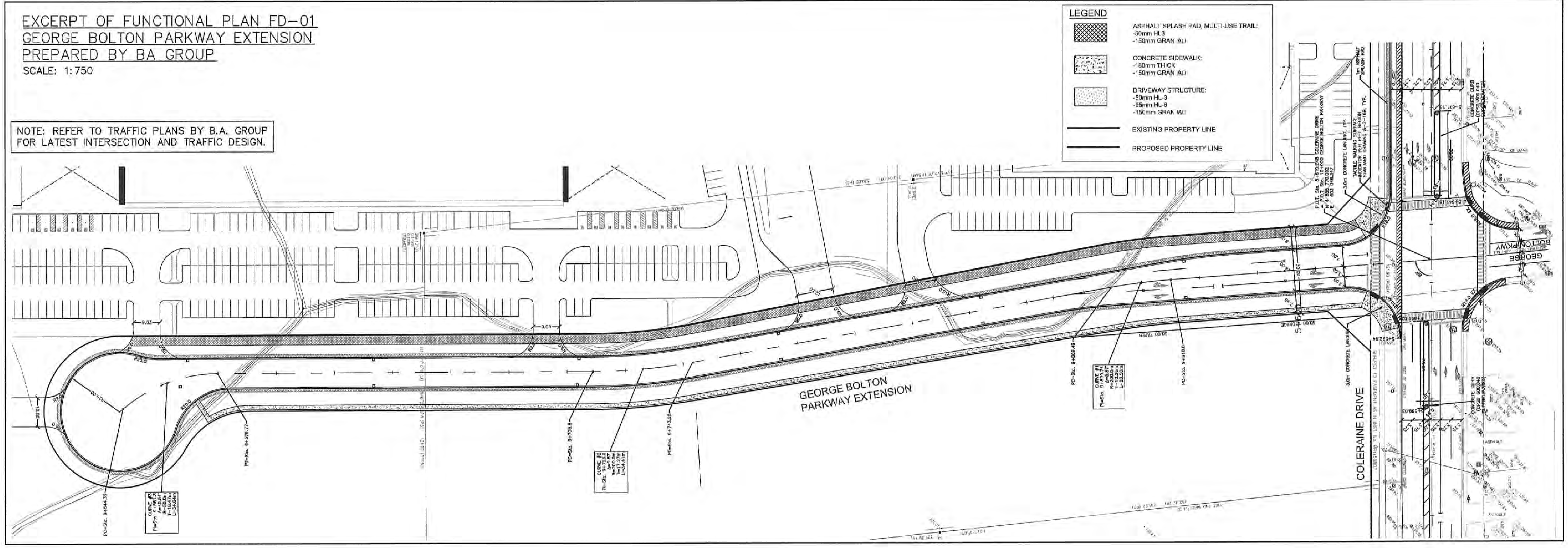
RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

EXCERPT OF FUNCTIONAL PLAN FD-01
GEORGE BOLTON PARKWAY EXTENSION
PREPARED BY BA GROUP

SCALE: 1:750

NOTE: REFER TO TRAFFIC PLANS BY B.A. GROUP FOR LATEST INTERSECTION AND TRAFFIC DESIGN.



LEGEND

▩	ASPHALT SPLASH PAD, MULTI-USE TRAIL: -50mm HL3 -150mm GRAN (A)
▨	CONCRETE SIDEWALK: -180mm THICK -150mm GRAN (A)
▒	DRIVEWAY STRUCTURE: -50mm HL-3 -65mm HL-8 -150mm GRAN (A)
—	EXISTING PROPERTY LINE
—	PROPOSED PROPERTY LINE

LEGAL DESCRIPTION
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CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
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OCT 16/19
A. M. CANDARAS

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a.m.candaras associates inc.
consulting engineers
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BOLTCOL NORTH
GEORGE BOLTON
PARKWAY EXTENSION

TOWN OF CALEDON
REGION OF PEEL

STORMWATER MANAGEMENT
POND (4+5) DETAILS

REGION FILE#: C02.311 SP 18–04A

SCALE: AS NOTED	DATE: NOVEMBER 2016	PROJ No. 1409
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. C2
DESIGNED: F.P.	SHEET 2 OF 3	

REV: 4

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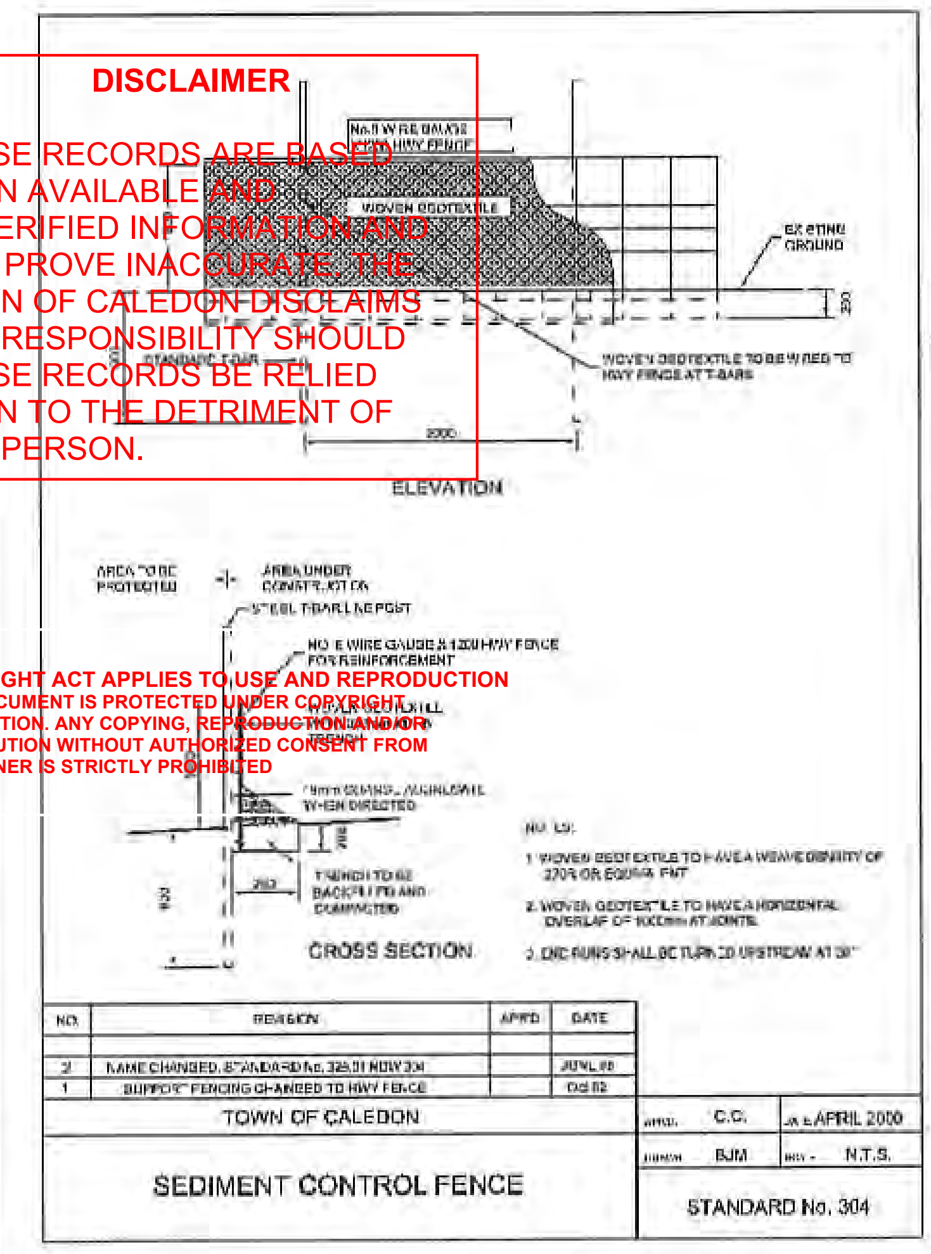
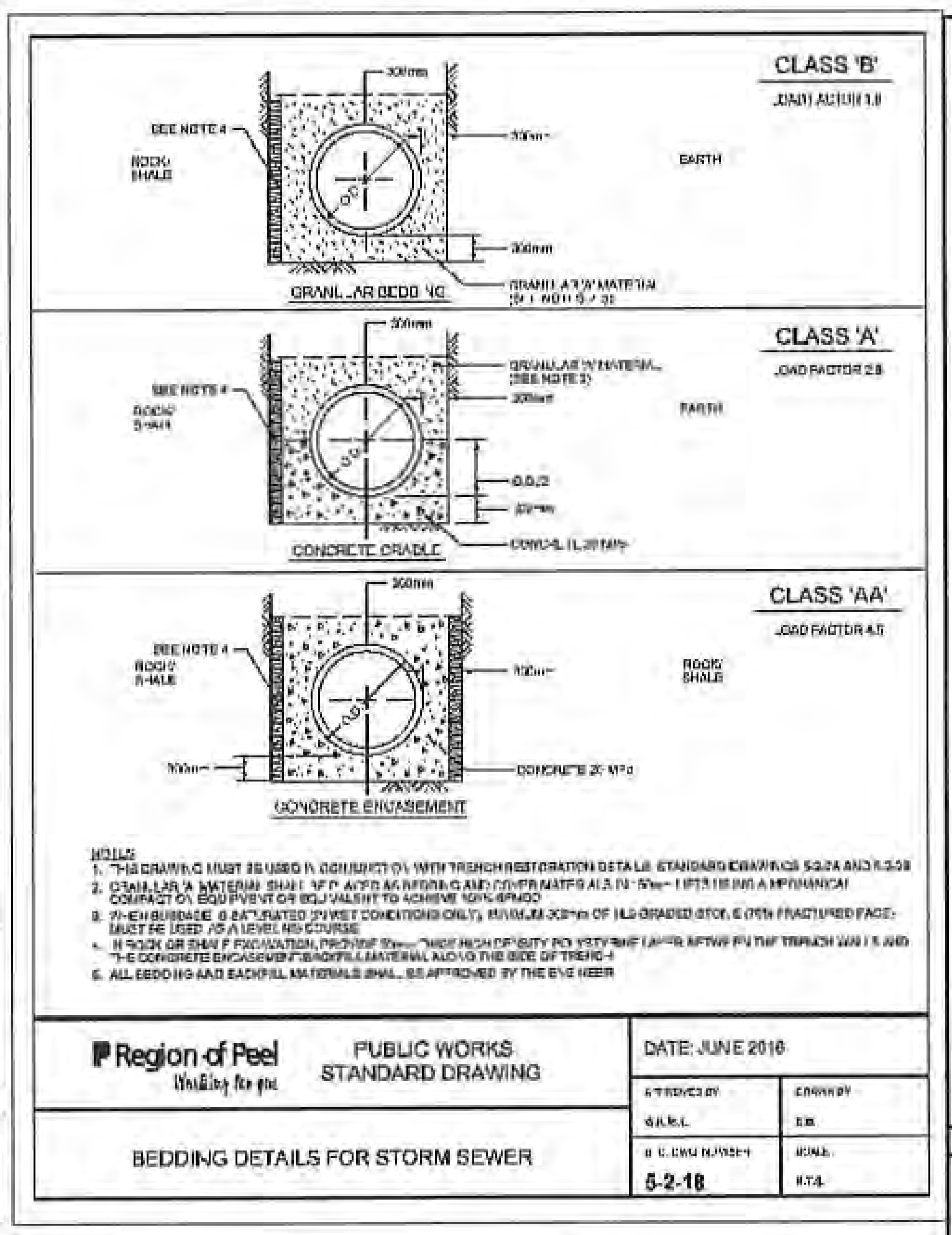
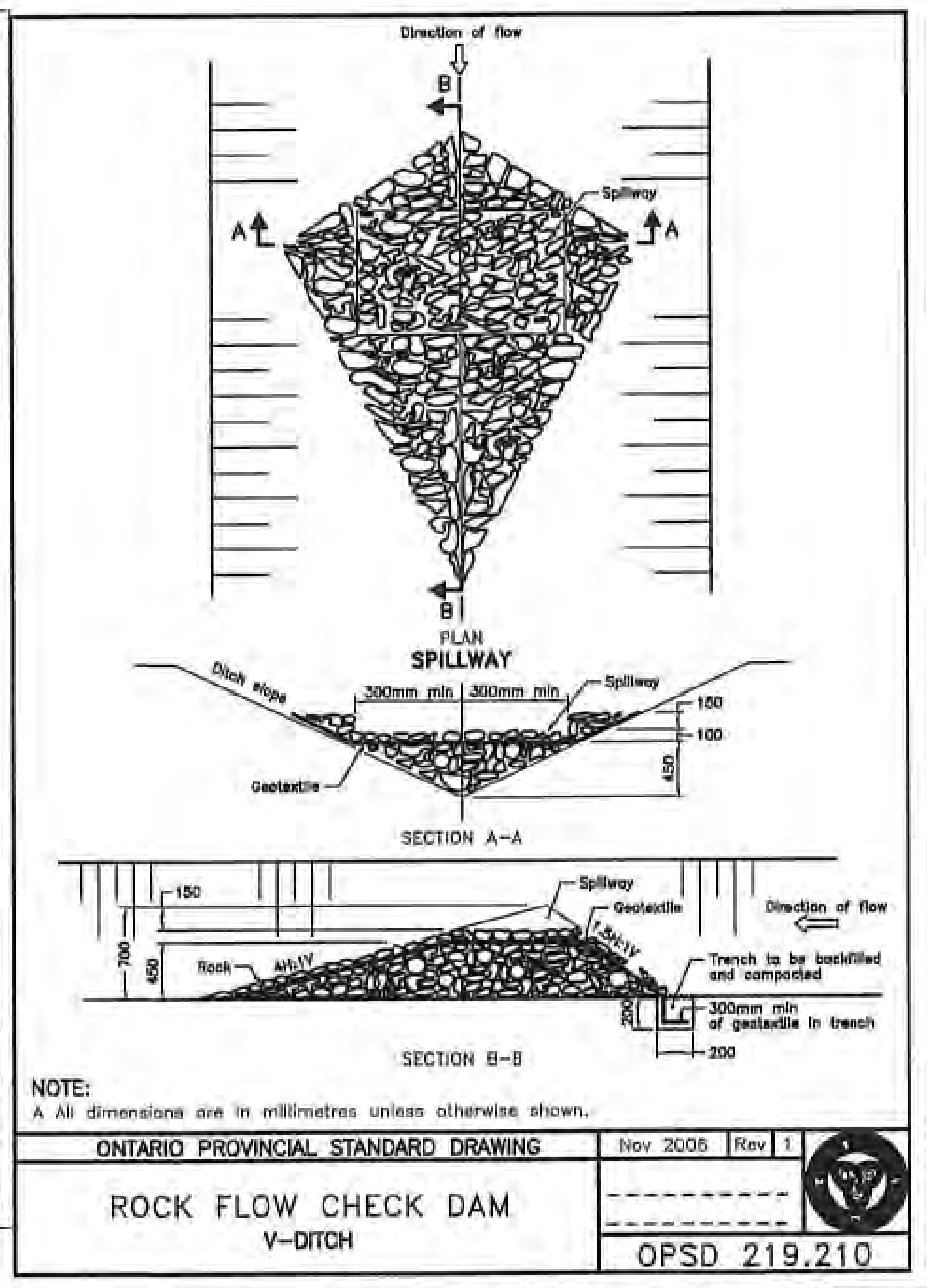
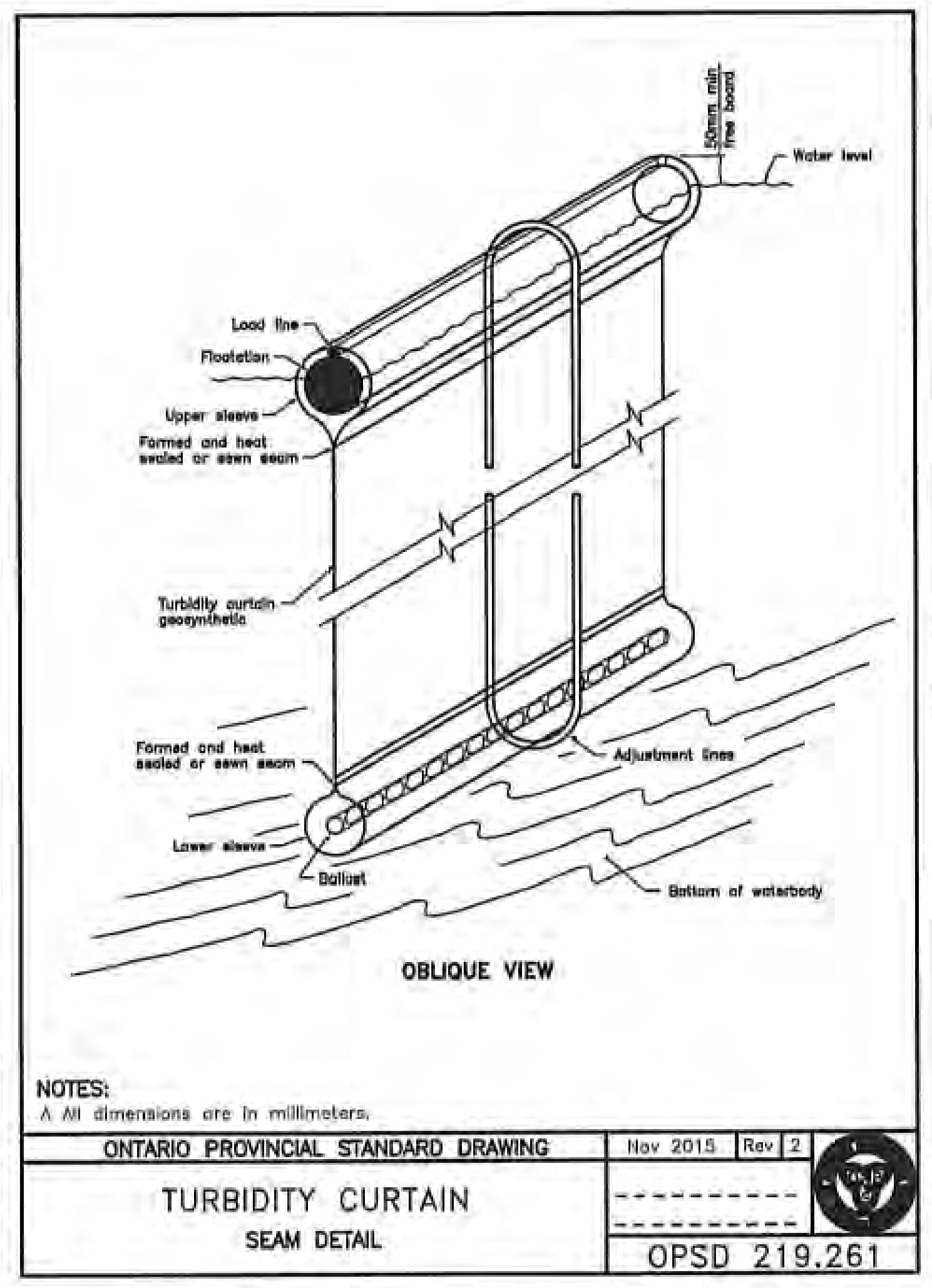
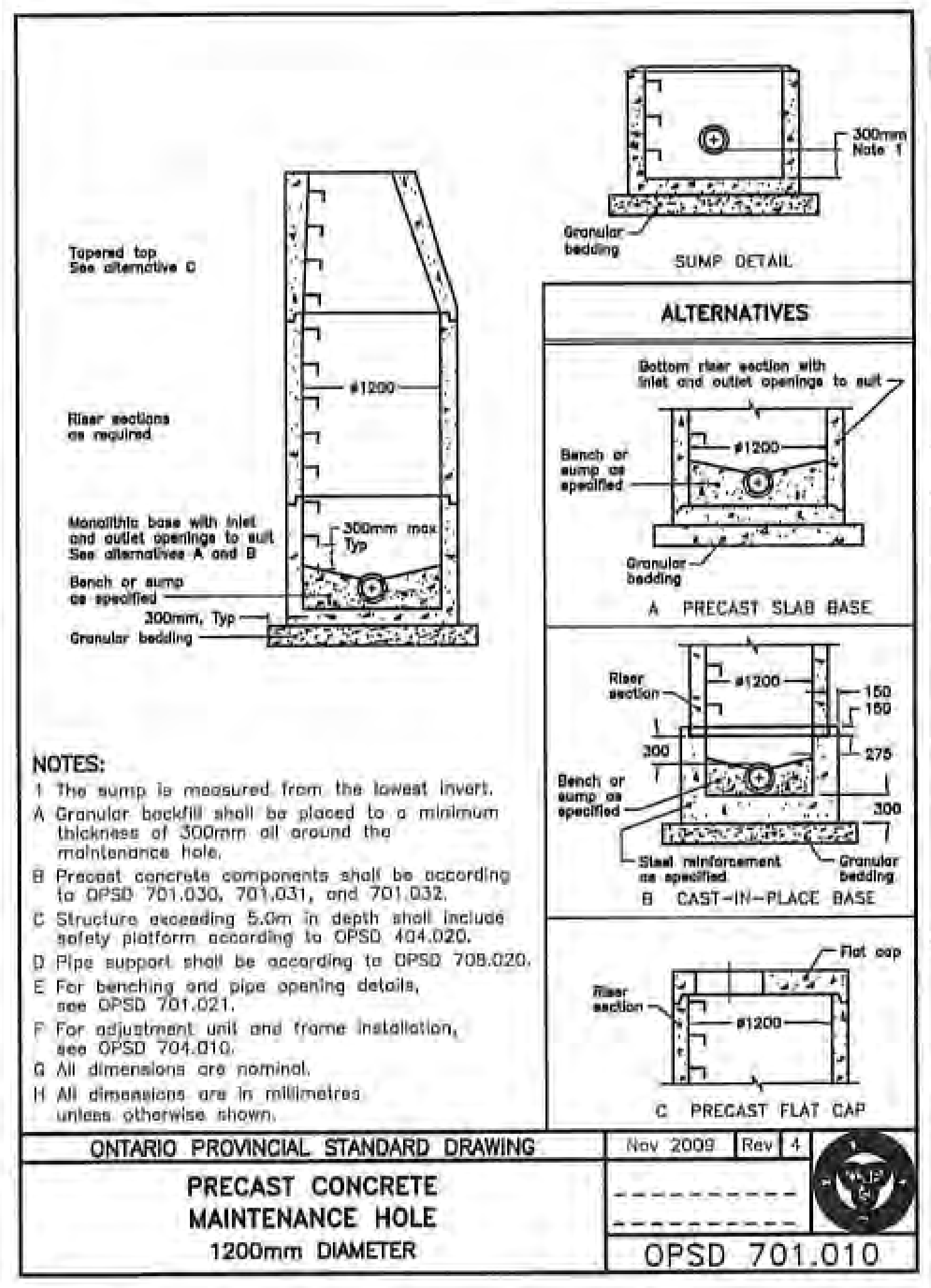
PLOTDATE: Oct 16, 2019 – 3:05pm
PLOTTED BY: fanche

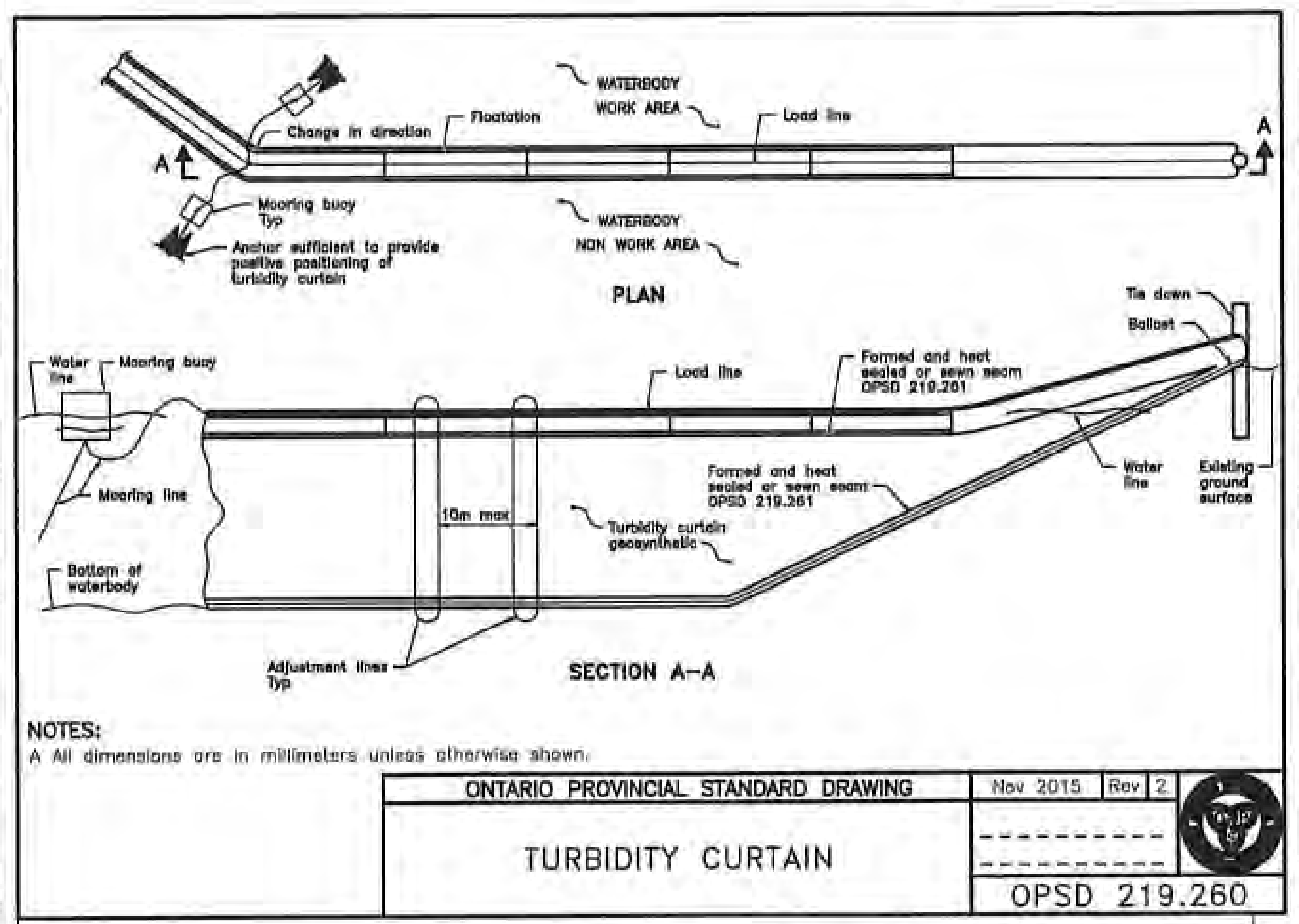


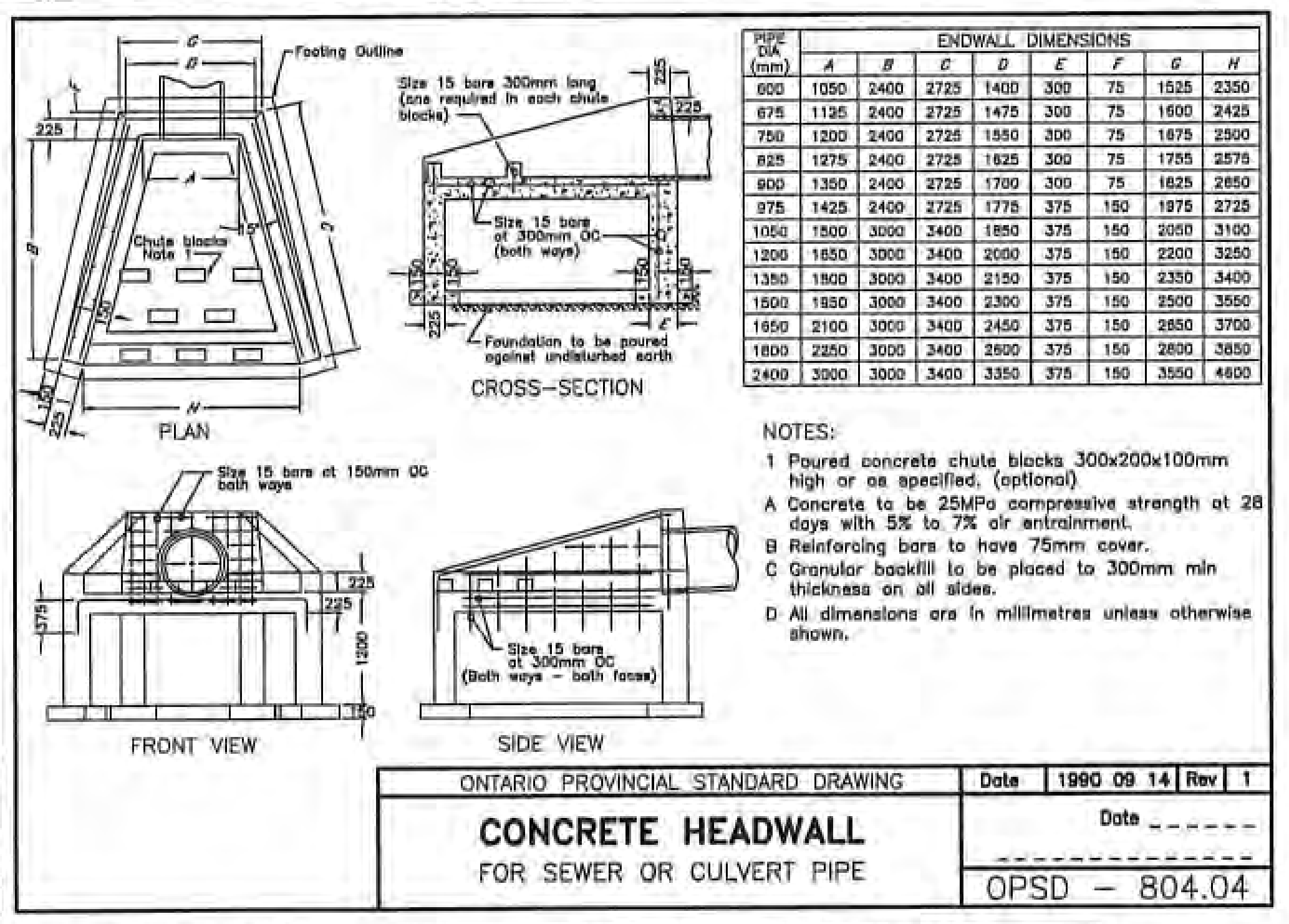


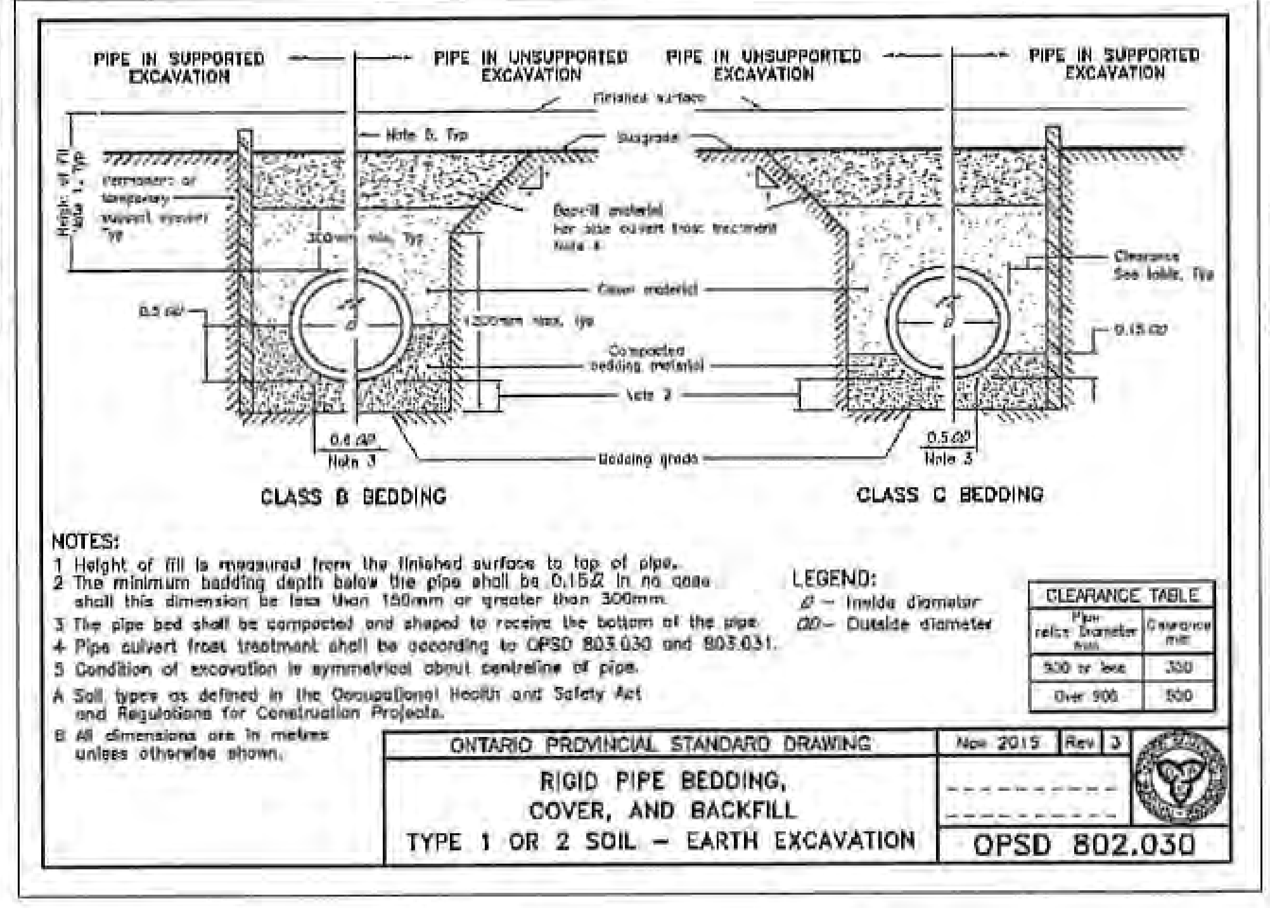


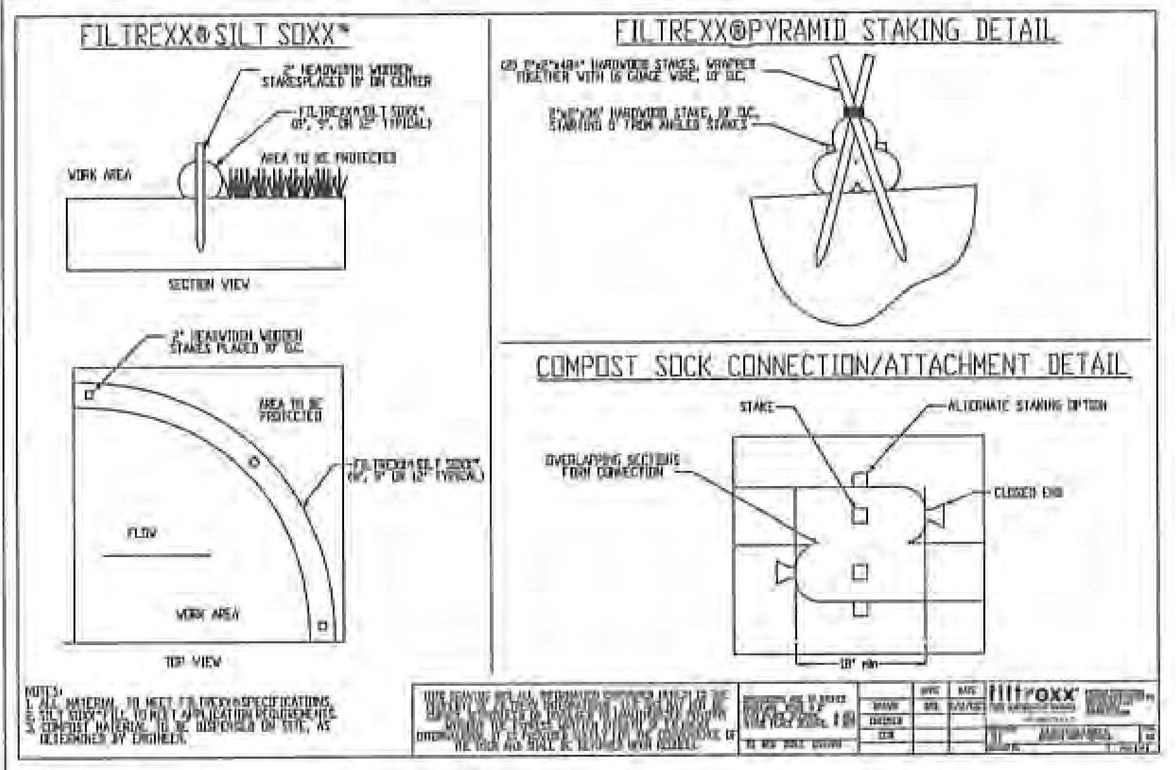


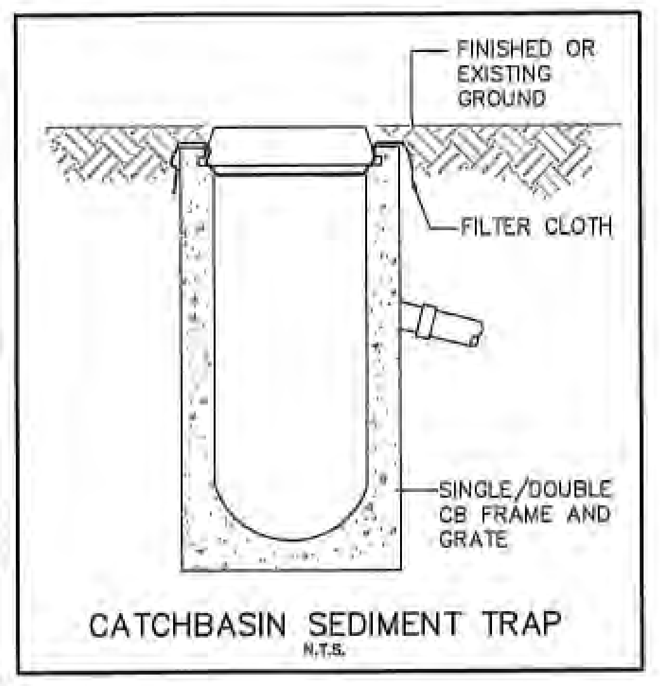




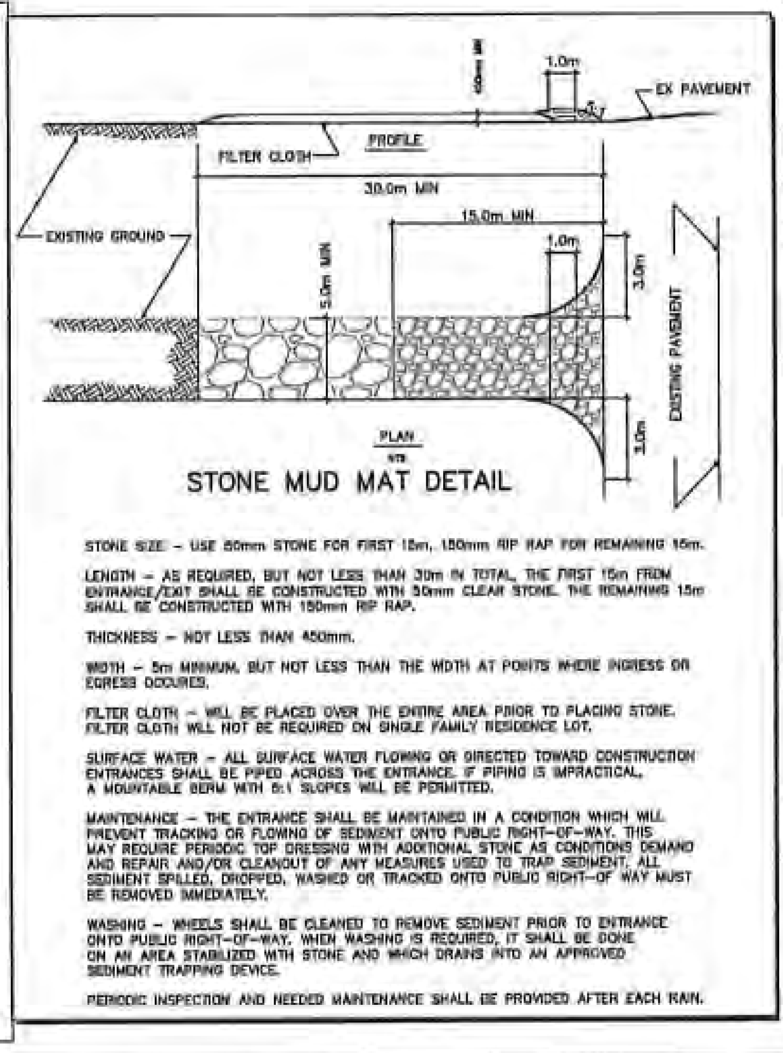


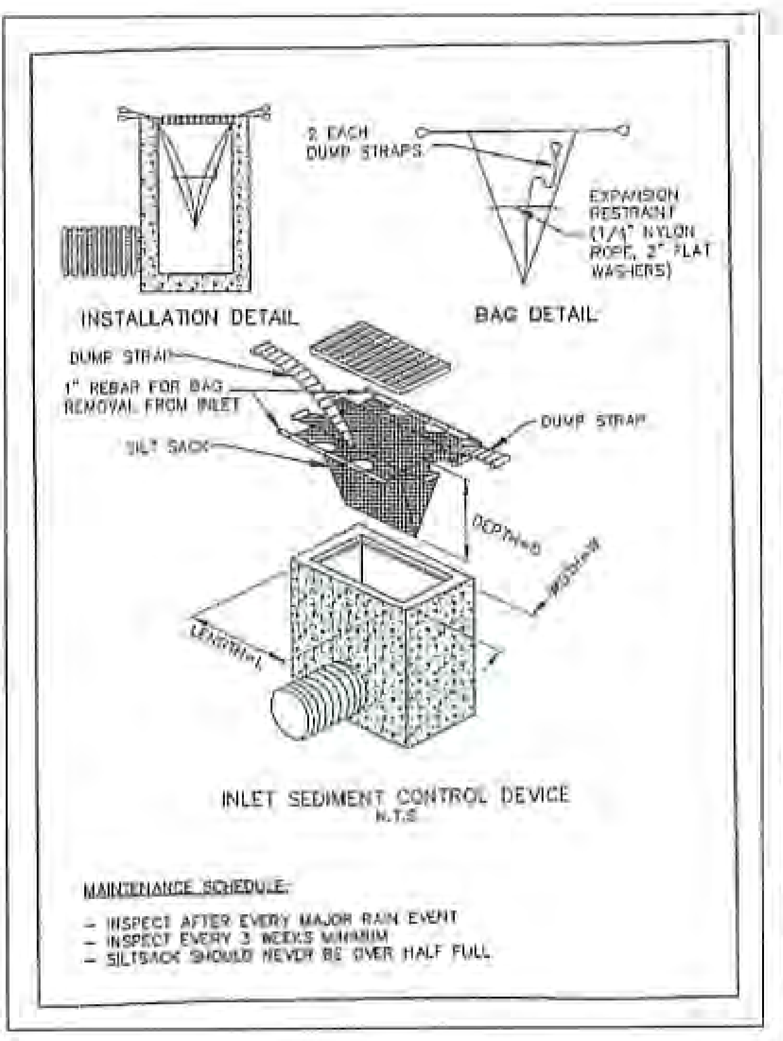






CATCHBASIN SEDIMENT TRAP
N.T.S.





Region of Peel General Notes:

GENERAL

1. THE APPLICANT, APPLICANTS REPRESENTATIVE, CONSULTANT, CONTRACTOR AND SUB CONTRACTORS ARE RESPONSIBLE TO ENSURE THAT THEIR DESIGN MATERIALS AND CONSTRUCTION PRACTICES CONFORM TO THE LATEST REGION OF PEEL STANDARDS, SPECIFICATIONS, MATERIALS AND DESIGN CRITERIA, POSTED ON REGION OF PEELS WEBSITE (www.peelregion.ca/pw/standards). IN THE ABSENCE OF REGION SPECIFICATIONS, THE ONTARIO PROVINCIAL STANDARD SPECIFICATIONS (OPSS) SHALL APPLY.
2. ALL WORKS SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT". THE GENERAL CONTRACTOR SHALL BE DEEMED THE CONSTRUCTOR AS DEFINED IN THE ACT.
3. THE CONTRACTOR AT THEIR EXPENSE SHALL VERIFY THE LOCATION, DIMENSION AND ELEVATION OF ALL EXISTING SERVICES AND UTILITIES IN THE FIELD.
4. PRIOR TO EXCAVATION OR BORING CONTRACTOR AT THEIR EXPENSE SHALL EXPOSE AND VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES AND SERVICES TO BE CROSSED AND MUST NOTIFY THE DESIGN ENGINEER AND THE AGENCY FIELD INSPECTOR AND/OR PROJECT MANAGER IMMEDIATELY, IN WRITING, OF ANY CONFLICTS OR DISCREPANCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR EXPOSING THE EXISTING UTILITIES FAR ENOUGH IN ADVANCE OF CONSTRUCTION TO MAKE NECESSARY DESIGN MODIFICATIONS FOR REVIEW AND APPROVAL, IF REQUIRED, WITHOUT DELAYING THE WORK.
5. THE CONTRACTOR, AT THEIR EXPENSE AND TO THE SATISFACTION OF THE REGION OF PEEL, SHALL BE RESPONSIBLE FOR THE RESTORATION AND THE REPAIR OF THE EXISTING UTILITIES AND ALL AREAS BEYOND THE PLAN OF SUBDIVISION DISTURBED DURING CONSTRUCTION.
6. THE SUPPORT OF ALL UTILITIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
7. ALL BACKFILL FOR SEWERS, WATERMAINS AND UTILITIES ON THE ROAD ALLOWANCE MUST BE MECHANICALLY COMPACTED.
8. ALL BOREHOLES SHOWN ON DRAWING ARE FOR INFORMATION ONLY. REFER TO GEOTECHNICAL REPORT.
9. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.

WATERMAINS

1. THE REGION OF PEEL SHALL CONDUCT THE OPERATION OF EXISTING VALVES AND HYDRANTS IF REQUIRED.
2. CONTRACTOR MUST USE BATTER BOARD OR ROD-AND-LEVEL METHOD FOR WATERMAIN INSTALLATION.
3. ALL WATERMAINS SHALL HAVE 1.70m MINIMUM COVER FOR URBAN ROAD DESIGN AND 2.1m MINIMUM COVER FOR RURAL ROAD DESIGN.
4. ALL WATERMAINS SHALL MAINTAIN A MINIMUM 1.5m CLEARANCE FROM ALL MANHOLES AND CATCH BASINS, WHERE APPLICABLE.
5. FOR WATERMAINS CROSSING OVER OR UNDER SEWERS A MINIMUM 0.5m VERTICAL CLEARANCE SHALL BE PROVIDED.
6. FOR WATERMAIN CROSSING A SANITARY SEWER, WATERMAIN JOINTS ARE TO BE OFFSET A MINIMUM OF 2.5m HORIZONTALLY FROM THE CENTERLINE OF THE SANITARY SEWER.
7. WATERMAIN BEDDING SHOULD BE AS PER DWG 1-5-1.
8. WATERMAINS TO BE INSTALLED TO GRADES AS SHOWN ON APPROVED PLANS, COPY OF GRADE SHEET MUST BE SUPPLIED TO THE REGION OF PEEL INSPECTOR PRIOR TO COMMENCEMENT OF WORK.
9. ANY JOINT DEFLECTION SHALL BE 50% OF MANUFACTURERS SPECIFICATIONS. PIPE BARREL DEFLECTION IS PROHIBITED.
10. FIRE HYDRANTS SHALL BE INSTALLED AS PER REGION STD. DWG. 1-6-1 OR 1-6-2 WITH FLANGE SET BETWEEN 50mm AND 150mm ABOVE FINISHED GRADE.
11. ALL HYDRANTS SHALL HAVE 1.2m MINIMUM HORIZONTAL CLEARANCE FROM ALL OTHER UTILITIES AND STRUCTURES MEASURED FROM THE NEAREST POINT OF THE STRUCTURE.
12. MECHANICAL RESTRAINERS ARE REQUIRED FOR ALL FITTINGS, VALVES, DEAD ENDS, CAPS AND HYDRANTS ON ALL PVC WATERMAINS; MINIMUM RESTRAINED PIPE LENGTH AS PER REGIONS STANDARD DRAWING 1-5-9.
13. STAINLESS STEEL NUTS AND BOLTS ARE TO BE USED ON ALL METALLIC FITTINGS AND JOINT RESTRAINTS.
14. ALL METALLIC VALVES, FITTINGS, THROUGH WALL METAL PIPING AND JOINT RESTRAINTS TO BE C/W DENSO PASTE, DENSO MASTIC & DENSO TAPE OR APPROVED EQUAL APPLIED TO MANUFACTURERS RECOMMENDATIONS.
15. WHERE PLASTIC PIPE IS USED, INSTALL A 12 GAUGE TWU STRANDED COPPER, LIGHT COLOURED, PLASTIC COATED TRACER WIRE ATTACHED TO THE PIPE WITH APPROVED WIRE SPLICE. THE WIRE SHOULD BE BROUGHT TO THE SURFACE AT EACH SERVICE & VALVE BOX AND HYDRANT VALVES.
16. 50mm DIAMETER WATERMAIN SHALL BE TYPE K SOFT COPPER. WATERMAIN INSTALLATION IN CUL-DE-SACS AS PER REGION STD. DWG. 1-7-4.
17. A PHYSICAL SEPARATION MUST BE MAINTAINED AT ALL CONNECTION POINTS OF NEW WATERMAIN TO THE EXISTING SYSTEM UNTIL BACTERIOLOGICAL TESTS HAVE PASSED, AS PER STD. DWG 1-7-7 AND 1-7-8.
18. PROVISION FOR FLUSHING OF NEW WATERMAINS PRIOR TO TESTING MUST BE PROVIDED WITH AT LEAST 50mm OUTLET ON WATERMAINS SMALLER THAN 300mm IN DIAMETER, AND MINIMUM 100mm OUTLET ON WATERMAINS 300mm AND LARGER. COPPER WATERMAINS ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE WATERMAIN, AS PER STD. DWG. 1-7-7 AND 1-7-8.
19. ALL SERVICE CONNECTIONS TO PVC PIPES ARE TO BE MADE USING APPROVED WIDE BAND SERVICE SADDLE, DIRECT TAPPING IS NOT ALLOWED.
20. ALL WATER SERVICES SHALL BE MINIMUM 25mm DIA NOMINAL COPPER PIPE SIZE OR 32mm DIA POLYETHYLENE PIPE. IN GENERAL, NON METALLIC SERVICES SHALL BE ONE SIZE LARGER THAN THE NOMINAL COPPER PIPE SIZE AS PER LATEST APPROVED REGIONAL PRODUCT LIST AND SIZES C/W TRACER WIRE.
21. THE MINIMUM LATERAL DISTANCE BETWEEN WATER SERVICES AND OTHER UTILITIES SHALL BE 1.2m.
22. ALL RESIDENTIAL WATER SERVICE BOXES/CURB STOPS SHALL BE INSTALLED WITHIN SODDED AREAS WITH MINIMUM DISTANCE OF 1.0 METRES FROM THE EDGE OF THE DRIVEWAY, BE FLUSH WITH GRADE AND ACCESSIBLE AT ALL TIME.
23. VALVE AND BOXES SHALL BE CAST IRON SLIDING TYPE, COMPLETED WITH VALVE GUIDE PLATES AND INSTALLED AS PER REGION STD. 1-3-8. MAINLINE VALVES TO BE RESTRAINED AS PER REGION STD. 1-3-3A. VALVES SHALL OPEN TO THE LEFT (COUNTER-CLOCKWISE)
24. ALL WATER SERVICES BOXES SHOULD BE "LEAD FREE" AS PER REGIONS MATERIAL SPECIFICATIONS.
25. THE REGION WILL COMPLETE THE NECESSARY WATER TESTING (PRESSURE TEST, FLUSHING, CHLORINATION AND SAMPLING). CONTRACTOR MAY PROCEED WITH HIS OWN PRESSURE TEST AND FLUSHING PRIOR TO REGIONS TESTING.
26. ALL METALLIC WATER PIPES INCLUDING (K)COPPER WATER SERVICES, INSTALLED OR REPAIRED, SHALL HAVE ZINC ANODE AS PER REGION OF PEEL STANDARD 1-7-1, OPSS422 AND OPSD 1109.011 AND TO CONFORM TO ASTM B-418 TYPE.
27. WATERMAIN PIPES SHALL BE BROUGHT ON SITE WITH MANUFACTURERS PLUGS AND STORED SO NO DEBRIS ENTER THE PIPE. THE CONTRACTOR IS NOT ALLOWED TO INSTALL ANY WATERMAIN UNTIL HE HAS A NIGHT PLUG ON SITE.
THE NIGHT PLUG IS TO BE USED EVERY TIME WHEN THE WORK IS STOPPED.

WATERMAIN IN FILL AREA

1. NO WATERMAIN TO BE LAID ON FILL UNTIL THE FIELD DENSITY TEST REPORTS HAVE BEEN SUBMITTED TO AND APPROVED BY THE REGION OF PEEL OR THE CONSULTING ENGINEER.
2. PIPE JOINTS DEFLECTIONS ARE NOT ALLOWED IN FILL AREA.
3. JOINTS SHALL BE MECHANICALLY RESTRAINED THE WHOLE LENGTH.
4. ALL HYDRANTS, TEE BRANCH VALVES AND HORIZONTAL BENDS ARE TO BE MECHANICALLY RESTRAINED WITH TIE RODS.
5. IN EXISTING MUNICIPAL RIGHT-OF-WAY OR EASEMENT, FILL TO BE PLACED TO 600mm MINIMUM ABOVE THE OBVERT OF THE WATERMAIN AND TO 300mm EITHER SIDE, COMPACTED TO MINIMUM 100% STANDARD PROCTOR DENSITY IN 300mm LIFTS; AND THEREAFTER, FOR EVERY 300mm LIFT ALONG THE CENTERLINE, AND 1.5m TO EITHER SIDE, OF WATERMAIN AT MAXIMUM INTERVAL OF 30.0m. TEST RESULTS MUST BE SUBMITTED TO AND APPROVED BY THE CONSULTANT OR AGENCY.

SANITARY SEWERS

1. ALL SANITARY SEWER BEDDING AS PER STD. 2-3-1.
2. MAINLINE SANITARY SEWER PIPE SIZE SHALL BE MINIMUM 250mm IN DIAMETER INSTALLED AT THE APPROVED DESIGN GRADE. PIPE CLASS AND APPURTENANCES AS PER REGIONS SPECIFICATIONS.
3. ALL SEWERS CONSTRUCTED WITH GRADES 0.5% OR LESS SHALL BE APPROVED BY THE ENGINEER AND THE AGENCY PROJECT MANAGER OR DESIGNATE AND BE INSTALLED WITH LASER AND CHECKED PRIOR TO BACKFILL.
4. MINIMUM SANITARY SEWER PIPE SLOPE FOR LAST LEG SHALL BE 1% AND DESIRABLE SLOPE 2%.
5. ALL MANHOLES SHALL BE AS PER REGION STD. DWG. 2-5-2, 2-5-3, 2-5-4, 2-5-5 AND 2-5-6 AND BENCHING AS PER STD 2-5-20.
6. FRAME AND COVERS SHALL BE AS PER REGION STD. DWG. 2-5-13, 2-6-1 to 2-6-8.
7. MANHOLE STEPS OR LADDERS SHALL BE AS PER REGION STD. DWG. 2-6-9 to 2-6-11.
8. MANHOLES DEEPER THAN 5.0m MUST BE EQUIPPED WITH SAFETY PLATFORMS, AS PER STD 2-6-13 and 2-6-14.
9. MANHOLE DROP STRUCTURES SHALL BE AS PER REGION STD. DWG. 2-5-26 AND 2-5-27.
10. SANITARY SERVICE LATERALS SHALL BE MINIMUM 125mm DIAMETER.
    a. SANITARY SERVICE SHALL BE LOWER THAN AND TO THE RIGHT OF THE STORM SERVICE AT THE PROPERTY LINE WHEN FACING THE LOT FROM THE STREET.
    b. CONNECTIONS TO SEWERS SHALL BE MADE WITH MANUFACTURED TEES OR WYES WHERE APPLICABLE AND SHALL BE COLOUR CODED AS NON-WHITE, AS PER STD. DWG. 2-4-1 to 2-4-7.

REGIONAL ROAD

1. CONSTRUCTION AND DETOUR SIGNAGE MUST CONFORM TO "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES" AND LATEST REVISION OF THE ONTARIO MINISTRY OF TRANSPORTATION "TRAFFIC CONTROL MANUAL FOR ROADWAY WORK OPERATIONS".
2. ALL TEMPORARY SIGNAGE AND TRAFFIC CONTROL MEASURES SHALL BE IN ACCORDANCE WITH REQUIREMENTS OF ONTARIO TRAFFIC MANUAL, BOOK 7 "TEMPORARY CONDITIONS" AND OPS SPECIFICATIONS AND STANDARD DRAWINGS.
3. PAVEMENT MARKINGS MUST BE IN ACCORDANCE WITH THE ONTARIO TRAFFIC MANUAL, BOOK 11 "PAVEMENT HAZARD AND DELINEATION MARKINGS".
4. THE CONTRACTOR SHALL NOTIFY IN ADVANCE, AS REQUIRED, THE APPROPRIATE AUTHORITY HAVING JURISDICTION FOR THE ROAD PRIOR TO COMMENCING ANY WORK AND SHALL ACQUIRE AND SATISFY THE REQUIREMENTS OF APPROPRIATE PERMITS (FEES, INSPECTIONS, SIGNAGE, TRAFFIC, MAINTENANCE, DIVERSION, ETC...)
5. REGIONAL ROAD CLOSURE IS NOT PERMITTED AT ANY TIME UNLESS APPROVAL FROM REGIONAL COUNCIL WAS OBTAINED FOR THE WORKS, WHERE A MINIMUM TWO MONTH LEAD TIME IS REQUIRED, AS PER REGIONAL POLICY W30-12.
6. WORK OPERATIONS THAT REQUIRE DIVERTING TRAFFIC TO ONE LANE ARE SUBJECT TO TIME RESTRICTIONS AND /OR NIGHT TIME OPERATIONS AS SPECIFIED IN ROAD OCCUPANCY PERMIT. THROUGH LANES MUST BE MINIMUM 3.5m, UNLESS OTHERWISE APPROVED.
7. FOR TEMPORARY DELINEATION OF TRAFFIC IN OPPOSITE DIRECTIONS A YELLOW CENTRE LINE ON PAVEMENT MUST BE PAINTED. TRAFFIC CONTROL BARRELS (CONES) ARE NOT PERMITTED FOR THIS USE ON REGIONAL ROADS.
8. NEW JERSEY BARRIERS (NJB) WITH CRASH ATTENUATION DEVICES MUST BE USED ON LONG TERM PROJECTS AS OPPOSED TO TRAFFIC CONTROL DELINEATORS (BARRELS).
9. ACCESS TO EXISTING ENTRANCES AND SIDE STREETS, INCLUDING PEDESTRIAN ACCESS, SHALL BE MAINTAINED. ACCESS REQUIREMENTS MUST COMPLY WITH REGION OF PEEL CONTROLLED ACCESS BY-LAW.
10. LOCATION OF EXISTING UTILITIES TO BE ESTABLISHED BY THE CONTRACTOR. ALL EXISTING UTILITY ELEVATIONS (SANITARY AND WATERMAIN) INCLUDING CENTRE LINE OF THE ROAD ELEVATIONS HAVE TO BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCING ANY WORK ON SITE. ANY DISCREPANCIES SHALL BE REPORTED TO THE REGION IMMEDIATELY.
11. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE FOR LOCATING, SUPPORTING AND PROTECTING ALL UNDERGROUND AND OVERHEAD UTILITIES AND STRUCTURES EXISTING AT THE TIME OF CONSTRUCTION IN THE AREA OF HIS WORK, WHETHER SHOWN ON THE PLANS OR NOT, AND FOR ALL REPAIRS AND CONSEQUENCES RESULTING FROM DAMAGE TO SAME.
12. THE CONTRACTOR(S) SHALL BE SOLELY RESPONSIBLE TO GIVE 72 HOURS WRITTEN NOTICE TO UTILITY AUTHORITY PRIOR TO CROSSING SUCH UTILITIES FOR THE PURPOSE OF INSPECTION. THIS INSPECTION WILL BE FOR THE DURATION OF CONSTRUCTION WITH THE CONTRACTOR RESPONSIBLE FOR ALL COSTS ARISING FROM SUCH INSPECTIONS.
13. ALL ROAD BASE SHALL BE AS PER REGION OF PEEL STD. DWG. 5-1-1 AND 5-1-2.
14. ASPHALT PRESERVATIVE SEALER SUCH AS RE-CLIMATE OR APPROVED EQUIVALENT SHALL BE APPLIED AFTER THE ONE-YEAR MAINTENANCE PERIOD FOR THE TOP COURSE ASPHALT.
15. ALL EXISTING PAVEMENTS, CURBS, SIDEWALKS AND BOULEVARDS, AND OTHER AREAS DISTURBED BY THE WORK, TO BE REINSTATED EQUAL TO EXISTING AND TO THE SATISFACTION OF APPLICABLE AUTHORITY HAVING JURISDICTION OVER THE ROAD ALLOWANCE. EXISTING PAVEMENT AND CURBS TO BE SAW- CUT TO PROVIDE A SMOOTH JOINT.
16. EROSION CONTROL MEASURES TO BE IMPLEMENTED AS REQUIRED.
17. FOR ROAD PROJECTS THAT WILL NOT BE COMPLETED PRIOR TO THE END OF THE CONSTRUCTION SEASON, THE FOLLOWING WILL NEED TO BE CONSIDERED IN ORDER TO WINTERIZE THE CONSTRUCTION PROJECT TO ENSURE SAFE CONDITIONS DURING WINTER:
    a. WHERE APPLICABLE, CURB AND GUTTER SECTIONS ARE TO BE COMPLETED, THE BASE COURSE ASPHALT SHALL BE IN PLACE
    b. CATCH BASINS AND MAINTENANCE HOLES SET TO EXISTING BASE GRADE
    c. STEEL PLATING NOT PERMITTED
    d. HOT MIX ASPHALT (HMA) ONLY
    e. LANE DELINEATION AND PAVEMENT MARKING COMPLETED
    f. WHERE NEW JERSEY BARRIERS USED, OFFSET NO LESS THAN 4.25m FROM EDGE OF TRAVELLED LANE
    g. ROAD AND BOULEVARD MUST BE FREE OF OBSTRUCTIONS AND ACCOMMODATE SAFE SNOW PLOW OPERATION CONSIDERING THAT A WING AND PLOW IS 6m WIDE AND 1.52m SNOW STORAGE MINIMUM REQUIRED
    h. ALL CATCH BASIN GRATES SHALL BE SIDE INLET, OPSD 400.081 (LATEST VERSION) UNLESS OTHERWISE NOTED
    i. WINTER SHUT-DOWN MEETINGS WITH THE REGION OF PEEL ROAD MAINTENANCE STAFF ARE REQUIRED PRIOR TO SEASONAL SHUT-DOWN AND SHALL BE ORGANIZED BY THE CONSULTANT OR PROJECT MANAGER OR DESIGNATE.

TRAFFIC SIGNS AND SIGNALS ON REGIONAL ROADS

1. ALL REQUIRED TRAFFIC SIGNS, WHETHER REGULATORY, WARNING, TEMPORARY OR GUIDE/DIRECTIONAL IN NATURE SHALL BE INSTALLED IN ACCORDANCE WITH THE STANDARDS SPECIFICATIONS AND LEGISLATION CONTAINED IN THE OTM MANUALS, THE HTA AND REGION OF PEEL TRAFFIC BY-LAW.
2. ELECTRICAL WORKS SHALL CONFORM TO THE ONTARIO PROVINCIAL STANDARD (OPS) DRAWINGS AND REGION OF PEEL STANDARD DRAWINGS AND SPECIFICATIONS.
3. TRAFFIC CONTROLLERS MUST BE INSTALLED AS PER APPROVED LOCATIONS. EQUIPMENT MUST NOT ENCROACH ON PRIVATE PROPERTY WITHOUT PERMISSION TO ENTER, EASEMENT, PERMANENT OR TEMPORARY UNDERTAKINGS.

KEY PLAN
N.T.S.

FOR GENERAL NOTES REFER TO DWG C3

LEGEND

- ⚲ HYDRANT AND VALVE
- □ CATCHBASIN
- ◫ DOUBLE CATCHBASIN
- ○ PROPOSED STORM MANHOLE
- ● PROPOSED SANITARY MANHOLE
- ◙ PROPOSED CATCHBASIN MANHOLE
- 236.00 PROPOSED ELEVATION
- 235.50 EXISTING ELEVATION
- ▪▪ VALVE AND BOX
- ⊗ VALVE AND CHAMBER

RECEIVED
NOV 04 2019
PLANNING DEPARTMENT

TOWN OF CALEDON
APPROVED AS NOTED
THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.
THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.
DATE: Nov 5/19
APPROVED BY: C. Blakely
MANAGER OF DEVELOPMENT
EAST COMMUNITY SERVICES

CONTRACTOR TO BE RESPONSIBLE FOR VERIFYING THE LOCATIONS OF ALL EXISTING UNDERGROUND AND ABOVE UTILITIES AND SERVICES. THE CONTRACTOR SHALL ADVISE THE ENGINEER OF ANY DISCREPANCIES PROIR TO PROCEEDING WITH CONSTRUCTION. VARIOUS UTILITIES CONCERNED TO BE GIVEN REQUIRED ADVANCED NOTICE PRIOR TO ANY DIGGING, FOR STAKE OUT. A.M. CANDARAS ASSOCIATES INC. ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF EXISTING UTILITIES AS INDICATED ON THIS DRAWING.

LEGAL DESCRIPTION
PART OF LOTS 2, 3, 4 AND 5,
CONCESSION 5,
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

BENCH MARK
BENCH MARK No. 10519980009
OBTAINED FROM THE MINISTRY OF NATURAL RESOURCES COSINE INTERNET SITE HAVING AN ELEVATION OF 217.968 METRES
TOWN OF CALEDON BENCHMARK No. 758056,
ELEVATIONS ARE BASED ON THE CANADIAN GEODETIC DATUM AND HAVING A PUBLISHED ELEVATION OF 251.263 metres.

OCT 16/19
A. M. CANDARAS

GENERAL NOTES - STORM SEWERS

A. STORM SEWER TO BE PROVIDED ON ALL ROADS WITH CURB AND GUTTER.
B. PLACE ALL CATCH BASIN LATERALS AT 2% GRADE UNLESS OTHERWISE NOTED. PIPE SIZE MINIMUM 250mm DIA. SINGLE, 300mm DIA. DOUBLE.
C. STORM SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD 802.030 FOR RIGID PIPE OR OPSD 802.010 WITH GRANULAR 'A' FOR FLEXIBLE PIPE UNLESS APPROVED OTHERWISE BY THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING.
D. MAINTENANCE HOLE TOPS (FRAMES) AND CATCHBASIN (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF ASPHALT IS PLACED.
E. STORM SEWER TO BE LOCATED OFFSET 1.5m SOUTH OR WEST OF CENTRELINE UNLESS OTHERWISE SPECIFIED.
F. ALL CONNECTIONS TO THE STORM MAIN SHALL BE MADE WITH A STORM MANHOLE OR APPROVED FACTORY TEE CONNECTION AS PER OPSD 708.01 OR 708.03.
G. PIPE MATERIAL TO BE REINFORCED CONCRETE WITH A STRENGTH OF 50 N/m/mm CERTIFIED TO C.S.A. STANDARD A247.2-1982, CLASS 50-D (PREVIOUSLY C.S.A. STANDARD A257.2-1974 CLASS II) OR PVC CERTIFIED TO C.S.A. STANDARDS 182.2 AND 182.4 MAX. PVC PIPE DIA. IS 600mm BIG O BOSS 2000 POLYETHYLENE PIPE WITH GASKETED BELL AND SPIGOT JOINTS CERTIFIED C.S.A. B182.8 FOR STORM SEWERS UP TO 900mm DIA. WHERE ONLY CONNECTION STD CATCHBASINS ARE CONSIDERED.
H. STORM SEWER TO BE MINIMUM 300mm DIA. WITH JOINTS CONFORMING TO C.S.A. STANDARD A 257.3
I. ALL PIPE BEDDING MUST CONFORM TO OPSD MAXIMUM COVER TABLE. NO FLEXIBLE PIPE SEWERS WILL BE INSTALLED WITH A DEPTH COVER GREATER THAN 8m UNLESS SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING.
J. ALL PIPE HANDLING INSTRUCTIONS MUST BE IN STRICT COMPLIANCE WITH MANUFACTURERS INSTALLATION GUIDES AND THE OCPA OR UNIBELL GUIDELINES.

TOWN OF CALEDON
GENERAL NOTES
STORM SEWERS

NO.	REVISION	APR'D	DATE
2	STANDARD No. 123 NOW 101		JUNE 08
1	NOTES EDIT		MAR. 08

APPR: C.C. DATE: MAR 01
DRAWN: BJM SCALE: NTS
STANDARD No. 101

GENERAL NOTES - ROADWORKS

ROADS

A. SINGLE - STAGE CURB & GUTTER TO COMPLY WITH OPSD 600.040 COMPLETE WITH 2 - 15M BARS
B. TWO - STAGE CURB & GUTTER TO COMPLY WITH OPSD 600.070
C. SIDEWALKS TO COMPLY WITH OPSD-310.010 AND ARE TO BE 1.5 METRES WIDE ON A 150mm COMPACTED GRANULAR "A" BASE. MINIMUM THICKNESS AS FOLLOWS :
   - NORMAL THICKNESS 125mm
   - RESIDENTIAL DRIVEWAY 150mm
   - COMMERCIAL/INDUSTRIAL DRIVEWAY 200mm
   (REINFORCEMENT AS PER OPSS IF REQUIRED)
D. NATIVE SUBGRADE SHALL HAVE A CROSSFALL OF 3 % AND THE MATERIAL SHALL BE APPROVED BY A SOILS CONSULTANT AND IS SUBJECT TO APPROVAL BY THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING.
E. THE ROAD BASE SHALL INCORPORATE 100mm DIAMETER SUBDRAIN WITH FACTORY INSTALLED FILTER FABRIC AS PER TOWN OF CALEDON STANDARD No. 240.
F. ALL CURB RADII TO BE MINIMUM OF 10.0 METRES RESIDENTIAL AND 15.0 METRES INDUSTRIAL AT THE EDGE OF ASPHALT.
G. NATIVE SUBGRADE TO BE COMPACTED TO MINIMUM 95 % STANDARD PROCTOR MAXIMUM DRY DENSITY AND SHALL BE PROOF ROLLED.
H. GRADE AND CROSS FALL ADJUSTMENT OF MAINTENANCE HOLE AND CATCH BASIN FRAMES WILL BE MADE USING PRODUCTS SPECIFICALLY MANUFACTURED FOR THAT PURPOSE AS PER OPSD 704.010.
I. NON-COMPRESSIBLE BACK FILL WILL BE USED DURING REBUILDING, ADJUSTING, OR ANY OTHER APPLICABLE CATCH BASIN OR MAINTENANCE HOLE WORKS.
J. CURB AND SIDEWALK CONCRETE SHALL BE 30MPa AT 28 DAYS WITH 7% +/- 1.5% ENTRAINED AIR AND NOT LESS THAN 355 kg/m3 OF CEMENT.(PER OPSS 315 AND 353)

TOWN OF CALEDON
GENERAL NOTES
ROADWORKS

NO.	REVISION	APR'D	DATE
2	STANDARD No. 175 NOW 102		JUNE 08
1	NOTES EDIT		MAR. 08

APPR: C.C. DATE: DEC 1999
DRAWN: BJM SCALE: NTS
STANDARD No. 102

SWM FACILITY CONSTRUCTION: DEWATERING NOTES

1. Inlet pump head must be wrapped in filter fabric, situated on a bed of rip-rap within the excavated pond area. Alternatively, clear stone may be placed over pump completely covering the pump head.
2. Outlet pump must discharge to a sediment bag or sediment trap/basin.
3. Discharge from sediment bag to be release at a vegetated location. If unavailable, sediment bag to be placed over flow dissipating structure. Sediment bag is to be minimum 30m from wetland/creek.
4. Sediment trap or basin to be protect with sediment fence installed around perimeter.
5. Dewatering to a well vegetated, grassed area may be permitted provided pump outlet head is located at least 30m from receiving water body.

SEDIMENT BASIN INSTALLATION & MAINTENANCE NOTES

1. Sediment basins are to be constructed prior to any construction activities , except for topsoil stripping and grading operations associated with the construction of the temporary ESC pond.
2. Proper compaction control must be used when constructing the embankments to ensure its stability.
3. Temporary Sediment basin slopes to be topsoil and seeded above the permanent water level.
4. Sediment accumulation in the ponds must be measured a minimum of once every six (6) months. The pond will require cleaning when sediment accumulation reaches 50% of the forebay design capacity, approximate depth of 0.50m.
5. Sediment pond embankments, outlet and spillway should be inspected weekly and after each rainfall and significant snowmelt events.

EROSION CONTROL NOTES

Following are the minimum or "Good Housekeeping" requirements recommended to achieve erosion control during the construction period. The measures will be inspected periodically by Town staff. It is the responsibility of the Developer/General Contractor to assure their continued effectiveness throughout construction.

a) Provide gravel entrance wherever equipment leaves the site to prevent mud tracking onto paved surfaces. Gravel bed shall be a minimum of 30m long, 6m wide and .3m deep and shall consist of coarse (2" crusher-run limestone) material. Maintain gravel entrance in clean condition.
b) Cover all catchbasins with 6mm steel plate that is firmly secured to the CB grating with clamps, screws or wires. Cover to remain in place until rough paving is completed. Maintain good housekeeping to prevent waterborne sediment from entering the storm sewer system. If the CB's must be used for site drainage during construction, they are each to be surrounded by Inlet-Soxx Inlet Protection.
c) Do not locate topsoil piles and excavation material closer than 2.5m from any paved surface, or one which is to be paved before the pile is removed. Topsoil pile to be located a minimum of 30m from top of bank. All topsoil piles to be seeded if they are to remain on-site long enough for seeds to grow (longer than 1 month).
d) Control wind-blown dust off-site to acceptable levels, by seeding topsoil piles and other areas temporarily, and/or watering, as required.
e) Temporary soil stockpiles should be placed away from all watercourses, a minimum distance of 15m from wetland limit.
f) Silt traps to be cleaned periodically.
g) Temporary sediment basins to be cleaned when sediment accumulation reaches 0.50m in depth.

No.	Date	By	REVISIONS
4	OCT.16/19	F.P.	ISSUED FOR CONSTRUCTION
3	JUL.29/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
2	APR.2/19	F.P.	ISSUED TO TOWN OF CALEDON, REGION OF PEEL
1	NOV./18	F.P.	ISSUED TO TOWN OF CALEDON

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consulting engineers
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Woodbridge ont. L4L 9R4
905-850-8020 Fax 905-850-8099
Email: civil@amcai.com

BOLTCOL NORTH
GEORGE BOLTON PARKWAY EXTENSION + SWM POND 4+5

TOWN OF CALEDON
REGION OF PEEL

GENERAL NOTES + CONSTRUCTION DETAILS

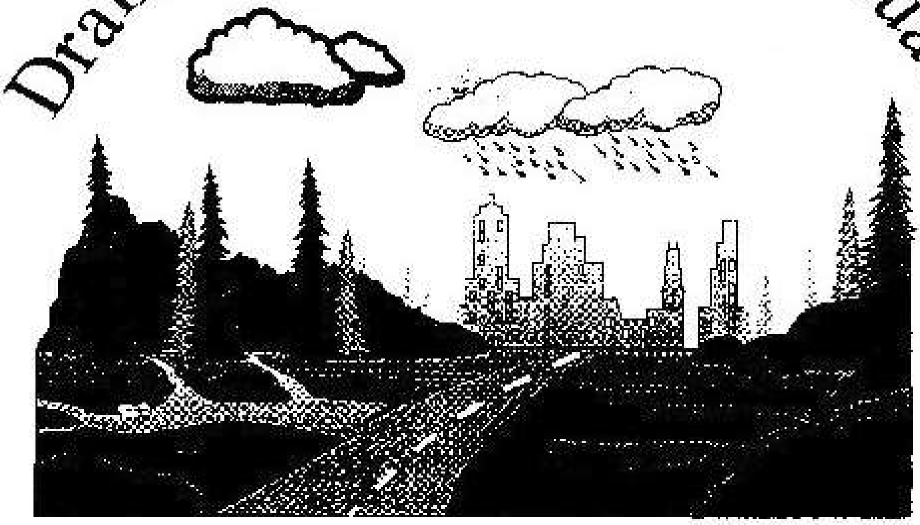
REGION FILE#: C02.311
SP 18-04A

SCALE: 1:500	DATE: JAN 2019	PROJ No. 1667
DRAWN: F.P.	CHK'D: A.M.C.	PLAN No. C3
DESIGNED: F.P.	SHEET 3 of 3	

REV: 4

Ministry
of
Transportation
Ontario

MTO
Drainage Management Manual



Drainage and Hydrology Section
Transportation Engineering Branch
Quality and Standards Division

Ministry
of
Transportation
Ontario

MTO
Drainage Management Manual

Chapter 8
Hydrology, Hydraulics and Stormwater Quality

Drainage and Hydrology Section
Transportation Engineering Branch
Quality and Standards Division

Transposition of Flood Discharges

Sometimes it is necessary to transpose a discharge from a gauging station to another point on the same stream or to an adjacent basin where the discharge is unknown. If the basins have similar characteristic, instantaneous peak discharges can be transposed directly using the expression

$$Q_2 = Q_1 \left(\frac{A_2}{A_1} \right)^{0.75} \qquad (8.31)$$

Where:

Q_1 = known peak discharge
Q_2 = unknown peak discharge
A_1 = known basin area
A_2 = unknown basin area

This expression is based on the modified index flood method. If the basins have significantly different hydrologic characteristics, it would be preferable to use the modified index flood method directly, possibly using the transposed figure as a check.

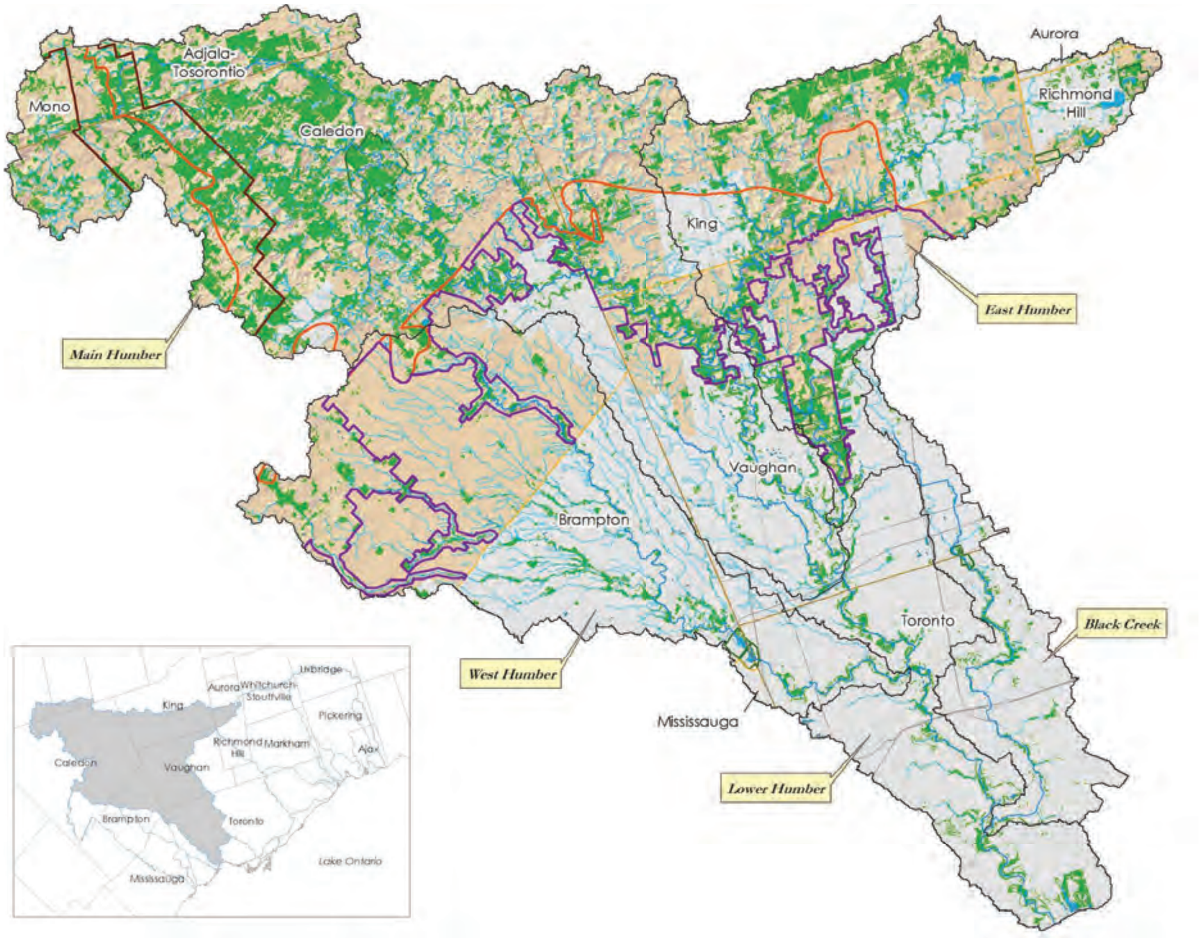
Where two or more gauging stations are available in a reasonably homogeneous watershed, the discharge corresponding to a given frequency at each station can be plotted on logarithmic paper and the required discharge interpolated or extrapolated, within reasonable limits.

April 2018

CIVICA
Waste Management Solutions

Prepared for: Toronto and Region Conservation Authority (TRCA)

Final Report:
Humber River Hydrology Update



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Appendix I

Initial Model Parameters (Existing Conditions)

Initial Model Parameters (NasHyd)

NHYD	Catchment ID	DT [min]	AREA [ha]	DWF [cms]	N	TP [hr]	IA [mm]	CN AMC II *
581	39.01	5	12.89	0	3	0.68	10	78
582	39.02	5	26.29	0	3	0.80	10	77
584	39.04	5	38.49	0	3	1.96	10	80
589	39.09	5	35.59	0	3	1.59	10	80
590	39.10	5	25.19	0	3	0.94	10	85
591	39.11	5	21.4	0	3	0.72	10	87
593	39.13	5	108.88	0	3	2.96	10	81
594	40.01	5	265.88	0	3	3.20	10	67
595	40.02	5	14.17	0	3	0.46	10	76
597	40.04	5	5.39	0	3	0.41	10	72
598	40.05	5	13.19	0	3	0.72	10	69
600	40.07	5	21.83	0	3	0.79	10	73
601	40.08	5	10.02	0	3	0.74	10	73
602	40.09	5	20.88	0	3	0.68	10	87
607	41.01	5	163.14	0	3	2.89	10	83
608	41.02	5	47.19	0	3	1.68	10	78
609	41.03	5	73.72	0	3	1.90	10	81
611	41.05	5	62.92	0	3	1.71	10	83
612	41.06	5	127.87	0	3	1.90	10	81
613	41.07	5	101.08	0	3	2.53	10	80
614	41.08	5	362.27	0	3	3.09	10	82
615	42.01	5	47.19	0	3	1.58	10	85
616	42.02	5	23.03	0	3	1.01	10	81
624	42.10	5	15.77	0	3	0.87	10	77
626	42.12	5	6.62	0	3	0.41	10	71
631	42.17	5	25.55	0	3	1.11	10	86
632	43.01	5	226.69	0	3	3.45	10	83
633	43.02	5	129.13	0	3	2.15	10	85
634	43.03	5	63.04	0	3	2.76	10	82
635	43.04	5	24.96	0	3	1.00	10	83
636	43.05	5	39.74	0	3	1.63	10	86
637	43.06	5	35.79	0	3	1.17	10	80
638	43.07	5	35.71	0	3	0.93	10	87
643	44.01	5	63.55	0	3	1.88	10	80
647	44.05	5	7.7	0	3	0.51	10	97
649	44.07	5	8.59	0	3	0.49	10	73
667	45.10	5	211.65	0	3	2.37	10	92
670	45.13	5	26.2	0	3	0.66	10	76
671	45.14	5	12.18	0	3	0.52	10	87
693	47.05	5	15.74	0	3	0.74	10	73

Appendix II

Calibrated Model Parameters (Existing Conditions)

Calibrated Model Parameters (NasHyd)

NHYD	Catchment ID	DT [min]	AREA [ha]	DWF [cms]	N	TP [hr]	IA [mm]	CN AMC II *	CN AMC III*
575	38.02	5	135.85	0	2.5	1.93	10	94	97
577	38.04	5	142.38	0	2.5	1.99	10	91	96
578	38.05	5	47.43	0	2.5	0.82	10	91	96
579	38.06	5	173.74	0	2.5	2.11	10	90	95
580	38.07	5	293.26	0	2.5	4.55	10	86	93
581	39.01	5	12.89	0	2.5	0.61	10	86	93
582	39.02	5	26.29	0	2.5	0.72	10	85	93
584	39.04	5	38.49	0	2.5	1.76	10	88	94
589	39.09	5	35.59	0	2.5	1.43	10	88	94
590	39.10	5	25.19	0	2.5	0.85	10	94	97
591	39.11	5	21.4	0	2.5	0.65	10	96	98
593	39.13	5	108.88	0	2.5	2.66	10	89	95
594	40.01	5	265.88	0	3	3.2	10	77	89
595	40.02	5	14.17	0	3	0.46	10	87	94
597	40.04	5	5.39	0	3	0.41	10	83	92
598	40.05	5	13.19	0	3	0.72	10	79	90
600	40.07	5	21.83	0	2.5	0.71	10	80	90
601	40.08	5	10.02	0	2.5	0.67	10	80	90
602	40.09	5	20.88	0	3	0.68	10	99	99
607	41.01	5	163.14	0	3	2.89	10	95	98
608	41.02	5	47.19	0	3	1.68	10	90	95
609	41.03	5	73.72	0	3	1.9	10	93	97
611	41.05	5	62.92	0	3	1.71	10	95	98
612	41.06	5	127.87	0	3	1.9	10	93	97
613	41.07	5	101.08	0	3	2.53	10	92	96
614	41.08	5	362.27	0	3	3.09	10	94	97
615	42.01	5	47.19	0	3	1.58	10	98	99
616	42.02	5	23.03	0	3	1.01	10	93	97
624	42.10	5	15.77	0	3	0.87	10	89	95
626	42.12	5	6.62	0	3	0.41	10	82	91
631	42.17	5	25.55	0	3	1.11	10	99	99
632	43.01	5	226.69	0	3	3.45	10	95	98
633	43.02	5	129.13	0	3	2.15	10	98	99
634	43.03	5	63.04	0	3	2.76	10	94	97
635	43.04	5	24.96	0	3	1	10	95	98
636	43.05	5	39.74	0	3	1.63	10	99	99
637	43.06	5	35.79	0	3	1.17	10	92	96
638	43.07	5	35.71	0	3	0.93	10	99	99
643	44.01	5	63.55	0	3	1.88	10	92	96
647	44.05	5	7.7	0	3	0.51	10	99	99
649	44.07	5	8.59	0	3	0.49	10	84	92
667	45.10	5	211.65	0	3	2.37	10	99	99
670	45.13	5	26.2	0	3	0.66	10	87	94
671	45.14	5	12.18	0	3	0.52	10	99	99
693	47.05	5	15.74	0	3	0.74	10	73	86

Appendix IV

Design Storm Model Results

Estimated Peak Flow - Existing Condition (with ponds)

Flow Node #	Hyd #	6hr						12hr						24hr						350yr	500yr
		2yr	5yr	10yr	25yr	50yr	100yr	2yr	5yr	10yr	25yr	50yr	100yr	2yr	5yr	10yr	25yr	50yr	100yr		
39.50	1776	6.94	11.37	54.85	73.86	88.74	104.49	6.95	10.87	63.82	83.47	98.43	114.43	6.37	9.76	65.37	83.47	97.56	112.36	167.72	180.19
39.60	7603	2.20	4.30	37.79	51.04	61.33	72.12	3.15	5.53	43.52	56.90	66.93	77.94	3.92	6.49	43.85	56.04	65.31	75.16	116.47	125.47
40.10	7590	14.57	21.66	94.16	127.33	154.41	181.57	16.95	24.24	113.59	149.08	176.58	206.16	17.35	24.17	119.98	154.65	181.05	209.28	308.24	332.48
40.20	1469	13.21	19.38	95.23	129.85	156.84	183.67	15.10	21.21	114.26	150.17	176.64	205.02	15.08	20.56	119.79	153.94	179.29	206.24	307.90	332.10
40.25	7593	13.36	18.91	28.73	35.09	40.49	48.18	9.57	13.22	19.23	23.09	26.64	30.60	6.32	8.47	11.97	14.25	16.16	18.18	46.34	49.33
40.30	1373	17.31	25.47	95.67	130.20	157.29	184.23	16.82	23.83	115.17	151.43	178.18	206.67	17.17	23.61	121.41	156.12	181.81	209.15	309.76	334.03
41.00	1819	2.36	4.96	12.04	15.95	18.85	21.92	3.22	6.01	13.48	17.22	20.05	23.05	3.56	6.18	13.14	16.51	18.99	21.62	32.89	35.36
41.20	1393	1.75	3.72	8.70	11.46	13.44	15.53	2.40	4.34	9.55	12.15	14.08	16.11	2.58	4.35	9.18	11.53	13.19	14.94	22.94	24.60
41.30	846	1.92	3.71	8.60	11.11	13.07	15.08	2.50	4.28	9.24	11.66	13.52	15.43	2.58	4.20	8.78	10.91	12.53	14.18	21.57	23.06
42.10	7591	3.39	5.53	12.95	17.46	20.41	23.57	3.85	6.81	15.26	19.79	22.74	25.94	4.41	7.52	15.84	20.19	23.10	26.11	36.41	39.09
42.20	1690	3.21	5.41	13.06	17.47	20.27	23.33	3.78	6.83	15.08	19.36	22.22	25.40	4.32	7.37	15.31	19.39	22.15	25.04	35.65	38.25
43.00	1012	6.05	10.12	20.05	25.36	29.49	34.20	7.08	10.78	20.63	25.60	29.27	33.29	6.77	10.13	18.77	23.05	26.26	29.52	48.30	51.82
43.20	857	6.05	10.27	21.38	28.31	33.40	39.22	6.20	9.81	19.87	25.30	29.73	34.13	5.80	8.83	16.52	20.46	23.62	27.21	50.28	54.44
44.10	7592	5.34	9.53	19.65	24.76	28.96	33.58	6.98	11.39	21.76	27.01	31.28	35.74	7.62	11.82	21.59	26.35	30.21	34.04	51.34	55.39
44.20	1307	5.52	9.68	19.57	24.63	28.80	33.17	7.05	11.29	21.32	26.55	30.61	34.66	7.53	11.52	20.96	25.60	29.15	32.68	49.41	53.88
45.00	7569	39.00	58.30	117.94	157.55	189.90	221.80	35.39	50.73	141.38	184.37	217.38	251.60	29.38	43.00	151.70	194.79	227.10	260.98	367.04	395.61
45.10	1028	43.58	64.74	118.13	157.78	190.21	222.18	35.46	50.18	141.60	184.63	217.69	251.88	29.27	42.84	151.67	194.77	227.06	260.63	367.32	395.81
45.20	7572	34.21	50.32	78.26	96.57	109.79	123.98	26.20	36.23	53.87	64.49	72.34	80.60	17.65	24.25	33.85	40.07	44.79	49.59	107.88	114.38
45.30	7573	19.95	32.16	117.33	156.65	188.65	220.33	25.20	38.42	140.46	182.89	215.57	249.28	28.01	41.15	149.32	191.27	222.93	255.69	362.15	389.88
45.40	2074	20.14	32.76	119.08	158.43	190.45	222.99	25.49	38.99	142.33	184.59	217.61	251.31	27.75	40.86	149.91	191.14	223.31	255.79	363.79	391.12
46.00	1503	12.76	19.18	34.87	46.85	55.91	65.46	12.29	18.00	30.07	39.75	47.59	55.47	10.78	15.03	26.37	34.98	41.46	47.53	91.05	100.46
46.10	681	18.34	26.01	35.52	42.95	49.12	56.14	12.65	16.98	22.94	27.44	30.84	34.14	7.69	10.15	13.44	15.84	17.61	19.39	45.16	48.00
46.30	1532	19.26	27.62	39.67	48.65	55.90	64.31	14.37	19.69	28.74	34.52	39.30	44.06	10.00	13.46	19.50	23.43	26.39	29.34	60.66	65.02
47.10	968	27.68	42.36	74.16	96.25	113.93	127.48	25.36	36.15	62.65	77.56	89.98	103.66	20.99	29.45	49.42	61.55	71.67	83.42	155.99	168.24
47.20	1559	22.31	32.74	50.18	64.07	73.79	83.65	17.13	24.25	41.51	54.34	64.50	75.28	14.71	20.71	35.78	45.24	53.42	62.99	119.52	132.23
48.10	7561	53.79	81.08	144.98	179.37	208.32	240.80	54.00	77.17	133.96	162.05	183.74	209.18	48.59	65.48	113.02	135.65	151.76	169.26	302.04	327.53
48.20	1544	64.12	95.29	155.84	189.63	218.38	251.25	57.24	81.86	136.19	160.98	181.44	198.99	48.09	67.11	109.25	128.48	139.00	153.14	286.59	311.67
48.30	1593	39.90	57.37	90.09	112.19	128.28	149.38	34.38	49.10	80.95	99.32	116.61	134.39	30.72	42.34	71.38	83.15	95.10	110.48	206.16	223.33
48.40	1612	26.06	38.95	80.86	109.77	129.93	152.46	27.01	38.23	74.05	94.59	112.45	129.43	24.38	33.95	60.83	76.62	90.14	105.52	197.25	211.83
49.10	1957	64.07	97.35	200.20	260.65	305.75	362.39	75.91	113.07	235.71	300.71	357.75	416.67	83.75	121.91	261.03	326.52	385.10	443.37	605.18	666.90
49.20	1319	76.14	111.98	203.82	265.56	311.29	370.49	73.86	108.86	240.32	304.52	364.58	424.55	79.06	113.01	261.98	325.12	386.33	444.32	610.79	672.49
49.30	975	63.41	96.56	201.07	261.17	306.46	363.81	75.31	112.30	236.31	301.45	358.33	417.68	82.88	119.91	260.76	326.18	385.46	443.39	606.75	667.72
49.40	7565	27.25	42.86	52.57	65.18	77.05	90.31	22.63	33.25	40.25	49.27	55.56	62.27	16.48	22.60	27.39	33.40	37.43	41.89	88.72	95.09
49.50	1631	59.53	93.85	202.12	261.72	307.28	364.82	74.32	109.75	237.29	302.01	359.00	418.39	80.85	116.37	260.56	325.76	385.61	442.67	606.31	668.11
49.70	1005	60.33	94.43	202.97	263.23	308.68	366.23	74.09	109.51	238.34	303.01	361.10	419.79	80.36	115.15	260.69	325.45	385.27	442.80	607.79	669.39
49.80	7568	21.94	31.12	47.43	58.82	68.04	77.19	17.52	24.74	35.96	42.79	47.78	53.14	11.87	16.23	22.99	26.98	29.87	32.79	74.13	78.64
49.90	7616	59.22	93.52	202.97	263.23	308.68	366.23	73.42	108.14	238.34	303.00	361.09	419.77	79.01	113.07	260.15	324.82	384.56	441.99	607.76	669.36
50.00	1649	113.74	170.59	277.15	353.06	413.37	478.05	125.72	178.16	282.25	357.43	414.34	479.90	121.33	171.87	274.59	342.86	403.98	465.66	709.00	768.57
50.10	1000	109.30	160.98	265.49	340.58	397.61	464.10	122.38	174.40	280.04	354.20	410.87	475.72	121.19	172.40	273.50	342.55	403.63	464.13	701.85	763.04
50.20	770	113.06	169.14	273.55	348.44	407.50	472.33	123.06	174.06	277.01	353.21	408.77	473.05	118.40	169.13	274.20	342.23	403.71	465.00	697.37	755.54
51.10	1442	22.31	33.71	121.59	161.86	195.53	228.17	26.12	40.26	145.25	189.03	222.71	258.10	28.36	41.95	152.71	195.54	227.98	261.27	379.92	410.23

Appendix VIII

Model Parameters (Future Conditions)

Funture Model Parameters (NasHyd)

NHYD	Catchment ID	DT [min]	AREA [ha]	DWF [cms]	N	TP [hr]	IA [mm]	CN AMC II *	CN AMC III*
597	40.04	5	5.39	0	3	0.41	10	83	92
598	40.05	5	13.19	0	3	0.72	10	81	91
600	40.07	5	21.83	0	2.5	0.71	10	83	92
601	40.08	5	10.02	0	2.5	0.67	10	81	91
612	41.06	5	127.87	0	3	1.9	10	93	97
613	41.07	5	101.08	0	3	2.53	10	91	96
614	41.08	5	362.27	0	3	3.09	10	94	97
615	42.01	5	47.19	0	3	1.58	10	97	99
616	42.02	5	23.03	0	3	1.01	10	94	97
624	42.10	5	15.77	0	3	0.87	10	89	95
626	42.12	5	6.62	0	3	0.41	10	81	91
634	43.03	5	63.04	0	3	2.76	10	96	98
635	43.04	5	24.96	0	3	1	10	99	99
637	43.06	5	35.79	0	3	1.17	10	91	96
643	44.01	5	63.55	0	3	1.88	10	93	97
649	44.07	5	8.59	0	3	0.49	10	89	95
670	45.13	5	26.2	0	3	0.66	10	89	95
693	47.05	5	15.74	0	3	0.74	10	75	87
7663	04.01B	5	374.161	0	1.5	2.94	43.4	69	84
7620	06.04B	5	36.255	0	1.5	0.92	10	87	94
7614	06.17B	5	71.299	0	1.5	1.55	10	78	89
7602	07.15B	5	145.847	0	1.5	0.49	23.1	75	87
7657	08.05B	5	102.491	0	3	1.39	43.4	71	85
7658	08.06B	5	131.151	0	3	2.1	43.4	86	93
7654	10.17B	5	125.348	0	1.75	1.28	37.4	86	93
7650	10.22B	5	79.807	0	1.75	0.23	43.4	68	83
7651	10.22C	5	46.08	0	1.75	0.76	43.4	87	94
7640	13.13B	5	107.971	0	3	1.38	10	83	92
7628	15.01B	5	43.872	0	1.5	1.98	12	63	80
7623	15.04B	5	83.182	0	1.5	1.25	12	65	81
7661	15.05B	5	91.055	0	1.5	0.51	21.3	65	81
7626	15.06B	5	31.85	0	1.5	2.02	32.7	44	64
7632	15.10B	5	63.862	0	1.5	1.76	22.4	46	66
7630	16.19B	5	90.985	0	1.5	2.9	12	61	78
7633	19.05B	5	15.337	0	1.5	0.94	12	59	77
7636	20.01B	5	90.8	0	1.5	3.97	12	55	74
7638	20.04B	5	62.392	0	1.5	1.98	12	60	78
7642	22.05B	5	68.059	0	1.5	1.63	10	68	83
7643	22.15B	5	24.643	0	1.5	0.8	10	87	94
7647	29.12B	5	7.112	0	2.5	0.36	10	82	91
7646	36.04B	5	16.638	0	2.5	1.04	10	72	86

Appendix X

Results (Regional Storm)

Peak Flow at Flow Nodes (Regional Storm)

Flow Node #	Hyd #	Areal Reduction Factor	Existing	Future	Difference	Difference	Comments
			(m^3/s)	(m^3/s)	(m^3/s)	(%)	
36.00	7606	99.2%	74.11	69.81	-4.29	**-0.06**	Timing of the Hydrographs Catchments 36.04 split into 36.04B (NasHyd) and 36.04A (StandHyd)
36.10	724	100.0%	72.83	68.11	-4.72	**-0.06**	Timing of the Hydrographs Catchments 36.04 split into 36.04B (NasHyd) and 36.04A (StandHyd)
36.20	7608	100.0%	32.36	31.47	-0.88	**-0.03**	Timing of the Hydrographs Catchments 36.04 split into 36.04B (NasHyd) and 36.04A (StandHyd)
36.40	7609	100.0%	40.59	36.69	-3.90	**-0.10**	Timing of the Hydrographs Catchments 36.05 change from NasHyd to StandHyd
37.00	729	99.2%	145.52	145.62	0.10	0.00	
37.10	7610	99.2%	48.22	48.22	0.00	0.00	
37.20	7611	99.2%	98.53	98.63	0.10	0.00	
37.30	1477	100.0%	77.67	77.78	0.10	0.00	
37.40	1025	100.0%	41.91	41.91	0.00	0.00	
37.50	7612	100.0%	36.20	36.31	0.11	0.00	
38.10	7607	95.4%	175.51	168.10	-7.41	**-0.04**	Timing of the Hydrographs Catchments 38.02 change from NasHyd to StandHyd
38.30	1940	97.1%	163.60	163.72	0.11	0.00	
39.00	726	92.0%	639.79	671.56	31.77	0.05	
39.10	590	100.0%	2.71	3.66	0.95	0.35	
39.20	1796	92.7%	341.47	331.61	-9.85	**-0.03**	Timing of the Hydrographs Catchments 35.14 change from NasHyd to StandHyd
39.30	1456	95.4%	237.83	224.74	-13.09	**-0.06**	Timing of the Hydrographs Catchments 35.14 change from NasHyd to StandHyd
39.50	1776	94.2%	344.80	329.16	-15.64	**-0.05**	Timing of the Hydrographs Catchments 35.14 change from NasHyd to StandHyd
39.60	7603	94.8%	241.59	228.44	-13.15	**-0.05**	Timing of the Hydrographs Catchments 35.14 change from NasHyd to StandHyd
40.10	7590	89.4%	647.44	675.78	28.34	0.04	
40.20	1469	92.0%	642.64	676.69	34.04	0.05	
40.25	7593	100.0%	49.93	49.96	0.03	0.00	
40.30	1373	89.4%	636.63	675.74	39.12	0.06	
41.00	1819	97.1%	64.03	68.92	4.90	0.08	
41.20	1393	99.2%	44.41	39.90	-4.50	**-0.10**	Timing of the Hydrographs Catchments 41.05 change from NasHyd to StandHyd
41.30	846	100.0%	40.85	40.85	0.00	0.00	
42.10	7591	94.2%	82.83	109.59	26.76	0.32	
42.20	1690	95.4%	73.21	99.29	26.08	0.36	
43.00	1012	97.1%	84.94	107.49	22.55	0.27	
43.20	857	100.0%	71.33	76.14	4.81	0.07	
44.10	7592	94.2%	111.87	149.67	37.80	0.34	
44.20	1307	94.8%	106.43	144.88	38.45	0.36	
45.00	7569	84.0%	799.79	890.93	91.15	0.11	
45.10	1028	84.0%	795.81	886.84	91.03	0.11	
45.20	7572	98.2%	120.32	135.03	14.71	0.12	
45.30	7573	84.0%	767.80	850.84	83.04	0.11	
45.40	2074	89.4%	829.09	955.23	126.14	0.15	
46.00	1503	98.2%	151.03	153.79	2.76	0.02	
46.10	681	100.0%	48.43	49.22	0.79	0.02	
46.30	1532	99.2%	87.48	88.78	1.30	0.01	
47.10	968	95.4%	276.69	279.30	2.61	0.01	
47.20	1559	96.3%	216.59	217.90	1.31	0.01	
48.10	7561	89.4%	532.74	534.95	2.21	0.00	
48.20	1544	92.0%	518.30	521.30	3.00	0.01	
48.30	1593	94.2%	407.10	409.92	2.82	0.01	
48.40	1612	94.2%	359.31	361.72	2.40	0.01	
49.10	1957	71.7%	1209.19	1432.17	222.99	0.18	
49.20	1319	74.4%	1232.81	1471.58	238.77	0.19	
49.30	975	71.7%	1203.68	1430.19	226.51	0.19	
49.40	7565	99.2%	103.49	103.49	0.00	0.00	
49.50	1631	71.7%	1184.83	1412.63	227.80	0.19	
49.70	1005	73.3%	1197.26	1449.68	252.43	0.21	
49.80	7568	100.0%	77.43	77.43	0.00	0.00	
49.90	7616	73.3%	1178.40	1434.42	256.02	0.22	
50.00	1649	70.2%	1553.63	1770.59	216.96	0.14	
50.10	1000	69.0%	1497.36	1702.08	204.72	0.14	
50.20	770	71.7%	1585.26	1808.21	222.95	0.14	
51.10	1442	89.4%	822.47	988.84	166.37	0.20	

APPENDIX E

DIGITAL COPY OF HEC-RAS MODEL

&

VO MODEL

APPENDIX G

Agency Correspondence

Buckton, George

From: Maria Parish <Maria.Parish@trca.ca>
Sent: Monday, June 17, 2024 3:24 PM
To: Buckton, George
Cc: Jason Wagler
Subject: [EXT] RE: Humber Station Village, Town of Caledon - Wetland Meeting Summary

EXTERNAL EMAIL

Hi George

The meeting minutes capture all of my comments. Thanks!

Regards

Maria Parish, B.Sc., M.A., CAN-CISEC
Senior Ecologist
Planning Ecology | Policy Planning

T: 437-880-1969
E: maria.parish@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region
Conservation
Authority

From: Buckton, George <gbuckton@geiconsultants.com>
Sent: Monday, June 17, 2024 12:52 PM
To: Maria Parish <Maria.Parish@trca.ca>
Subject: FW: Humber Station Village, Town of Caledon - Wetland Meeting Summary

EXTERNAL SENDER
Hi Maria,

Hope you're doing well. Just following up on this request before I forget 😊

Thanks,
George

GEI
GEORGE BUCKTON, M.F.C.
Senior Ecologist
416.816.2246
650 Woodlawn Road West, Block C, Unit 2, Guelph, ON N1K 1B8

From: Buckton, George
Sent: Friday, May 31, 2024 9:30 AM
To: Maria Parish <Maria.Parish@trca.ca>
Cc: Jason Wagler - TRCA (jason.wagler@trca.ca) <jason.wagler@trca.ca>
Subject: Humber Station Village, Town of Caledon - Wetland Meeting Summary

Hi Maria,

I hope you are well and looking forward to the weekend.

I realize I did not provide a summary of our Humber Station meeting on January 26, 2024. Could you please review and revise as needed. I am looking for your written confirmation that I've captured everything correctly. I realize it's been a while since the meeting so happy to answer any questions you might have.

1. **Wetland Risk Evaluation**

GEI shared their Wetland Sensitivity mapping as part of the Wetland Risk Evaluation which included Schaeffers' 2-year floodline along the riparian corridors (attached for your reference).
GEI/Schaeffers/Arcadis explained that for the wetlands that they are proposing to retain, none of the wetlands are fully within the 2-year floodline. However, the majority of the wetlands are part of the riparian floodplain, and it will be demonstrated they will be maintained through fluvial geomorphology /SWM exercises.
TRCA acknowledged that all retained wetlands are within the 2-year floodline and will receive a larger volume of water post-development.
TRCA agreed that FBWB modeling is not required for the site. Instead, the consultant team will demonstrate that erosion thresholds are not exceeded, and flows are contained within the channel corridor.

2. **Wetlands within Buffers**

TRCA suggested created wetlands within degraded areas in the valley could help reduce the volume of water directed to the SWM ponds. This approach was carried out by the warehouse owners east of the valley.
TRCA agreed that created wetland pockets within the proposed drainage alignment corridor could help provide LID infiltration as well as enhanced ecological functions.

3. **MAS2-1 Relocation**

GEI described the desire to relocate a small MAS2-1 slightly west (see markup green arrow on attached).
Schaeffers noted the MAS2-1 could be moved to the bank of channel provided it was demonstrated adequate water inputs were received.
TRCA confirmed the MAS2-1 could be relocated west, and suggested that use of sod mats be explored, and that the wetland be made slightly larger.
Shaeffers asked if the wetland needs to be offline or can be online.
TRCA stated as long as the function is replicated, they are okay either way.

4. **SAS Online Pond Wetland (Near Humber Stn Road)**

Schaeffers noted they expect a lot of water to be directed here.
TRCA requested monitoring for changes in the vegetation community and expressed concern about blowing out the culvert at Humber Station Road.
TRCA requested the monitoring plan include vegetation and water levels here.
TRCA agreed that FBWB modeling is not required for this wetland.

5. **Southern Wetland Compensation Area**

Schaeffers noted a wetland compensation area at the south end of the Study Area is proposed and will be fed clean roof water. Water from here will be directed to the central existing headwater drainage feature, and a SWM Pond will outlet treated water to the floodplain of the east valley.

TRCA confirmed they are okay with this approach, and suggested trees and shrubs be planted along the wetland edge for shading.

GEI noted that thicket swamp communities provide attenuation, shading, and can endure variable water levels (silver maple, cedar, dogwood, willows).

TRCA noted they are okay shifting the wetland east into the buffer.

Schaeffers asked if the sanitary and water infrastructure can be placed in the outer most edge of the valley buffer.

TRCA requested further information be provided.

Thanks Maria,
George

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